

ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# Volume 2

2010

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Project for an Ontario Women's Health Evidence-Based Report

## **Volume 2 Ontario Women's Health Equity Report, 2010 Improving Health and Promoting Equity in Ontario**

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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

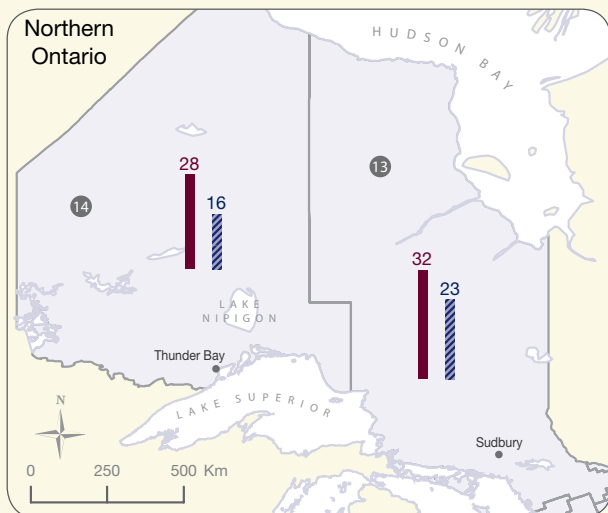
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 1, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 2, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

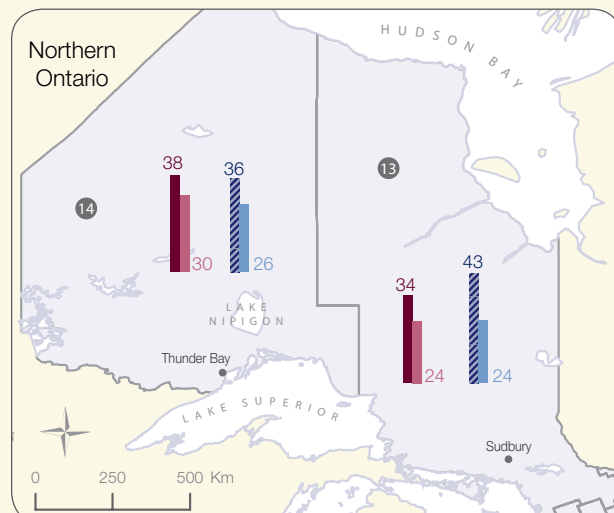
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

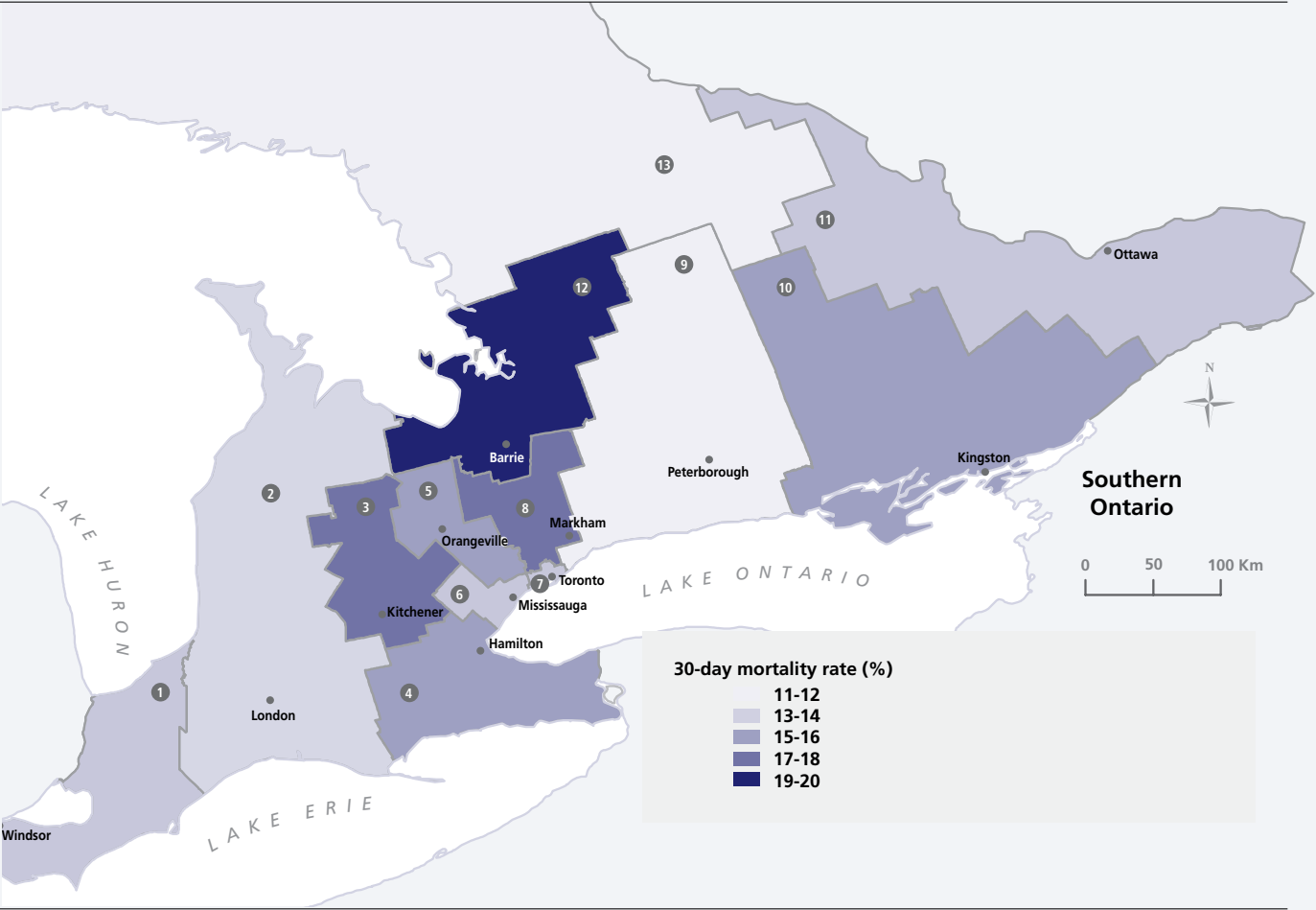


# CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

Figure 3: Example of a Choropleth Map





ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# Musculoskeletal Conditions

## *Chapter 8*

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### INSIDE

- General MSK Indicators
  - Health and Functional Status
  - Access and Utilization of Services
- Osteoarthritis
- Rheumatoid Arthritis
- Osteoporosis

**power** 

Project for an Ontario Women's Health Evidence-Based Report



## **July 2010 • Volume 2 Ontario Women's Health Equity Report Improving Health and Promoting Health Equity in Ontario**

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# Executive Summary

## ISSUE

Musculoskeletal (MSK) conditions include diseases that affect the bones, ligaments, tendons, muscles and joints; together these conditions limit physical functioning, impose significant pain and suffering and are the number one cause of disability for Ontarians.

As a result, the associated costs to our health care system and to society are staggering. Women develop osteoarthritis and autoimmune diseases, including inflammatory arthritis, more often than men. Since women experience accelerated bone loss at menopause, they are also more likely to develop osteoporosis and suffer from low-trauma fractures. As well, for most MSK conditions, the number affected and the associated disease severity is greater among specific racial/ethnic subgroups (particularly Aboriginal populations) and among women and men with lower income and less education.

Despite the high frequency of MSK conditions and their substantial—and growing—population impact, MSK conditions have received relatively little attention from health policy makers and health care professionals. To date, MSK conditions are not explicitly incorporated within the Ontario chronic disease strategy, nor are these conditions routinely considered in the context of chronic disease health care planning. However, prevention and management of other common chronic conditions—such as diabetes and heart disease—cannot be optimized in the presence of untreated problems arising from MSK conditions as they prevent individuals from engaging in physical activity to improve fitness and lose weight.

To date, quality improvement for MSK conditions has been addressed in only two provincial strategies: diagnosis and treatment of osteoporosis (Ontario Ministry of Health and Long-term Care (MOHLTC) Osteoporosis Strategy) and wait times for hip and knee replacement

surgery, (Ontario Wait Times Strategy). We are hopeful that this report will help to encourage a broader response to this important public health problem. Additional strategies are needed to reduce the burden of MSK conditions in Ontarians including strategies aimed at improving access to: health promotion; appropriate and timely diagnosis and to care and services when required. Unless these strategies are developed and implemented in short order, it is anticipated that MSK conditions will place an even greater stress on the health care system over time as a result of the obesity epidemic and aging and will continue to negatively impact many lives.

### ABOUT THIS CHAPTER

The chapter has four sections:

- A. General MSK Indicators
  - Health and Functional Status
  - Access and Utilization of Services
- B. Osteoarthritis
- C. Rheumatoid Arthritis
- D. Osteoporosis

In the first section, **general indicators** of Ontario women and men with MSK conditions are profiled |

including: health and functional status (including the presence of other chronic conditions and probable depression, activity limitations, labour force participation and being overweight or obese) and access and utilization of services (including multiple pain medication use, primary care, specialty care, allied health professions, home care and access to prescription drug coverage for adults under age 65). In the subsequent three sections, we examine the leading causes of MSK-related morbidity: **osteoarthritis, rheumatoid arthritis** and **osteoporosis**. We report on indicators that assess: prevalence; severity; treatment (including total joint replacement for patients with osteoarthritis and use of disease modifying anti-rheumatic drugs and biologic agents for rheumatoid arthritis); screening for primary and secondary prevention of osteoporosis and outcomes including mortality after a hip fracture.

## STUDY

The indicators we report are the result of a rigorous selection process, which included an extensive literature review of existing indicators as well as input and agreement from experts in the field (see [Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through many sources including: Statistics Canada; Ontario District Health Councils; Public Health Research Education and Development; the Canadian Institute for Health Information; Health Canada; the Association of Public Health Epidemiologists of Ontario; Ontario Women's Health Council; the Institute for Clinical Evaluative Sciences; the American College of Rheumatology; the Arthritis Foundation; the Joint Commission; National Committee for Quality Assurance: Healthcare Effectiveness Data and Information Set and the Australian Institute of Health and Welfare. Many of these indicators are widely used to measure quality of care. We build on these reports by incorporating a gender and equity analysis (see [The POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts

and different experiences with health care which, together with differences in biology, contribute to observed gender differences in health. Furthermore, well documented health inequities among women and men associated with sociodemographic factors are associated with differences in illness burden between subgroups of women and may be larger than overall differences between women and men.

Data from several sources were used to produce this chapter. These include: Statistics Canada's Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1), 2005 (Cycle 3.1) and 2007; Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); CIHI National Rehabilitation System (NRS); Continuing Care Reporting System (CCRS); Ontario Drug Benefit (ODB) database; Ontario Health Insurance Plan (OHIP), physician claims data; the National Ambulatory Care Reporting System (NACRS); data from the Ontario Hip/Knee Osteoarthritis Cohort; the Registered Persons Database (RPDB); the Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB) and the Statistics Canada 2006 Census. Data on general MSK indicators were first stratified by sex and then further stratified by annual household income, educational attainment, age, ethnicity, years of immigration and Local Health Integration Network (LHIN) and analysed as allowed by sample size. Indicators of general health and functioning were measured among those with MSK conditions and those without MSK conditions, either with or without another chronic condition. Data on clinical care and outcomes were also first stratified by sex and then further stratified by age, neighbourhood income, neighbourhood educational attainment and LHIN and analysed as allowed by sample size. Data from the Ontario Hip/Knee Osteoarthritis Cohort were stratified by age, income, education and rural/urban location. Age-adjustment was done using indirect standardization and data were standardized to the population with MSK conditions. A complete list of the indicators in this chapter and their data sources can be found in [Appendix 8.2](#) and a more detailed description of methods can be found in [Appendix 8.3](#).

## KEY FINDINGS

### **MSK conditions are a significant cause of pain and disability in Ontario.**

MSK conditions affect over one-third of the population. In this chapter, we focused on MSK conditions that are important causes of morbidity and mortality among women in Ontario: osteoarthritis, rheumatoid arthritis and osteoporosis. Osteoarthritis, a common condition that is often suboptimally managed, represents approximately two-thirds of the burden due to MSK conditions.

### **The burden of MSK conditions is greatest among older women, particularly those with less education or low income.**

All the indicators of disease prevalence and severity identified a greater burden of illness due to MSK conditions among women than men, with increasing age ([Exhibits 8B.2, 8B.3, 8B.12, 8C.1, 8D.2](#)), and for those with lower versus higher socioeconomic status ([Exhibits 8B.1, 8B.11, 8D.1](#)). While these differences may reflect differential risk for developing MSK conditions (e.g., due to exposure to occupational risk factors or other risk factors, like obesity); greater disease severity or differences in the availability of social support, they may also reflect gender and socioeconomic inequities in access to and quality of health care.

### **MSK conditions commonly occur in the setting of other chronic conditions.**

People living with other common chronic conditions, such as diabetes and heart disease, are likely to also have a MSK condition. The increased risk of MSK conditions with older age, the association between inflammatory arthritis and heart disease and the commonality of risk factors (diet, being overweight or obese and sedentary lifestyle) all contribute to the high rate of coexisting illness (comorbidity) among

people affected by MSK conditions. Women with MSK conditions have a higher burden of comorbidity than men with these conditions ([Exhibit 8A.1](#)). Yet, the impact of MSK conditions on the management of these other conditions has been greatly under appreciated. For example, physical activity and weight loss in a person with diabetes may be difficult in the setting of painful hip or knee arthritis. On the other hand, these other conditions may also impact appropriate management of MSK conditions. For example, use of non-steroidal anti-inflammatory medications may be unsafe in the setting of hypertension. This has implications for Ontario's chronic disease strategy and underscores the necessity of patient-centred models of chronic disease prevention and management. As our population ages, there will be a greater number of individuals with multiple health conditions and they will most likely have a comorbid MSK condition, which will add to the complexity of their chronic disease management. These findings point to an urgent need to implement a comprehensive chronic disease prevention and management strategy.

### **MSK conditions are associated with high rates of depression.**

Among individuals with MSK conditions, 10 percent had probable depression, with the proportion higher among women than men ([Exhibit 8A.4](#)) and among those with low versus high income, such that 21 percent of low-income women with MSK conditions had probable depression ([Exhibit 8A.5](#)). This is concerning as research has shown that comorbid depression may worsen treatment outcomes and increase health care utilization. For those with painful osteoarthritis, concomitant depression has been associated with greater pain and disability and worse outcomes following knee replacement surgery. In other chronic pain conditions, comorbid depression

has also been linked to reduced adherence to effective pain interventions and reduced effectiveness of these therapies. Thus, the recognition and treatment of comorbid depression has the potential to improve outcomes for people with MSK conditions. Yet, mental health conditions appear to be under recognized and consequently, under treated in older adults, the same population that is disproportionately affected by MSK conditions.

### **MSK conditions have a greater impact on disability than other chronic conditions.**

Compared with Ontarians who reported having a chronic condition not including an MSK condition, those with an MSK condition were more likely to report moderate to severe activity limitations ([Exhibit 8A.6](#)). As was the case for other indicators, the impact was greatest among older women; 53 percent of women aged 65 and older with MSK conditions reported limitations in their ability to perform instrumental activities of daily living (IADL) and/or activities of daily living (ADL), such as shopping, meal preparation or bathing ([Exhibit 8A.11](#)). Such limitations have been linked with inability to work, greater out of pocket costs for informal and formal care giving, reduced mobility leading to loss of independence and need for long-term care. This greater burden due to MSK conditions may reflect not only the nature of these conditions, but also their relative under management (studies have documented an under recognition of these conditions as important and treatable) and barriers to management (e.g., lack of physician skill in examination for MSK conditions). In particular, research suggests that exercise and optimizing pain management in these individuals has the potential to substantially reduce the disability associated with MSK conditions in our population.

### **MSK conditions are associated with greater use of multiple pain medications.**

We found that 16 percent of adults with MSK conditions were using two or more types of medications to manage symptoms of pain including pain relievers (non-narcotic and narcotic) and/or anti-depressants compared with only nine percent of adults with another chronic condition ([Exhibit 8A.18](#)). This finding suggests that the population with MSK conditions may be at increased risk for adverse drug events leading to hospitalization and mortality. Perhaps not surprisingly, the highest use of multiple pain medications was among women with MSK conditions (18 percent) ([Exhibit 8A.18](#)), in whom the risk of comorbid depression is highest and for whom disease severity may be greater. We also documented a decrease in reported medication use with increasing age. Research suggests this decrease is not associated with reduced need, but rather reflects an increased prevalence of other conditions which preclude the safe use of pharmacological treatments for MSK conditions and/or physician discomfort managing these complex patients and suboptimal pain management in this population. Currently, no guidelines exist for the management of MSK conditions in the setting of other common chronic conditions in older adults. Our findings suggest this gap needs to be addressed.

### **Allied health care providers are under utilized for MSK conditions.**

Physical therapy and chiropractic care are integral to the management of most MSK conditions. Yet, consistent with previous studies, our results indicate they are being under utilized. Only 15 percent of adults with an MSK condition reported consulting a physiotherapist at least once in the previous year. While the numbers who had ever seen a physiotherapist may be higher, our findings nonetheless suggest an important care gap. Underuse of allied health care providers for

MSK conditions may be related to cost barriers (many services provided by these health care providers are not covered) as well as a lack of appreciation of the role of these health care providers in the management of MSK conditions. Greater use of allied health care by those with higher income ([Exhibit 8A.32](#)) likely reflects enhanced access for these subgroups. While the correct rate of use of allied health care providers is unclear, development and implementation of guidelines for use of allied health care providers coupled with mechanisms to facilitate access when indicated has the potential to enhance the care and thus outcomes of people with MSK conditions.

**One in five adults aged 25-64 with an MSK condition had no prescription drug insurance coverage ([Exhibit 8A.36](#)).**

Medical management of most MSK conditions includes pharmacologic agents to manage pain and inflammation. Particularly for inflammatory arthritis conditions, recommended drug therapies may be costly. Surveys have documented that lack of insurance coverage for expensive disease modifying anti-rheumatic drugs (DMARDs) or biologic agents for inflammatory arthritis is a major barrier to timely and effective management of these conditions. This is particularly concerning in light of the fact that the proportion of adults aged 25-64 who lacked drug insurance coverage was highest among those in the lowest annual household income group ([Exhibit 8A.37](#)), in whom the burden—and thus need for medication—is likely to be greatest (36 percent of low-income adults with MSK conditions reported no drug coverage).

**Wait times for hip and knee replacement surgery have improved, but could still be better.**

Osteoarthritis is the most common MSK condition and accounts for the vast majority of hip and knee

replacement surgeries currently performed. Joint replacement in the setting of advanced hip or knee osteoarthritis has been shown to be highly effective and cost-effective in relieving pain and reducing disability. Hip and knee replacement surgeries help people return to work and get on with their lives. However, wait times for joint replacement surgery in Ontario have historically been identified as unacceptable. In 2001, approximately 20 percent of patients waited more than a year for a first hip replacement, and almost 30 percent waited this long for a first knee replacement. In 2004, fewer than half received an elective hip or knee replacement within six months: the need for strategies to reduce these unacceptable wait times has been recognized. In 2004, Ontario launched its wait time strategy for joint replacement surgery and set a wait time benchmark of six months. Wait times have improved, since the implementation of this strategy. In 2007/08, 64 percent received their hip replacement, and 54 percent a knee replacement, within six months. The Ontario Health Quality Council (OHQC) 2010 Report on Ontario's Health System showed continued gradual improvement through October 2009, but many Ontarians still wait too long for hip and knee replacement surgery. The good news is that wait times did not vary by sex or income ([Exhibit 8B.6](#)). While this is encouraging, it is important to note that our estimates of wait times are based on the time period from the last orthopaedic surgeon visit to the date of surgery; we are not able to assess wait times from physician referral to surgical evaluation. The measurement of wait times does not take into consideration the period prior to when the decision to undergo surgery was made or the delay between the referral to an orthopaedic surgeon and the first visit, which may also vary regionally and by other patient and provider characteristics. A limitation of this measure is that it does not capture referral biases or delays in referral for joint replacements. Our objective



was to determine whether wait times differed by sex or socioeconomic status.

**Rates of joint replacement based on administrative data tell us about who got care, not who did not.**

Additionally, it is important to note that while the joint replacement wait time strategy has addressed wait times for those getting surgery, there is, to date, no evidence as to whether this increased access to joint replacement surgery has reduced inequities in access to this procedure. Using administrative data alone, it is impossible to identify who needed the procedure but was not offered it or to control for the effects of patients' preferences for care (i.e., their willingness to consider surgery). To address these limitations, we used data collected through the Ontario Hip/Knee Osteoarthritis Cohort. We found that women and those with lower education and income ([Exhibit 8B.5](#)) were far more likely than men and those with higher socioeconomic status to have a need for surgery. Women and men were equally willing to consider this surgery, however willingness to consider a joint replacement was lower among those with less education or lower annual income ([Exhibit 8B.5](#)) than their better educated or wealthier counterparts. Research suggests that the major reason for these differences is that individuals with lower socioeconomic status are more likely to overestimate the risks and underestimate the benefits of joint replacement surgery. Thus, after controlling for willingness, in fact unmet need for joint replacement was greater among individuals with higher education or income. Collectively, these findings are concerning; these data indicate clear inequities in the provision of this very effective procedure. Subsequent research has pointed to the need for educational interventions and improved patient-physician communication to address misperceptions about, and thus unwillingness

to consider, joint replacement surgery as well as to address the gender or socioeconomic disparities that persist in the receipt of these procedures among those who may benefit.

**There was substantial variability in rates of discharge to rehabilitation post total joint replacement surgery.**

For those who are able to be discharged home, there is evidence that outcomes following inpatient rehabilitation are not superior to those following home-based post-operative care. In the absence of guidelines for post-operative discharge, we found substantial variability by LHIN in the proportion of patients discharged to an inpatient setting following a primary hip or knee replacement surgery ([Exhibit 8B.9](#)). This variability likely reflects a number of factors, including the availability of inpatient rehabilitation beds and surgeon/hospital practice variation. Again, what constitutes the right rate is unclear. We found no relationship between patients' income or education and this indicator. However, as the potential need might be expected to be higher among those with lower education or income, the absence of a gradient may reflect overuse among patients with higher socioeconomic status.

**Back pain was higher among those with lower versus higher education or income.**

Although no gender differences were observed, the prevalence of back pain was significantly associated with income such that the proportion affected was highest among low-income women and men (in whom approximately 28 percent reported a back pain diagnosis) ([Exhibit 8B.11](#)). Further, the sharpest increase in prevalence occurred in the middle age group (aged 45-64) ([Exhibit 8B.12](#)). Both findings are consistent with greater risk for back pain associated with physically



demanding occupations, particularly those requiring heavy lifting, and the high rates of work disability in this age group associated with back pain.

### **Rheumatoid arthritis is a serious MSK condition that is under treated in Ontario.**

The most common inflammatory arthritis is rheumatoid arthritis. Rheumatoid arthritis, a systemic autoimmune disease that affects approximately twice as many women as men, is associated with substantial morbidity as well as mortality. Using an administrative data algorithm, we estimated that approximately one percent of Ontarians aged 25 and older had rheumatoid arthritis and the rate among women was twice that among men ([Exhibit 8C.1](#)). There was variability across the province by LHIN in the prevalence of rheumatoid arthritis, with the highest rates in the Northwest. This finding is likely related to the known higher prevalence of rheumatoid arthritis among the Aboriginal population of Canada; rheumatoid arthritis is up to two and a half times more common in the Aboriginal community living off reserve than in non-Aboriginal Canadians. However, arthritis receives little attention as a significant health issue within the Aboriginal community.

Guidelines for diagnosis and treatment of this condition recommend early initiation of immune suppressing medications to prevent joint destruction that leads to disability. However, these medications are associated with substantial adverse effects and require routine monitoring; thus, many primary care physicians are uncomfortable prescribing these medications. For this reason, it is recommended that patients with possible rheumatoid arthritis be referred to a specialist, specifically a rheumatologist, to confirm the diagnosis and institute evidence based care. Of the approximately one percent of Ontarians with rheumatoid arthritis, only 40 percent had been seen by a specialist during a

one-year period (42 percent of women and 35 percent of men), likely representing a substantial care gap for these individuals. The proportion that had seen a specialist was higher among those from higher-income neighbourhoods ([Exhibit 8C.2](#)), potentially reflecting increased awareness of, and/or demand for care, and possibly indicating inequities in care and access barriers among disadvantaged populations. In the absence of available prescription drug information for individuals under age 65 we were able to examine the proportion of patients with rheumatoid arthritis who were on first line therapies only among those receiving Ontario Drug Benefits; fewer than half of these individuals were receiving effective therapy for rheumatoid arthritis. Interpretation of these findings is difficult. However, as disease remission is uncommon, it is likely that these low drug treatment rates represent substantial under treatment of this condition.

Interestingly, although specialist care for rheumatoid arthritis was higher in urban than rural regions of the province, likely related to enhanced access to specialist care, the proportion receiving appropriate medications was higher among those residing in a rural region ([Exhibit 8C.5](#)). One potential explanation for this observation is that among those referred to a specialist for treatment of rheumatoid arthritis, disease severity, and thus need for treatment, may be substantially higher for those residing in rural versus urban regions (i.e., the threshold for referral to a specialist is higher among rural rather than urban physicians due to specialist availability). Unfortunately, we cannot control for disease severity using administrative health data.

There is a major need for data in younger populations in order to assess rates of medication use post diagnosis, timing of treatment and adverse events. There is also a need to address the problem of insufficient numbers of rheumatologists to care for the growing number of people with rheumatoid arthritis.

Improved capacity within primary care to manage these individuals—once the diagnosis is established and treatment initiated—would enhance our capacity to care for patients with inflammatory arthritis. Models of care such as shared care between specialists and primary care physicians and use of technology such as telemedicine improve access to specialty care may help to achieve this goal.

### **Substantial gaps in care for osteoporosis persist.**

Osteoporosis is a very common MSK condition which predominantly affects older women and men, and which is characterized by increased risk for fracture. Over the past two decades, a number of studies have documented care gaps in osteoporosis. To address the growing numbers of osteoporosis-related fractures in Ontario, the Ontario MOHLTC established the Osteoporosis Strategy. This multi-pronged strategy has largely targeted interventions to individuals who have experienced a fracture, as these individuals are at particularly high risk for another fracture; effective treatment exists and benchmarks for quality of post-fracture care have been developed. Risk for fracture is associated with a number of factors, including older age, falls, specific medical conditions and low bone mineral density (BMD). Fracture rates are higher among women than men due to a higher propensity of these risk factors among women. We examined a number of indicators for osteoporosis quality of care.

Collectively, our findings indicate an ongoing care gap. Only one-third of men and women received a BMD test to assess for low bone mass, or a prescription for an effective bone-sparing agent within a year of experiencing a low-trauma fracture ([Exhibit 8D.6](#)). Unlike other indicators in this chapter, the care gap for osteoporosis is wider for men than for women; however similar rural/urban ([Exhibit 8D.7](#)) and socioeconomic gradients ([Exhibits 8D.6, 8D.10](#)) persist with worse care noted among lower socioeconomic groups and for Ontarians from rural areas. A number of barriers to appropriate care have been identified and are being aggressively targeted for intervention. These include lack of awareness of the link between fracture and osteoporosis, a propensity to rely on BMD results alone to determine treatment (whereas comprehensive fracture risk assessment is recommended), and under recognition that men are also at risk for osteoporosis and fracture. Further, as shown previously by others, even among those in whom treatment is initiated, persistence on effective treatment remains relatively low; only 38 percent of those aged 66 and older remained continually on medication one year following a first prescription ([Exhibit 8D.10](#)). This is concerning as high adherence to medications is required to optimize benefit. Non-adherence has been linked with patients' inability to "feel" the drug working (bone loss/gain is silent) and relatively large side effect profiles for these medications.

## KEY MESSAGES

We took a broad look at MSK conditions in the province, focusing on gender, socioeconomic and regional variations in MSK-associated burden and, where possible, health system performance. However, unlike many other chronic conditions that affect Ontarians, relatively few indicators of health system performance exist for MSK conditions that can be measured with existing data in Ontario.

Our findings point to a number of key areas for intervention and improvement. We found sizeable variations by gender, socioeconomic status, and rural/urban residency for many indicators. These findings are important for the LHINs to consider in their priority setting, planning and quality improvement activities. The following five actions can help accelerate progress in reducing the burden of MSK conditions, improving health outcomes among people with these conditions and reducing related health inequities. Successful adoption of these actions needs to take into account gender and socioeconomic differences in the incidence, prevalence, burden and experiences with care for people with MSK conditions as well as the social context of the lives of women and men with these conditions.

### **Increase focus on prevention and health promotion to reduce the burden of MSK conditions.**

- MSK conditions share many risk factors with other common chronic conditions, including diet, being overweight or obese and sedentary lifestyle. A common approach to the prevention of chronic diseases that highlights the benefits of risk factor modification in preventing MSK conditions and reducing their associated morbidity and functional limitations is needed.
- Health promotion strategies focused on physical activity and healthy weight maintenance must also take into consideration the high prevalence of hip and knee

arthritis. These conditions may limit patients' abilities to comply with recommendations to increase physical activity which is an important component of chronic disease management.

### **Wide implementation of a patient-centred approach to chronic disease management can help improve the quality of life and health outcomes of women and men with MSK conditions.**

- The common occurrence of MSK conditions (primarily osteoarthritis) with other chronic conditions (e.g., depression, diabetes and heart disease) has implications for the management and outcomes of each of these conditions. Self-management is a cornerstone of the management of all chronic conditions and has been shown to reduce depression and increase physical activity among people with MSK conditions and other chronic conditions. Expanded use of chronic disease self-management models is required to optimize patient outcomes.
- Chronic disease self-management must also take into consideration the high prevalence of multi-morbidity among older Ontarians. The adoption of a more patient-centred focus to chronic disease management that acknowledges the high prevalence of MSK conditions among people with other common chronic conditions, such as diabetes and heart disease is needed.

### **Increase the focus on early diagnosis and treatment of people with inflammatory arthritis, in particular rheumatoid arthritis, to reduce associated disability.**

- Inflammatory rheumatoid arthritis and like conditions affect 1-2 percent of Ontarians, with their greatest impact on women during their child-bearing years. Much research has clearly shown that getting these individuals onto effective disease-modifying drug

therapies within the first few months of symptoms can substantially change their risk for long-term disability and thus improve their quality of life. Strategies are needed to raise arthritis awareness and to ensure that those with possible inflammatory arthritis receive a timely referral to rheumatology for diagnosis and treatment.

**Continued support for the Ontario Osteoporosis Strategy is needed to reduce persistent gaps in care.**

- Care gaps persist in the management of osteoporosis following a low-trauma fracture as well as in screening and diagnosis. The rate of low-trauma fracture varied significantly across LHINs and by income with higher rates in lower-income neighbourhoods. Follow up for osteoporosis after fracture is less than optimal. Only one-quarter of adults received a BMD test to check for osteoporosis after a fracture. The percentage of adults who were placed into long-term care after having suffered a hip fracture also varied across LHINs, suggesting that opportunities exist to reduce these rates.
- Among adults aged 66 and older with a new fracture, two-thirds were not assessed or treated for osteoporosis.

In addition, among older adults (aged 68-70) who did not have a previous BMD test, only 45 percent of women and nine percent of men were screened using BMD testing after age 65. The percentage of eligible adults who were screened varied across LHINs and by neighbourhood income.

**Improve the quality, availability and timeliness of data to assess MSK conditions and their care in the province.**

- MSK conditions are predominantly managed in the ambulatory care setting. As a result, high quality data regarding these conditions is lacking. Better and more comprehensive data on management of these conditions in primary care and other ambulatory care settings is needed. There is a need for validation studies to evaluate the current accuracy of diagnostic coding for MSK conditions. There is a need to expand surveillance of prescription drug use for younger individuals, in order to enable assessment of the quality of care for many MSK conditions, but in particular inflammatory arthritis. For osteoporosis, quality of care cannot be adequately evaluated without knowledge of the results of BMD testing.

# Introduction

Musculoskeletal (MSK) conditions comprise a large group of diseases that affect the bones, ligaments, tendons, muscles and joints. Together, these conditions are the number one cause of disability in Ontarians.

MSK conditions limit physical functioning and can impose significant pain and suffering. The resultant inability to work and/or live independently and associated lost opportunities may have a devastating impact on the lives of those affected. As a result, the costs to our health care system and to society from MSK conditions are staggering. In this chapter, we look at MSK conditions as a group, as well as at the most common MSK conditions: osteoarthritis, rheumatoid arthritis, osteoporosis and back pain.

Indicators in this chapter explore the percentage of women and men in the province affected by MSK conditions, overall and for specific conditions, the impact of living with an MSK condition in terms of pain, depressed mood, activity limitations and inability to participate in valued life activities, and the quality of care for these conditions. To highlight the importance of MSK conditions, we have compared the burden of living with an MSK condition to that associated with living with other common chronic conditions, which include, for example, diabetes and heart disease. We identify where these indicators differ for women and men, by income, education, age, ethnicity and where they live. We chose indicators that looked at different types of recommended treatment for MSK conditions including drug and non-drug therapies and surgery, selecting indicators that are amenable to change.

## The chapter has four sections:

- General MSK Indicators
  - Health and Functional Status
  - Access and Utilization of Services
- Osteoarthritis
- Rheumatoid Arthritis
- Osteoporosis

Risk factors for MSK conditions include increasing age, family history and genetic predisposition (e.g., race/ethnicity), hormonal factors (e.g., menopause), lifestyle risk factors (e.g., obesity, physical inactivity) and sports and occupational injuries. The burden of illness in the population due to MSK conditions is on the rise as our population ages and there is a growing number who are physically inactive and obese.

Women develop osteoarthritis and autoimmune diseases, including inflammatory arthritis, more often than men. Since women experience accelerated bone loss at menopause, they are also more likely to develop osteoporosis and suffer from low-trauma fractures. For most MSK conditions, the number affected and the associated disease severity, is greater among specific subgroups—particularly Aboriginal populations and among women and men with lower income and less

education. This is, in part, related to the fact that many risk factors for MSK conditions are more common among these population subgroups.

Women are not only more likely to develop MSK conditions, but for many reasons, they are also more likely to have worse outcomes. For example, women with osteoarthritis or rheumatoid arthritis self-reported worse arthritis symptoms and disability than their male counterparts.<sup>1</sup> Lower education has been linked with higher rates of obesity and exposure to certain physically challenging occupations, which increase the likelihood of developing osteoarthritis and low back pain. Differential access to, utilization of and/or adherence to, effective treatments among those affected by these conditions influences associated health outcomes.<sup>2-4</sup> Indeed, inequities in receipt of timely and appropriate health care delivery to people with MSK conditions have also been associated with gender and socioeconomic status (e.g., total joint replacement surgery of the hip and knee<sup>1, 5</sup> and bone mineral density (BMD) testing and post-fracture care for osteoporosis). These inequities have been linked to a number of factors, including health insurance, social and financial resources, geographic proximity to care, transportation, literacy, knowledge, cultural beliefs regarding medical care, patient preferences, self-efficacy, trust and compatibility with the physician and physician bias.<sup>6-8</sup>

Although for most MSK conditions there is no known cure, much can be done to reduce the risk for these conditions, including prevention of sports-related knee injury, weight reduction in those overweight or obese and increased physical activity. These health promotion strategies overlap substantially with those for other common chronic conditions, such as diabetes and heart disease, presenting an opportunity to link strategies across chronic conditions. In those affected by MSK conditions, a number of interventions—pharmacological and non-pharmacological—have been shown to be effective in reducing the symptoms, improving functional status and slowing the rate of progression.

Unfortunately, substantial gaps exist in the diagnosis and management of MSK conditions, precluding achievement of optimal outcomes in this population. Identified barriers to the diagnosis and successful management of MSK conditions include: the societal belief that these conditions are an expected consequence of aging; lack of skills and confidence among primary care doctors to conduct MSK examinations, thus difficulty with diagnosis; lack of awareness regarding the impact of early diagnosis and treatment on long-term prognosis for inflammatory arthritis; inadequate numbers of health care professionals and specialists with expertise in these conditions (including regional variations in numbers of specialists), resulting in long wait times for consultation; financial barriers to accessing some health professions, e.g., physiotherapy (delisted in Ontario except for specific situations); misperceptions about the risks and benefits of various treatment approaches (opioid analgesics, joint replacement surgery) and the presence of other chronic conditions (especially in older adults) that makes the use of recommended treatments (e.g., anti-inflammatory medications) challenging. Finally, as for many chronic conditions, lifestyle changes, including physical activity and healthy weight management are critical to successful management of the condition, yet tough to implement.

Despite the high frequency of MSK conditions and their substantial, and growing, population impact, MSK conditions have received relatively little attention from health policy makers and health care professionals. Currently, MSK conditions are not incorporated within the Ontario chronic disease strategy, nor are these conditions routinely considered in the context of chronic disease health care planning. However, prevention and management of other common chronic conditions, such as diabetes and heart disease, cannot be optimized in the presence of untreated MSK conditions if they prevent individuals from engaging in physical activity to improve fitness and lose weight. To date, quality



improvement for MSK conditions have been addressed in only two provincial strategies: diagnosis and treatment of osteoporosis through the Ontario Osteoporosis Strategy<sup>9</sup> and wait times for hip and knee replacement surgery, through the Ontario Wait Time Strategy.<sup>10</sup> We are hopeful that this report will help to encourage a broader response to this important public health problem. Unless strategies to reduce the burden of MSK conditions are developed and implemented in short order, it is anticipated that MSK conditions will place an even greater stress on the health care system over time and, as a result of the obesity epidemic and the aging population, will continue to negatively impact many lives.

The indicators we report are the result of a systematic review of the literature and rigorous selection process (see [Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through many sources including Statistics Canada; Ontario District Health Councils; Public Health Research, Education and Development; Health Canada; the Canadian Institute for Health Information; the Association of Public Health Epidemiologists of Ontario; Ontario Women's Health Council; the Institute for Clinical Evaluative Sciences; the American College of Rheumatology; the Arthritis Foundation; the Joint Commission: Improving and Measuring Osteoporosis Management; National Committee for Quality Assurance: Healthcare Effectiveness Data and Information Set and the Australian Institute of Health and Welfare.<sup>11-31</sup> Many of these indicators are widely used to measure quality of care. We build on these reports by incorporating a gender and equity analysis (see [The POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts and different experiences with health care which, together with differences in biology, contribute to observed

gender differences in health. Furthermore, well documented health inequities among women and men associated with sociodemographic factors are such that differences in illness burden between subgroups of women may be larger than overall differences between women and men.

Data from several sources were used to produce this section. These include: Statistics Canada's 2006 Census and the Canadian Community Health Survey (CCHS), 2001 (Cycle 1.1), 2005 (Cycle 3.1) and 2007; Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); CIHI National Rehabilitation System (NRS); Continuing Care Reporting System (CCRS); Ontario Drug Benefit (ODB) database; Ontario Health Insurance Plan (OHIP) data; the National Ambulatory Care Reporting System (NACRS), Registered Persons database (RPDB), the Ontario Hip/Knee Osteoarthritis Cohort and the Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB). Indicators of health and functional status and access and utilization of services were based on self-report and compared between people with MSK conditions and those without MSK conditions, with or without another chronic condition. Indicators of the prevalence of arthritis and rheumatism and the prevalence of back pain were also based on self-report. Data were first stratified by sex and then further stratified by annual household income, educational attainment, age, ethnicity, years of immigration and Local Health Integration Network (LHIN) and analysed as allowed by sample size. Age-adjustment, where appropriate, was done using indirect standardization and data were adjusted to the population with MSK conditions. Data on physician follow up, clinical care and outcomes for osteoarthritis, rheumatoid arthritis and osteoporosis were also first stratified by sex and then further stratified by age, neighbourhood income, neighbourhood educational attainment, rural/urban residency and LHIN and analysed as allowed by sample size.

Age-adjustment, where appropriate, was done using indirect standardization. [Appendix 8.3](#) provides a more detailed description of research methods.

A complete list of the indicators in this chapter and their data sources can be found in [Appendix 8.2](#). [Appendix 8.1](#) indicates which attribute of the Ontario Health Quality Council's (OHQC) nine attributes of a high performing health system the indicator assesses. It also identifies which of the strategic objectives included in the Ontario MOHLTC strategy map would be met through improvement on this indicator. As well,

indicators of osteoporosis care were mapped to the strategic objectives of the Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario.<sup>9</sup>

We hope this chapter will help ensure the needs of all Ontarians are addressed, including improved access to health promotion, appropriate and timely diagnosis and access to care and services when required. This information should also help ensure that as new programs targeting MSK conditions are introduced, their benefits reach everyone equally.





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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

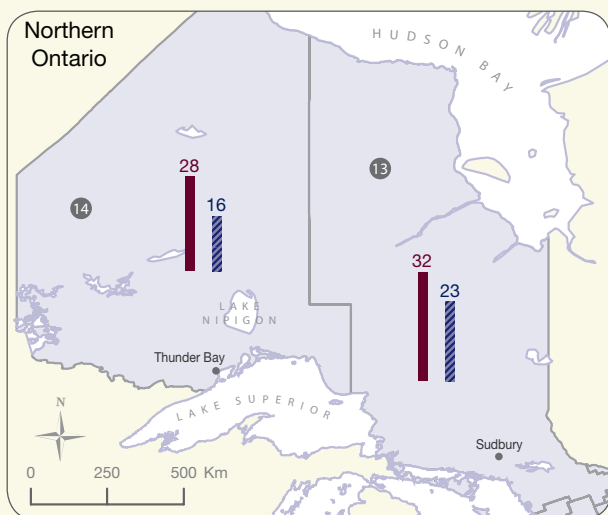
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

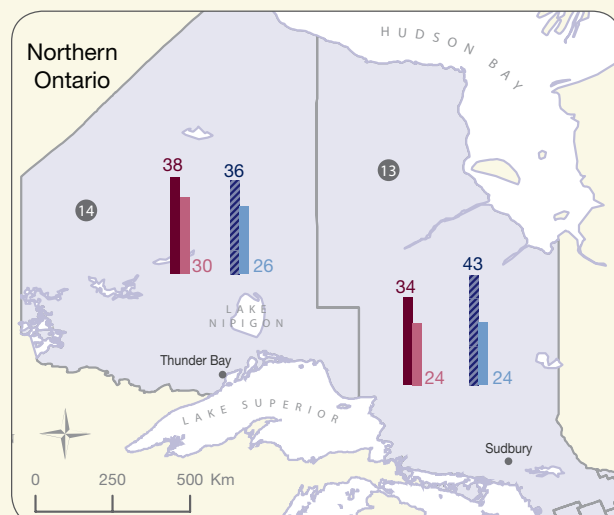
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

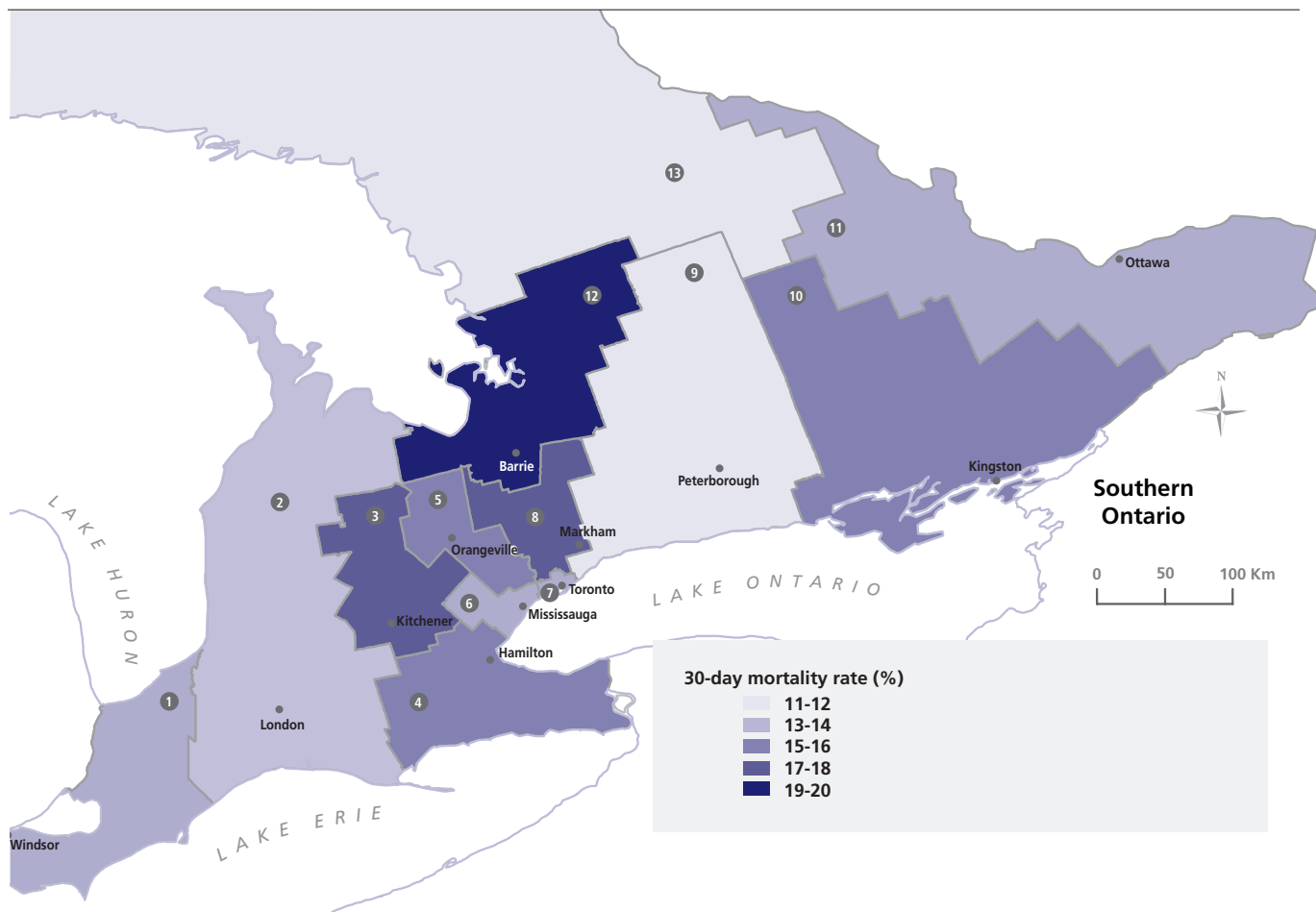


## CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**









# Section 8A

## *General MSK Indicators*

### INTRODUCTION

The term musculoskeletal (MSK) conditions embraces over 100 different conditions which affect the joints, bones, muscles, ligaments and tendons. A common feature of most of them is pain in and around the joints, sometimes accompanied by swelling or stiffness.

MSK conditions are the most frequent type of chronic physical conditions affecting Ontarians: women are affected more frequently than men and the prevalence increases with age.<sup>32, 33</sup> Risk factor modification, chronic disease management and access to appropriate health care services can help control the symptoms of these conditions and prevent and reduce associated limitation in activities. Lower socioeconomic position is associated with a higher prevalence and greater severity of many MSK conditions. Thus, by addressing socioeconomic factors, barriers to health care and disparities in quality of health care encountered by individuals with lower socioeconomic position, it is possible to improve the quality of life of disadvantaged women and men with these conditions. This section looks at the impact of MSK conditions on the health and functional status of Ontarians. It also examines the relationships between MSK conditions and health behaviours, medication use, employment and access to and utilization of health care services.

Given the association between MSK conditions and increasing age, it is not surprising that people with these conditions often report having other health conditions. It is well recognized that inflammatory

arthritis (e.g., rheumatoid arthritis) is associated with heart disease<sup>34, 35</sup> and osteoarthritis has been identified as the condition with the highest rate of comorbidities.<sup>36, 37</sup> The presence of multiple conditions complicates care. Individuals with arthritis (either rheumatoid arthritis or osteoarthritis) have on average, more comorbidities than people with other chronic conditions.<sup>38, 39</sup> Mental health disorders such as depression also frequently accompany MSK conditions<sup>40-42</sup> and may worsen the effects of pain and fatigue.<sup>43-46</sup>

A major consequence of arthritis is activity limitation and associated disability. MSK conditions are by far the most frequent cause of pain and long-term disability in the population, particularly for women.<sup>32</sup> Pain may contribute to problems with daily activities and getting around in the community. These problems may also cause difficulties with employment and some individuals, especially women with arthritis, are likely not be in the workforce.<sup>47</sup> Activity limitations, which are more common among people with MSK conditions than in the general population, are also associated with having low socioeconomic status.<sup>48</sup> Activity limitations include difficulties in carrying out everyday

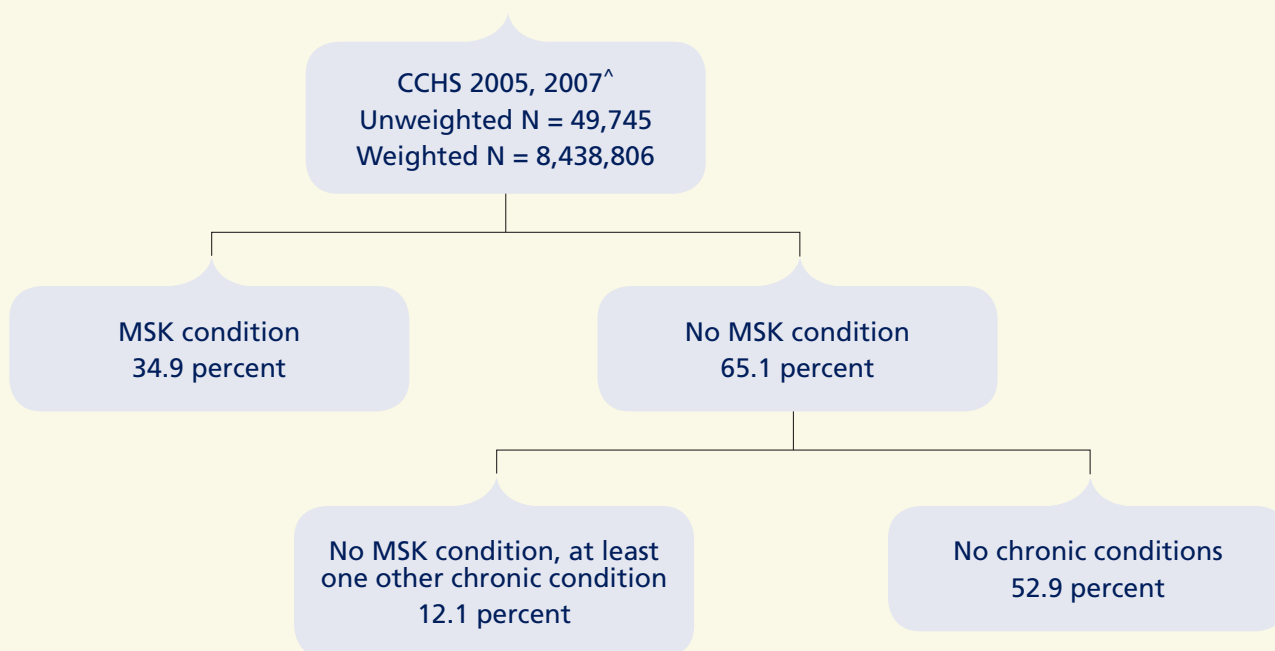
activities at home, school and/or work. MSK conditions can also result in limitations of instrumental activities of daily living (IADL) such as housework and errands and activities of daily living (ADL) such as getting dressed and other self-care activities.<sup>49-51</sup>

Although there is no cure for most MSK conditions, the symptoms can be managed and disability prevented by active self-management, clinical care and use of appropriate services. This section documents the proportion of those with MSK conditions who are overweight or obese. Being overweight has been found to be a contributing factor to the development of arthritis, especially osteoarthritis.<sup>52, 53</sup> Remaining physically active has also been shown to maintain function and reduce activity limitations in people with arthritis and back pain.<sup>54-58</sup> When medical care is needed, most MSK conditions are managed by general practitioners/family physicians (GP/FP). Medication use, especially pain relievers, is important for managing symptoms associated with MSK conditions.<sup>59, 60</sup> For some types of inflammatory arthritis, such as rheumatoid arthritis, specialist care—specifically rheumatologist care—is needed to ensure treatment with drugs to control the disease.<sup>61</sup> Orthopaedic surgeons may also play a role in care, particularly in the provision of total hip and knee replacement surgery. However, barriers to specialist care related to gender and to socioeconomic status are known to exist.<sup>1</sup> Allied health professionals, particularly physiotherapists and chiropractors have an important role in managing musculoskeletal symptoms and disability.<sup>61, 62</sup> Barriers to care such as lack of insurance coverage for required services may limit use of allied health professionals and lack of insurance is also a potential barrier to appropriate medication use for working-age people. People with chronic conditions often have unmet health care needs,<sup>63</sup> and people with MSK conditions are no exception. Younger women in particular have been shown to have greater unmet health needs than older women or men.<sup>63</sup>

Many of the adverse outcomes related to MSK conditions, such as long-term disability are more frequent in those of lower socioeconomic status.<sup>64</sup> Lower socioeconomic position is a risk factor for most types of MSK conditions. For example, lower education and lower income, as well as the overall education level of the area of residence, contribute to a higher prevalence of arthritis.<sup>65</sup> Low back pain is the most frequent reason for Workers' Compensation Claims, and having a blue-collar job is associated with longer absences from work.<sup>66, 67</sup> Socioeconomic position is also associated with greater barriers to health and other services.<sup>48, 68</sup>

In this section we report on selected indicators using data from the Canadian Community Health Survey (CCHS) to assess the health and functional status of adults who have MSK conditions (arthritis, rheumatism or back pain). Estimates of the prevalence of selected conditions can be found in each of the subsequent clinical sections. The sample was restricted to adults aged 25 and older and excluded respondents who did not answer the questions used to identify MSK conditions to avoid misclassifying people. When sample size allowed, we compared people with an MSK condition to those without an MSK condition but with another chronic condition and to people without any chronic conditions, while other comparisons were between people with an MSK condition compared to people without MSK conditions (see [Figure 1](#)). Data were indirectly standardized to the age distribution of the population with MSK conditions.

In this section, we used data from CCHS, 2000/01 (Cycle 1.1); 2005 (Cycle 3.1) and combined data from 2005 (Cycle 3.1) and 2007. The use of the combined cycles increased the available sample size and power to measure associations. As well, one of the indicators (physician visits) used data from the Ontario Health

**Figure 4**

^ Sample from CCHS is limited to adults aged 25 and older who answered the questions on MSK conditions and who were not missing information on age

Insurance Plan (OHIP) linked to the CCHS, 2000/01 (Cycle 1.1) sample. We report on indicators including:

- The prevalence of at least one other chronic physical condition and the prevalence of probable depression among adults (comorbidity);
- Functional status including the prevalence of activity limitations (activities at home, school or work were limited due to a long-term physical or mental condition); prevalence of limitations in IADLs (meal preparation, shopping for groceries, light or heavy housework) or limitations in ADLs (washing/dressing/eating, moving about inside the house); the percentage

of people who report having activities prevented by pain; labour force participation and the percentage who were overweight or obese based on self-reported height and weight;

- Access to and utilization of services including multiple medication use (two or more of pain relievers (narcotic and/or non-narcotic) and/or anti-depressants); unmet health care needs; use of primary and specialty care; difficulties accessing specialized services; use of home care services; consultation with allied health professionals and insurance coverage for prescription medications.

## EXHIBITS AND FINDINGS

### HEALTH AND FUNCTIONAL STATUS

#### PREVALENCE OF COMORBIDITY (MULTIPLE CHRONIC CONDITIONS)

**Indicator:** This indicator measures the percentage of adults aged 25 and older with a chronic condition who reported having at least one other chronic condition (comorbidity) diagnosed by a health professional. We report the rate of multiple chronic conditions among people with a musculoskeletal (MSK) condition and among people without an MSK condition, but with another chronic condition.

**Background:** There are disparities in chronic disease prevalence by gender, socioeconomic status and ethnicity.<sup>48</sup> The prevalence of multiple chronic conditions may be particularly underestimated in socioeconomically disadvantaged populations if they encounter barriers to care and thus are not diagnosed. The POWER Study Burden of Illness chapter reported that 29 percent of Ontarians (31 percent of women and 25 percent of men) had two or more chronic conditions in 2005.<sup>48</sup> Rates reported in this chapter will differ from the earlier chapter because of the exclusion of hypertension, a common chronic condition. Hypertension was excluded in an effort to limit included conditions to those that will affect functional status as this provides a more appropriate comparison group.

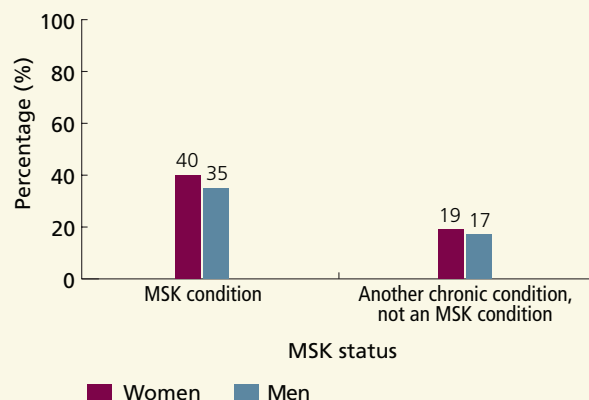
Data for this variable were derived from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007. The chronic conditions that were included in the analyses were: Alzheimer's disease and other dementia; bowel disorders, Crohn's disease or colitis; urinary incontinence; cancer; heart disease; stroke; diabetes (non-gestational) or using insulin; emphysema, asthma or chronic obstructive pulmonary disease.

**Finding:** In Ontario, among adults aged 25 and older with at least one chronic condition, adults with an MSK condition were more than twice as likely to have another chronic condition as adults without an MSK condition but with another chronic condition (38 percent versus 18 percent, respectively). Among adults with an MSK condition, women were more likely to have another chronic condition than men (40 percent versus 35 percent, respectively) (see Exhibit 8A.1).

**Exhibit 8A.1** | Age-standardized percentage of adults aged 25 and older with a chronic condition who reported having at least one other chronic condition diagnosed by a health professional among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005 and 2007

### FINDINGS

- Adults with an MSK condition were more than twice as likely to have at least one other chronic condition than adults without an MSK condition but with another chronic condition, regardless of sex.
- Among those with an MSK condition, women were more likely than men to have at least one other chronic condition.
- Among adults with another chronic condition, but not an MSK condition, there was no sex difference in the percentage who reported having at least one other chronic conditions.

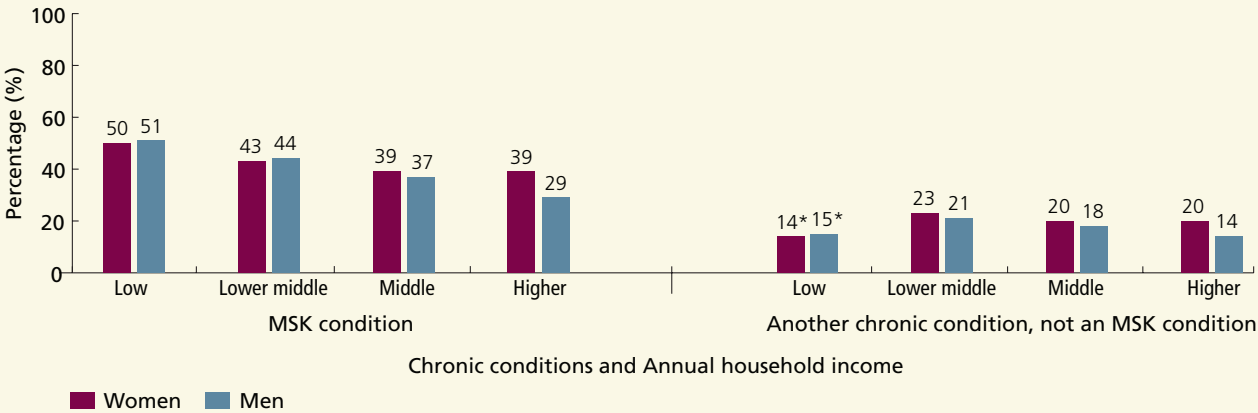


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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**Exhibit 8A.2** | Age-standardized percentage of adults aged 25 and older with a chronic condition who reported having at least one other chronic condition diagnosed by a health professional among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2005 and 2007



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

**FINDINGS**

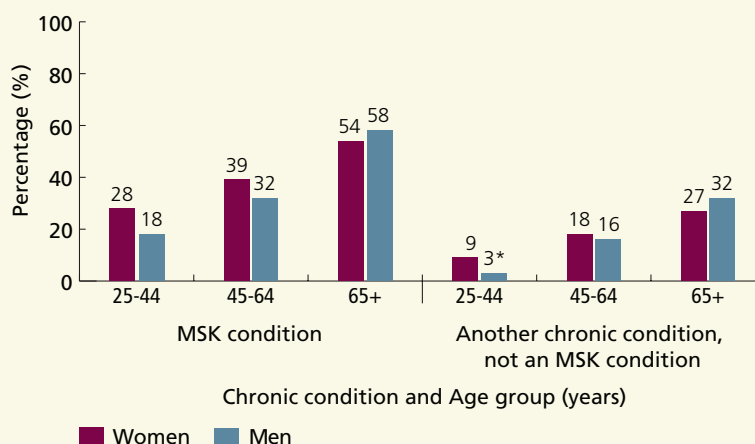
- Across all income levels, adults with an MSK condition were more likely to have at least one other chronic condition than those without an MSK condition, but with another chronic condition.
- Half of low-income women and men who had an MSK condition reported having at least one other chronic condition.
- Low-income women with an MSK condition were more likely to have at least one other chronic condition than higher-income women (50 percent versus 39 percent, respectively).
- Low-income men with an MSK condition were more likely to have at least one other chronic condition than higher-income men (51 percent versus 29 percent, respectively).

POWER Study

**Exhibit 8A.3** | Percentage of adults aged 25 and older with a chronic condition who reported having at least one other chronic condition diagnosed by a health professional among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005 and 2007

**FINDINGS**

- Across all age groups, adults with an MSK condition were more likely to have at least one other chronic condition than those without an MSK condition, but with another chronic condition.
- The percentage of adults with multiple chronic conditions increased with age for those with and without an MSK condition.
- Over half of women and men with an MSK condition aged 65 and older had at least one other chronic condition.
- Women aged 25-64 with an MSK condition were more likely to have at least one other chronic condition than their male counterparts.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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## PREVALENCE OF PROBABLE DEPRESSION

**Indicator:** This indicator measures the percentage of adults aged 25 and older who had probable depression.<sup>69</sup> We report the prevalence among people with musculoskeletal (MSK) conditions and among people without an MSK condition, with or without another chronic condition.

**Background:** Depression is among the most common mental disorders, and is among the most treatable. Depression causes significant distress or impairment in physical, social, occupational and other key areas of functioning and is known to be associated with socioeconomic status, ethnicity, immigration status, location of residence (urban versus rural), health behaviours, psychological well-being, social resources, stress and physical illness.<sup>70, 71</sup> According to the POWER Study Depression chapter, 7.4 percent of Ontarians aged 15 and older (9.8 percent of women and 4.9 percent of men) met the criteria for having probable depression in 2001.<sup>72</sup>

MSK conditions are characterized by chronic pain. Chronic pain conditions, including MSK conditions, are known to be associated with a high prevalence of concomitant depression.<sup>73-75</sup> Risk factors for development of depression in the setting of chronic pain include age, gender, psychosocial factors, (e.g., social support,<sup>76, 77</sup> and coping skills,<sup>76, 78</sup>) poor sleep quality and fatigue,<sup>79</sup> and physical disability (loss of ability to perform valued activities).<sup>80-85</sup> Comorbid depression in the setting of a chronic painful MSK condition has been associated with reduced adherence by patients to effective pain interventions<sup>86, 87</sup> and with reduced effectiveness of these therapies when used.<sup>88</sup> Thus, recognition of, and attention to, the potential co-occurrence of depression is an important part of clinical management of these conditions.

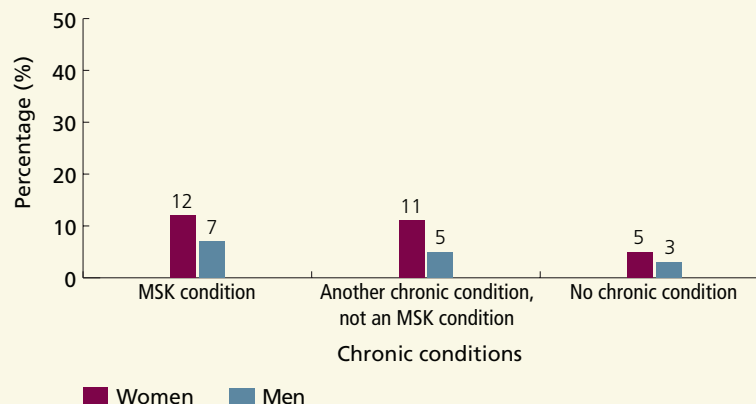
This indicator is based on data from the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1). The CCHS uses the Composite International Diagnostic Interview-Short Form for Major Depression. This series of questions calculates the predicted probability of major depressive episodes occurring within the year preceding the interview.<sup>69</sup> Respondents whose predicted probability score was greater than 0.9 were considered to have probable depression. However, this scale was never fully validated, so rates reported here may differ from the actual population prevalence (see [Appendix 8.3](#) for more detail).

**Findings:** In 2001, among Ontarians aged 25 and older, after adjusting for age, ten percent of adults with MSK conditions had probable depression, compared to eight percent of adults without an MSK condition but with at least one other chronic condition and four percent of adults without any chronic conditions. Adults with either an MSK condition or another chronic condition were more likely to have probable depression than adults without any chronic conditions. Among adults with an MSK condition, women were more likely to have probable depression than men (12 percent versus seven percent, respectively) (see [Exhibit 8A.4](#)).

**Exhibit 8A.4** | Age-standardized percentage of adults aged 25 and older who had probable depression<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2000/01

**FINDINGS**

- Regardless of the presence of MSK conditions or other chronic conditions, women were more likely than men to have probable depression.
- Women and men with MSK conditions or with other chronic conditions were more likely to have probable depression than adults with no chronic conditions.



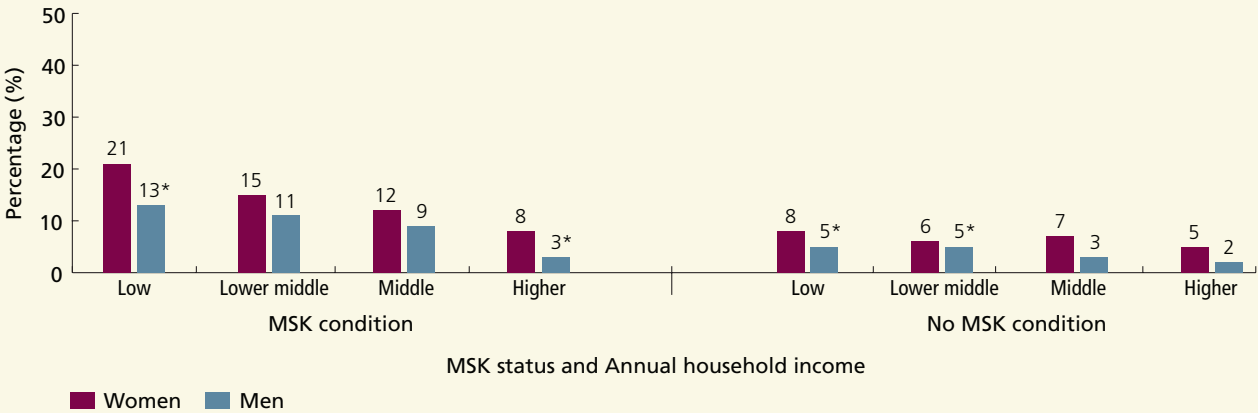
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Composite International Diagnostic Interview-Short Form for Major Depression score of >0.9

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**Exhibit 8A.5** | Age-standardized percentage of adults aged 25 and older who had probable depression<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2000/01



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Composite International Diagnostic Interview-Short Form for Major Depression score of >0.9

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

**FINDINGS**

- Across all income levels, adults with an MSK condition were more likely to have probable depression than those without an MSK condition.
- Low-income women and men with an MSK condition were much more likely to have probable depression than those with higher incomes.
- Among women with an MSK condition, the percentage with probable depression ranged from 21 percent among low-income women to eight percent among higher-income women. Though the rates among men with MSK conditions should be viewed with caution due to sample size, a similar pattern was seen.
- The percentage of adults with an MSK condition who also had probable depression decreased with age (data not shown).
- Across all age groups, women were more likely than men to have probable depression, irrespective of the presence of MSK conditions (data not shown).
- Adults with an MSK condition who lived in an urban area were more likely to have probable depression than adults living in rural areas, ten percent versus seven percent, respectively (data not shown).

POWER Study

## ACTIVITY LIMITATIONS

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported that their activities at home, school or work were limited due to a long-term physical or mental condition or health problem. A long-term condition is one that is expected to last or has already lasted six months or more. We report the prevalence of activity limitations among people with musculoskeletal (MSK) conditions and among people without an MSK condition, with or without another chronic condition.

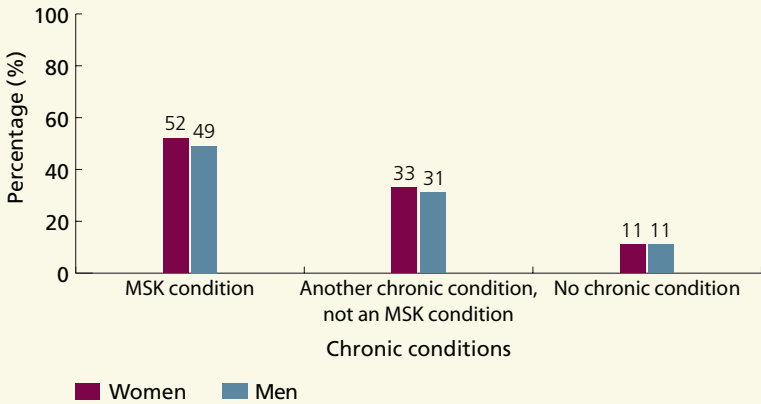
**Background:** The proportion of people with activity restrictions is a marker of population health status and will increase with population aging. A goal of public health and clinical practice is to maintain or improve functioning and reduce the proportion of the population whose health limits their everyday activities. Among individuals living with MSK conditions, activity limitation is a useful measure of the impact of the disease on one's quality of life.<sup>89</sup> Prevention and chronic disease management can improve functional health outcomes in this population and reduce the prevalence and severity of activity restrictions. As MSK conditions disproportionately impact older women, the effect of activity limitations includes inability to live independently in the community, resulting in long-term care placement. According to the POWER Study Burden of Illness chapter, 25 percent of Ontarians aged 25 and older (27 percent of women and 24 percent of men) reported having activity limitations in 2005.<sup>48</sup> Data from the CCHS, 2005 (Cycle 3.1) and 2007 were used to assess this indicator.

**Findings:** In 2005 and 2007, among Ontarians aged 25 and older, after adjusting for age, 51 percent of adults with MSK conditions reported having activity limitations as compared to 32 percent of adults with at least one other chronic condition, not including an MSK condition and 11 percent of adults with no chronic conditions. Among adults with an MSK condition, women were more likely to report activity limitations than men (52 percent versus 49 percent, respectively) (see [Exhibit 8A.6](#)).

**Exhibit 8A.6** | Age-standardized percentage of adults aged 25 and older who reported having activity limitations<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005 and 2007

**FINDINGS**

- Women and men with an MSK condition were more likely than those with other chronic conditions or those with no chronic conditions to report activity limitations.
- Women with an MSK condition were more likely than men to report activity limitations, though this difference was small (52 percent versus 49 percent, respectively).



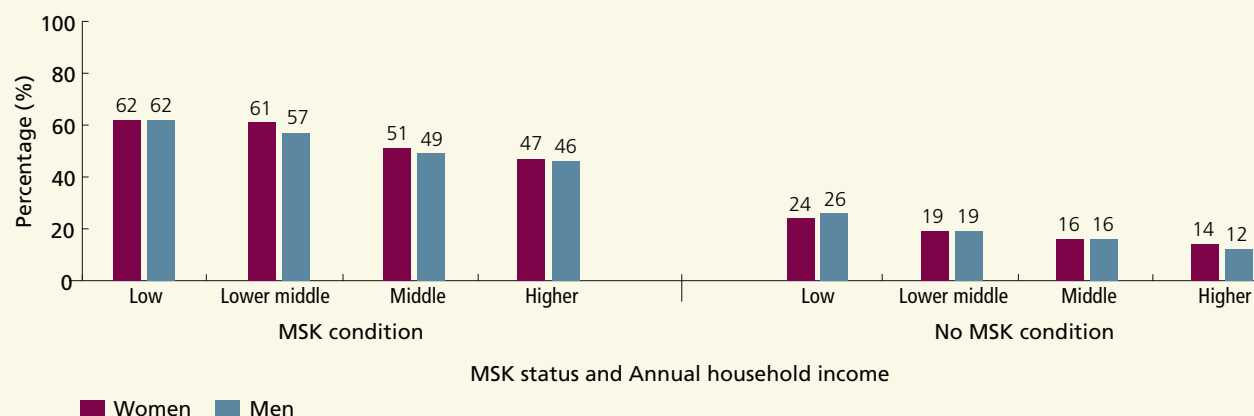
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Activities at home, school or work have been limited due to a long-term physical condition, mental condition or health problem

POWER Study

**Exhibit 8A.7** | Age-standardized percentage of adults aged 25 and older who reported having activity limitations<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2005 and 2007



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Activities at home, school or work have been limited due to a long-term physical condition, mental condition or health problem

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

### FINDINGS

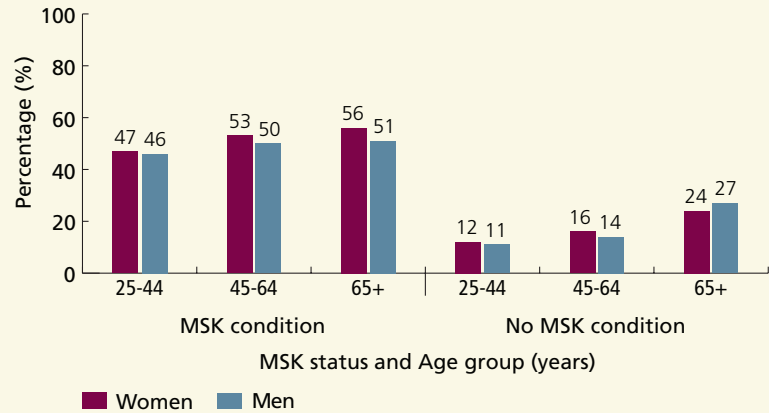
- Across all income levels, adults with an MSK condition were two to three times more likely to report activity limitations than those without an MSK condition.
- Among adults with an MSK condition, the percentage with activity limitations increased as income decreased.
- Among adults with an MSK condition, the percentage with activity limitations ranged from 62 percent among low-income women and men to 47 percent among higher-income women and 46 percent among higher-income men.

POWER Study

**Exhibit 8A.8 |** Percentage of adults aged 25 and older who reported having activity limitations<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005 and 2007

**FINDINGS**

- In each age group, women and men with an MSK condition were more likely to report activity limitations than adults without an MSK condition, ranging from more than a two-fold increase among those aged 65 and older to a four-fold increase among those aged 25-44.
- Among adults with an MSK condition, the percentage reporting activity limitations increased with age, from 47 percent of women and 46 percent of men aged 25-44 to 56 percent of women and 51 percent of men aged 65 and older.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Activities at home, school or work have been limited due to a long-term physical condition, mental condition or health problem

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## PREVALENCE OF LIMITATIONS IN IADLS (INSTRUMENTAL ACTIVITIES OF DAILY LIVING) AND/OR ADLS (ACTIVITIES OF DAILY LIVING)

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported having limitations in carrying out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs). We report the prevalence of IADL and/or ADL limitations among people with musculoskeletal (MSK) conditions and among people without an MSK condition, with or without another chronic condition.

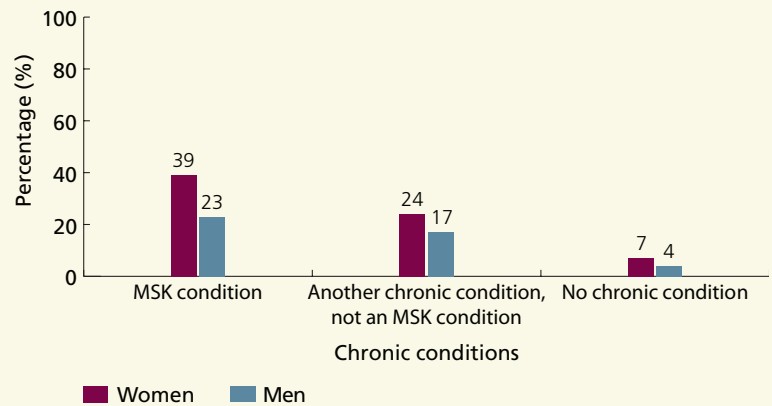
**Background:** IADLs include light and heavy housework, laundry, meal preparation, transportation, grocery shopping, using the telephone and money management. ADLs include washing, dressing, eating and moving about inside the house. IADL and ADL limitations may result from either physical or mental impairments. IADL limitations represent difficulties in carrying out routine life activities and are generally interpreted as an indicator of mild to moderate disability. Limitations in ADLs reflect difficulty in carrying out self-care activities, and therefore represent a more severe disability. Most people who report ADL limitation will also have IADL limitations. The prevalence of IADL and/or ADL limitations varies by gender, socioeconomic status, and region. Overall, women report needing assistance with IADLs and/or ADLs more than men.<sup>48</sup> Because limitation in IADLs is a predictor of mortality<sup>90</sup> and both ADL and IADL limitations are prevalent in the community and have been linked to reduced quality of life, this indicator is an important measure of the impact of disease on quality of life. The [POWER Study Burden of Illness chapter](#) reported that 16 percent of Ontarians aged 25 and older (20 percent of women and 11 percent of men) reported having IADL and/or ADL limitations in 2005.<sup>48</sup> Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to assess this indicator (see [Appendix 8.3](#) for details).

**Findings:** Among Ontarians aged 25 and older, after adjusting for age, 32 percent of those with an MSK condition reported limitations in carrying out their IADLs and/or ADLs as compared to 21 percent of adults with at least one chronic condition and six percent of adults with no chronic conditions. Adults with an MSK condition were more likely to report IADL and/or ADL limitations than adults with another chronic condition or those with no chronic conditions. Among adults with MSK conditions, women were more likely to report IADL and/or ADL limitations than men (39 percent versus 23 percent, respectively) (see [Exhibit 8A.9](#)).

**Exhibit 8A.9** | Age-standardized percentage of adults aged 25 and older who reported having limitations in IADLs (Instrumental Activities of Daily Living) and/or ADLs (Activities of Daily Living) among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005

**FINDINGS**

- Women and men with an MSK condition were more likely to report IADL and/or ADL limitations than adults without MSK conditions with or without another chronic condition.
- Over one-third of women and nearly one-quarter of men with an MSK condition reported having IADL and/or ADL limitations.
- Women were more likely to report IADL and/or ADL limitations than men, irrespective of the presence of MSK conditions.

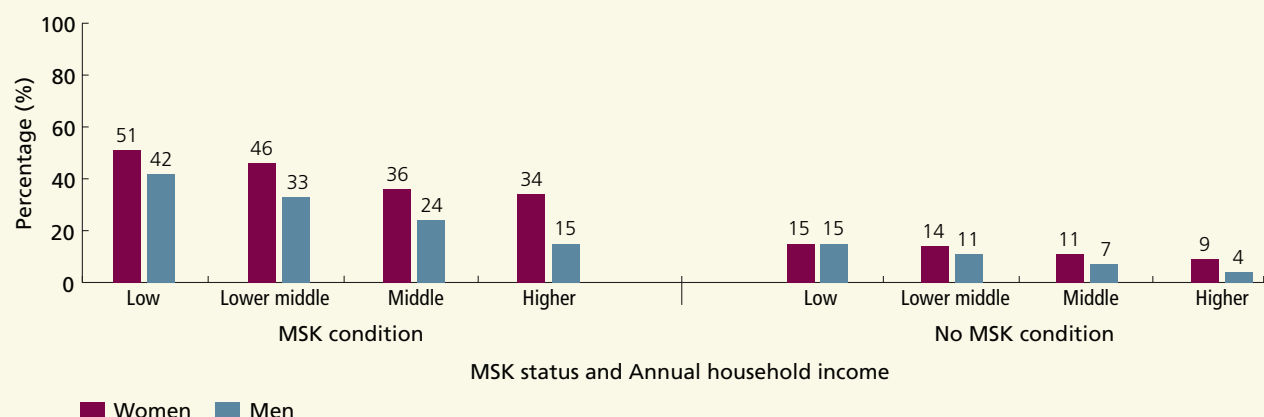


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

POWER Study

**Exhibit 8A.10** | Age-standardized percentage of adults aged 25 and older who reported having limitations in IADLs (Instrumental Activities of Daily Living) and/or ADLs (Activities of Daily Living) among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2005



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

## FINDINGS

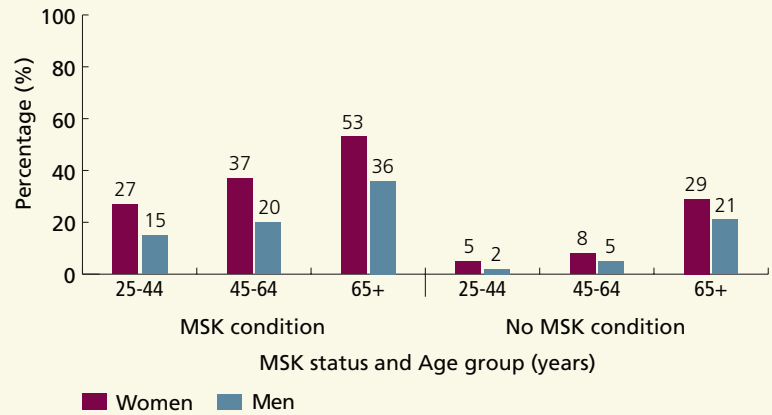
- Across all income levels, adults with an MSK condition were three to four times more likely to report IADL and/or ADL limitations than those without an MSK condition.
- Among adults with an MSK condition, the percentage with IADL and/or ADL limitations increased as income decreased.
- Among women with an MSK condition, the percentage reporting IADL and/or ADL limitations ranged from 51 percent among low-income women to 34 percent among higher-income women.
- Among men with an MSK condition, the percentage reporting IADL and/or ADL limitations ranged from 42 percent among low-income men to 15 percent among higher-income men.
- Among adults with an MSK condition, immigrants were more likely to report IADL and/or ADL limitations than non-immigrants; 35 percent versus 31 percent, respectively (data not shown).
- Adults with MSK conditions who were from visible minority communities were more likely to report IADL and/or ADL limitations than White adults, 37 percent versus 31 percent, respectively (data not shown).

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**Exhibit 8A.11** | Percentage of adults aged 25 and older who reported having limitations in IADLs (Instrumental Activities of Daily Living) and/or ADLs (Activities of Daily Living) among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005

**FINDINGS**

- In each age group, women and men with an MSK condition were more likely to report IADL and/or ADL limitations than adults without an MSK condition, ranging from an almost two-fold increase among women and men aged 65 and older to a greater than five-fold increase among those aged 25-44.
- The proportion of adults who reported IADL and/or ADL limitations increased with age, among those with or without an MSK condition.
- Women with an MSK condition reported higher rates of IADL and/or ADL limitations than men across all age groups.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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## ACTIVITIES PREVENTED BY PAIN OR DISCOMFORT

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported that at least some of their activities were prevented due to pain or discomfort. We report the prevalence of this indicator among people with musculoskeletal (MSK) conditions and among people without an MSK condition, with or without another chronic condition.

**Background:** Painful MSK conditions are associated with sleep interruption,<sup>91-94</sup> psychological stress,<sup>95, 96</sup> poorer perceived health,<sup>97</sup> and decreased quality of life.<sup>98</sup> Since pain may be worse with weight-bearing, persistent pain often leads to avoidance of physical activities that exacerbate the pain (such as walking and stair climbing), which leads to physical deconditioning and muscle weakness.<sup>99-101</sup> This, in turn, may lead to worsening of the condition in addition to increasing risk for falls and fracture. Painful MSK conditions are the second most frequent reason for a visit to a primary care physician<sup>29</sup> and account for the highest use of non-steroidal anti-inflammatory drugs.<sup>102, 103</sup> Thus, efforts to reduce the population burden of MSK conditions must address the associated pain.

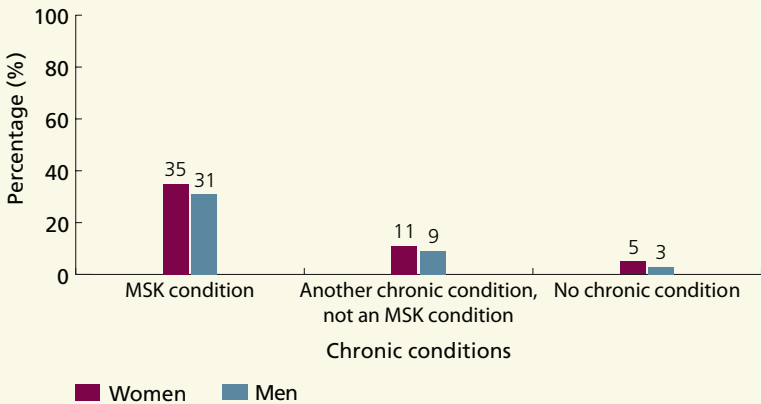
There are effective pain management strategies that can reduce the frequency and severity of chronic pain associated with MSK conditions, thereby reducing its impact on daily activities. Improvements on this indicator would represent improvements in functional status and quality of life. The POWER Study Burden of Illness chapter reported that 14 percent of Ontarians aged 25 and older (16 percent of women and 12 percent of men) reported having activity limitations due to pain and discomfort in 2001.<sup>48</sup> Data from the CCHS, 2000/01 (Cycle 1.1) were used to assess this indicator.

**Findings:** In 2000/01, among Ontarians aged 25 and older, after adjusting for age, 33 percent of those with an MSK condition reported that at least some of their activities were prevented due to pain or discomfort as compared to 10 percent of adults with another chronic condition, not including an MSK condition and four percent of adults with no chronic conditions. Among adults with MSK conditions, women were more likely than men to report that at least some of their activities were prevented due to pain or discomfort (35 percent versus 31 percent, respectively) (see Exhibit 8A.12).

**Exhibit 8A.12** | Age-standardized percentage of adults aged 25 and older who reported that their activities were prevented due to pain or discomfort among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2000/01

**FINDINGS**

- One in three women and men with an MSK condition reported that their activities were limited by pain.
- Women and men with an MSK condition were three times more likely to report activities prevented due to pain or discomfort than adults with another chronic condition and eight times more likely to report this limitation than those without any chronic conditions.
- Women with an MSK condition were more likely to report activities prevented due to pain or discomfort than men, though this difference was not large (35 percent versus 31 percent, respectively).

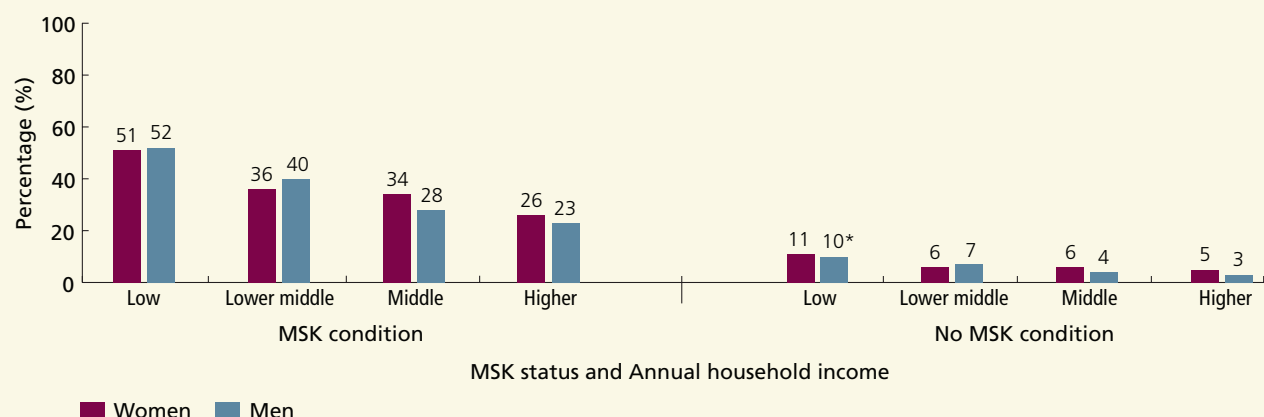


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

POWER Study

**Exhibit 8A.13** | Age-standardized percentage of adults aged 25 and older who reported that their activities were prevented due to pain or discomfort among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2000/01



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

## FINDINGS

- Women and men with an MSK condition were more than four times as likely to report that at least some of their activities were prevented due to pain or discomfort as adults without an MSK condition, across all income groups.
- The proportion of adults who reported that at least some of their activities were prevented due to pain or discomfort varied by annual household income.
- Among women with MSK conditions, low-income women were more likely to report that at least some of their activities were prevented due to pain or discomfort than higher-income women (51 percent versus 26 percent, respectively).
- Among men with MSK conditions, low-income men with an MSK condition were more likely to report that at least some of their activities were prevented due to pain or discomfort than higher-income men (52 percent versus 23 percent, respectively).
- A similar pattern was seen for educational attainment (data not shown).

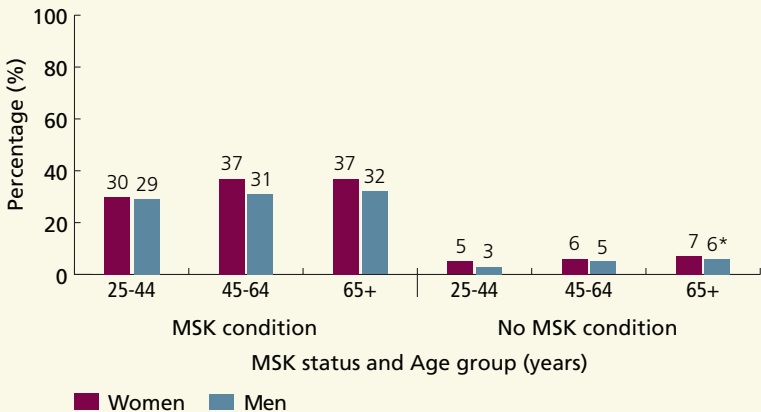
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**Exhibit 8A.14** | Percentage of adults aged 25 and older who reported that their activities were prevented due to pain or discomfort among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2001

**FINDINGS**

- In each age group, women and men with MSK conditions were more than five times as likely to report that at least some of their activities were prevented due to pain or discomfort as adults without MSK conditions.
- Among women with MSK conditions, those aged 45 and older were more likely than younger women to report that at least some of their activities were prevented due to pain. Yet almost one-third of women and men age 25-44 also reported these limitations.
- Among men with MSK conditions, the percentage that reported that their activities were prevented due to pain or discomfort did not vary by age.
- The percentage of adults with an MSK condition who reported that at least some of their activities were prevented due to pain or discomfort varied by Local Health Integration Network (LHIN), ranging from 26 percent (Mississauga Halton LHIN) to 38 percent (North East LHIN).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

\* Interpret with caution due to high sampling variability

POWER Study

## LABOUR FORCE PARTICIPATION

**Indicator:** This indicator measures the percentage of adults aged 25-64 with a musculoskeletal (MSK) condition who reported that they were without a job and not looking for one in the past year. This reflects the percentage of individuals with an MSK condition who were not participating in the labour force.

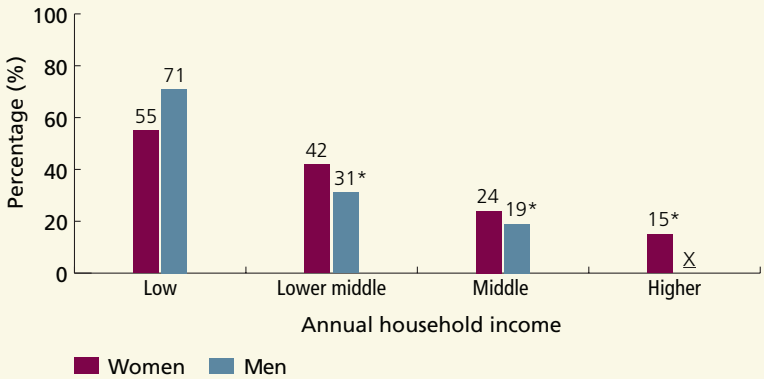
**Background:** A likely consequence of disabling conditions, such as MSK conditions and associated pain, is reduced participation in the labour force. The ICES Atlas 'Arthritis and related conditions in Ontario' (2004), reported that among people who were of working age, a higher percentage of those with arthritis (one in three) reported not being in the labour force than the percentage reported for any other chronic condition (one in seven).<sup>104</sup> Among those with an MSK condition, women aged 45-64 were more likely not to have a job than younger women or men aged 45-64. Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1, subsample 3) were used to assess this indicator.

**Findings:** In 2005, among Ontarians aged 25-64, after adjusting for age, 21 percent with an MSK condition reported that they were without a job and not looking for one in the past year. Women were more likely than men to report being without a job and not looking for one in the past year (26 percent versus 14 percent, respectively).

**Exhibit 8A.15** | Age-standardized percentage of adults aged 25-64 with a musculoskeletal (MSK) condition<sup>^</sup> who reported they were without a job and not looking for one in the past year, by sex and annual household income, in Ontario, 2005

**FINDINGS**

- The percentage of adults who were without a job and not looking for one varied by annual household income.
- Low-income women were much more likely to report being without a job and not looking for one as compared to higher-income women (55 percent versus 15 percent, respectively).
- Seventy-one percent of low-income men with an MSK condition were without a job and not looking for one as compared to 31 percent and 19 percent of men in the middle-income groups. We were unable to report on the percentage of high-income men due to small sample size and the rates among men in the middle income groups should be interpreted with caution.
- Adults with less than a secondary school education were more than twice as likely to report being without a job and not looking for one in the past year as compared to those with a Bachelor's degree or higher (37 percent versus 16 percent, respectively) (data not shown).
- Adults aged 45-64 with an MSK condition were more than twice as likely to report being without a job and not looking for one in the past year as compared to those aged 25-44, 24 percent versus 10 percent, respectively (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

\* Interpret with caution due to high sampling variability

X Suppressed due to small sample size

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

POWER Study

## OVERWEIGHT OR OBESE

**Indicator:** This indicator measures the percentage of adults aged 25 and older whose Body Mass Index (BMI), calculated from self-reported height and weight, was greater than or equal to 25. We report the proportion of adults who are overweight or obese among those with musculoskeletal (MSK) conditions and among those without an MSK condition, with or without another chronic condition.

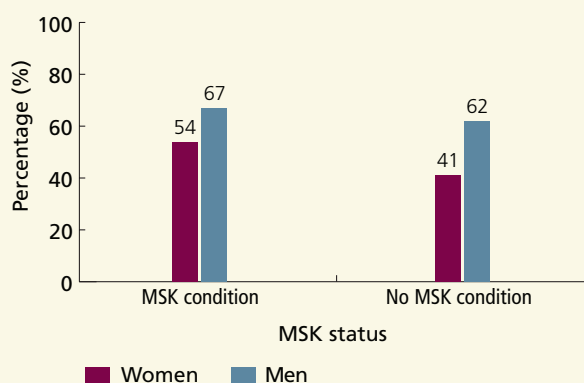
**Background:** Being overweight contributes to the development and worsening of arthritis, particularly osteoarthritis of the knee. A high proportion of adults with an MSK condition who are overweight or obese is of concern as being overweight or obese can contribute to the pain experienced from MSK conditions such as arthritis and back pain.<sup>52, 53, 105</sup> The [POWER Study Burden of Illness chapter](#) reported that 53 percent of Ontarians (45 percent of women and 62 percent of men) were overweight or obese based on self-reported height and weight.<sup>48</sup> Women may be more likely to under report their weight and men may over report their height, which can lead to misclassification bias. This may affect estimates of gender differences on this measure. Data from the CCHS, 2005 (Cycle 3.1) and 2007 were used to assess this indicator. We were unable to assess weight loss, which may be a measure of self-management among individuals with MSK conditions, as weight loss may reduce pain, improve functional status and decrease risk for disease progression.

**Findings:** In 2005 and 2007, among Ontarians aged 25 and older and after adjusting for age, 60 percent of adults with an MSK condition were overweight or obese as compared to 52 percent of adults without an MSK condition. Among those with an MSK condition, women were less likely than men to be overweight or obese (see [Exhibit 8A.13](#)).

### Exhibit 8A.16 | Age-standardized percentage of adults aged 25 and older who reported being overweight or obese<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005 and 2007

#### FINDINGS

- Women and men with an MSK condition were more likely to be overweight or obese than those without an MSK condition, however over half of all Ontarians were overweight or obese.
- Women were less likely than men to be overweight or obese, whether they had an MSK condition or not. Almost two-thirds of men with or without an MSK condition were overweight or obese as compared to 54 percent of women with an MSK condition and 41 percent of women without an MSK condition.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Body Mass Index (BMI)  $\geq 25$  calculated from self-reported height and weight

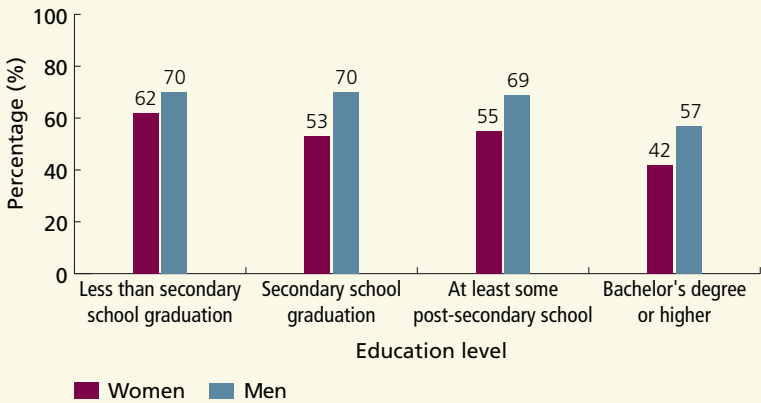
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**Exhibit 8A.17** | Age-standardized percentage of adults aged 25 and older who reported being overweight or obese<sup>¥</sup>, among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and education level, in Ontario, 2005 and 2007

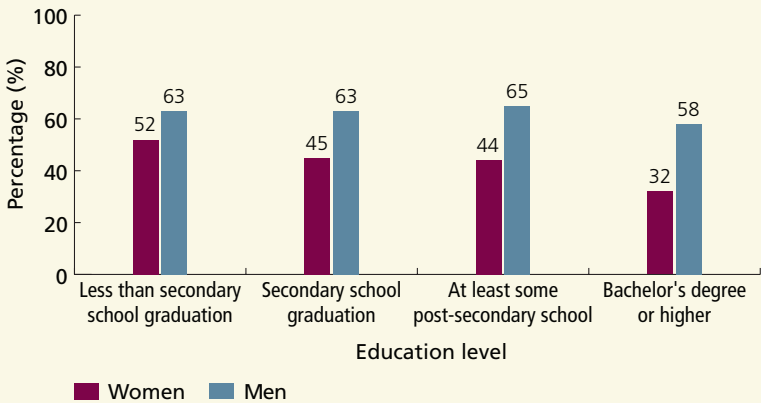
**FINDINGS**

- Women and men with an MSK condition were more likely to be overweight or obese than those without an MSK condition, irrespective of educational attainment.
- Women with an MSK condition who had less than a secondary school education were more likely to be overweight or obese as compared to women with a Bachelor's degree or higher (62 percent versus 42 percent, respectively).
- Men with an MSK condition who had less than a secondary school education were more likely to be overweight or obese than men with a Bachelor's degree or higher (70 percent versus 57 percent, respectively).
- Across all age groups women and men with an MSK condition were more likely to be overweight or obese than adults without an MSK condition (data not shown).
- Among adults with an MSK condition, non-immigrants and those living in rural areas were more likely to be overweight or obese than their counterparts (data not shown).

**Adults with an MSK condition**



**Adults without an MSK condition**



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Body Mass Index (BMI)  $\geq$  25 calculated from self-reported height and weight

POWER Study

## ACCESS AND UTILIZATION OF SERVICES

### MEDICATION USE

**Indicator:** This indicator measures the percentage of people aged 25 and older who reported taking two or more types of pain medication including pain relievers (narcotic and/or non-narcotic medications) and/or anti-depressants in the past month. We report the rate among people with musculoskeletal (MSK) conditions and among people without an MSK condition, but with at least one other chronic condition.

**Background:** There is currently no cure for most MSK conditions. Medication use, including both prescribed and non-prescribed agents, is a central component of the symptomatic management of these conditions. Specifically, the use of medications, including oral analgesics (e.g., narcotic analgesics such as acetaminophen and opioids), non-steroidal anti-inflammatory drugs (NSAIDs), intra-articular corticosteroids and natural health products (e.g., glucosamine, chondroitin) is common among persons with MSK conditions and have variably been shown to reduce pain and improve mobility.<sup>106, 107</sup> The chronic nature of these conditions means that treatment is long-term. Additionally, antidepressants are often used to manage pain or individuals may be prescribed these medications for the downstream effects of living with chronic pain associated with MSK conditions, in particular sleep disruption and depressed mood.

However, medicinal treatment of these conditions may be complicated by the presence of age-related changes. For example, changed kidney function, may render older persons more likely to experience serious adverse events associated with the commonly used drugs.<sup>108-112</sup> The presence of other chronic conditions, such as hypertension and cardiovascular disease and the concomitant prescription of medications to treat these conditions, including anticoagulants and angiotensin converting enzyme (ACE) inhibitors may further complicate treatment due to potential drug interactions.<sup>113-115</sup> Other non-medical barriers to appropriate use of pain therapies include misconceptions about the risks associated with use of analgesics—in particular risk for addiction or dependence—and a societal perspective that these conditions are a normal and expected part of aging.<sup>116</sup>

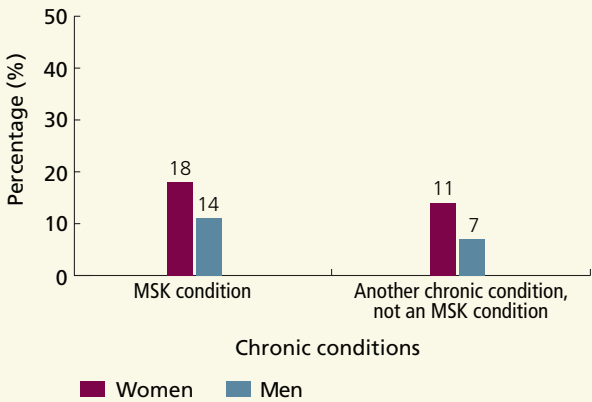
Data from the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1) were used to assess this indicator. Respondents were asked about their medication usage in the past month including the use of pain relievers (e.g., aspirin, acetaminophen, arthritis medicine or anti-inflammatories), narcotic medications (codeine, Demerol or morphine); or anti-depressants (e.g., Prozac, Paxil or Effexor). We report the percentage who reported taking two or more of these types of medications. There were some limitations of the data. The medication module of CCHS 2000/01 (Cycle 1.1) was an optional module and sampling regions within the South East Local Health Integration Network (LHIN) and the Champlain LHIN did not include this module. Medication use is assessed only by self-report. As well, the proportion of individuals who responded to the various medication questions was significantly lower for the question about narcotic use than for other medications.

**Findings:** In 2001, among Ontarians aged 25 and older, after adjusting for age, 16 percent of those with an MSK condition reported taking two or more types of medications in the past month compared to nine percent of adults with at least one other chronic condition. Among adults with an MSK condition, women were more likely than men to report taking two or more types of medications, 18 percent versus 14 percent, respectively (see [Exhibit 8A.18](#)).

**Exhibit 8A.18** | Age-standardized percentage of adults aged 25 and older with a chronic condition who reported taking two or more types of medication in the past month<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2000/01

**FINDINGS**

- Adults with an MSK condition were more likely to report taking at least two types of medication (pain relievers and/or anti-depressants) in the past month than adults with another chronic condition.
- Women with an MSK condition were more likely than men to report taking at least two types of medication in the past month (18 percent versus 14 percent, respectively). This pattern was also seen for women and men with another chronic condition (eleven percent versus seven percent, respectively).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Medications included pain relievers (narcotic and/or non-narcotic) and/or anti-depressants

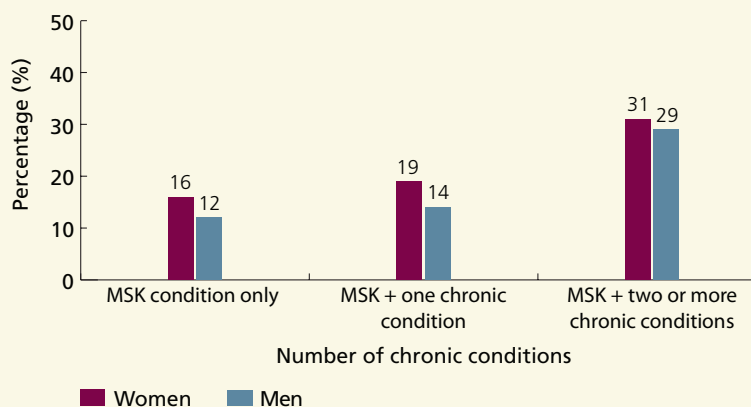
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**Exhibit 8A.19** | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who reported taking two or more types of medication in the past month<sup>¥</sup>, by sex and number of chronic conditions, in Ontario, 2000/01

### FINDINGS

- The proportion of adults with an MSK condition who reported taking at least two types of medication (pain relievers and/or anti-depressants) in the past month increased with the number of chronic conditions they reported.
- Among women, 16 percent of those with an MSK condition alone reported taking two types of medication in the past month compared to 31 percent of women with an MSK condition and at least two other chronic conditions.
- Among men, 12 percent of those with an MSK condition alone reported taking at least two types of medication in the past month compared to 29 percent of men with an MSK condition and at least two other chronic conditions.
- Among women with an MSK condition, the percentage who reported taking at least two types of medication in the past month decreased with age; 22 percent of women aged 25-44 reported taking two or more types of medication compared to 9 percent of women aged 75 and older (data not shown).
- Low-income adults with an MSK condition were more likely to report taking at least two types of medications in the past month compared to higher-income adults (22 percent versus 15 percent, respectively) (data not shown).
- Because two Local Health Integration Networks (LHINs) did not participate in the module on drug use, we did not report this indicator at the LHIN-level.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Medications included pain relievers (narcotic and/or non-narcotic) and/or anti-depressants

POWER Study

## UNMET HEALTH CARE NEEDS

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported that there was a time during the past 12 months when they needed health care but did not receive it. We report the prevalence of unmet health care needs among people with musculoskeletal (MSK) conditions and among people without an MSK condition, with or without another chronic condition.

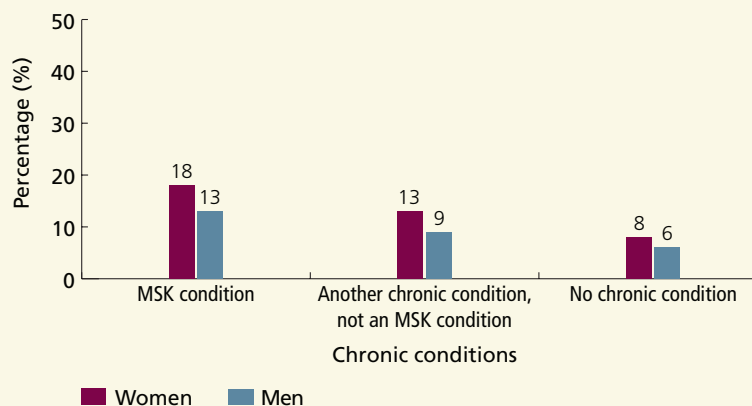
**Background:** 'Unmet need' is a self-reported measure of an individual's experiences in obtaining the care they believe they require.<sup>117</sup> While non-specific, it is commonly used as an indicator of access to care. The impact of unmet need may be adverse health outcomes and worse health-related quality of life.<sup>118</sup> Low-income and minority women and men are more likely to report unmet needs as are those with greater health care needs. Perceived unmet need is influenced by individual health needs, predisposition to seek care, availability of services, structural barriers to attaining services and the ability of providers to deliver effective care to diverse populations. Because health needs and barriers to care are influenced by determinants of care such as age, gender, socioeconomic status, ethnicity and where one lives, measuring unmet need across these factors may identify groups who are more likely to have reduced access to health care services. Expectations may also influence perceptions of unmet need.<sup>117, 118</sup> The [POWER Study Access to Health Care Services chapter](#) reported that 12 percent of Ontarians aged 25 and older (14 percent of women and 10 percent of men) reported unmet health care needs in 2005.<sup>68</sup> The percentage reporting unmet health care needs was higher among those with at least one chronic condition (17 percent of women and 12 percent of men).<sup>68</sup> Timely access to needed health care services is important for people with MSK conditions in order to minimize disability and improve quality of life. For some, needed care can be provided by a primary care provider. Others will require the expertise of specialists and diagnostic imaging. A 2004 study using 2000/2001 Canadian Community Health Survey (CCHS) data found that 17.8 percent of individuals who reported that they had arthritis or rheumatism and 22 percent of those who reported low back pain, stated they had not received needed health care in the previous year.<sup>63</sup> Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to measure this indicator.

**Findings:** In 2005, among Ontarians aged 25 and older, after adjusting for age, 16 percent of those with an MSK condition reported having unmet needs compared to eleven percent of adults with at least one chronic condition not including an MSK condition and seven percent of adults with no chronic conditions. Among adults with an MSK condition, women were more likely than men to report unmet health needs (18 percent versus 13 percent, respectively) (see [Exhibit 8A.20](#)).

**Exhibit 8A.20** | Age-standardized percentage of adults aged 25 and older who reported having unmet health care needs among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005

**FINDINGS**

- Adults with an MSK condition were more likely to report unmet health care needs than adults with another chronic condition or those without any chronic conditions.
- Women were more likely to report unmet health care needs than men, irrespective of the presence of MSK conditions or other chronic conditions.
- Nearly one in five women with an MSK condition reported unmet health needs.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

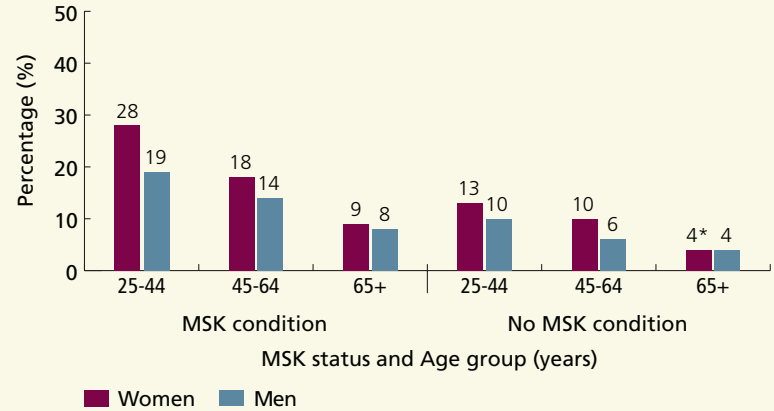
\* Interpret with caution due to high sampling variability

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**Exhibit 8A.21** | Percentage of adults aged 25 and older who reported having unmet health care needs among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005

**FINDINGS**

- Adults with an MSK condition were approximately twice as likely to report having unmet health care needs as those without an MSK condition. This pattern persisted for women and men and across all age groups.
- The percentage of women and men who reported unmet health care needs declined with age, irrespective of the presence of an MSK condition.
- Among women with an MSK condition, the percentage reporting unmet health care needs declined from 28 percent of those aged 25-44 to nine percent of women aged 65 and older.
- Among men with an MSK condition, 19 percent of those aged 25-44 reported having unmet health care needs as compared to eight percent of men aged 65 and older.
- Lower-income women with an MSK condition were more likely to report unmet health care needs than higher-income women with an MSK condition (21 percent versus 17 percent, respectively). There was no income difference among men (data not shown).
- The pattern for educational attainment was reversed; women with an MSK condition who had a Bachelor's degree or were more likely to report unmet needs than those with less than a high school graduation (21 percent versus 15 percent, respectively). Again, the education related variation was not seen among men (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

\* Interpret with caution due to high sampling variability

POWER Study

## PRIMARY AND SPECIALTY CARE

**Indicator:** This group of indicators measures the percentage of adults aged 25 and older who had at least four visits to a primary care physician (general practitioner/family physician (GP/FP)) in the last year and the percentage who have at least one office visit to any type of specialist in the last year. We report the rates among people with a musculoskeletal (MSK) condition and among people without an MSK condition, with or without another chronic condition.

**Background:** Access to effective care is crucial for people with MSK conditions whose health and functional status can dramatically affect their daily lives if their condition is not properly treated. A recent Ontario study showed that 22 percent of Ontarians visited a physician for an MSK condition each year and 33 percent of these saw a specialist.<sup>119</sup> Visit rates for arthritis-related conditions increased with age and were higher in women than in men.<sup>120</sup> There is regional variation in the number of available practitioners across Ontario, including those who treat MSK conditions such as rheumatologists, orthopaedic surgeons and general practitioners (GP).<sup>121, 122</sup> Variations in regional rates of service visits may reflect differences in practice or regional variations in access to services. OHIP data for 2001—the year evaluated—showed that the median number of visits to a GP/FP for all Ontarians was three and the median number of specialist visits was zero. This analysis focused on overall use of health services and thus looked at the percentage of people who had more than the median number of visits—that is four or more GP visits and one or more specialist visits to identify the proportion who were high users of health care services. While visits are a measure of access, from these data we cannot assess the effectiveness of care received. With respect to specialist care, all types of specialists were included which cannot be used to measure access to appropriate specialist care for the treatment of MSK conditions.

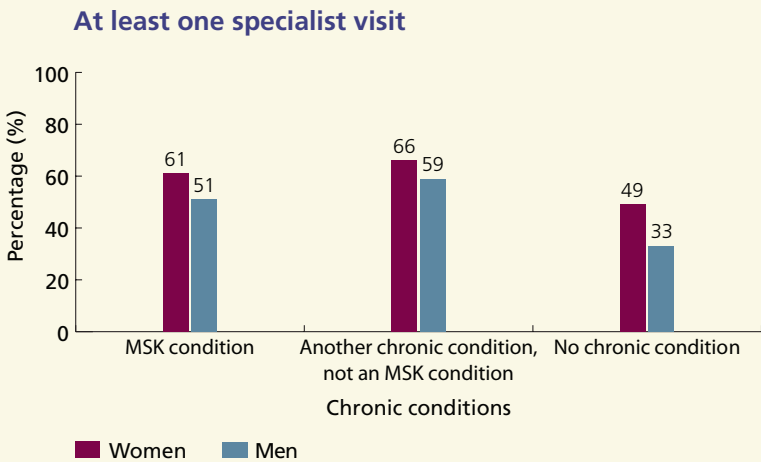
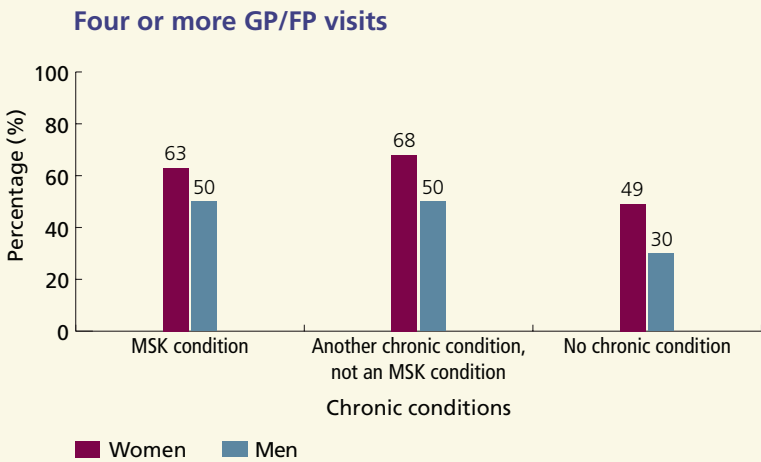
The data for this indicator were from a linkage between the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1) and physician claims data from the Ontario Health Insurance Plan (OHIP). The linked CCHS sample was followed for one year through OHIP claims to determine the number of physician visits that respondents had. Visits were divided into those to primary care physicians (GP/FP) or specialists and visits to emergency room, inpatient visits and telephone consultations were excluded. Remuneration to physicians through Alternate Fee Plans (AFPs) could not be captured.

**Findings:** In 2001, 58 percent for adults aged 25 and older with an MSK condition had at least four visits to a GP/FP within one year compared to 59 percent of adults with at least one other chronic condition (not including an MSK condition) and 40 percent of adults without any chronic conditions. Among adults with an MSK condition, 57 percent had at least one visit to any type of specialist within the year compared to 62 percent of adults with at least one other chronic condition (not including an MSK condition) and 41 percent of adults without any chronic conditions. Among adults with an MSK condition women were more likely than men to have had at least four visits to a GP/FP in the previous year (63 percent versus 50 percent, respectively) and were more likely to have seen any type of specialist during the same period (61 percent versus 51 percent, respectively) (see [Exhibit 8A.22](#)).

**Exhibit 8A.22** | Age-standardized percentage of adults aged 25 and older who had at least four visits to a general practitioner/family physician (GP/FP) or those who had at least one visit to any type of specialist within one year, among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2000/01

**FINDINGS**

- Adults with an MSK condition were more likely to have seen a primary care physician at least four times or any type of specialist at least once compared to adults with no chronic conditions. Rates of primary care physician and specialist visits were similar for adults with an MSK condition and adults with other chronic conditions.
- Women were more likely to have seen a primary care physician at least four times or any type of specialist at least once compared to men, irrespective of the presence of MSK conditions or other chronic conditions.



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

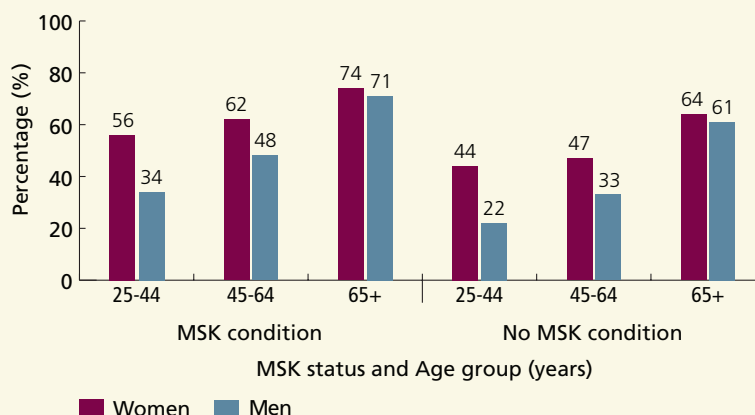
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**Exhibit 8A.23** | Percentage of adults aged 25 and older who had at least four visits to a general practitioner/family physician (GP/FP) or those who had at least one visit to any type of specialist within one year, among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2000/01

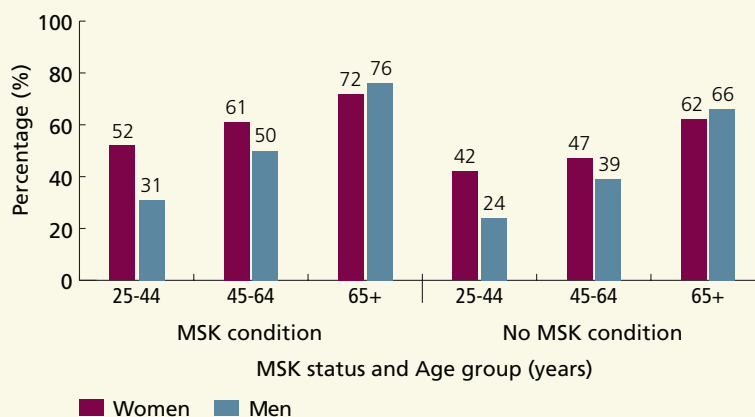
### FINDINGS

- Women and men with an MSK condition were more likely than those without one to have seen a GP/FP at least four times or any type of specialist at least once during the year.
- With the exception of adults aged 65 and older, women were more likely than men to have seen any type of specialist in the last year.
- Among women with an MSK condition, 56 percent of those aged 25-44 had four or more visits to a GP/FP as compared to 74 percent of women aged 65 and older.
- Among men with an MSK condition, the percentage who had seen a GP/FP four or more times ranged from 34 percent among those aged 25-44 to 71 percent among men aged 65 and older.
- Among women with an MSK condition, 52 percent of those aged 25-44 had seen any type of specialist compared to 72 percent of women aged 65 and older.
- Among men with MSK conditions, the percentage who had seen any type of specialist ranged from 31 percent (those aged 25-44) to 76 percent (men aged 65 and older).
- Low-income adults were more likely to see a GP/FP at least four times within one year compared to higher-income adults (61 percent versus 55 percent, respectively). Use of specialist services did not vary by income (data not shown).

#### Four or more GP/FP visits



#### At least one specialist visit



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

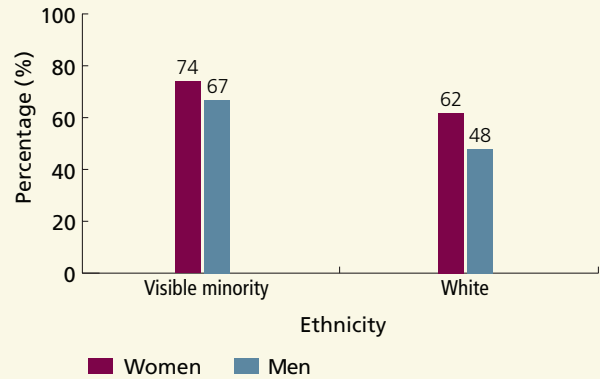
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**Exhibit 8A.24 |** Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition^ who had at least four visits to a general practitioner/family physician (GP/FP) within one year, by sex and ethnicity, in Ontario, 2000/01

**FINDINGS**

- Women with an MSK condition were more likely than men to have seen a GP/FP at least four times in the year, regardless of ethnicity.
- Among women with an MSK condition, visible minority women were more likely than White women to have seen a GP/FP at least four times during the year (74 percent versus 62 percent, respectively).
- Among men with an MSK condition, 67 percent of visible minority men versus 48 percent of White men had four or more GP/FP visits during the year.
- The percentage of adults who had seen any type of specialist at least once did not vary by ethnicity (57 percent of visible minority adults versus 58 percent of White adults) (data not shown).



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)

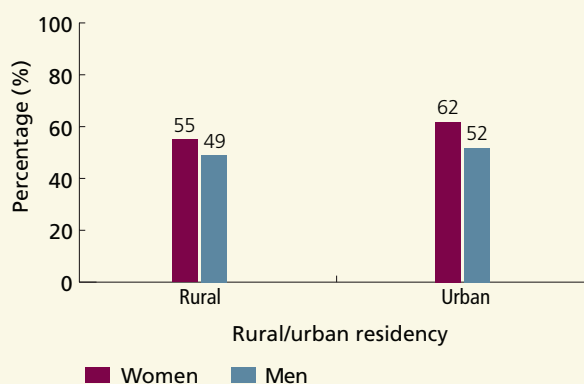
^ People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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## Exhibit 8A.25 | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who had at least one visit to any type of specialist within one year, by sex and rural/urban residency, in Ontario, 2000/01

### FINDINGS

- Women with an MSK condition were more likely than men to have seen a specialist at least once, regardless of rural/urban residency. Women were also more likely than men to have seen a GP/FP at least four times in the year (data not shown).
- Among women with an MSK condition, 55 percent of rural residents compared to 62 percent of urban residents had seen any type of specialist at least once during the year.
- The percentage of women with an MSK condition who had seen a GP/FP four or more times during the year did not vary by rural/urban residency (data not shown).
- Among men with an MSK condition, the percentage that had seen any type of specialist at least once during the year did not vary by rural/urban residency (49 percent versus 52 percent, respectively).
- The percentage of men with an MSK condition who had seen a GP/FP four or more times during the year was higher among urban residents than among rural residents (51 percent versus 46 percent, respectively) (data not shown).



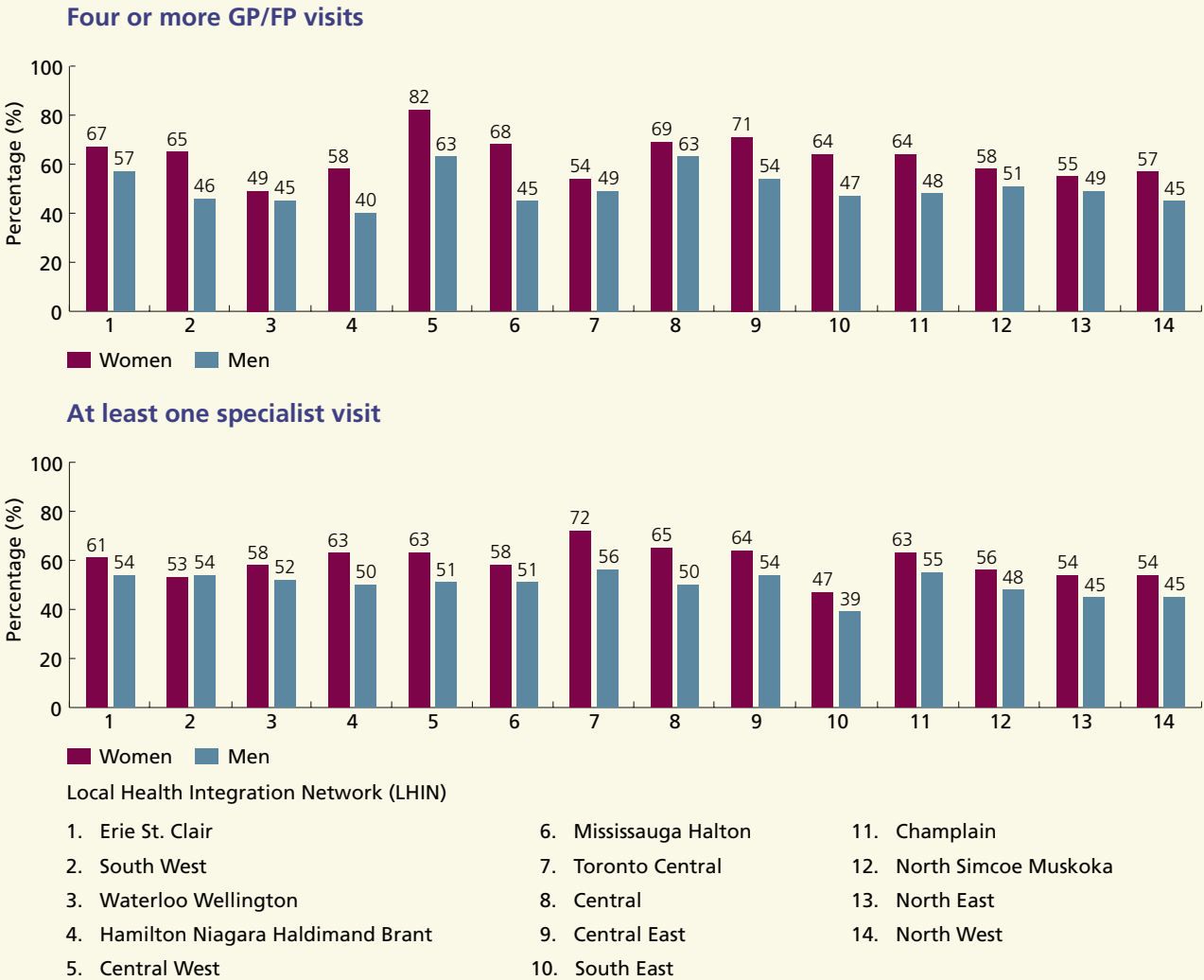
**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of rural/urban residency

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**Exhibit 8A.26** | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who had at least four visits to a general practitioner/family physician (GP/FP) or those who had at least one visit to any type of specialist within one year, by sex and Local Health Integration Network (LHIN), in Ontario, 2000/01



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**FINDINGS**

- Among adults with an MSK condition, the percentage who had seen a GP/FP at least four times or any type of specialist at least once during the year varied across LHINs.
- The percentage of women with an MSK condition who visited a GP/FP at least four times ranged from 49 percent (Waterloo Wellington LHIN) to 82 percent (Central West LHIN). Among men with an MSK condition, the percentage ranged from 40 percent (Hamilton Niagara Haldimand Brant LHIN) to 63 percent (Central and Central West LHIN).
- The percentage of women with an MSK condition who visited any type of specialist at least once ranged from 47 percent (South East LHIN) to 72 percent (Toronto Central LHIN). Among men with an MSK condition the percentage ranged from 39 percent (South East LHIN) to 56 percent (Toronto Central LHIN).

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## DIFFICULTIES ACCESSING SPECIALIZED SERVICES

**Indicator:** This indicator measures the percentage of people aged 25 and older who reported difficulties accessing any of the following specialized services: specialist care for a diagnosis or consultation for a new or existing illness or condition; specialized diagnostic tests (non-emergency magnetic resonance (MR) imaging, computed tomography (CT) scanning, and angiography); elective (non-emergent) surgery. We report the rates among people with a musculoskeletal (MSK) condition and among people without an MSK condition, with or without another chronic condition, who required these services.

**Background:** When patients require specialized care, services need to be accessed in a timely manner whether it is for a new or existing problem. When accessing specialized services, patients may be faced with difficulties at multiple points of care along their care path, including primary care, specialty care, diagnostic care, hospital-based care and home care.<sup>123</sup> Analysis of the Canadian Community Health Survey (CCHS) found that among Canadians aged 15 and older who accessed specialized services, approximately 19 percent reported difficulties accessing specialist care, 13 percent reported difficulties accessing specialized diagnostic tests and one to three percent reported difficulties accessing non-emergency surgery.<sup>21</sup> Health system redesign to improve patient flow and efficiency can reduce wait times and improve access to care. However, overuse of specialized services when not indicated can contribute to longer wait times or difficulties with access to care for those who require the services.<sup>124</sup> Therefore, another way to reduce wait times is to identify and use evidence-based indications for these services. According to the POWER Study Access to Health Care Services chapter, in 2007 among respondents who required access to these services, 24 percent reported difficulties accessing specialist care, 19 percent reported difficulties accessing specialized diagnostic testing and 15 percent reported difficulties accessing elective surgery.<sup>68</sup>

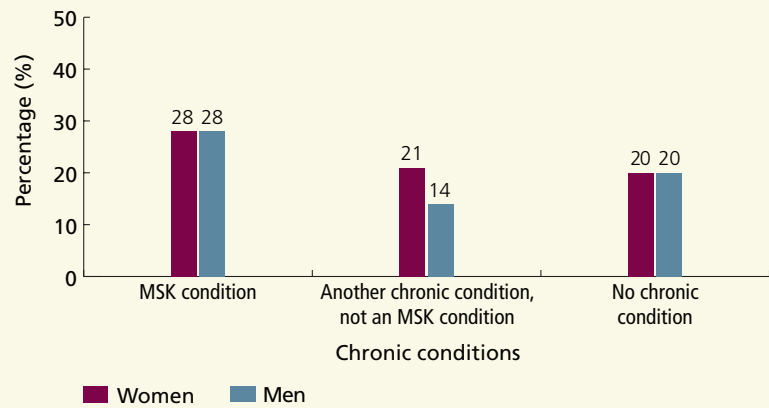
Data from the CCHS, 2005 (Cycle 3.1, subsample 3) and 2007 were used to assess this indicator. Adults who felt they needed these services (i.e., specialist care, specialized diagnostic testing or elective surgery) were asked if they had difficulties getting access to these services in the past 12 months (see [Appendix 8.3](#) for details). Perception of need and expectations for timeliness of service may differ by education and other sociodemographic characteristics. Thus, differences in perception of need and expectations in addition to differences in need due to clinical factors may contribute to variation in findings across population subgroups.

**Findings:** In Ontario, 28 percent of adults aged 25 and older with an MSK condition who needed specialized services reported difficulties accessing specialized services (specialist care; elective diagnostic testing; elective surgery) compared to 18 percent of adults with at least one chronic condition, not including an MSK condition and 20 percent of adults without any chronic conditions. Women and men with MSK conditions were equally likely to report difficulties accessing specialized services (see [Exhibit 8A.27](#)).

**Exhibit 8A.27** | Age-standardized percentage of adults aged 25 and older who reported difficulties accessing specialized services<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005 and 2007

**FINDINGS**

- Women and men with an MSK condition were more likely to report difficulties accessing specialized services than adults without an MSK condition, with or without another chronic condition.
- More than one in four women and men with an MSK condition who reported needing specialized services reported difficulties accessing these services.
- The percentage of adults with an MSK condition who reported difficulties accessing specialized services did not vary by sex.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

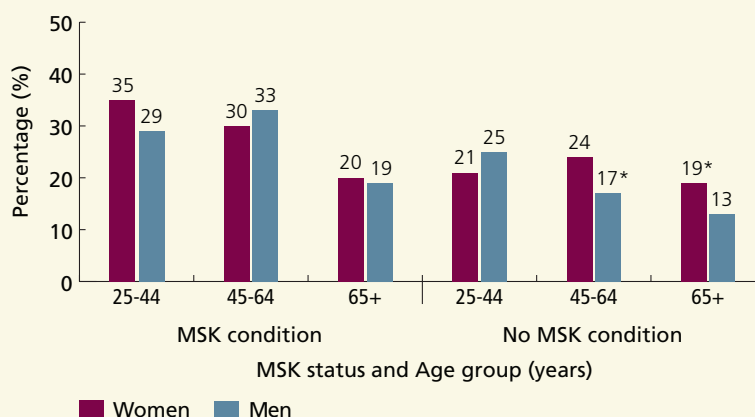
<sup>¥</sup> Specialized services include specialist care for a diagnosis or consultation for a new or existing illness or condition; specialized diagnostic tests (non-emergency magnetic resonance (MR) imaging, computed tomography (CT) scanning, and angiography); elective (non-emergent) surgery

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## Exhibit 8A.28 | Percentage of adults aged 25 and older who reported difficulties accessing specialized services<sup>¥</sup> among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005 and 2007<sup>^</sup>

### FINDINGS

- Across all age groups, adults with an MSK condition were more likely to report difficulties accessing specialized services than adults without an MSK condition.
- Among women with an MSK condition, those aged 25-44 were more likely to report difficulties accessing specialized services than women aged 65 and older (35 percent versus 20 percent, respectively).
- Among men with an MSK condition, those aged 25-44 were more likely to report difficulties accessing specialized services than men aged 65 and older (29 percent versus 19 percent, respectively).
- Among women and men with an MSK condition access to specialized services did not vary by annual household income (data not shown).
- Among adults with an MSK condition, those with a Bachelor's degree or higher were more likely to report difficulties accessing specialized services than those with less than a secondary school education (33 percent versus 24 percent, respectively) (data not shown).
- There was significant variation across Local Health Integration Networks (LHINs). The percentages of those who reported difficulties accessing specialized services ranged from 18 percent in the South East LHIN to 36 percent in the Mississauga Halton and Waterloo Wellington LHINs (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

<sup>¥</sup> Specialized services include specialist care for a diagnosis or consultation for a new or existing illness or condition; specialized diagnostic tests (non-emergency magnetic resonance (MR) imaging, computed tomography (CT) scanning, and angiography); elective (non-emergent) surgery

\* Interpret with caution due to high sampling variability

POWER Study

## HOME CARE SERVICES

**Indicator:** This indicator measures the percentage of people aged 25 and older who reported that they received any government subsidized and/or privately paid home care services in the past year. We report the rates among people with a musculoskeletal (MSK) condition and among people without an MSK condition, with or without another chronic condition.

**Background:** Individuals with MSK conditions who require more home care services tend to be older women with more comorbid conditions. Uninsured costs to the individual or their family might deter patients from using appropriate levels of home care services. Receipt of home care services, particularly among those with limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL) (i.e., those who are moderately to severely disabled) is critical to allow people to continue to live independently in the community.

Data from the Canadian Community Health Survey (CCHS), 2005 and 2007 were used to measure this indicator. The CCHS includes a series of questions that ask respondents about their use of home care services in the past 12 months and also whether the costs are partially covered by the government or not covered (i.e., costs are borne by the individual). To determine the percentage of respondents who received any home care, the derived variable on home care use was used (see [Appendix 8.3](#) for more details).

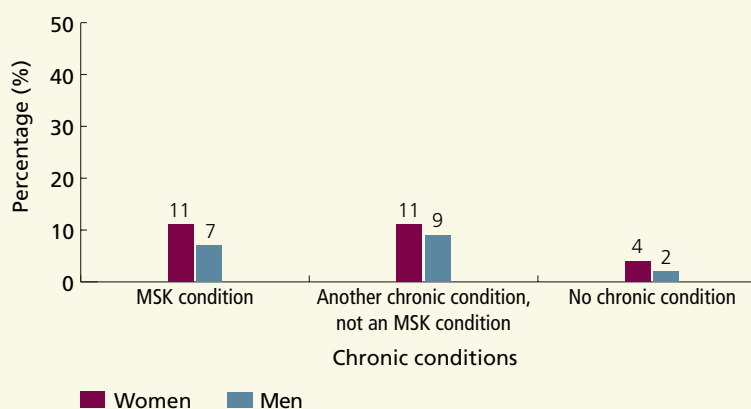
**Findings:** In Ontario, nine percent of individuals aged 25 and older with an MSK condition reported receiving any home care services compared to ten percent of adults with a chronic condition other than an MSK condition and three percent of adults with no chronic conditions. Among those with MSK conditions, women were more likely than men to report receiving any home care services (eleven percent versus seven percent, respectively) (see [Exhibit 8A.29](#)).



**Exhibit 8A.29** | Age-standardized percentage of adults aged 25 and older who reported receiving any home care services in the past 12 months among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005 and 2007

**FINDINGS**

- Women and men with an MSK condition or another chronic condition were more likely to report receiving home care services than those without chronic conditions.
- Women were more likely than men to receive home care services, irrespective of the presence of an MSK condition or another chronic condition.

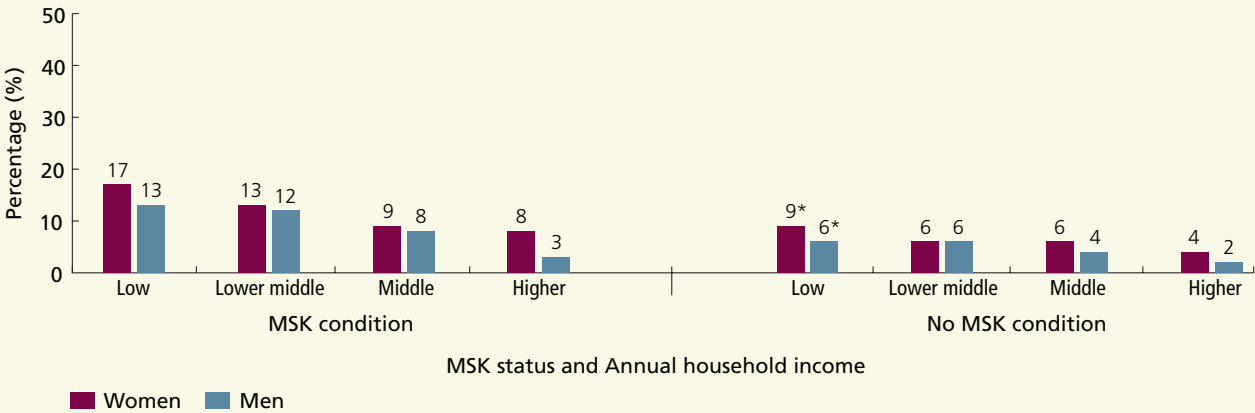


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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**Exhibit 8A.30** | Age-standardized percentage of adults aged 25 and older who reported receiving any home care services in the past 12 months among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario, 2005 and 2007



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

**FINDINGS**

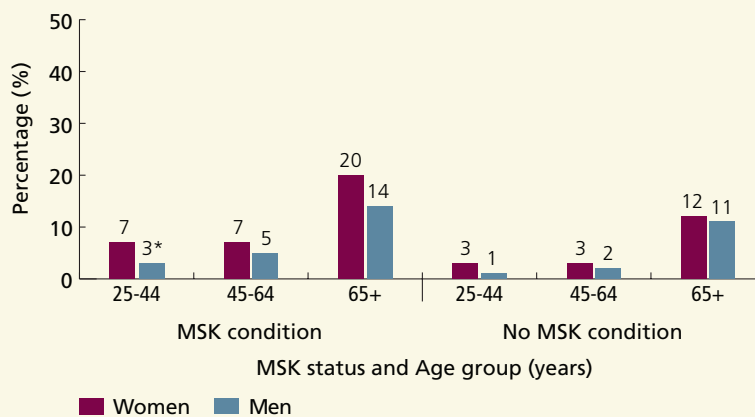
- The percentage of adults with an MSK condition who reported receiving any home care service varied by annual household income. Low-income women and men reported greater use of home care services than those with higher incomes.
- Among women with an MSK condition, the percentage receiving any home care services ranged from 17 percent among low-income women to eight percent among higher-income women.
- Among men with an MSK condition, the percentage receiving any home care services ranged from 13 percent among low-income men to three percent among higher-income men.
- Among adults with an MSK condition, higher-income women were more likely than men to receive any home care service (eight percent versus three percent, respectively).

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### Exhibit 8A.31 | Percentage of adults aged 25 and older who reported receiving any home care services among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and age group, in Ontario, 2005 and 2007

#### FINDINGS

- Regardless of age, women and men with an MSK condition were more likely than those without an MSK condition to receive any home care services.
- The percentage of adults who received any home care services increased with age, among those with and without an MSK condition.
- Among women with an MSK condition, seven percent of those aged 25-64 received some home care as compared to 20 percent of women aged 65 and older.
- Among men with an MSK condition, less than five percent of those aged 25-64 received any home care as compared to 14 percent of men aged 65 and older.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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## CONSULTATIONS WITH ALLIED HEALTH PROFESSIONALS

**Indicator:** These indicators measure the percentage of people aged 25 and older with musculoskeletal (MSK) conditions who reported seeing a physiotherapist or chiropractor at least once in the past 12 months.

**Background:** People with MSK conditions visit a physiotherapist or a chiropractor more often than people with other chronic conditions. Referral to rehabilitation professionals such as physiotherapists is part of clinical practice guidelines for arthritis, and treatment by physiotherapists or chiropractors is often part of the management of back pain.<sup>61, 62</sup> Since 2004 chiropractic and most physiotherapy services have not been covered by the Ontario Health Insurance Plan (OHIP), although some people may have coverage through supplementary health insurance. Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess these indicators. Respondents were asked if they had seen or talked on the telephone with a chiropractor or a physiotherapist in the past 12 months.

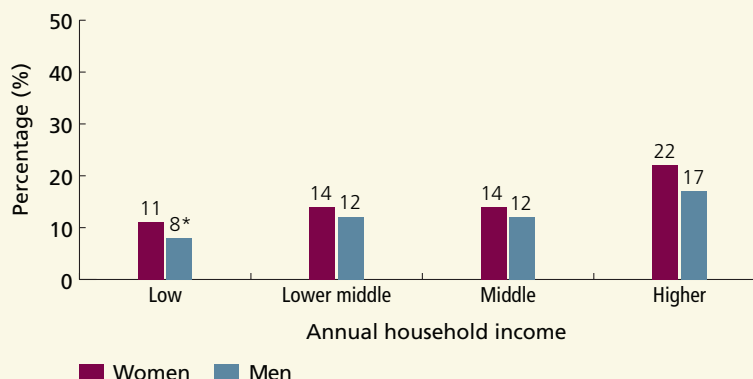
**Findings:** In Ontario, after adjusting for age, 15 percent of adults aged 25 and older with an MSK condition reported consulting with a physiotherapist at least once in the past 12 months and 18 percent reported consulting with a chiropractor. Women were more likely than men to have seen a physiotherapist (16 percent versus 13 percent, respectively); however women and men had similar rates of chiropractic use (18 percent and 19 percent, respectively).

**Exhibit 8A.32** | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who saw a physiotherapist or chiropractor in the past 12 months, by sex and annual household income, in Ontario, 2005 and 2007

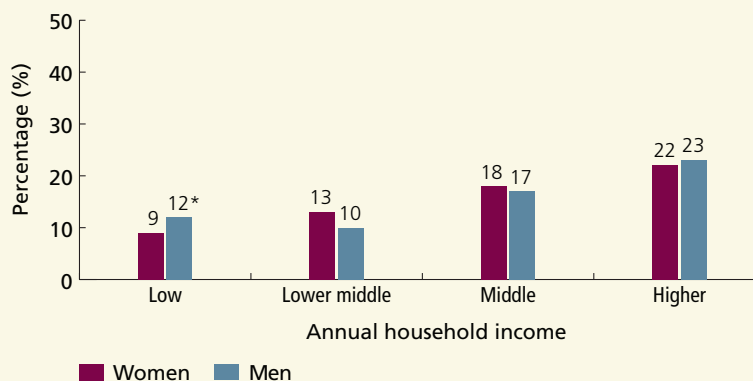
### FINDINGS

- Among adults with an MSK condition, the percentage of women and men who had seen a chiropractor or a physiotherapist varied by annual household income.
- Eleven percent of low-income women and 8 percent of low-income men had seen a physiotherapist in the past 12 months compared to 22 percent of higher-income women and 17 percent of higher-income men.
- Nine percent of low-income women and 12 percent of low-income men had seen a chiropractor in the past 12 months compared to 22 percent of higher-income women and 23 percent of higher-income men.
- Similar to the pattern seen for income, there was an education gradient in the percentage of adults who consulted with a physiotherapist; nine percent of adults with less than a high school education consulted with a physiotherapist as compared to 22 percent of those with a Bachelor's degree or higher (data not shown).
- Similarly for chiropractic care, 13 percent of adults with less than a high school education consulted with a chiropractor as compared to 21 percent of those with a Bachelor's degree or higher (data not shown).

### Physiotherapist



### Chiropractor



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

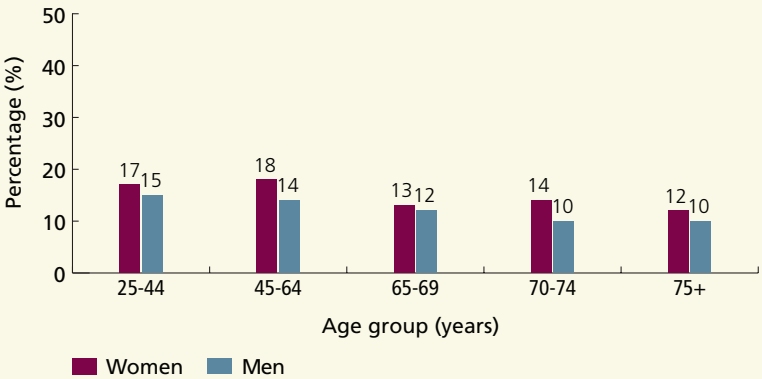
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**Exhibit 8A.33** | Percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who saw a physiotherapist or chiropractor in the past 12 months, by sex and age group, in Ontario, 2005 and 2007

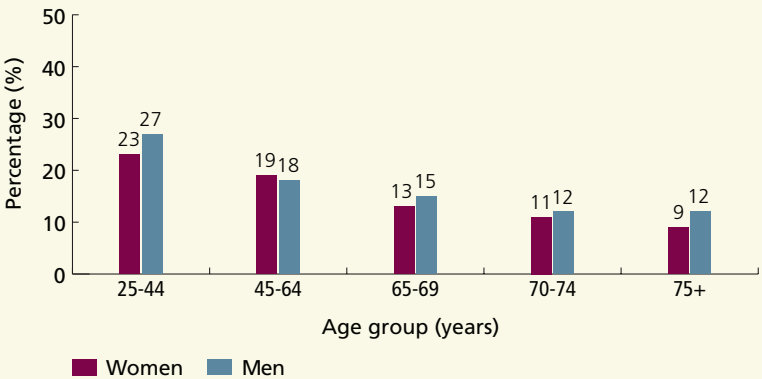
**FINDINGS**

- The percentage of adults with MSK conditions who reported consulting with a physiotherapist or a chiropractor decreased with age.
- The rates for physiotherapy ranged from 17 percent of women and 15 percent of men aged 25-44 to 12 percent of women and 10 percent of men aged 75 and older.
- Twenty-three percent of women and 27 percent of men aged 25-44 with an MSK condition saw a chiropractor as compared to nine percent of women and 12 percent of men aged 75 and older.

**Physiotherapist**



**Chiropractor**



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

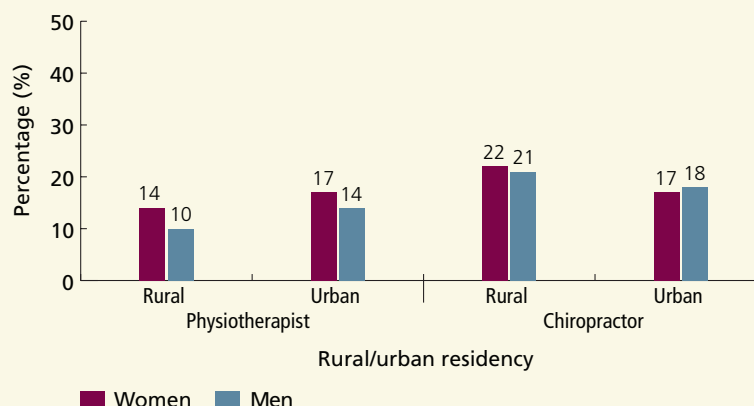
<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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**Exhibit 8A.34** | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who saw a physiotherapist or chiropractor in the past 12 months, by sex and rural/urban residency, in Ontario, 2005 and 2007

### FINDINGS

- Women and men with an MSK condition who lived in urban areas were more likely to consult with a physiotherapist than adults living in rural areas (17 percent of women and 14 percent of men versus 14 percent of women and ten percent of men, respectively).
- The reverse pattern was seen for chiropractic care. Twenty-two percent of women and 21 percent of men living in rural areas had seen a chiropractor in the previous year as compared to 17 percent of women and 18 percent of men living in urban areas.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of rural/urban residency

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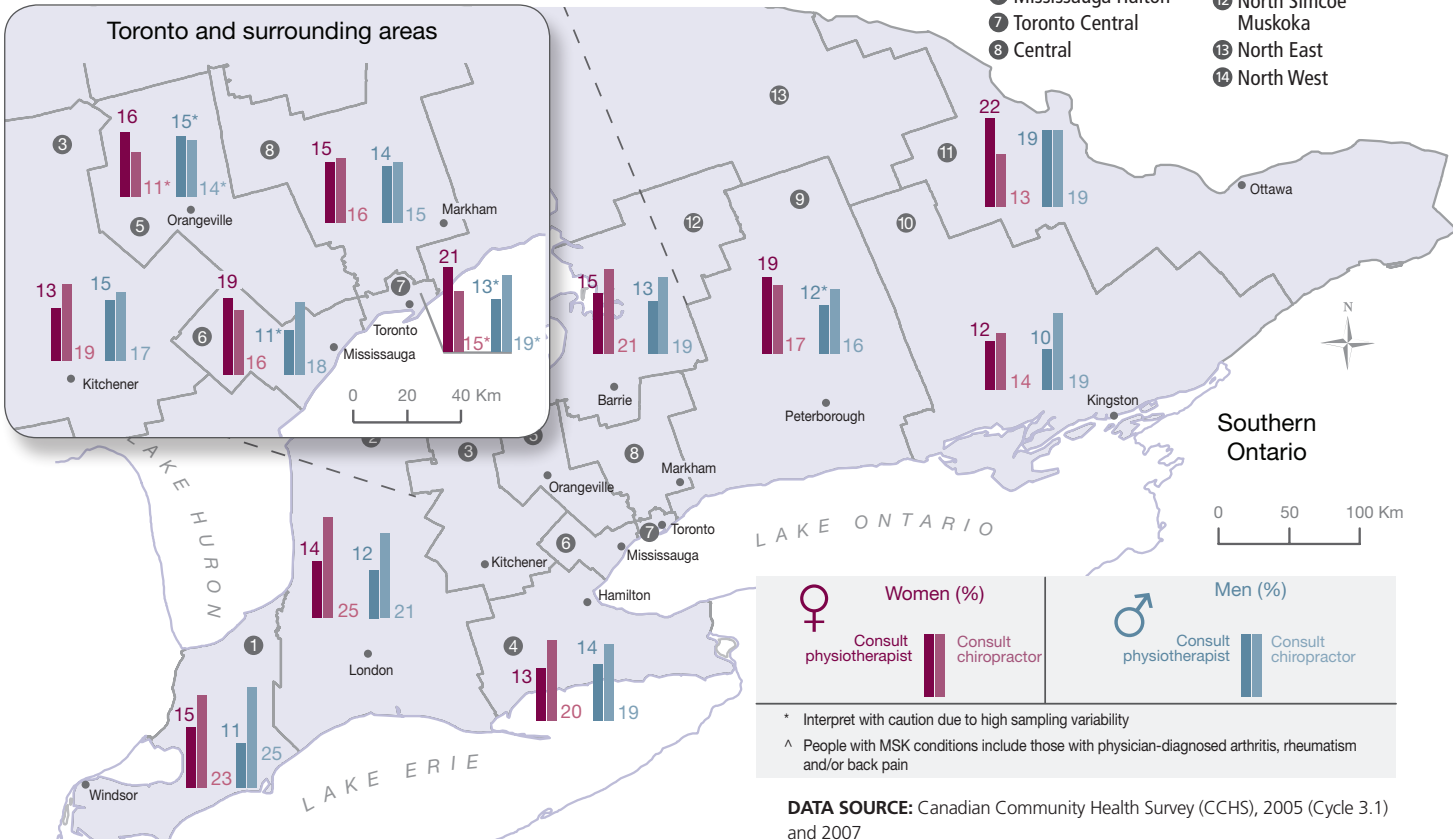


**Exhibit 8A.35** | Age-standardized percentage of adults aged 25 and older with a musculoskeletal (MSK) condition<sup>^</sup> who saw a physiotherapist or chiropractor at least once in the past 12 months, by sex and Local Health Integration Network (LHIN), in Ontario, 2005 and 2007

**FINDINGS**

- The percentage of adults with an MSK condition who consulted with a physiotherapist or a chiropractor in the previous 12 months varied across LHINs.
- The percentage of women who consulted with a physiotherapist ranged from 10 percent (North East LHIN) to 22 percent (Champlain LHIN). Among men, the percentage ranged from 10 percent (South East LHIN) to 19 percent (Champlain LHIN).
- The percentage of women who consulted with a chiropractor ranged from 11 percent (Central West LHIN) to 25 percent (South West LHIN). Among men, the percentage ranged from 14 percent (Central West LHIN) to 25 percent (Erie St. Clair LHIN).

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## INSURANCE COVERAGE FOR PRESCRIPTION MEDICATIONS

**Indicator:** This indicator measures the percentage of adults aged 25-64 with musculoskeletal (MSK) conditions who had some type of insurance that covered all or part of the cost of prescription medications. We also report the source of insurance—whether it is government-sponsored, employer-sponsored or privately paid.

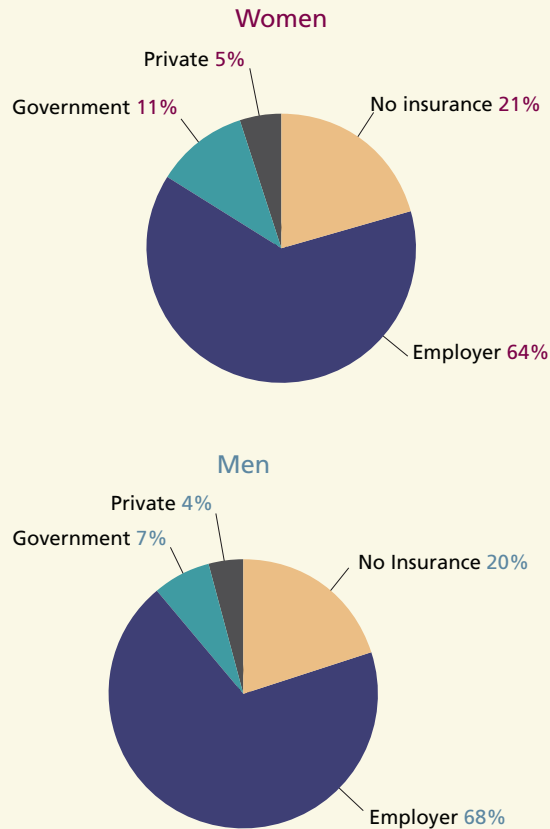
**Background:** Differences in insurance coverage will encourage or discourage people from seeking care or treatment for their health problems. This is particularly important for people with MSK conditions as care and pain control are hugely dependent on medications and services provided by health professionals. Among adults aged 25-64, the relative proportion of individuals with inflammatory arthritis conditions is higher than among older age groups, where degenerative osteoarthritis is most prevalent. For inflammatory arthritis, such as rheumatoid arthritis, the optimal use of disease modifying antirheumatic drugs (DMARDs)<sup>125-127</sup> and the availability of new biological agents<sup>128, 129</sup> has dramatically enhanced the success of medical management. Moreover, it has been recognized that early therapeutic intervention improves clinical outcomes and reduces the accrual of joint damage and disability.<sup>130-132</sup> However, these drugs are expensive. A survey of rheumatologists in Ontario was carried out in 2000 to assess practice patterns and perceived barriers to providing adequate rheumatology care.<sup>133</sup> The survey found that one of the most common barriers for patients was financial barriers such as affordability of drugs.<sup>133</sup> Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to assess this indicator. The sample was limited to adults aged 25-64 because in Ontario, residents who are aged 65 and older are eligible for provincial drug benefits through the Ontario Drug Benefits program.

**Findings:** In Ontario, among adults aged 25-64 with an MSK condition and after adjusting for age, 79 percent reported having health insurance that covered the costs of prescription medications. Women and men had similar rates of health insurance coverage (79 percent of women and 80 percent of men). The most common type of health insurance was employer sponsored (66 percent); nine percent of adults with an MSK condition had government-sponsored health insurance and five percent reported they had a private insurance plan (see [Exhibit 8A.36](#)).

**Exhibit 8A.36** | Type of health insurance held by adults aged 25-64 with a musculoskeletal (MSK) condition,<sup>^</sup> by sex, in Ontario, 2005

**FINDINGS**

- Overall, 79 percent of Ontarians with an MSK condition (79 percent of women and 80 percent of men) aged 25-64 reported having some type of prescription drug coverage; however this means that 21 percent, or one in five adults with an MSK condition did not have health insurance that covered their prescription medications.
- The percentage of adults with an MSK condition who reported having some type of prescription drug coverage did not vary by sex.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

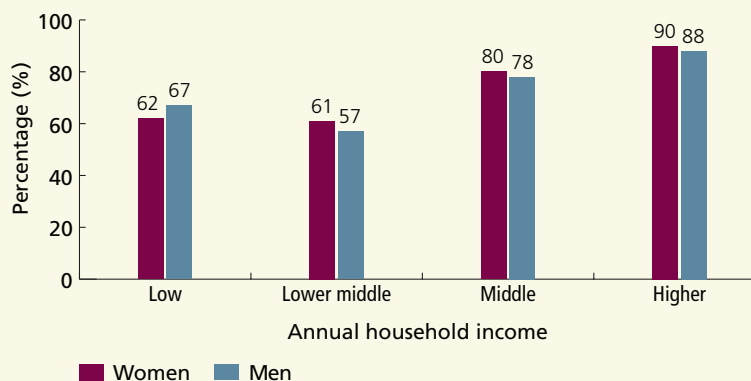
<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

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### Exhibit 8A.37 | Age-standardized percentage of adults aged 25-64 with a musculoskeletal (MSK) condition<sup>^</sup> who had prescription drug coverage, by sex and annual household income, in Ontario, 2005

#### FINDINGS

- There was an income gradient among adults who reported having prescription drug coverage.
- Sixty-four percent of low-income adults (62 percent of women and 67 percent of men) reported having prescription drug coverage compared to 89 percent of higher-income adults (90 percent of women and 88 percent of men).
- Adults with less than a secondary school education were less likely to have insurance for prescription medication than adults with a Bachelor's degree or higher (72 percent versus 85 percent, respectively) (data not shown).
- The percentage of men with an MSK condition who reported having some prescription drug insurance varied by age, 75 percent of men aged 25-44 as compared to 82 percent of men aged 45-64. The rates did not vary by age among women, 77 percent among women aged 25-44 compared to 80 percent among women aged 45-64 (data not shown).
- Among adults with an MSK condition prescription drug coverage varied by immigration, ethnicity and rural/urban residency. Immigrants were less likely than adults who were born in Canada to have any coverage (72 percent versus 82 percent, respectively). Adults from visible minority populations were less likely than White adults to have prescription drug coverage (72 percent versus 80 percent, respectively). Rural residents were less likely to have some prescription drug coverage than urban residents (75 percent versus 79 percent, respectively).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

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# Section 8A

## SUMMARY OF FINDINGS

This section reports on selected indicators for adults with a musculoskeletal (MSK) condition (arthritis or rheumatism and/or back pain) and compared to people without an MSK condition, with or without another chronic condition. The indicators include measures of morbidity, health and functional status, self-management and access and utilization of services. These indicators were evaluated using survey data and one indicator was evaluated using survey data linked to administrative data. Indicators were reported by income, education, age, ethnicity, immigration, rural/urban residency and Local Health Integration Network (LHIN) where data were available and sample sizes allowed.

### The indicators we report include:

- Health and functional status
  - Prevalence of at least one other chronic condition (comorbidity)
  - Prevalence of probable depression
  - Activity limitations
  - Limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)
  - Activities prevented by pain and discomfort
  - Labour force participation
  - Being overweight or obese
- Access and utilization of services
  - Multiple pain medication use
  - Unmet health care needs
  - Use of primary and specialty physician care
  - Difficulties accessing specialized services
  - Use of home care services
  - Consultation with allied health professionals (chiropractors or physiotherapists)
  - Insurance coverage for prescription medications

Findings for the indicators reported in this section are summarized below.

Women and men with an MSK condition were more likely to have other chronic conditions, had worse health and functional status, more unmet health care needs, higher health service utilization and greater difficulties accessing specialized services than adults without MSK conditions. Adults with an MSK condition were also more likely to be overweight or obese and were more likely to use multiple medications than those without an MSK condition. Among adults with MSK conditions, women were more likely than men to have worse health and functional status, including more than one chronic condition, probable depression, IADL and/or ADL limitations and to have activities prevented due to pain or discomfort. Women were also more likely than men to report unmet health care needs.

### Prevalence of at Least One Other Chronic Condition

Adults with an MSK condition were more than twice as likely to report having another chronic condition as adults without an MSK condition but with another chronic condition (38 percent versus 18 percent, respectively). Women with an MSK condition were more likely to have another chronic condition than men (40 percent versus 35 percent, respectively) and the prevalence of multiple chronic conditions increased with age. Low-income adults with an MSK condition were more likely to have more than one chronic condition as those with higher-incomes.

### Prevalence of Probable Depression

Adults with an MSK condition or with another chronic condition were more likely to have probable depression than adults without any chronic conditions (ten percent,

eight percent and four percent, respectively). Women with an MSK condition reported higher rates of probable depression than men (12 percent of women versus 7 percent of men); this pattern was also seen among adults without MSK conditions. As well, lower-income women with an MSK condition were more likely to have probable depression than higher-income women, 21 percent versus eight percent, respectively. A similar pattern was seen among men.

### **Activity Limitations, Limitations in IADLs and/or ADLs and Activities Prevented by Pain or Discomfort**

Rates of activity limitations, limitations in IADLs and/or ADLs and activities prevented by pain or discomfort were higher (10-20 percent higher rates) among adults with an MSK condition than among adults with another chronic condition and five- to ten-fold higher than among adults without any chronic conditions. Among adults with an MSK condition for all three measures of functional status, women were more likely to report limitations than men and the rates increased with age. These indicators also varied by annual household income. The percentage of adults reporting activity limitations ranged from 62 percent among low-income adults with an MSK condition to 47 percent among higher-income adults; limitations in IADLs and/or ADLs ranged from 46 percent among lower-income adults to 25 percent among higher-income adults and activities prevented by pain decreased from 52 percent (low-income adults) to 25 percent (higher-income adults).

### **Labour Force Participation**

Among adults with an MSK condition who were aged 25-64, 21 percent reported that they were without a job and had not looked for one in the past year. Women were more likely to be without a job than men (26 percent versus 14 percent, respectively). Rates also varied by income and by education; lower-income adults and those with less education were more likely to be without a job than their counterparts.

### **Overweight or Obese**

More than half of Ontario adults are overweight or obese. Adults with an MSK condition were more likely to be overweight or obese than adults without an MSK condition (60 percent versus 52 percent, respectively). Among adults with an MSK condition, women were less likely to be overweight than men (54 percent versus 67 percent, respectively). The percentage of adults with an MSK condition who were overweight or obese was higher among those with less education, those who were born in Canada and those living in rural areas as compared to their counterparts.

### **Multiple Pain Medication Use**

Adults with an MSK condition were more likely to be using at least two types of medications (pain relievers (narcotic and/or non-narcotic) and/or anti-depressants) in the past month than adults without an MSK condition but with another chronic condition (16 percent versus 9 percent, respectively). The percentage of adults with an MSK condition who reported using at least two types of the selected medications in the past month increased with the number of chronic conditions they had—from 14 percent among adults with an MSK condition only to 30 percent among adults with an MSK condition and at least two other chronic conditions. The percentage of adults with an MSK condition who reported taking at least two types of medications in the past month increased with age and was higher among low-income adults as compared to higher-income adults (22 percent versus 15 percent, respectively). Data for this indicator should be interpreted with caution due to lower response rates for narcotic use.

### **Unmet Health Care Needs**

Sixteen percent of adults with an MSK condition reported having unmet health care needs in the previous twelve months compared to 11 percent of adults with another chronic condition and seven percent of adults without any chronic conditions. Among adults with an MSK condition, women were more likely to report

unmet health care needs than men (18 percent versus 13 percent, respectively). Unmet health care needs decreased with age among adults with MSK conditions, from 23 percent among adults aged 25-44 to nine percent among adults aged 65 and older. In all but the oldest age group, women were more likely to report unmet health care needs than men. Unmet health care needs among women with an MSK condition varied by income and education; lower-income women were more likely to report unmet health care needs than higher-income women. Conversely, women with a Bachelor's degree or higher were more likely to report unmet health care needs than women with less than a high school education. Unmet health care needs did not vary by income and education among men with an MSK condition.

### **Use of Primary and Specialty Physician Care**

Fifty-eight percent of adults with an MSK condition had seen a primary care physician at least four times within one year and 57 percent had seen any type of specialist at least once during the same period. Utilization rates for adults with MSK conditions were similar to utilization rates for those with other chronic conditions, but higher than the rates for adults without any chronic conditions. Women with an MSK condition were more likely than men to have seen a primary care physician at least four times (63 percent versus 50 percent) or to have seen a specialist at least once (61 percent versus 51 percent) during the 12 month follow up. The percentage of adults who had seen a primary care physician four or more times or any type of specialist at least once increased with age and varied across LHINs. Adults with MSK conditions who were from visible minority groups were more likely than White adults to have seen a primary care physician four or more times during a 12 month period and adults living in urban areas were more likely than adults from rural areas to have seen a specialist during the one year period.

### **Difficulties Accessing Specialized Services**

Twenty-eight percent of adults with an MSK condition who reported needing specialized services reported difficulties accessing specialized services (specialist care, elective diagnostic testing and elective surgery) compared to 18 percent of adults with another chronic condition and 20 percent of adults with no chronic conditions. Among adults with an MSK condition, the percentage who reported difficulties accessing specialized services varied by age, education and Local Health Integration Network (LHIN). Younger adults and those with higher educational attainment were more likely to report difficulties accessing specialized services than their counterparts.

### **Use of Home Care Services**

Nine percent of adults with an MSK condition reported receiving home care services compared to ten percent of adults with another chronic condition and three percent of adults without any chronic conditions. Women with an MSK condition were more likely than men to receive home care services (11 percent versus 7 percent). Low-income adults were more likely to receive home care services than higher-income adults (15 percent versus 6 percent, respectively) and women and men aged 65 and older were more likely to receive home care services than adults aged 25-64.

### **Consultation with Allied Health Professionals (Chiropractors or Physiotherapists)**

Fifteen percent of adults with an MSK condition reported consulting with a physiotherapist at least once in the previous 12 months and 18 percent had consulted with a chiropractor during the same period. Use of physiotherapists and chiropractors increased with income and with educational attainment. Rates were also higher among adults aged 25-44 compared to those aged 75 and older. Adults living in rural areas were more likely than those living in urban areas to



have seen a chiropractor (21 percent versus 17 percent respectively) but were less likely to have seen a physiotherapist (12 percent versus 15 percent, respectively). Use of physiotherapy and chiropractic care among adults with an MSK condition also varied by LHIN.

### **Insurance Coverage for Prescription Medications**

In Ontario, adults aged 65 and older are eligible for provincial drug benefits. For those under age 65, insurance coverage for prescription medications may overcome financial barriers to adequate treatment. Among adults aged 25-64 with an MSK condition, 79 percent reported having some type of health insurance (private, employer-sponsored, government) that covered prescription medications, which means that one in five did not have prescription drug coverage. This did not vary by sex, but did vary by age (for men only), income and education. Low-income adults were less likely to have health insurance for prescription medications than higher-income adults, 64 percent versus 89 percent, respectively. A similar pattern was seen for educational attainment. Adults with an MSK condition who were immigrants, visible minorities and those from rural areas were less likely to have prescription drug coverage than their counterparts.





# Section 8B

## *Osteoarthritis*

### INTRODUCTION

Osteoarthritis is by far the most common type of arthritis.<sup>134-138</sup> Osteoarthritis usually affects the large weight-bearing joints (hips and knees), spine (neck and low back), hands and feet. Osteoarthritis results from mechanical and biological events affecting the joint cartilage and underlying bone. Risk factors for development of osteoarthritis include older age, female sex, joint injury (sports, occupational, trauma), genetic predisposition and metabolic factors, including obesity. The end result is destruction of all the joint tissues.<sup>139</sup> According to the ICES Atlas, 'Arthritis and Related Conditions in Ontario', 17.5 percent of the adult Ontario population has some form of arthritis or rheumatism, and the prevalence varies by sex—21.4 percent of women versus 13.2 percent of men.<sup>17</sup> Based on American data from the National Health and Nutrition Examination Survey (NHANES), between 75 and 80 percent of this population will have osteoarthritis.<sup>140-142</sup> Osteoarthritis-related symptoms and disability are more common among women than men<sup>1, 53, 143</sup> and among persons with lower socio-economic status,<sup>64, 144-146</sup> even after adjustment for lifestyle risk factors for osteoarthritis, such as obesity.

For individuals with osteoarthritis, progressive pain and joint stiffness results in reduced independence due to physical disability<sup>147</sup> and increased health care use.<sup>148</sup> Painful osteoarthritis has also been associated with sleep interruption,<sup>91-94</sup> psychological stress,<sup>95, 96</sup> worse self-reported health,<sup>97</sup> and decreased quality of life.<sup>98</sup> In people with hip or knee osteoarthritis—since pain is worse with weight-bearing—persistent pain often leads to avoidance of physical activities that exacerbate

the pain (such as walking and stair climbing), which leads to reduced physical fitness and increased muscle weakness.<sup>99-101</sup> This, in turn, worsens the joint disease, and increases the risk for falls and fracture. Among individuals with knee osteoarthritis, the presence and severity of knee pain are recognized risk factors for disability and worsening of the disease.<sup>134, 149-152</sup> Osteoarthritis is the second most frequent reason for a visit to a primary care physician; pain is the major symptom that causes patients to seek this care.<sup>29</sup> Painful osteoarthritis accounts for the highest rate of use of non-steroidal anti-inflammatory drugs<sup>102, 103</sup> and is the number one reason why people with osteoarthritis choose to undergo joint replacement surgery.<sup>1</sup>

Older people living with painful osteoarthritis (the majority of people with osteoarthritis are older) are at increased risk for depression and anxiety because of the stresses of living with chronic pain and associated disability, fatigue and poor sleep. Having depression and chronic painful osteoarthritis is associated with worse pain, more disability, less adherence to recommended treatments and—as a result—greater health care use and worse outcomes. As such, efforts to reduce the downstream effects of osteoarthritis on quality of life and costs in the population must address the pain associated with osteoarthritis.

Since there is no cure for osteoarthritis, current guidelines recommend a stepped, multidisciplinary approach to management to relieve pain and improve or maintain physical functioning.<sup>11, 153</sup> As for all types of arthritis, management should include: education around self-management; lifestyle interventions including

weight loss if appropriate; increased physical activity and use of aids and devices (e.g., canes and braces) to optimize functioning. Both prescription and non-prescription medications are recommended, starting with glucosamine or acetaminophen, and then—depending on the response—moving to stronger pain therapies, including non-steroidal anti-inflammatory drugs, joint injections, and ultimately, if required, opioid analgesics, such as acetaminophen with codeine. When these approaches are no longer sufficient to control the pain and disability, and when quality of life is no longer acceptable, total joint replacement surgery is recommended.<sup>154</sup>

Despite the availability of effective therapies for osteoarthritis, research to date indicates that major care gaps exist. A large proportion of individuals with advanced osteoarthritis remain undiagnosed and untreated.<sup>5</sup> Even among those who are diagnosed with osteoarthritis, few receive evidence-based comprehensive care.<sup>155</sup> Low referral rates for physiotherapy and occupational therapy,<sup>156</sup> underuse of effective pain therapies<sup>116</sup> and lack of identification of appropriate candidates for joint replacement surgery<sup>5</sup> result in many patients being referred late or never being referred for surgical consideration. Additionally, research indicates that among older individuals living with painful osteoarthritis, the downstream effects of the pain, including depression, are also unlikely to be diagnosed and treated.

Identified barriers to effective care for osteoarthritis include: primary care physicians' lack of confidence and skill in performing a joint examination necessary to diagnose arthritis;<sup>157</sup> cost barriers, such as for anti-inflammatory drugs and physiotherapy (as of April 1, 2005, the Ontario Health Insurance Plan (OHIP) no longer covers physiotherapy services for those under age 65 except in specific situations, such as following surgery); misperceptions by patients and their physicians about the risks and benefits of various drug therapies including fear of addiction;<sup>116</sup> the high proportion of these patients with other medical problems (e.g., hypertension or heart disease) that may prohibit safe use of

some osteoarthritis therapies and the societal belief that osteoarthritis is 'just' a normal part of aging, for which nothing can be done.

In this section, we report on indicators of osteoarthritis and examine differences associated with sex, age, neighbourhood income, rural/urban residency and Local Health Integration Network (LHIN). The indicators include:

- The prevalence of arthritis and/or rheumatism in the Ontario population
- The prevalence of moderate to severe osteoarthritis in two communities in Ontario
- Unmet need for total joint replacement (hip and knee) in two communities in Ontario
- Percentage undergoing planned primary total joint replacement (hip and knee) within recommended wait times
- Admission to inpatient rehabilitation after a total joint replacement
- Lengths of stay in inpatient rehabilitation after total joint replacement
- Prevalence of back problems

Data for the prevalence of osteoarthritis and low back pain in the Ontario population were from the Canadian Community Health Survey. The prevalence of moderate to severe hip and knee osteoarthritis was estimated using data from the Ontario Hip/Knee Osteoarthritis cohort. The cohort was also used to estimate unmet need for total joint replacement (hip and knee). Data on wait times for joint replacement surgery, admission to inpatient rehabilitation after surgery and lengths of stay for inpatient rehabilitation were from the Canadian Institute for Health Information Discharge Abstracts Database (CIHI-DAD), Ontario Health Insurance Plan (OHIP) database and the National Rehabilitation Reporting System (NRS). For further details on the databases or methods used to analyse each indicator, see [Appendix 8.3](#).

## EXHIBITS AND FINDINGS

### PREVALENCE OF ARTHRITIS AND RHEUMATISM

**Indicator:** This indicator measures the percentage of people aged 25 and older who reported having arthritis or rheumatism (excluding fibromyalgia) diagnosed by a health professional.

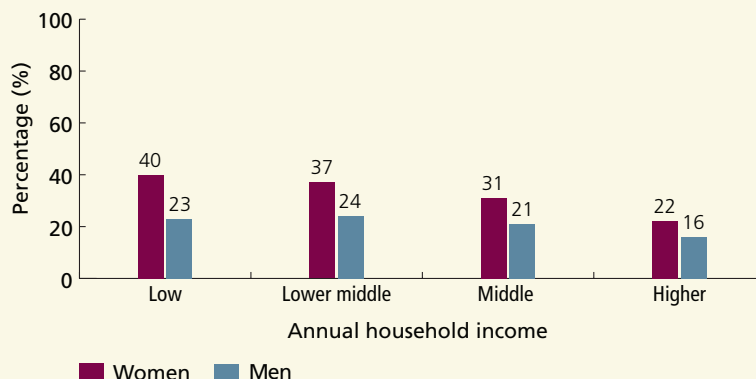
**Background:** Arthritis comprises over 100 different conditions and is the leading cause of deformity and long-term disability in Ontario. The burden of illness in the population due to arthritis is increasing due to increased longevity, reduced physical activity, increasing rates of obesity and lack of timely access to health care to mitigate disability. Together, arthritis is the foremost cause of disability, and has a major impact on the functioning and independence of the population.<sup>158</sup> Since arthritis often limits physical function and imposes significant pain and suffering, a high proportion of indirect costs are attributable to long-term disability, such as economic dependence and social isolation.<sup>29, 159-162</sup> Based on population projections and trends, it is estimated that the prevalence of arthritis will grow to 21-26 percent by 2021.<sup>163</sup> This increase is largely a result of increased population risk for these conditions related to increased longevity, reduced physical activity and increased obesity.<sup>161</sup> The most common form of arthritis, accounting for 75-80 percent of the prevalence, is osteoarthritis.<sup>140, 141</sup>

**Findings:** In Ontario, 25 percent of adults aged 25 and older reported having physician-diagnosed arthritis or rheumatism (excluding fibromyalgia). Women were significantly more likely than men to have arthritis or rheumatism (30 percent versus 19 percent, respectively).

### Exhibit 8B.1 | Age-standardized percentage of adults aged 25 and older who have arthritis or rheumatism,<sup>^</sup> by sex and annual household income, in Ontario, 2005

#### FINDINGS

- Irrespective of income, women were more likely to report having arthritis or rheumatism than men.
- The prevalence of arthritis or rheumatism varied by income for women and for men.
- Forty percent of low-income women reported having arthritis or rheumatism as compared to only 22 percent of higher-income women. Among men, the prevalence ranged from 23 percent among low-income men to 16 percent among higher-income men.
- A similar pattern was seen for education (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Physician-diagnosed arthritis or rheumatism, excluding fibromyalgia

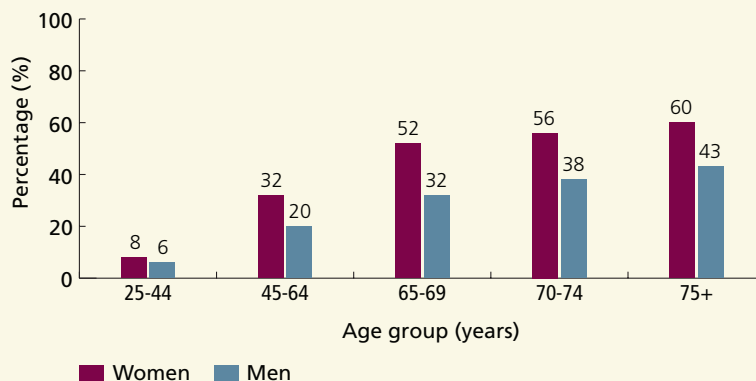
**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

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### Exhibit 8B.2 | Percentage of adults aged 25 and older who have arthritis or rheumatism,<sup>^</sup> by sex and age group, in Ontario, 2005

#### FINDINGS

- Across all age groups, women reported higher rates of arthritis or rheumatism than men.
- The prevalence of arthritis or rheumatism increased markedly with age.
- More than half of all women aged 65 and older reported having arthritis, including 60 percent of women aged 75 and older.
- Among men, the prevalence ranged from six percent among those aged 25-44 to 43 percent among men aged 75 and older.
- The prevalence of arthritis and rheumatism was higher among rural residents compared to urban residents (30 percent versus 24 percent) (data not shown).
- The prevalence of arthritis and rheumatism varied by Local Health Integration Network (LHIN) and ranged from 19 percent (Toronto Central LHIN) to 35 percent (North East LHIN) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Physician-diagnosed arthritis or rheumatism, excluding fibromyalgia

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## PREVALENCE OF MODERATE TO SEVERE OSTEOARTHRITIS

**Indicator:** This indicator measures the percentage of adults aged 55 and older from two Ontario communities (Oxford County and Borough of East York) who had moderate to severe hip/knee osteoarthritis.

**Background:** Osteoarthritis, a degenerative joint disease, is the most common type of arthritis, affecting an estimated ten percent of Canadian adults.<sup>161</sup> It is the most common chronic condition affecting older persons and risk factors include older age, obesity, previous joint injury and heredity.<sup>161</sup> Involvement of the hips and knees is associated with the greatest impact on pain and disability. Effective treatment can reduce pain and disability associated with osteoarthritis and can improve the quality of life for those affected. It is difficult to estimate the prevalence of osteoarthritis because confirmed cases are based on a combination of history, clinical examination and/or radiography. However, women have a higher prevalence of osteoarthritis than men<sup>149</sup> and more osteoarthritis-related disability.<sup>149</sup>

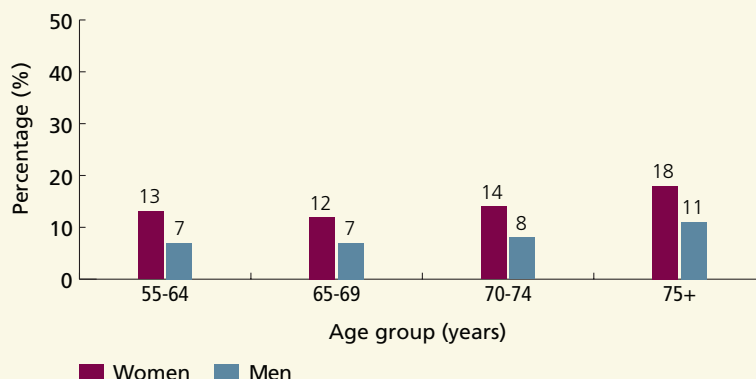
Data for this variable were derived from the Ontario Hip/Knee Osteoarthritis Cohort, which is comprised of people with moderate to severe hip/knee osteoarthritis from a rural community (Oxford County) and an urban community (the Borough of East York in Toronto) in Ontario, recruited between 1995 and 1997. On a screening survey of 100 percent of the population (n~ 50,000), individuals aged 55 and older were identified as having moderate to severe hip or knee osteoarthritis, and thus selected for cohort inclusion, if: they reported difficulty in the previous three months with each of stair climbing, rising from a chair, standing and walking; and they reported swelling, pain or stiffness in any joint lasting at least six weeks; and they indicated on a diagram that a hip or knee had been 'troublesome'. Ninety-six percent of those who met these criteria had hip or knee osteoarthritis on examination. This population cohort is unique; although the data are not current, no other similar data are available that provides information on diagnosis and disease severity in a population-based cohort. We believe these findings most likely reflect current patterns of the disease though there may have been some increases in disease prevalence due to rising rates of obesity (see [Appendix 8.3](#) for details on the cohort).

**Findings:** In two Ontario communities (Oxford County and the Borough of East York), 12 percent of adults aged 55 and older had moderate to severe hip or knee osteoarthritis. Women were more likely than men to have at least moderate hip or knee osteoarthritis (14 percent versus 8 percent, respectively).

### Exhibit 8B.3 | Percentage of adults aged 55 and older who had moderate to severe hip or knee osteoarthritis,<sup>^</sup> by sex and age group, in two Ontario communities, 1995-1997

#### FINDINGS

- Across all age groups, women were more likely to have moderate to severe hip or knee osteoarthritis than men.
- The percentage of adults reporting moderate to severe disease increased with age.
- Thirteen percent of women and seven percent of men aged 55-64 had moderate to severe hip or knee osteoarthritis as compared to 18 percent of women and 11 percent of men aged 75 and older.



**DATA SOURCE:** Ontario Hip/Knee Osteoarthritis Cohort

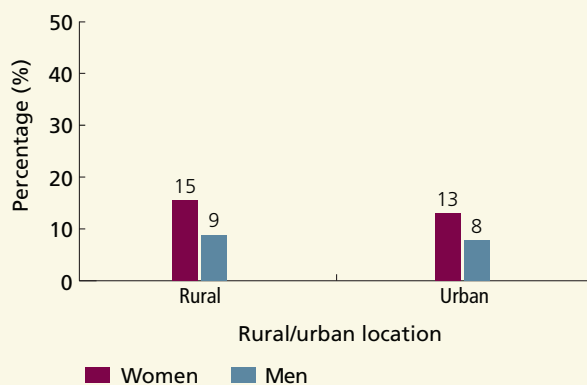
<sup>^</sup> Defined as difficulty in the previous three months with each of stair climbing, rising from a chair, standing and walking; and they reported swelling, pain or stiffness in any joint lasting at least six weeks; and the respondent indicated on a diagram that a hip or knee had been 'troublesome'.

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### Exhibit 8B.4 | Age-standardized percentage of adults aged 55 and older who had moderate to severe hip or knee osteoarthritis,<sup>^</sup> by sex and rural/urban location, in two Ontario communities, 1995-1997

#### FINDINGS

- In both the rural and urban communities, women were more likely to have moderate to severe osteoarthritis than men.
- Adults from the rural community were more likely to have moderate to severe hip or knee osteoarthritis than those from the urban community, though these differences were small (12 percent versus 10 percent, respectively).
- Women from the rural community were more likely to have moderate to severe hip or knee osteoarthritis than women from the urban community (15 percent versus 13 percent, respectively).
- Similarly, men from the rural community were more likely to have moderate to severe disease than men from the urban community (nine percent versus eight percent, respectively).



**DATA SOURCE:** Ontario Hip/Knee Osteoarthritis Cohort

<sup>^</sup> Defined as difficulty in the previous three months with each of stair climbing, rising from a chair, standing and walking; and they reported swelling, pain or stiffness in any joint lasting at least six weeks; and the respondent indicated on a diagram that a hip or knee had been 'troublesome'.

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## UNMET NEED FOR TOTAL JOINT REPLACEMENT (HIP AND KNEE)

**Indicator:** This indicator measures the percentage of Ontario Hip/Knee Osteoarthritis Cohort participants with moderate to severe osteoarthritis deemed to be good candidates for total joint replacement (hip or knee) who were not on a waiting list for surgery (potential need). The results were also reported after adjusting for willingness to undergo surgery (unmet need).

**Background:** Currently, there is no cure for osteoarthritis, a disease of fluctuating symptoms and/or relatively slow progression.<sup>53</sup> For individuals with advanced hip or knee osteoarthritis in whom medical treatment has failed, total joint replacement has become the accepted treatment.<sup>164-166</sup> Total joint replacement ranks near the top among medical and surgical interventions in its cost-effectiveness and capacity to improve quality of life.<sup>164</sup> In 2004/05, Canadians underwent 58,714 hip and knee arthroplasties—an 86.6 percent increase over rates reported a decade earlier.<sup>167</sup> Due to technical advances and expanded indications for the procedure, this increase has been disproportionately greater in the 'younger' (45-54) and 'older' (85+) age groups.<sup>167, 168</sup> However, studies suggest total joint replacement is under utilized, particularly among women, certain racial or ethnic minority groups and people of lower socioeconomic status.<sup>1, 169-175</sup>

Data for this variable were derived from the Ontario Hip/Knee Osteoarthritis Cohort, which is comprised of people with moderate to severe hip/knee osteoarthritis from a rural community (Oxford County) and an urban community (the Borough of East York in Toronto) in Ontario, recruited between 1995 and 1997. On a screening survey of 100 percent of the population (n~50,000), individuals aged 55 and older were identified as having moderate to severe hip or knee osteoarthritis, and thus selected for cohort inclusion if: they reported difficulty in the previous three months with each of stair climbing, rising from a chair, standing and walking; and they reported swelling, pain or stiffness in any joint lasting at least six weeks; and they indicated on a diagram that a hip or knee had been 'troublesome'. Ninety-six percent of those who met these criteria had hip or knee osteoarthritis on examination (see [Appendix 8.3](#) for details on cohort). Cohort participants were defined as having "potential need" for total joint replacement based on the following criteria: a Western Ontario McMaster University Osteoarthritis Index summary score of at least 39/100, radiographic and clinical evidence of arthritis of the hip or knee, and no absolute contraindications to total joint replacement.<sup>1</sup> "Unmet need" for surgery was defined as having potential need for surgery and reporting willingness (probably or definitely) to undergo the surgery. Socioeconomic status and social circumstances may influence willingness to undergo surgery. This population cohort is unique; although the data are not current, no other similar data are available that provide diagnosis and disease severity in a population-based cohort. We believe these findings most likely reflect current patterns.

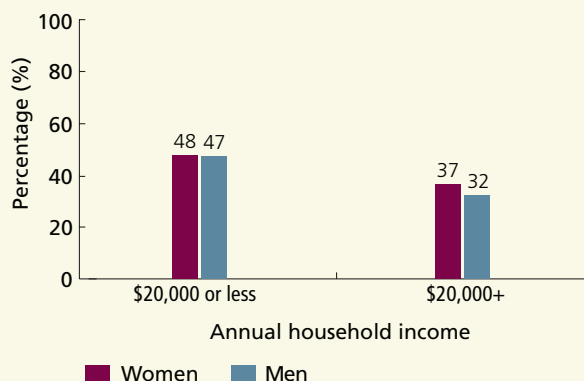
**Findings:** In the Ontario Hip/Knee Osteoarthritis Cohort, 45 percent of women and 39 percent of men with moderate to severe hip or knee osteoarthritis had a potential need for hip/knee total joint replacement, but were not on a waiting list for surgery. After adjusting for willingness to undergo surgery (unmet need), 29 percent of women and 30 percent of men needed and were willing to undergo hip/knee total joint replacement, but were not on a waiting list for surgery.

**Exhibit 8B.5** | Percentage of Ontario Hip/Knee Osteoarthritis Cohort participants aged 55 and older who were candidates for total joint replacement (hip or knee)<sup>^</sup> who were not currently on a wait list for surgery, by sex and annual household income, 1995-1997

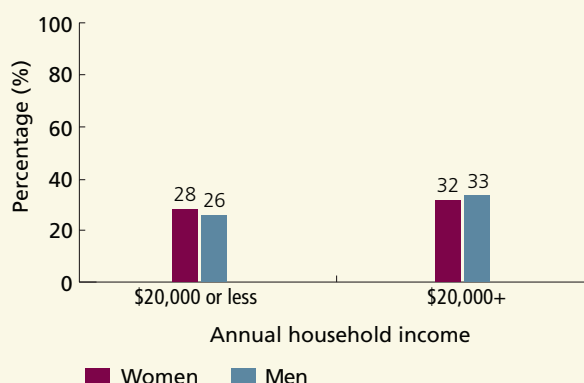
### FINDINGS

- Lower-income women and men had a greater potential need for total joint replacement (hip or knee) than those from higher-income areas.
- After adjusting for willingness to undergo surgery, the unmet need for total joint replacement (hip or knee) was higher among higher-income women and men as compared to lower-income women and men. This was due to less willingness among lower-income adults to undergo surgery.
- Across all age groups, women were more likely to have potential need and unmet need for total joint replacement (hip or knee) than men. Unmet need for surgery was also higher in adults age 55-64 and aged 75 and older compared to those age 65-74 (data not shown).
- Willingness to consider total joint replacement (hip or knee) as a treatment option was similar among men and women, but for both sexes, declined with increasing age, was higher in the rural than in the urban community, and lower in those with lower education and income (data not shown).

### Potential need



### Unmet need (probably or definitely willing to undergo surgery)



**DATA SOURCE:** Ontario Hip/Knee Osteoarthritis cohort

<sup>^</sup> Candidates for total joint replacement had a Western Ontario McMaster University Osteoarthritis Index summary score of >39, radiographic and clinical evidence of arthritis of the hip or knee and no absolute contraindications to total joint replacement

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## PERCENTAGE UNDERGOING PLANNED PRIMARY TOTAL JOINT REPLACEMENT (HIP AND KNEE) WITHIN RECOMMENDED WAIT TIMES (26 WEEKS)

**Indicator:** This indicator measures the percentage of adults aged 20 and older who received an elective primary total joint replacement within the recommended wait time of 26 weeks. The population was limited to adults who had not undergone a joint replacement in Ontario within the previous five years.

**Background:** When non-surgical interventions have failed to adequately control symptoms, total joint replacements are highly beneficial and cost-effective procedures for reducing pain, improving quality of life and restoring functional ability and mobility. The impact of prolonged wait times is the pain and functional disability experienced by patients, which can be considerable. In 2004, fewer than 50 percent of patients in Ontario received their elective joint replacements within the recommended wait time of six months. It was reported in ICES Atlas titled 'Access to health services in Ontario' (2005) that about 20 percent of total hip replacement patients and 30 percent of total knee replacement patients waited more than one year for surgery.<sup>176</sup> Furthermore, there is evidence that regional variations in procedure rates exist. Factors that contribute to geographical variation in procedure rates include disease burden, access to orthopaedic surgeons and family doctors, surgeons' access to hospital beds and operating room time, physician enthusiasm and patient preference.<sup>176</sup>

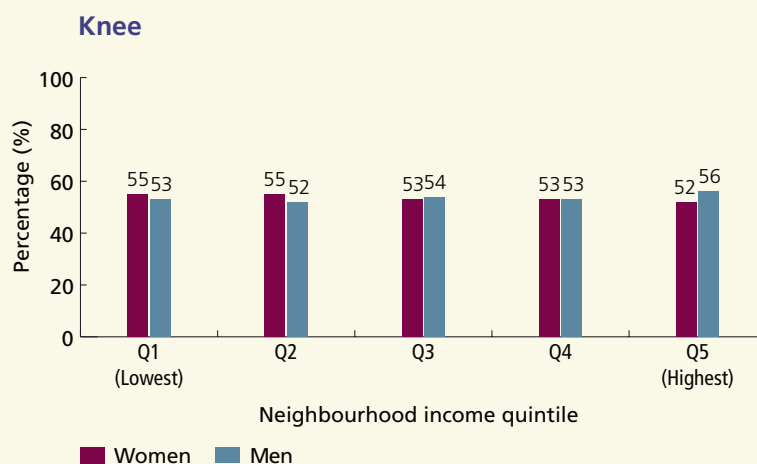
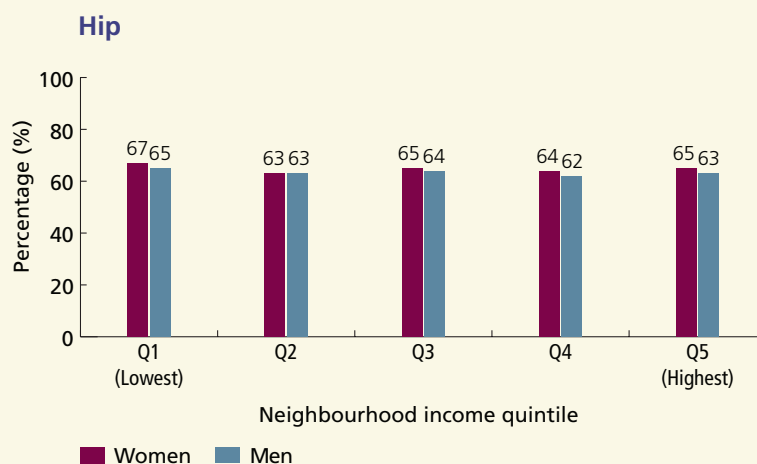
Wait times were calculated for all adults who had undergone an elective, primary hip or knee replacement, excluding replacements associated with a diagnosis of cancer, fracture or trauma. The wait time was calculated from the date of the most recent surgical consult (prior to surgery) to the admission date when the surgery occurred, based on routinely collected administrative data. The measurement of wait times does not take into consideration the period prior to when the decision to undergo surgery was made or the delay between the referral to an orthopaedic surgeon and the first visit, which may also vary regionally and by other patient and provider characteristics. A limitation of this measure is that it does not capture referral biases or delays in referral for joint replacements. Our objective was to determine whether wait times differed by sex or socioeconomic status. More recent data are now available that assess current wait times for these procedures.

**Findings:** In Ontario, 64 percent of adults (65 percent of women and 63 percent of men) underwent an elective primary total hip replacement and 54 percent of women and 54 percent of men underwent an elective primary total knee replacement within the recommended wait time of 26 weeks in 2007/08. The percentage of women and men undergoing joint replacement within the recommended wait time did not vary for either type of replacement.

**Exhibit 8B.6** | Percentage of adults aged 20 and older who received an elective primary total joint replacement within the recommended wait time of 26 weeks, by sex, procedure type and neighbourhood income quintile, in Ontario, 2007/08

### FINDINGS

- Across neighbourhood income quintiles, the percentage of women and men who underwent total hip replacements or total knee replacements within the recommended wait time of 26 weeks did not vary by sex.
- There was no income variation in the percentage of women or men who underwent a total hip or knee replacement within the recommended wait time.

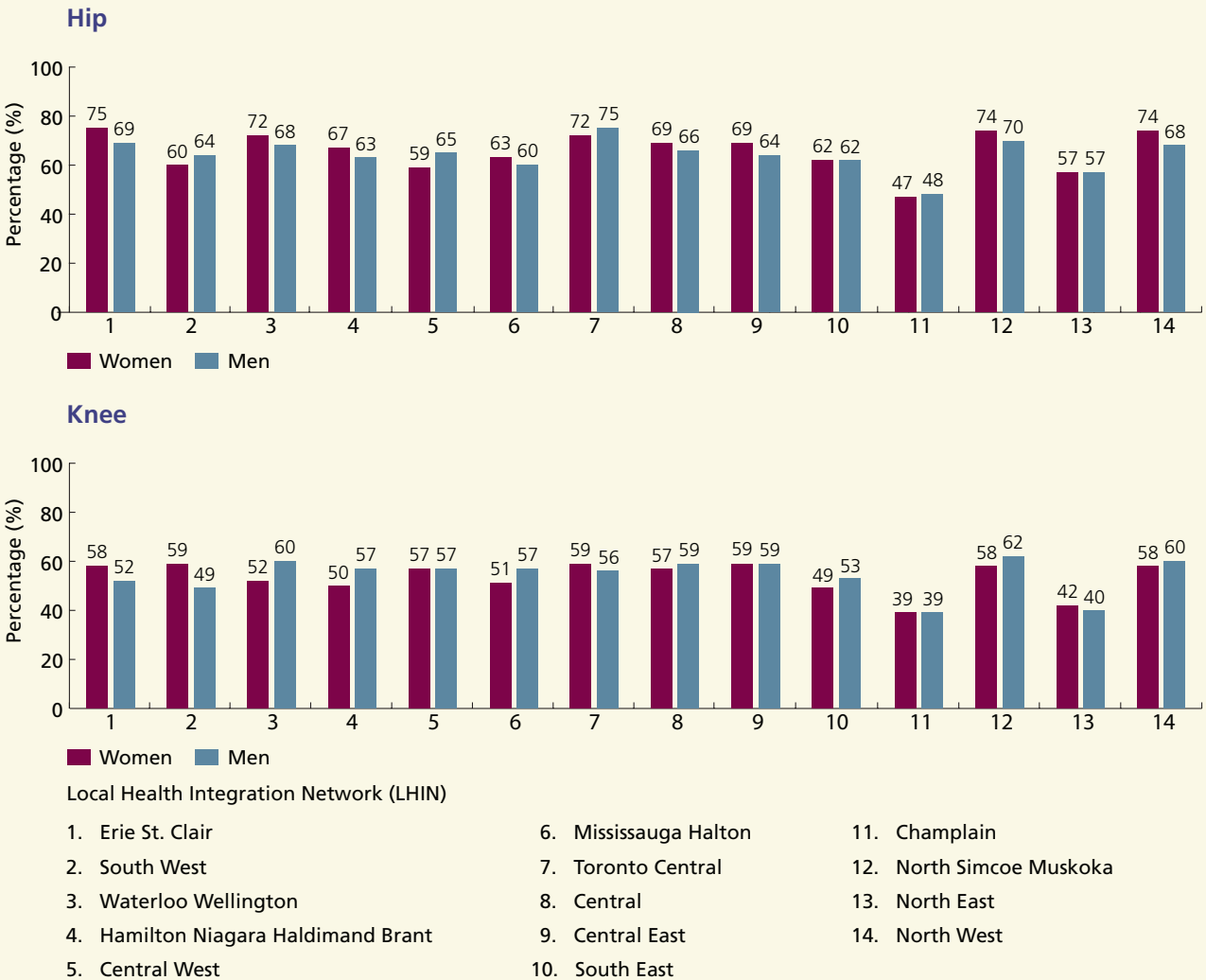


**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census

**NOTE:** See [Appendix 8.3](#) for details on neighbourhood income quintile calculation

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**Exhibit 8B.7** | Percentage of adults aged 20 and older who received an elective primary total joint replacement within the recommended wait time of 26 weeks, by sex, procedure type and Local Health Integration Network (LHIN), in Ontario, 2007/08



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP)

### FINDINGS

- The percentage of adults who received an elective primary total joint replacement within the recommended wait time period of 26 weeks varied across LHINs.
- The percentage of women who had an elective primary total hip replacement within the recommended wait time ranged from 47 percent (Champlain LHIN) to 75 percent (Erie St. Clair LHIN). Among men, the percentage ranged from 48 percent (Champlain LHIN) to 75 percent (Toronto Central LHIN).
- The percentage of women who had an elective primary total knee replacement within the recommended wait time ranged from 39 percent (Champlain LHIN) to 59 percent (South West, Toronto Central, and Central East LHINs). Among men, the percentage ranged from 39 percent (Champlain LHIN) to 62 percent (North Simcoe Muskoka LHIN).

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## ADMISSION TO INPATIENT REHABILITATION AFTER A TOTAL JOINT REPLACEMENT (HIP OR KNEE)

**Indicator:** This indicator measures the percentage of adults aged 20 and older who underwent an elective primary total joint replacement who were admitted to an inpatient rehabilitation bed within 14 days of being discharged. The population was limited to adults who had not undergone a joint replacement in Ontario within the previous five years and who had some type of post-discharge care.

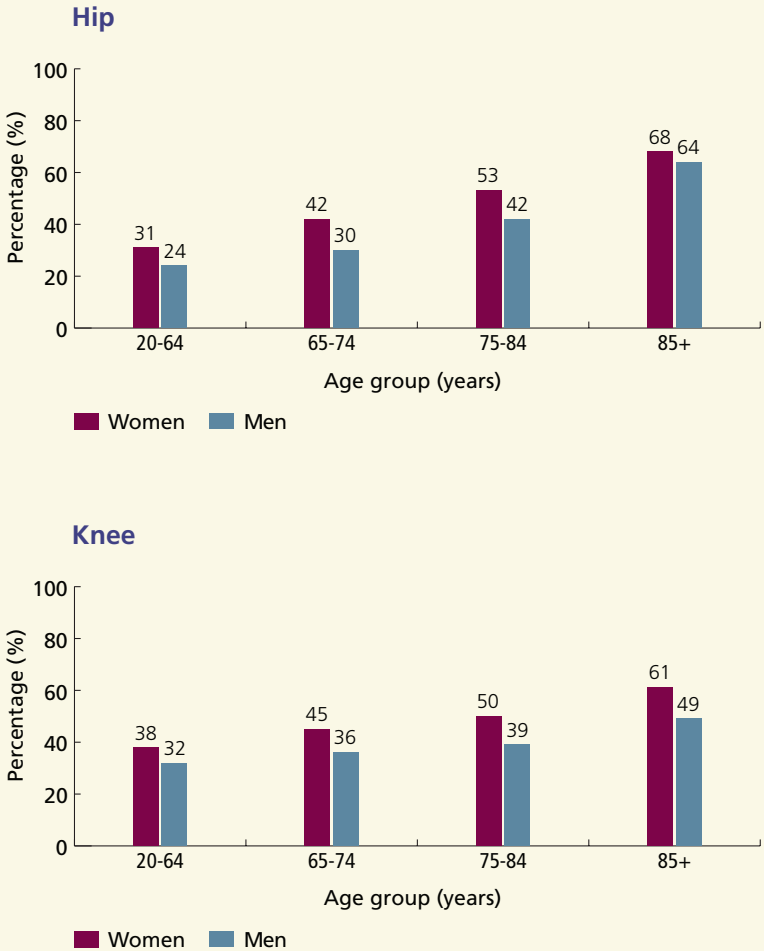
**Background:** After total joint replacement, rehabilitation is essential to improve function and maximize surgical outcomes.<sup>177</sup> Intense rehabilitation is required for total hip and knee replacements and should begin in the early post-operative period and continue in the post-acute care phase.<sup>177</sup> Rehabilitation can be provided in outpatient or inpatient settings. In studies examining rehabilitation options, three patient characteristics were consistently reported among those who received inpatient rehabilitation: older age, living alone, and having more comorbidity.<sup>177</sup> An Ontario study found similar associations but also reported significant geographic variation in inpatient rehabilitation rates.<sup>177</sup> Individuals who cannot effectively participate in outpatient rehabilitation for clinical reasons or lack of support at home benefit from inpatient rehabilitation.

**Findings:** In Ontario, among adults aged 20 and older who received some type of post-discharge care, 38 percent who had an elective primary total hip replacement and 42 percent who had an elective primary knee replacement were admitted within 14 days to a rehabilitation hospital or an acute care hospital with a prescription for rehabilitation. Women were more likely than men to be admitted for rehabilitation after a hip replacement (42 percent versus 32 percent, respectively) or a knee replacement (45 percent versus 36 percent, respectively).

**Exhibit 8B.8** | Percentage of adults aged 20 and older who were admitted to inpatient rehabilitation<sup>^</sup> following an elective primary total joint replacement, by sex, procedure type and age group, in Ontario, 2006/07

**FINDINGS**

- Women were more likely than men to be admitted to inpatient rehabilitation after a total joint replacement (hip or knee), irrespective of age.
- As age increased, the percentage of women and men who underwent a total hip or knee replacement who were admitted to inpatient rehabilitation increased.
- Among adults who had a primary total hip replacement, 28 percent of those age 20-64 (31 percent of women and 24 percent of men) and 67 percent of those aged 85 and older (68 percent of women and 64 percent of men) were admitted to inpatient rehabilitation.
- For adults who had a total knee replacement, 36 percent of those age 20-64 (38 percent of women and 32 percent of men) and 57 percent of those aged 85 and older (61 percent of women and 49 percent of men) were admitted to inpatient rehabilitation.
- Income was not associated with admission to inpatient rehabilitation after a total hip or knee replacement (data not shown).
- Among adults who had a primary total hip or knee replacement, women and men from rural areas were less likely than those from urban areas to be admitted to inpatient rehabilitation within 14 days; 23 percent versus 40 percent, respectively for total hip replacements and 24 percent versus 45 percent, respectively for total knee replacements (data not shown).

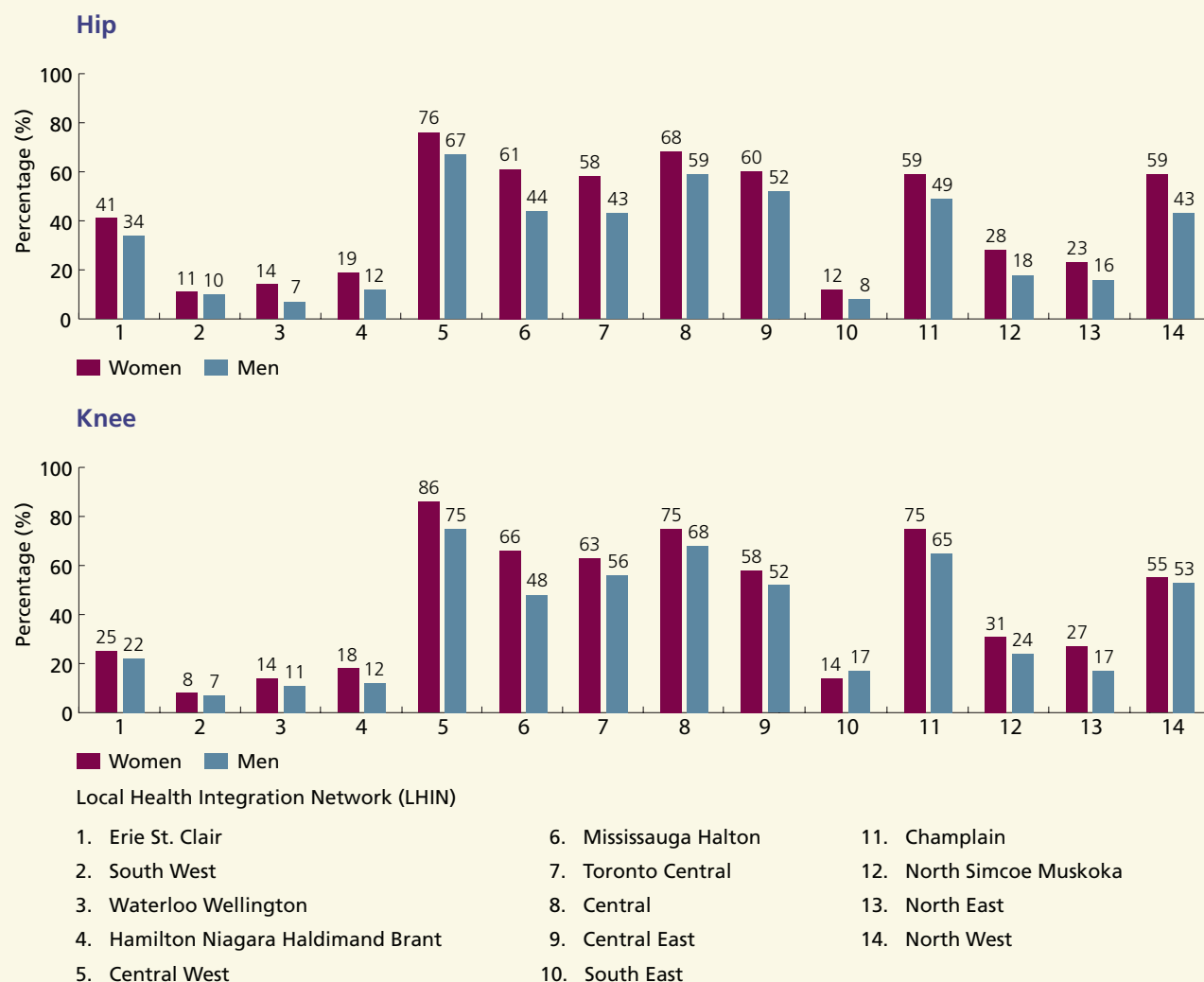


**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); CIHI National Rehabilitation System (NRS)

<sup>^</sup> Inpatient rehabilitation included admission to a rehabilitation hospital or to another acute care hospital within 14 days of discharge from hospital after a joint replacement for patients who received some post-discharge care

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**Exhibit 8B.9** | Age-standardized percentage of adults aged 20 and older who were admitted to inpatient rehabilitation<sup>^</sup> following a primary total joint replacement, by sex, procedure type and Local Health Integration Network (LHIN), in Ontario, 2006/07



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); CIHI National Rehabilitation System (NRS)

<sup>^</sup> Inpatient rehabilitation included admission to a rehabilitation hospital or to another acute care hospital within 14 days of discharge from hospital after a joint replacement for patients who received some post-discharge care

## FINDINGS

- The percentage of adults who were discharged to inpatient rehabilitation following a primary total joint replacement varied across LHINs.
- The percentage of women who were discharged to inpatient rehabilitation following a primary total hip replacement ranged from 11 percent (South West LHIN) to 76 percent (Central West LHIN). Among men, the percentages ranged from seven percent (Waterloo Wellington LHIN) to 67 percent (Central West LHIN).
- The percentage of women who were discharged to inpatient rehabilitation following a primary total knee replacement ranged from eight percent (South West LHIN) to 86 percent (Central West LHIN). Among men, the percentages ranged from seven percent (South West LHIN) to 75 percent (Central West LHIN).

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## LENGTH OF STAY IN INPATIENT REHABILITATION AFTER TOTAL JOINT REPLACEMENT (HIP OR KNEE)

**Indicator:** This indicator measures the mean length of stay (days) for adults aged 20 and older admitted to inpatient rehabilitation following an elective primary joint replacement (total hip replacement or total knee replacement). The population was limited to adults who had not undergone a joint replacement in Ontario within the previous five years and who were admitted to inpatient rehabilitation.

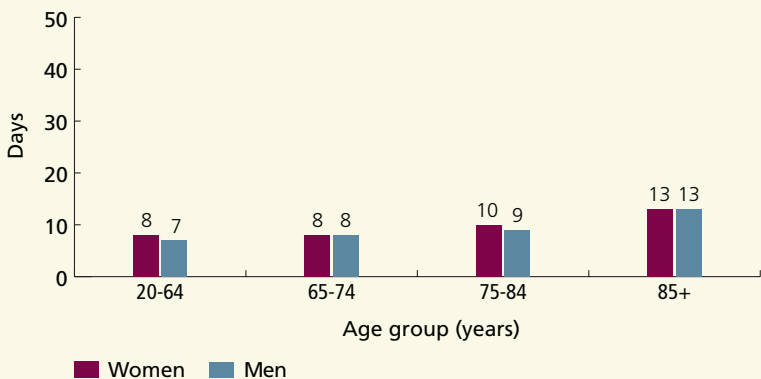
**Background:** After total joint replacement, rehabilitation is essential to improve function.<sup>177</sup> Lengths of stay for inpatient rehabilitation are known to vary by age, sex, comorbidity and the area of residency.<sup>177</sup> According to the ICES Atlas 'Arthritis and related conditions in Ontario', compared to other musculoskeletal conditions, patients with total joint replacement had relatively short inpatient rehabilitation stays.<sup>177</sup> However, older women with other health conditions are more likely to have longer inpatient rehabilitation lengths of stay following total hip replacement and total knee replacement.<sup>177</sup>

**Findings:** In Ontario, the mean lengths of stay for inpatient rehabilitation for adults aged 20 and older who were admitted to inpatient rehabilitation following an elective primary joint replacement was 9 days for women and 8 days for men.

**Exhibit 8B.10** | Mean length of stay (in days) for inpatient rehabilitation for adults aged 20 and older following an elective primary total joint replacement, by sex and age group, in Ontario, 2006/07

**FINDINGS**

- The mean lengths of stay for inpatient rehabilitation following elective total joint replacement increased with age. Women and men aged 85 and older had a mean length of stay of 13 days as compared to 8 days (8 days for women and 7 days for men) for those aged 20-64.
- The mean lengths of stay for inpatient rehabilitation following elective total joint replacement varied across Local Health Integration Networks (LHINs), from 7 days (North West LHIN) to 15 days (South East LHIN) (data not shown).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); CIHI National Rehabilitation System (NRS)

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## PREVALENCE OF BACK PROBLEMS

**Indicator:** This indicator measures the percentage of people aged 25 and older who reported having back problems, excluding fibromyalgia and arthritis, diagnosed by a health professional.

**Background:** Back pain is an important public health problem in all industrialized nations.<sup>178-181</sup> Back pain generally includes neck and low back pain associated with degenerative musculoskeletal conditions, mainly osteoarthritis. Although most people appear to recover quickly from an episode of low back pain, a significant minority develop long-term disability and/or severe pain, especially women.<sup>178, 180</sup> Back pain is reported more frequently than arthritis in women under age 45 and arthritis is reported more frequently than back pain by women aged 45 and older. For men back pain is more frequently reported than arthritis for men under age 55.<sup>182</sup>

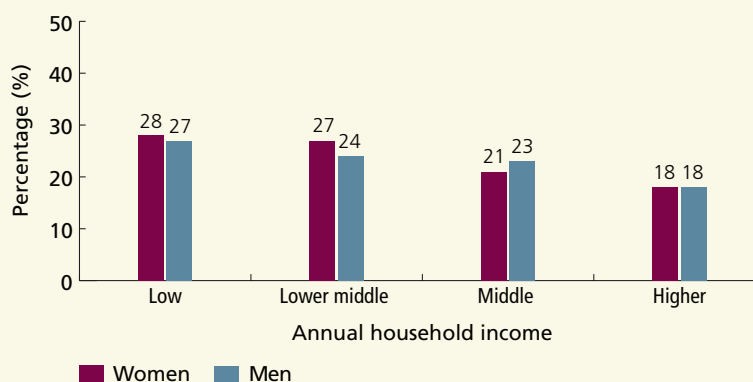
Data for this indicator were from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007.

**Findings:** In Ontario, 21 percent of adults aged 25 and older (22 percent of women and 20 percent of men) reported that they had back problems diagnosed by a health professional. The prevalence of back problems did not vary by sex.

### Exhibit 8B.11 | Age-standardized percentage of adults aged 25 and older who reported having back problems diagnosed by a health professional, by sex and annual household income, in Ontario, 2005 and 2007

#### FINDINGS

- Lower-income adults were more likely to report having back problems than higher-income adults.
- Among women, the percentage reporting back problems diagnosed by a health professional ranged from 28 percent among low-income women to 18 percent among higher-income women.
- Among men, the percentage reporting back problems diagnosed by a health professional ranged from 27 percent among low-income men to 18 percent among higher-income men.
- A similar pattern was seen for education. Adults with less than a secondary school education were more likely to report having back problems than those with a Bachelor's degree or higher (33 percent versus 15 percent, respectively) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

**NOTE:** See [Appendix 8.3](#) for definitions of annual household income

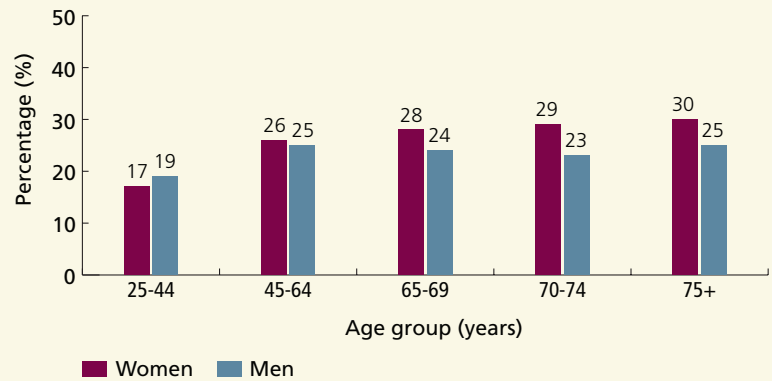
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**Exhibit 8B.12** | Percentage of adults aged 25 and older who reported having back problems diagnosed by a health professional, by sex and age group, in Ontario, 2005 and 2007

**FINDINGS**

- The percentage of adults who reported back problems diagnosed by a health professional increased with age for women and men.
- Seventeen percent of women aged 25-44 reported having back problems as compared to 30 percent of women aged 75 and older.
- The rates among men ranged from 19 percent among those aged 25-44 to 25 percent of men aged 75 and older.
- Women aged 70 and older were more likely to report back problems than similarly aged men.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

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# Section 8B

## SUMMARY OF FINDINGS

This section reports on indicators of quality of care for osteoarthritis, including the prevalence of physician-diagnosed arthritis and rheumatism and back pain in the community, the prevalence of moderate to severe hip and knee osteoarthritis in two communities in Ontario, measures for total joint replacement surgery including unmet need, wait times and admissions and lengths of stay for inpatient rehabilitation after total joint replacement surgery. These indicators were evaluated using survey, research and administrative data and were reported by income, education, age, rural/urban residency and Local Health Integration Network (LHIN) where data were available and sample sizes allowed.

Findings for the indicators reported in this section are summarized below.

- The prevalence of osteoarthritis in the Ontario population
- The prevalence of moderate to severe osteoarthritis in two communities in Ontario
- Unmet need for total joint replacement (hip or knee)
- Percentage undergoing planned primary total joint replacement (hip and knee) within recommended wait times (26 weeks)
- Admission to inpatient rehabilitation after a total joint replacement (hip and knee)
- Lengths of stay in inpatient rehabilitation after total joint replacement (hip and knee)

### Prevalence of Arthritis and Rheumatism

The prevalence of arthritis and rheumatism in Ontario was 25 percent and was higher among women than among men (30 percent versus 19 percent, respectively). The prevalence varied by income, education, age, rural/urban residency and by LHIN. Lower-income women and men, older adults and rural residents were

more likely to have arthritis or rheumatism than their counterparts. Based on current evidence, approximately three-quarters of those who report arthritis and rheumatism are expected to have osteoarthritis.<sup>140,141</sup>

### Prevalence of Moderate to Severe Hip/Knee Osteoarthritis

The prevalence of moderate to severe osteoarthritis in adults aged 55 and older from two communities in Ontario was 12 percent and was higher in women than in men (14 percent versus 8 percent, respectively). The prevalence of osteoarthritis increased with age and was slightly higher in the rural community than in the urban community (12 percent versus 10 percent, respectively).

### Unmet Need for Total Joint Replacement (Hip or Knee)

Potential need for total joint replacement (hip or knee) was defined as meeting surgical criteria but not being on a waiting list for surgery. Unmet need was defined as having need and indicating willingness to undergo total joint replacement, but not being on a waiting list. Among adults aged 55 and older with moderate to severe hip or knee osteoarthritis, 45 percent of women and 39 percent of men had a potential need for total joint replacement (hip or knee). After adjusting for willingness to undergo surgery, 29 percent of women and 30 percent of men had an unmet need for surgery. The potential need for surgery was higher among lower-income adults and those with less education. However, as willingness to consider surgery as a treatment option was lower among those with lower socioeconomic status, unmet need did not differ substantially by income or educational attainment. This suggests that improved communication of risks and benefits of this procedure to individuals of low socioeconomic status might influence willingness for

surgery. Unmet need for total joint replacement (hip or knee) also remained higher in the rural versus urban community and in adults age 55-64 and those aged 75 and older than among adults age 65-74.

### **Percentage Undergoing Planned Primary Total Joint Replacement (Hip and Knee) Within Recommended Wait Times**

Timely rehabilitation after joint replacement surgery is critical to regain function and reduce disability. In Ontario, 64 percent of adults underwent a primary total hip replacement and 54 percent underwent a primary total knee replacement within the recommended wait time of 26 weeks. This did not vary by sex or by income, but did vary by Local Health Integration Network (LHIN).

### **Admission to Inpatient Rehabilitation After a Total Joint Replacement (Hip or Knee)**

In Ontario, among adults who had undergone a primary total joint replacement, 38 percent who had an elective hip replacement and 42 percent who had an elective knee replacement were admitted to rehabilitation (either to an acute care hospital or to a rehabilitation hospital) within 14 days; women were more likely to be admitted to rehabilitation than men, irrespective of the type of surgery. The percentage of adults

who were admitted to rehabilitation did not vary by income but did increase with age. There was also substantial LHIN variation in rehabilitation admission rates and rural residents were less likely than urban residents to be admitted to rehabilitation after joint replacement surgery.

### **Length of Stay in Inpatient Rehabilitation After a Total Joint Replacement (Hip or Knee)**

The mean length of stay for adults who had been admitted to inpatient rehabilitation after total joint replacement surgery was nine days and did not vary by sex or by income. Lengths of stay were highest among adults aged 85 and older and lengths of stay varied by LHIN from 7 days (North West LHIN) to 15 days (South East LHIN).

### **Prevalence of Back Pain**

The prevalence of back pain in the Ontario population was 21 percent. The prevalence of back pain did not vary by sex, but did vary by household income, educational attainment and age. Adults from lower-income households and those with less than a secondary school education were more likely to report physician-diagnosed back pain than their counterparts. The prevalence of back pain also increased with age.





## Section 8C

# *Rheumatoid Arthritis*

### INTRODUCTION

Among the inflammatory arthritis conditions, rheumatoid arthritis is the most common, affecting approximately one percent of Ontarians.

Rheumatoid arthritis is a chronic, systemic, autoimmune disease characterized by joint swelling, joint tenderness and destruction of synovial joints, leading to severe disability and premature mortality.<sup>183-187</sup> Rheumatoid arthritis typically affects the small joints of the hands, feet and wrists; larger joints may also be affected, including the shoulders, elbows, hips, knees and ankles. Due to the systemic inflammation that characterizes rheumatoid arthritis, people with this condition may also develop serious involvement of other organ systems, including the blood vessels, heart, lungs and nervous system. As a result, rheumatoid arthritis is associated with increased mortality.<sup>188</sup> Structural changes can be seen on x-ray or other imaging techniques,<sup>189</sup> but joint damage is rarely apparent in the very early stages of disease but rather accumulates consistently over time.<sup>190-193</sup> Still, changes can be seen as early as four months after onset and imaging results can be used to predict more severe disease.

The peak onset of rheumatoid arthritis is in midlife. The sex ratio of rheumatoid arthritis varies with age, but is consistently higher in women, with an overall ratio for women to men of about 2.5:1. Sex hormones play a role in determining one's predisposition to, and course of rheumatoid arthritis. Women who have never been pregnant are at increased risk of developing the disease. During pregnancy, rheumatoid arthritis may go into remission, while the postpartum period is associated

with exacerbation.<sup>194, 195</sup> Other factors that have been found to be positively associated with prevalence and severity include smoking history, low socioeconomic status, and psychological stress.<sup>196</sup> Additionally, there is evidence that the prevalence rates vary between racial populations, with particularly low rates found among Southeast Asians and high rates found among Aboriginal adults.<sup>197</sup>

In the absence of a definitive test for rheumatoid arthritis, the diagnosis is made based on the presence or absence of combinations of clinical (e.g., pattern of swollen and tender joints) and laboratory (e.g., presence of antibodies and measures of inflammation) abnormalities according to predefined criteria. Unfortunately, the identification of individuals with early inflammatory arthritis, such as rheumatoid arthritis, remains a major challenge for primary care physicians. Although musculoskeletal (MSK) conditions represent up to one-fifth of visits to primary care practitioners, there is often a lack of confidence (including a lack of knowledge and skills) among primary care physicians in performing an arthritis screening assessment.<sup>155</sup> This results in under diagnosis and under management of arthritis in the community. Thus, early diagnosis in primary care with timely referral to specialty care is needed to improve outcomes for individuals with rheumatoid arthritis. Reliable and valid screening tools exist but have not been introduced in Canada. As a result, long delays in making a diagnosis



and instituting effective treatment are commonplace.

Since the potential impact of rheumatoid arthritis is significant, early and aggressive treatment is recommended<sup>195</sup> and it is important that patients are managed by rheumatologists, in conjunction with their primary care providers.<sup>198</sup> Treatment aims to reduce joint inflammation (i.e., swelling and tenderness), relieve pain and maintain or restore joint function through prevention of bone and cartilage destruction. Evidence-based guidelines for the management of rheumatoid arthritis are currently being developed in Canada. Based on guidelines from Europe and the US, treatment is comprised of patient education and enhanced self-management, physical and occupational therapy and the use of a combination of non-steroidal anti-inflammatory drugs (NSAIDs) and disease-modifying anti-rheumatic drugs (DMARDs) or biologic therapies. Quality of care indicators have been developed for rheumatoid arthritis by the American College of Rheumatology.<sup>199</sup>

Based on these quality indicators, a patient with an established diagnosis of rheumatoid arthritis should be treated with a DMARD unless there is a contraindication, inactive disease or the patient refuses treatment. Thus, most patients with active disease are expected to be taking a DMARD or biologic therapy. There is some evidence that patients who are not under the care of a rheumatologist are less likely to receive DMARDs or biologic therapies.<sup>198</sup> Corticosteroids may also have a place in treatment, systemically or through injection into the inflamed joints. Surgical treatment may be recommended when significant joint deformity or instability occurs and when quality of life is affected through pain and/or loss of physical function. Some of the more frequently employed surgical measures are joint replacement of the hips, knees and other joints, tendon repair and carpal tunnel release.

Over the past decade, the optimal use of DMARDs<sup>125-127</sup> and the availability of new biological agents,<sup>128, 129</sup> has dramatically enhanced the success of rheumatoid arthritis management. Moreover, it has been recognized that early therapeutic intervention improves clinical

outcomes and reduces the accumulation of joint damage and disability.<sup>130-132</sup> Despite their efficacy however, DMARD and biologic therapies are generally expensive and their use may be associated with serious adverse effects; for example infection due to immune suppression. Thus, many primary care physicians are uncomfortable prescribing, or monitoring, these medications. As a result, patients with rheumatoid arthritis are unlikely to receive timely and aggressive medical management without referral to a rheumatologist. Efforts are underway to develop and implement strategies to improve the early detection of inflammatory arthritis, in order to expedite referral to rheumatology for timely diagnosis and treatment.

In this section, we report on indicators of rheumatoid arthritis and examine differences associated with sex, age, neighbourhood income, rural/urban residency and Local Health Integration Network (LHIN). The indicators include:

- The prevalence of rheumatoid arthritis
- Specialist follow up for patients with rheumatoid arthritis
- Treatment with DMARDs or biologics for patients with rheumatoid arthritis

The prevalence of rheumatoid arthritis as of April 1, 2005 was established using an administrative data algorithm. Adults were identified as having rheumatoid arthritis if they had at least two Ontario Health Insurance Plan (OHIP) records containing a rheumatoid arthritis diagnosis (OHIP diagnosis code 714) that were at least two months apart, but not more than four years apart. As well, at least one record had to be from a specialist (for more details, see [Appendix 8.3](#)). OHIP claims linked with reference information from the ICES Physician Database were used to measure specialist follow up. Data from the Ontario Drug Benefits (ODB) database were used to measure treatment with DMARDs or biologics. These data are restricted to adults aged 65 and older because of access to provincially funded drug benefits.

## EXHIBITS AND FINDINGS

### PREVALENCE OF RHEUMATOID ARTHRITIS

**Indicators:** This indicator measures the percentage of people aged 25 and older who had physician diagnosed rheumatoid arthritis as of April 1, 2005.

**Background:** Rheumatoid arthritis affects approximately one percent of Canadian adults, and approximately twice as many women as men.<sup>19</sup> Rheumatoid arthritis is a chronic inflammatory disease characterized by joint swelling, joint tenderness and destruction of synovial joints, leading to severe disability and premature mortality.<sup>183-187</sup> Patients with rheumatoid arthritis are challenged with increased functional disability and mortality if the disease is inadequately controlled. It places a high economic burden on the patient and the health care system.<sup>200</sup> Rheumatoid arthritis is associated with a significant increase in mortality because of the disease itself, the increased risk of other health problems and drug adverse effects.<sup>19</sup> A cohort study of rheumatoid arthritis patients in the US found that while there was significant comorbidity in this group, mortality among patients was associated with disease severity independent of comorbid conditions, a finding that illustrated the systemic nature of rheumatoid arthritis.<sup>201</sup>

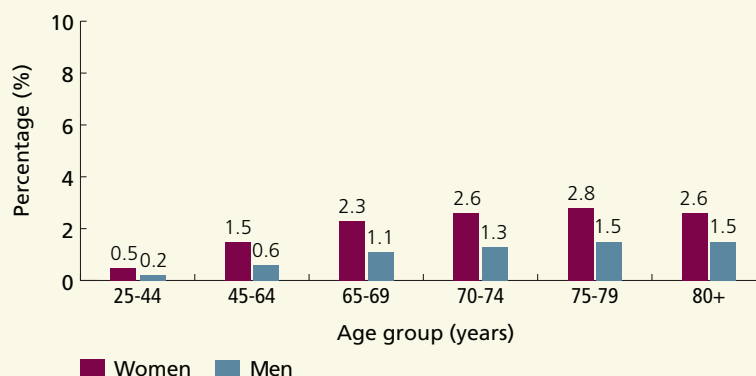
Based on an administrative data algorithm, adults were identified as having rheumatoid arthritis if they had at least two OHIP records containing a rheumatoid arthritis diagnosis that were at least two months apart, but not more than four years apart. As well, at least one record had to be from a specialist (for more details, see [Appendix 8.3](#)).

**Findings:** In Ontario, 0.9 percent of adults aged 25 and older had rheumatoid arthritis as of April 1, 2005. Women were twice as likely as men to have rheumatoid arthritis (1.2 percent versus 0.6 percent, respectively).

## Exhibit 8C.1 | Percentage of adults aged 25 and older with rheumatoid arthritis, by sex and age group, in Ontario, April 1, 2005

### FINDINGS

- Across all age groups, the prevalence of rheumatoid arthritis was higher among women than men.
- The percentage of adults with rheumatoid arthritis increased with increasing age.
- The rates ranged from 0.5 percent among women aged 25-44 to 2.8 percent among women aged 75-79 and 2.6 percent among women aged 80 and older.
- The rates among men ranged from 0.2 percent among those aged 25-44 to 1.5 percent among men aged 75 and older.
- The prevalence of rheumatoid arthritis did not vary by neighbourhood income, but did decrease somewhat as average neighbourhood educational attainment increased (data not shown).
- While the prevalence of rheumatoid arthritis was higher in rural areas than in urban areas (1.0 percent vs. 0.9 percent, respectively), the difference was small (data not shown).
- The prevalence of rheumatoid arthritis varied across Local Health Integration Networks (LHIN) and ranged from 0.8 percent (Toronto Central and Central LHINs) to 1.2 percent (North East LHIN) (data not shown).



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB); ICES Physician Database (IPDB)

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## SPECIALIST CARE FOR PATIENTS WITH RHEUMATOID ARTHRITIS

**Indicator:** This indicator measures the percentage of people aged 25 and older with rheumatoid arthritis as of April 1, 2005 who were seen by a specialist (rheumatologist, orthopaedic surgeon, general internist or physical medicine specialist) during 2005/06.

**Background:** There is a growing body of evidence about the importance of regular rheumatologic care in the management of rheumatoid arthritis.<sup>12</sup> There is strong evidence to show that early, aggressive treatment with disease modifying drugs can prevent damage and disability,<sup>202</sup> however primary care physicians may be uncomfortable prescribing these drugs because of potential side effects and the need for long-term follow up. There is also evidence that rheumatoid arthritis patients who are not under the care of a rheumatologist are less likely to receive disease modifying drugs or biologic therapies.<sup>198</sup> Current guidelines on the diagnosis and management of rheumatoid arthritis indicate that patients should be followed up by a specialist every 6-12 months after the disease is controlled.<sup>203</sup> Despite current clinical guidelines, which state that patients with rheumatoid arthritis should be treated by a rheumatologist, only one-third of Ontarians who had seen a physician for rheumatoid arthritis saw a rheumatologist. Individuals who had seen a physician for rheumatoid arthritis were more likely to see a medical specialist (rheumatologists or internists) and less likely to see a primary care physician than those who were seen for osteoarthritis.<sup>120</sup> These same studies also showed regional variations and lower rates of follow up care among men than women.

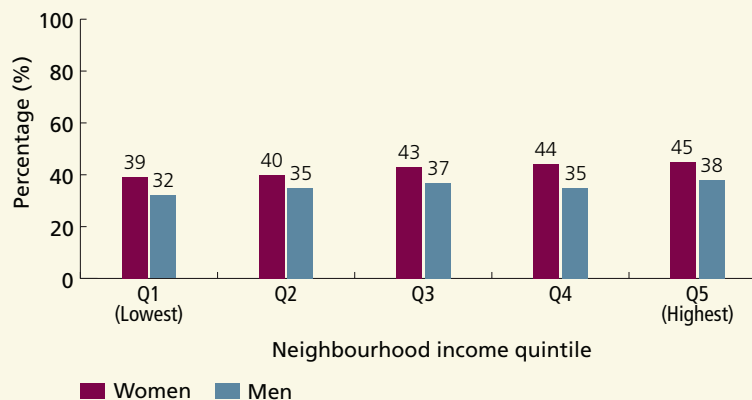
People who were identified as having rheumatoid arthritis as of April 1, 2005 based on an administrative data algorithm (at least two physician records containing a rheumatoid arthritis diagnosis no less than two months apart, but not more than four years apart) were included. The percentage that had seen a specialist during the 2005/06 fiscal year is reported, based on data from the Ontario Health Insurance Plan (OHIP).

**Findings:** In Ontario, 40 percent of adults aged 25 and older with rheumatoid arthritis were seen by a specialist during the 2005/06 fiscal year. Women were more likely than men to see a specialist during the year (42 percent versus 35 percent, respectively).

## Exhibit 8C.2 | Age-standardized percentage of adults aged 25 and older with rheumatoid arthritis who were seen by a specialist<sup>^</sup> during a one year period, by sex and neighbourhood income quintile, in Ontario, 2005/06

### FINDINGS

- The percentage of adults with rheumatoid arthritis who were seen by a specialist varied by income. Thirty-nine percent of women with rheumatoid arthritis who were living in the lowest-income neighbourhoods saw a specialist during the year as compared to 45 percent of women living the highest-income neighbourhoods.
- Among men with rheumatoid arthritis, 32 percent of those living in the lowest-income neighbourhoods saw a specialist during the year as compared to 38 percent of men living the highest-income neighbourhoods.
- Regardless of income, women were more likely than men to be seen by a specialist.
- Women with rheumatoid arthritis who were aged 25-44 were less likely than women aged 45-69 to have seen a specialist during the year (39 percent versus 46 percent, respectively). A similar pattern was seen for men (data not shown).



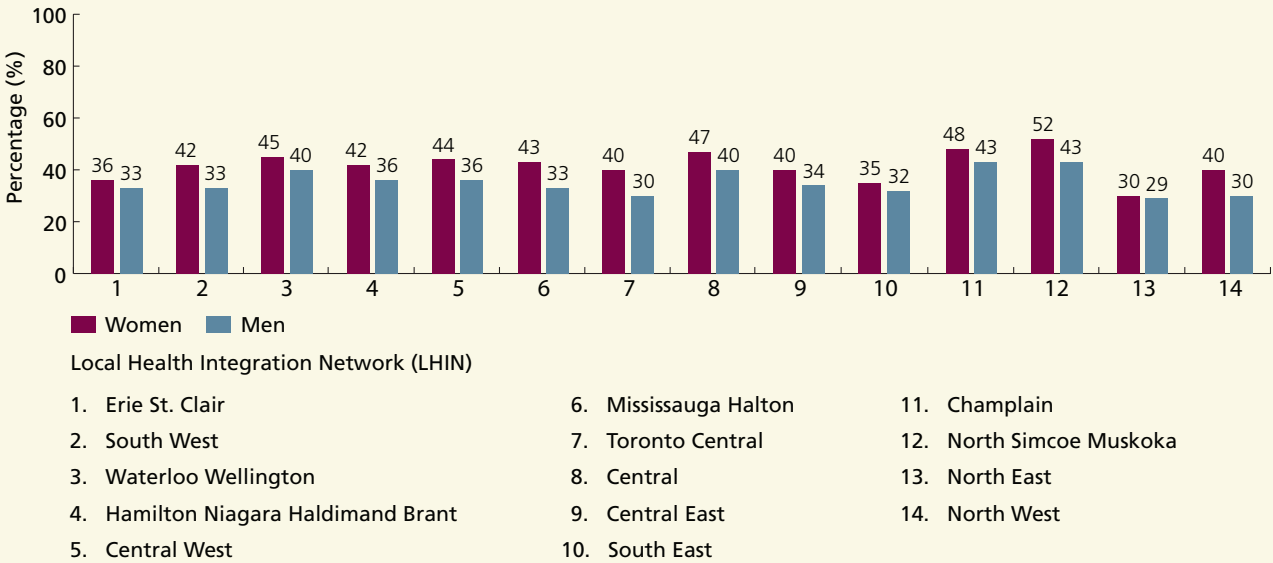
**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Statistics Canada 2006 Census; Registered Persons Database (RPDB)

<sup>^</sup> Specialists include rheumatologists, orthopaedic surgeons, general internists and physical medicine specialists

**NOTE:** See [Appendix 8.3](#) for details of neighbourhood income quintile calculation

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**Exhibit 8C.3** | Age-standardized percentage of adults aged 25 and older with rheumatoid arthritis who were seen by a specialist<sup>^</sup> during a one year period, by sex and Local Health Integration Network (LHIN), in Ontario, 2005/06



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Registered Persons Database (RPDB)

<sup>^</sup> Specialists include rheumatologists, orthopaedic surgeons, general internists and physical medicine specialists

**FINDINGS**

- The percentage of adults with rheumatoid arthritis who were seen by a specialist during the year varied across Local Health Integration Networks (LHINs).
- The percentage of women with rheumatoid arthritis who were seen by a specialist ranged from 30 percent (North East LHIN) to 52 percent (North Simcoe Muskoka LHIN).
- Among men the percentage ranged from 29 percent in the North East LHIN to 43 percent in the Champlain and North Simcoe Muskoka LHINs.
- The percentage of adults with rheumatoid arthritis who were seen by a specialist varied by rural/urban residency, although these differences were small. Among women, 39 percent from rural areas were seen by a specialist as compared to 42 percent of women from urban areas. There was no difference in the percentage of men who were seen by a specialist by rural/urban residency (data not shown).

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## TREATMENT WITH A DISEASE MODIFYING ANTI-RHEUMATIC DRUG (DMARD) OR A BIOLOGIC AGENT

**Indicator:** This indicator measures the percentage of people aged 65 and older with rheumatoid arthritis who filled at least one prescription for a disease modifying anti-rheumatic drug (DMARD) or a biologic agent (see [Appendix 8.3](#) for details on the drugs included) during the 2005/06 fiscal year.

**Background:** Early treatment of rheumatoid arthritis with a disease modifying anti-rheumatic drug (DMARD) or a biologic agent has been shown to be highly effective in slowing the bone and joint damage associated with rheumatoid arthritis, which leads to loss of function.<sup>202</sup> Over the past decade, the optimal use of DMARDs, in particular the anchor DMARD methotrexate (MTX)<sup>125-127</sup> and the availability of new biologic agents<sup>128, 129</sup> has dramatically enhanced the success of rheumatoid arthritis management. Moreover, it has been recognized that early therapeutic intervention improves clinical outcomes and reduces the accrual of joint damage and disability.<sup>130-132</sup> The American College of Rheumatology recommends that patients with an established diagnosis of rheumatoid arthritis should be treated with a DMARD unless it is contraindicated, the patient has inactive disease or refuses treatment.<sup>199</sup>

More recently, treating to target has been advocated as a means to improve rheumatoid arthritis outcomes.<sup>204</sup> Undoubtedly, treating patients when joint destruction can still be prevented would be ideal. DMARD therapy is clearly accepted as the primary treatment for rheumatoid arthritis, although adverse reactions to DMARDs require physician and laboratory monitoring.<sup>202</sup>

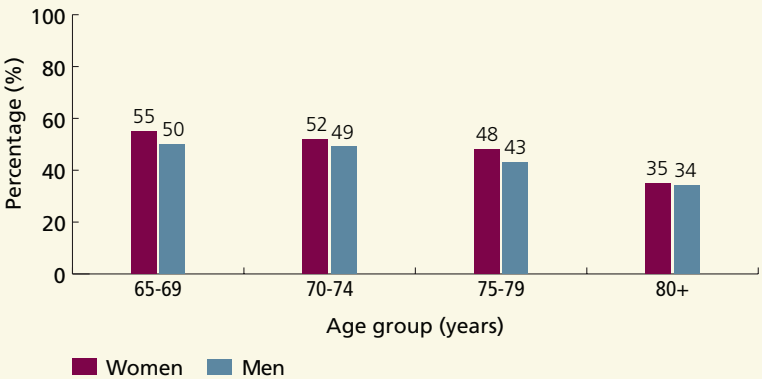
People who were identified as having rheumatoid arthritis as of April 1, 2005 based on an administrative data algorithm (at least two OHIP records containing a rheumatoid arthritis diagnosis no less than two months apart, but not more than four years apart) were included. Data from the Ontario Drug Benefits (ODB) database were used to evaluate medication use in patients aged 65 and older during the 2005/06 fiscal year. The sample was restricted to this age group because of access to provincially funded drug benefits in this population. The data do not include sufficient clinical information to exclude those with contraindications to medication use. Thus, all patients identified as having rheumatoid arthritis are included in these analyses and there may have been appropriate reasons for not receiving these medications in some cases. Importantly, younger adults stand to benefit from therapy and are less likely to have clinical contraindications to these drugs. Yet, due to data limitations we are unable to assess DMARD use among individuals with rheumatoid arthritis under age 65.

**Findings:** In Ontario, 47 percent of adults aged 65 and older with rheumatoid arthritis filled a prescription for a DMARD or biologic agent during the 2005/06 fiscal year. Women were slightly more likely than men to be treated with a DMARD or biologic agent (48 percent versus 44 percent, respectively).

**Exhibit 8C.4** | Percentage of adults aged 65 and older with rheumatoid arthritis who filled a prescription for a disease modifying anti-rheumatic drug (DMARD) or biologic agent,<sup>^</sup> by sex and age group, in Ontario, 2005/06

**FINDINGS**

- The percentage of adults aged 65 and older with rheumatoid arthritis that filled a prescription for a DMARD or biologic agent decreased with age. More than half of women and men aged 65-69 with rheumatoid arthritis were prescribed a DMARD or biologic agent compared to slightly more than one-third of adults aged 80 and older. Those in the oldest age group may have more contraindications for therapy.
- The percentage of women and men with rheumatoid arthritis who filled a prescription for a DMARD or biologic agent did not vary by neighbourhood income or by neighbourhood educational attainment (data not shown).



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Ontario Drug Benefits (ODB) database; Registered Persons Database (RPDB)

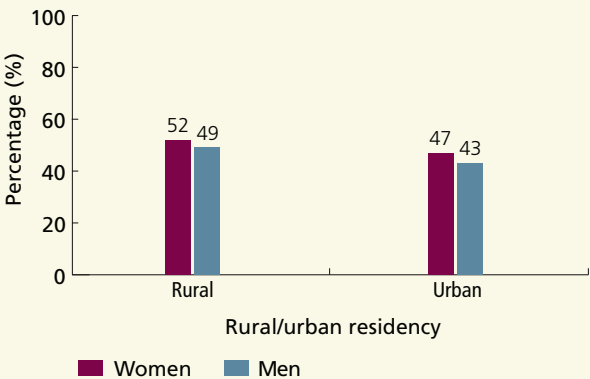
<sup>^</sup> See [Appendix 8.3](#) for details of the drugs included

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**Exhibit 8C.5** | Age-standardized percentage of adults aged 65 and older with rheumatoid arthritis who filled a prescription for a disease modifying anti-rheumatic drug (DMARD) or biologic agent,<sup>^</sup> by sex and rural/urban residency, in Ontario, 2005/06

**FINDINGS**

- The percentage of adults with rheumatoid arthritis who were prescribed DMARDs or biologic agents varied by rural/urban residency. Adults who live in rural areas (52 percent of women and 49 percent of men) were more likely to fill a prescription for a DMARD or biologic agents than adults living in urban areas (47 percent of women and 43 percent of men).
- The percentage of adults with rheumatoid arthritis who filled a prescription for a DMARD or biologic agent varied across Local Health Integration Networks (LHINs). The percentage ranged from 38 percent (Toronto Central LHIN) to 58 percent (North Simcoe Muskoka LHIN) (data not shown).



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Ontario Drug Benefits (ODB) database; Registered Persons Database (RPDB)

<sup>^</sup> See [Appendix 8.3](#) for details of the drugs included

**NOTE:** See [Appendix 8.3](#) for definitions of rural/urban residency

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# Section 8C

## SUMMARY OF FINDINGS

This section reports on indicators of quality of care for rheumatoid arthritis including the prevalence of rheumatoid arthritis, specialist follow up for patients with rheumatoid arthritis and treatment with disease-modifying anti-rheumatic drugs (DMARDs) or biologic agents for patients with rheumatoid arthritis. These indicators were evaluated using administrative data and as such could be compared by sex, age group, neighbourhood income, neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN).

Findings for the indicators reported in this section are summarized below.

### Prevalence of Rheumatoid Arthritis

Slightly less than one percent of Ontario adults aged 25 and older had rheumatoid arthritis as of April 1, 2005. Women were more likely to have rheumatoid arthritis than men (1.2 percent versus 0.6 percent, respectively). The prevalence of rheumatoid arthritis increased with age and was more common in rural areas than in urban areas though these differences were small. The prevalence of rheumatoid arthritis also varied by LHIN, ranging from 0.8 percent (Toronto Central and Central LHINs) to 1.2 percent (North East LHIN).

### Specialist Care for Patients with Rheumatoid Arthritis

Of adults with rheumatoid arthritis, only 40 percent were seen by a specialist (including rheumatologists, orthopaedic surgeons, physical medicine specialists or general internists) during the 2005/06 fiscal year.

Women were more likely to receive specialist care than men (42 percent versus 35 percent, respectively). Adults living in higher-income neighbourhoods and women living in urban areas were more likely to see a specialist during the course of the year than their counterparts. Access to specialist care also varied by age and LHIN.

### Treatment with DMARDs or Biologic Agents for Patients with Rheumatoid Arthritis

Of adults aged 65 and older with rheumatoid arthritis, only 47 percent had filled a prescription for a DMARD or a biologic agent during the 2005/06 fiscal year. As with specialist care, women were more likely than men to have filled a prescription (48 percent versus 44 percent), but prescription rates did not vary by neighbourhood income. The percentage of adults who had filled a prescription decreased with age from greater than half of adults aged 65-69 to only a third of adults aged 80 and older. Women and men living in rural areas were more likely to have filled a prescription for a DMARD or a biologic agent than those living in urban areas and prescription fill rates also varied by LHIN.

# Section 8D

## *Osteoporosis*

### INTRODUCTION

Osteoporosis is a skeletal condition characterized by compromised bone strength that puts a person at increased risk for fractures.

An estimated two million Canadians are living with osteoporosis and the cost to the Canadian health care system of treating osteoporosis and the fractures it causes is currently estimated to be \$1.9 billion annually.<sup>205</sup> Osteoporosis affects an estimated one in six women and one in sixteen men aged 50 and older.<sup>20</sup> While the risk factors for osteoporosis are similar for women and men, women experience a higher incidence of fracture due to a higher prevalence of these risk factors, in particular low bone mineral density following menopause and osteoporosis. The risk of osteoporosis in women increases significantly after menopause; in the first five years immediately after menopause, women can experience bone loss at a rate of 2-5 percent per year.<sup>20</sup>

Interest in osteoporosis and fractures by policy makers, healthcare providers and the public has increased dramatically in recent years due to the increased availability of effective treatment options and awareness of osteoporosis as a health issue. The primary aim of any intervention in osteoporosis care is to reduce fracture risk. Osteoporosis often first presents with a low-trauma fracture—fractures that are caused by a force that would be insufficient to break normal bones (e.g., a fall from a standing height or less) and usually involving the wrist, hip, spine or shoulder. Low-trauma fractures are the most important indication

of underlying osteoporosis and are a predictor of future fractures.<sup>206</sup> Osteoporosis can also lead to compression fractures of the vertebrae in the spine which can result in pain and disability.

Primary prevention through population-based health promotion strategies can reduce the risk of osteoporosis starting at a young age. A life course approach that targets improvements in diet and exercise (to optimize bone mass) and reductions in the prevalence of risk factors for the disease (e.g., smoking, physical inactivity, inadequate vitamin D and calcium intake, and excessive alcohol use) is recommended. Secondary prevention of osteoporotic fractures depends on the identification of individuals at risk for fractures, followed by interventions to reduce this risk such as modification of lifestyle factors and use of bone-sparing medications. Bone mineral density (BMD) testing with dual-energy x-ray absorptiometry (DXA) is the gold standard for identifying individuals at risk, as BMD is the best quantifiable predictor of osteoporotic fracture.<sup>206</sup> A DXA test may help clarify the benefit-to-risk ratio for those women and men who are uncertain about initiating drug therapy. Current guidelines recommend the following preventative lifestyle measures: adequate amounts of calcium and vitamin D; regular weight-bearing exercise; avoidance of tobacco use and alcohol intake at or below moderate consumption.<sup>206</sup> Treatment



for those with osteoporosis typically involves use of bone-sparing medications and lifestyle changes. In recent years there have been significant advances in the management of post-menopausal osteoporosis in women with several efficacious treatment options now available.

Canadian studies have reported that the majority of patients with low-trauma fractures are not evaluated and do not receive treatment for osteoporosis representing an unmet need in those at highest risk.<sup>207-212</sup> An important opportunity for intervention is missed in these high-risk individuals since effective therapies exist to decrease the risk of repeat fractures.<sup>206</sup> Solomon and colleagues analyzed osteoporosis treatment trends in Medicare patients with hip and wrist fractures in Pennsylvania. In 1995, only six percent had filled a prescription for an osteoporosis medication in the six months after a fracture; this increased to 22 percent in 2000.<sup>213</sup> Even though treatment rates are improving they are still suboptimal, especially for patients with fracture.

Prevention of falls that can lead to fractures is another important strategy to reduce the burden of illness resulting from osteoporosis. In Ontario, the rate of fall-related hospitalizations is higher among women than men and among women and men living in lower-income neighbourhoods than those living in higher-income neighbourhoods.<sup>48</sup>

The Osteoporosis Society of Canada recommends that BMD should be measured in post-menopausal women or men over the age of 50 with one of the other major risk factors for fracture. Increases in BMD testing and treatment with bone-sparing medications have been associated with a decline in the incidence of hip and wrist fractures, however there are still an estimated 20,000 hip and wrist fractures each year in Ontario.<sup>214</sup> It should be noted that women have twice the rate of hip and wrist fractures as men.<sup>214</sup> In terms of socioeconomic status, lower household income is associated

with an increased risk of hip fracture.<sup>215, 216</sup> Similarly, utilization of BMD tests was less among those with lower socioeconomic status.<sup>217</sup>

Based on the recommendations of commissioned reports and committees, in 2005 the Ontario Ministry of Health and Long-Term Care (MOHLTC) launched the Ontario Osteoporosis Strategy, a population-based initiative to improve quality of care for osteoporosis in Ontario. The overall goal of the Ontario Osteoporosis Strategy is to reduce morbidity, mortality and costs from osteoporosis and related fractures through an integrated and comprehensive approach aimed at health promotion and disease management.<sup>9</sup> A comprehensive strategy will help raise public awareness, change the knowledge, attitudes and behaviours of both the public and health professionals, and improve prevention and treatment programs. The Ontario Osteoporosis Strategy has five main components: health promotion; access to and quality of bone mineral density testing; post-fracture care; professional education; and research and evaluation. As part of the Strategy, an Osteoporosis Research, Monitoring and Evaluation Working Group (ORMEW) was formed in the Fall of 2006. ORMEW was responsible for developing a monitoring and evaluation framework that outlines a core set of performance indicators, data elements, data collection methodology and protocols for reporting. A literature review was conducted of international, national and provincial peer-reviewed and grey literature to identify quality indicators for osteoporosis. The ORMEW Group then rated the indicators for both importance and validity. Seventeen indicators were agreed upon but for the purpose of this report, only indicators that are currently measurable using available data were selected. In addition, two indicators: long-term care placement after hip fracture and mortality after hip fracture are also included. The indicators included in this section have been mapped to the recommendations from the Ontario Osteoporosis Strategy (see [Appendix 8.1](#)).

In this section, we report on indicators of osteoporosis and examine differences associated with sex, age, neighbourhood income, rural/urban residency and Local Health Integration Network (LHIN).

The indicators include:

- The prevalence of low-trauma fracture
- BMD testing after a low-trauma fracture
- Diagnosis and treatment following a low-trauma fracture
- Baseline BMD testing in older adults
- Continuation of drug treatment for osteoporosis in older adults
- Long-term care after hip fracture
- One-year mortality after hip fracture

The prevalence of low-trauma fractures were estimated using data from the Canadian Institute for Health Information Discharge Abstracts Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS). BMD testing for screening or diagnosis was measured using data from the Ontario Health Insurance Plan (OHIP). Treatment for osteoporosis and continuation of drug use were measured using data from the Ontario Drug Benefits (ODB) database; these data are restricted to adults aged 65 and older because access to provincially funded drug benefits is universally available to seniors and population-based data on drug use is only available for this age group. Long-term care admissions were assessed using data from OHIP and from ODB and one-year mortality was determined using data from the Registered Persons Database (RPDB).



## EXHIBITS AND FINDINGS

### LOW-TRAUMA FRACTURE RATE

**Indicator:** This indicator measures the low-trauma fracture rate (per 10,000) among adults aged 50 and older during the fiscal year 2007/08. Low-trauma fractures include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm due to osteoporosis that have a high probability of being due to osteoporosis.

**Background:** Osteoporosis is an increasingly common health concern that, while much more common in women, affects both women and men. Osteoporosis is characterized by increased risk for fractures following minimal trauma. People who sustain a low-trauma fracture—defined as a fracture resulting from a fall from a height no higher than standing level—have a greater risk of a subsequent fracture than those who have not experienced a low-trauma fracture.<sup>218</sup> They constitute a high-risk group and are candidates for secondary prevention, including further assessment to identify and ameliorate risk factors for osteoporotic fracture (e.g., low bone mineral density, recurrent falls, and some medications).<sup>206</sup>

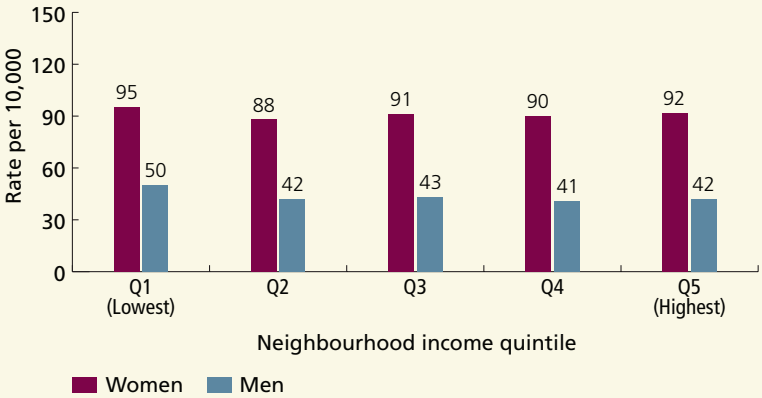
Data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS) were used to identify people with one of the selected fractures as the most responsible diagnosis (CIHI-DAD) or one of the first three diagnoses (NACRS) were included if they also contained an external cause of injury code indicative of fracture due to a minor fall. Patients were excluded if they had epilepsy, malignant neoplasm or multiple myeloma diagnosed within two years prior to their fracture.

**Findings:** In 2007/08, among Ontario adults aged 50 and older, the rate of low-trauma fractures was 71 per 10,000 adults. Women were more likely than men to suffer a low-trauma fracture (91 per 10,000 women versus 44 per 10,000 men).

### Exhibit 8D.1 | Age-standardized low-trauma fracture<sup>^</sup> rate (per 10,000) among adults aged 50 and older, by sex and neighbourhood income quintile, in Ontario, 2007/08

#### FINDINGS

- Irrespective of neighbourhood income, the rate of low-trauma fracture was approximately two times greater among women than among men.
- Overall, the low-trauma fracture rate decreased with increasing neighbourhood income. The rate was 76 per 10,000 for adults living in the lowest-income neighbourhoods and 70 per 10,000 for adults living in the highest-income neighbourhoods (data not shown).
- The rate of low-trauma fractures among men living in the lowest-income neighbourhoods was higher than the rate among men living in higher-income neighbourhoods. While the variation among women was significant, the differences were small.



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2006 Census

<sup>^</sup> Low-trauma fractures likely due to osteoporosis include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm

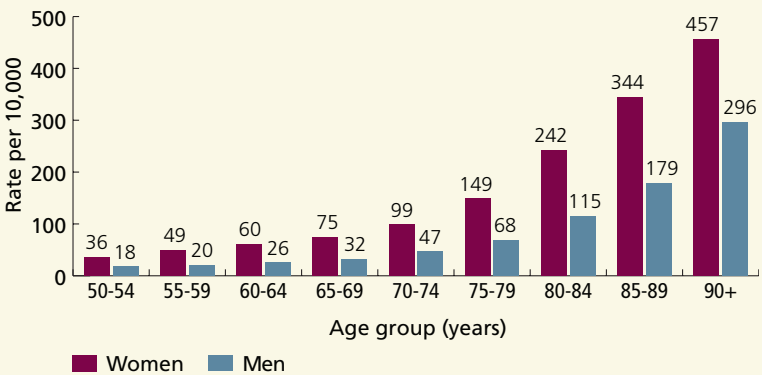
**NOTE:** See [Appendix 8.3](#) for details of neighbourhood income quintile calculation

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### Exhibit 8D.2 | Low-trauma fracture<sup>^</sup> rate (per 10,000) among adults aged 50 and older, by sex and age group, in Ontario, 2007/08

#### FINDINGS

- Across all age groups, women experienced higher low-trauma fracture rates than men.
- Among women, low-trauma fracture rates increased dramatically with age, from 36 per 10,000 women aged 50-54 to 457 per 10,000 women aged 90 and older.
- The age pattern was similar among men; from 18 per 10,000 men aged 50-54 to 296 per 10,000 men aged 90 and older.
- Low-trauma fracture rates were higher among adults living in rural areas compared to those living in urban areas (70 per 10,000 versus 76 per 10,000, respectively) (data not shown).

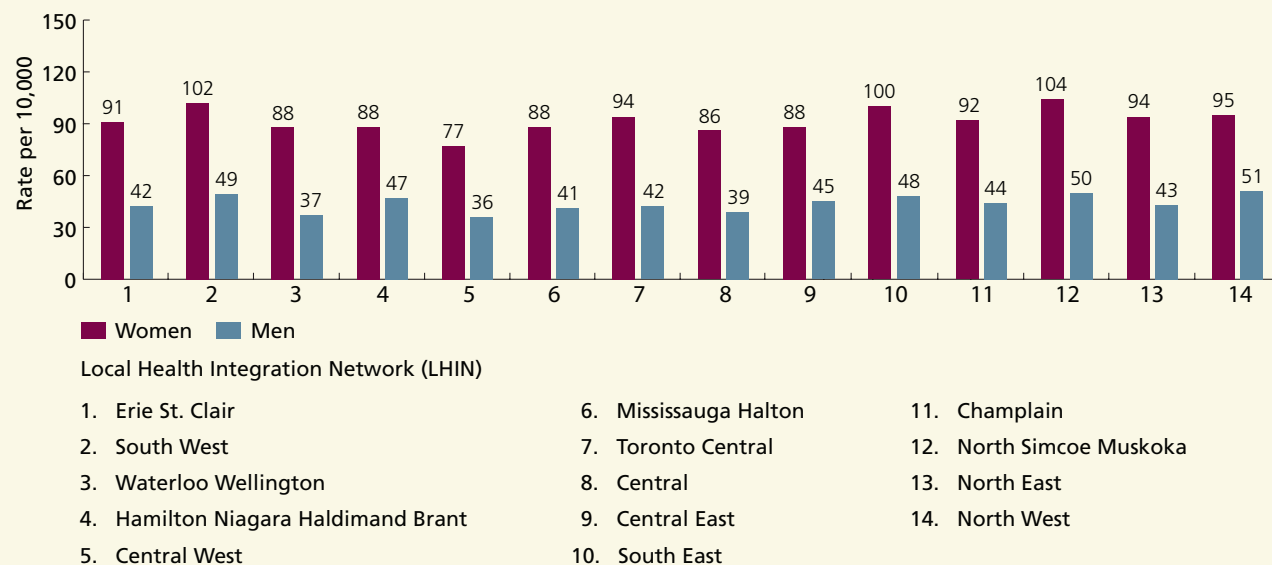


**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> Low-trauma fractures likely due to osteoporosis include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm

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### Exhibit 8D.3 | Age-standardized low trauma fracture<sup>^</sup> rate (per 10,000) among adults aged 50 and older, by sex and Local Health Integration Network (LHIN), in Ontario, 2007/08



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> Low-trauma fractures likely due to osteoporosis include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm

#### FINDINGS

- Across all LHINs, the rates of low-trauma fractures among women were approximately twice that among men.
- The rate of low-trauma fracture varied across LHINs. The rate among women ranged from 77 per 10,000 (Central West LHIN) to 104 per 10,000 (North Simcoe Muskoka LHIN).
- Among men, the rates ranged from 36 per 10,000 (Central West LHIN) to 51 per 10,000 (North West LHIN).

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## BONE MINERAL DENSITY (BMD) TESTING FOLLOWING LOW-TRAUMA FRACTURE

**Indicator:** This indicator measures the percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year of discharge after having a low-trauma fracture.

**Background:** Osteoporosis increases the risk for fractures. Because people who suffer a fracture are at an increased risk of additional fractures and are more likely to have osteoporosis, this measure assesses how well the health system manages people at high risk for a second fracture. Guidelines recommend BMD testing following a low-trauma fracture to provide an assessment of bone mass which is used to make treatment recommendations.<sup>206</sup> Data from the Ontario Health Insurance Plan (OHIP) were used to assess BMD testing in patients who had been identified as having a low-trauma fracture (see [low-trauma fracture rate indicator](#)). Adults were excluded from the sample if they had undergone a BMD test within the 12 month period prior to their fracture or if they had died within twelve months after their fracture. Due to lack of drug data on those under age 65, we were unable to exclude those who were already receiving pharmacologic therapy for osteoporosis, which may influence estimates.

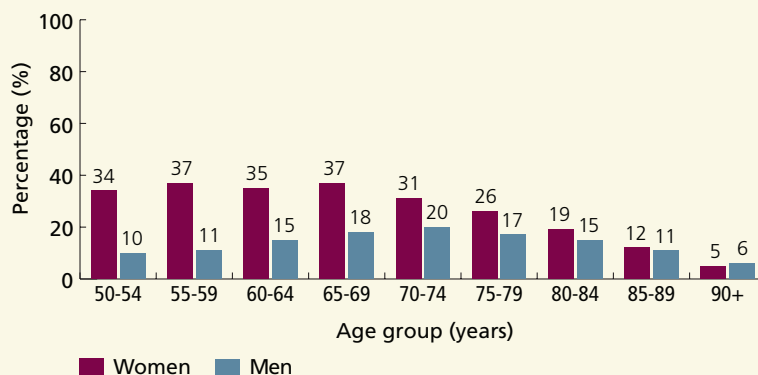
**Findings:** In Ontario, in 2007/08, 23 percent of adults aged 50 and older who had a low-trauma fracture received a BMD test within one year post-discharge following their fracture. Women were twice as likely to receive a BMD test as men (26 percent versus 13 percent, respectively).



## Exhibit 8D.4 | Percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex and age group, in Ontario, 2007/08

### FINDINGS

- Across all age groups, the majority of women and men did not undergo BMD testing after a low-trauma fracture.
- The percentage of women who received a BMD test within one year after having a low-trauma fracture decreased after age 70; while 34-37 percent of women aged 50-69 underwent BMD testing after a low-trauma fracture, this declined to less than 19 percent of women aged 80-84 and only five percent of women aged 90 and older.
- The percentage of men who underwent BMD testing after a low-trauma fracture increased to age 70 (20 percent) and then declined.
- With the exception of those aged 85 and older, women were more likely than men to receive a BMD test after a low-trauma fracture. Women aged 50-69 were more than three times as likely to be tested as similarly aged men.
- Women and men living in lower-income neighbourhoods (24 percent of women and 12 percent of men) were less likely to undergo BMD testing after a low-trauma fracture than those living in higher-income neighbourhoods (28 percent of women and 15 percent of men), however the differences were small (data not shown).
- Adults living in urban areas and those living in neighbourhoods with higher average educational attainment were more likely to undergo BMD testing after a low-trauma fracture than their counterparts (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> The sample is limited to adults who had a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm) who were alive one year post discharge and who had not had a BMD within twelve months prior to their fracture.

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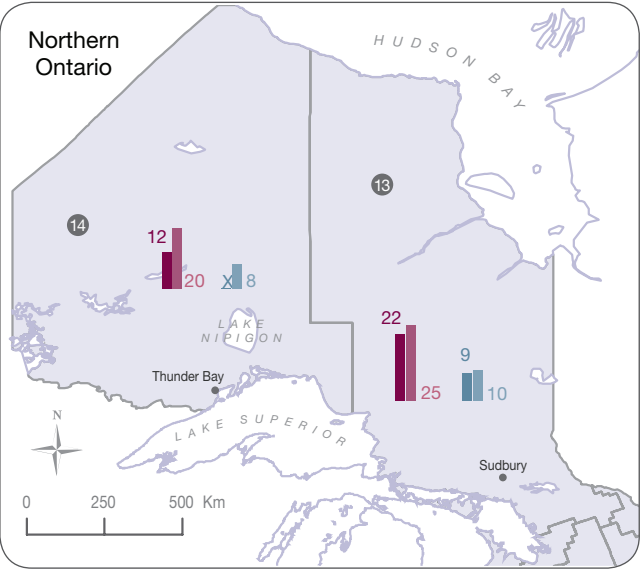
**Exhibit 8D.5** | Age-standardized percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex, neighbourhood income and Local Health Integration Network (LHIN), in Ontario, 2007/08

**FINDINGS**

- The percentage of adults who received a BMD test after a low-trauma fracture varied across LHINs.
- The percentage who received a BMD test after a low-trauma fracture ranged from 12 percent (North West LHIN) to 31 percent (North Simcoe Muskoka LHIN) among lower-income women and from 19 percent (Erie St. Clair LHIN) to 32 percent (Toronto Central LHIN) among higher-income women.
- The percentage who received a BMD test after a low-trauma fracture among men ranged from six percent (South East LHIN) to 18 percent (Hamilton Niagara Haldimand Brant LHINs) among lower-income men and from six percent (Erie St. Clair LHIN) to 22 percent (Waterloo Wellington LHIN) among higher-income men.

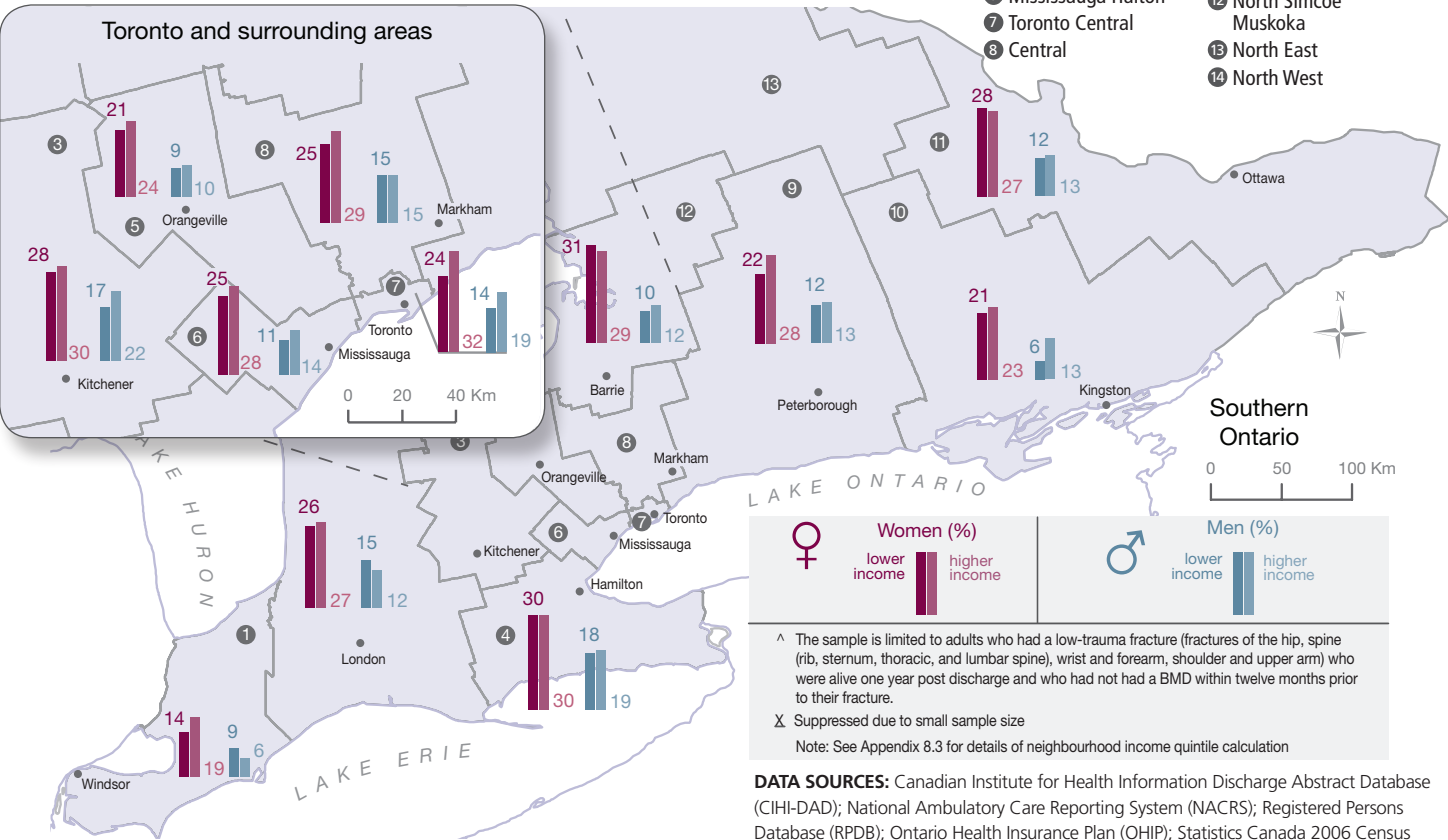
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**Overall Ontario**  
In Ontario, 24 percent of lower-income women, 28 percent of higher-income women, 13 percent of lower-income men and 14 percent of higher-income men aged 50 and older received a bone mineral density (BMD) test within a year of having a low-trauma fracture.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



<sup>^</sup> The sample is limited to adults who had a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm) who were alive one year post discharge and who had not had a BMD within twelve months prior to their fracture.

X Suppressed due to small sample size

Note: See Appendix 8.3 for details of neighbourhood income quintile calculation

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census

## DIAGNOSIS AND TREATMENT POST-FRACTURE IN OLDER ADULTS

**Indicator:** This indicator measures the percentage of adults aged 66 and older who suffered a low-trauma fracture who received neither a bone mineral density (BMD) test nor prescription drug treatment within one year after their fracture.

**Background:** People who sustain a low-trauma fracture are at increased risk of a subsequent fracture (e.g., one in five will experience another fracture within a year following a spine fracture).<sup>218</sup> These individuals therefore constitute a high-risk group, and as such, should undergo comprehensive assessment, including BMD testing, and based on fracture risk profile, treatment with bone-active agents.<sup>206</sup> Current guidelines recommend that people who suffer a low-trauma fracture undergo BMD testing to confirm a diagnosis of osteoporosis and receive pharmacologic therapy within six months post-fracture. However, a recent Ontario study found that 31 percent of women and eight percent of men with fractures typical of osteoporosis report receiving treatment for osteoporosis.<sup>207</sup>

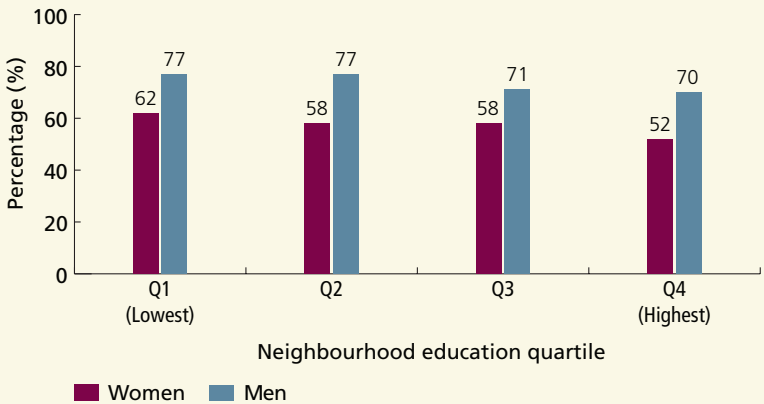
Data from the Ontario Health Insurance Plan (OHIP) were used to assess BMD testing and data from the Ontario Drug Benefits (ODB) database were used to assess medication use in patients who had been identified as having a low-trauma fracture (see [first indicator](#)). Adults were excluded from the sample if they had undergone a BMD test or filled a prescription for an osteoporosis medication within the 12 month period prior to their fracture or if they had died within twelve months after their fracture. The sample was restricted to adults aged 66 and older because of access to provincially funded drug benefits (ODB) in adults aged 65 and older and because the indicator specifically identified new prescriptions and one year of data were needed to ensure that patients were not previously on these medications.

**Findings:** In Ontario in the 2007/08 fiscal year, 63 percent of adults aged 66 and older did not receive a bone mineral density test or prescription drug treatment within one year of having a low-trauma fracture. Men were more likely than women to not undergo testing or treatment (74 percent versus 58 percent, respectively).

**Exhibit 8D.6 |** Age-standardized percentage of adults aged 66 and older who received neither a bone mineral density (BMD) test nor prescription drug treatment<sup>¥</sup> within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex and neighbourhood education quartile, in Ontario, 2007/08

**FINDINGS**

- A greater percentage of older adults living in the neighbourhoods with the lowest levels of educational attainment did not receive a BMD test or prescription drug treatment within one year after having a low-trauma fracture as compared to those living in neighbourhoods with higher levels of education.
- Among older women, 62 percent of those living in the lowest-education neighbourhoods did not receive a BMD test or prescription drug treatment after a low-trauma fracture compared to 52 percent of older women living in the highest-education neighbourhoods.
- For older men, 77 percent of those living in the lowest-education neighbourhoods did not receive a BMD test or prescription drug treatment after a low-trauma fracture compared to 70 percent of older men living in the highest-education neighbourhoods.
- The percentage who did not receive a BMD test or prescription drug treatment after a low-trauma fracture varied by income for women, from 61 percent among women living in the lowest-income neighbourhoods to 55 percent among women living in the highest-income neighbourhoods. This indicator did not vary by neighbourhood income for men (data not shown).
- Women aged 85 and older were less likely to receive a BMD test or prescription drug treatment within one year after having a low-trauma fracture compared to women aged 66-69. The association was reversed for men; men aged 65-69 were less likely to receive a BMD test or prescription drug treatment within one year of having a low-trauma fracture compared to older men, though the difference among men was not significant (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Drug Benefits (ODB) database; Statistics Canada 2006 Census

¥ For a list of included prescription medications, see [Appendix 8.3](#)

<sup>^</sup> The sample is limited to adults who had a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm) who were alive one year post discharge and who had not filled a prescription for an osteoporosis medication or had a BMD test within twelve months prior to their fracture.

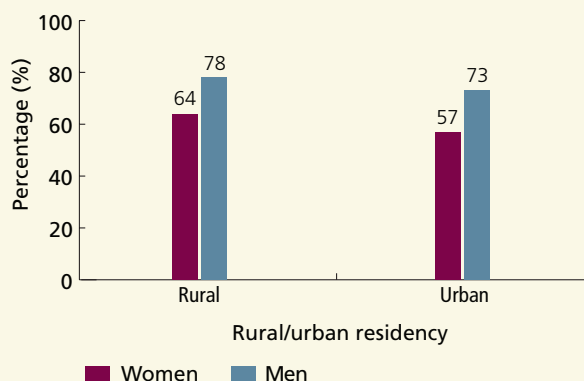
**NOTE:** See [Appendix 8.3](#) for details on neighbourhood education quartile calculation

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**Exhibit 8D.7** | Age-standardized percentage of adults aged 66 and older who received neither a bone mineral density (BMD) test nor prescription drug treatment<sup>¥</sup> within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex and rural/urban residency, in Ontario, 2007/08

**FINDINGS**

- Adults who lived in rural areas (64 percent of women and 78 percent of men) were more likely to have not received a BMD test or prescription drug treatment within one year after having a low-trauma fracture than those who live in urban areas (57 percent of women and 73 percent of men).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Drug Benefits (ODB) database

<sup>¥</sup> For a list of included prescription medications, see [Appendix 8.3](#)

<sup>^</sup> The sample is limited to adults who had a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm) who were alive one year post discharge and who had not filled a prescription for an osteoporosis medication or had a BMD test within twelve months prior to their fracture

**NOTE:** See [Appendix 8.3](#) for definitions of rural/urban residency

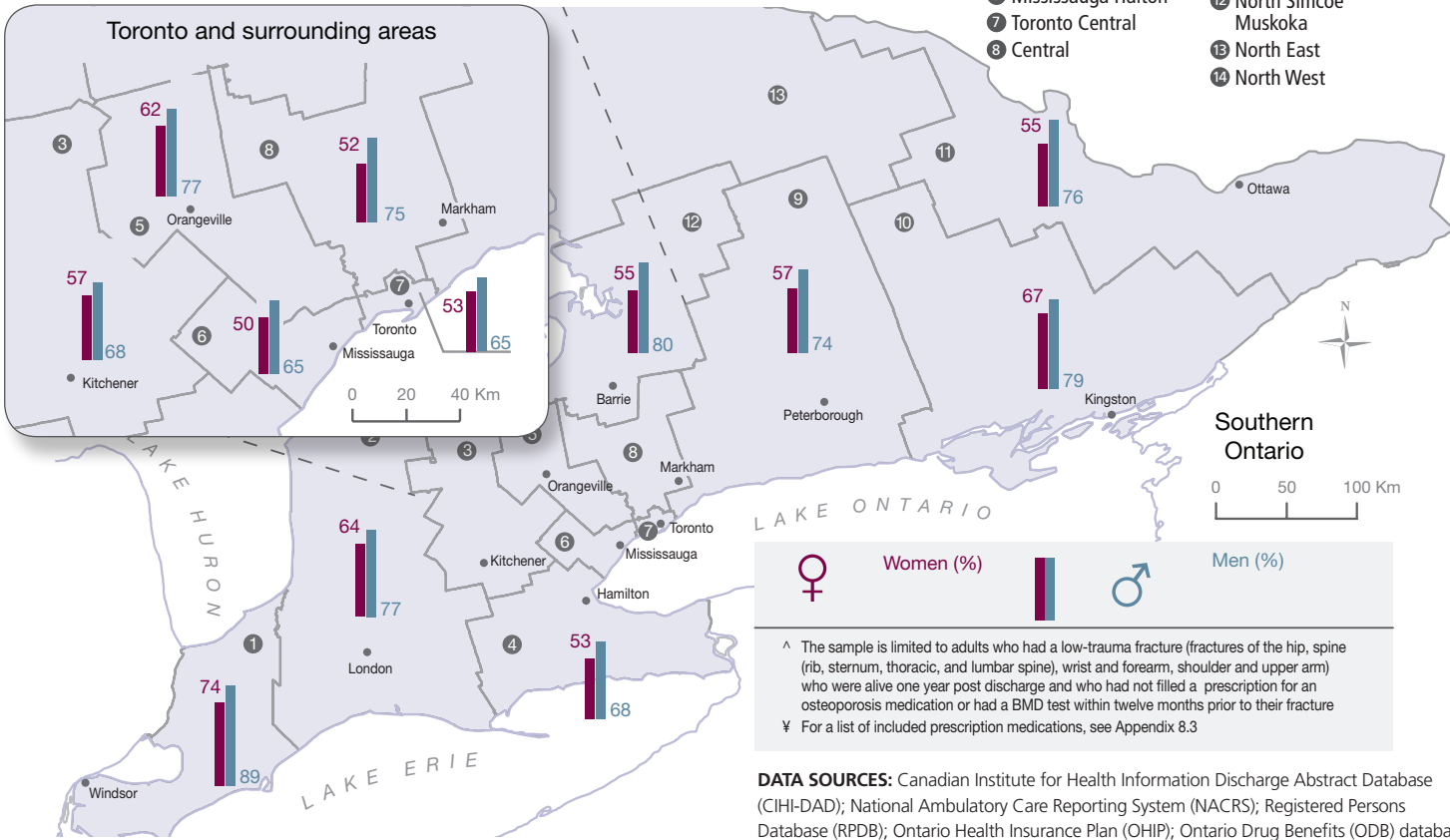
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**Exhibit 8D.8 |** Age-standardized percentage of adults aged 66 and older who received neither a bone mineral density (BMD) test nor prescription drug treatment\* within one year post-discharge after a low-trauma fracture,^ by sex and Local Health Integration Network (LHIN), in Ontario, 2007/08

**FINDINGS**

- The percentage of older adults who did not receive a BMD test or prescription drug treatment within one year after having a low-trauma fracture varied across LHINs.
- The percentage of women who did not receive treatment or testing ranged from 50 percent (Mississauga Halton LHIN) to 74 percent (Erie St. Clair LHIN).
- The percentage of men who did not receive treatment or testing ranged from 65 percent (Mississauga Halton and Toronto Central LHINs) to 89 percent (Erie St. Clair LHIN).

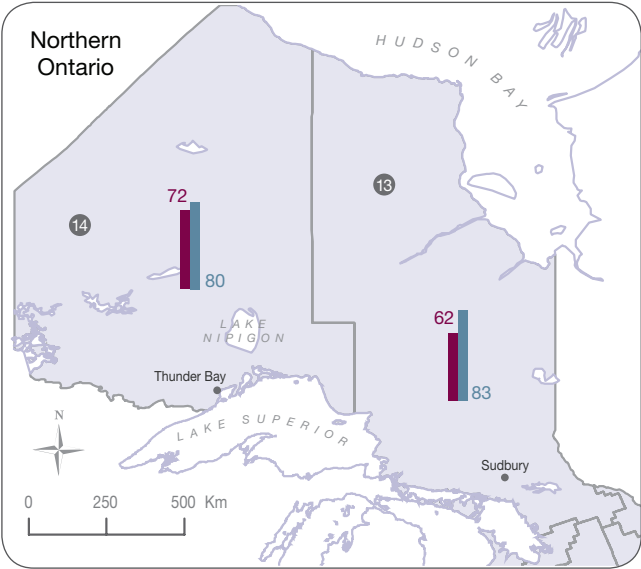
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**Overall Ontario**

In Ontario, 58 percent of women and 74 percent of men aged 66 and older receive neither a bone mineral density (BMD) test nor prescription drug treatment within one year of having a low-trauma fracture.

58% 74%



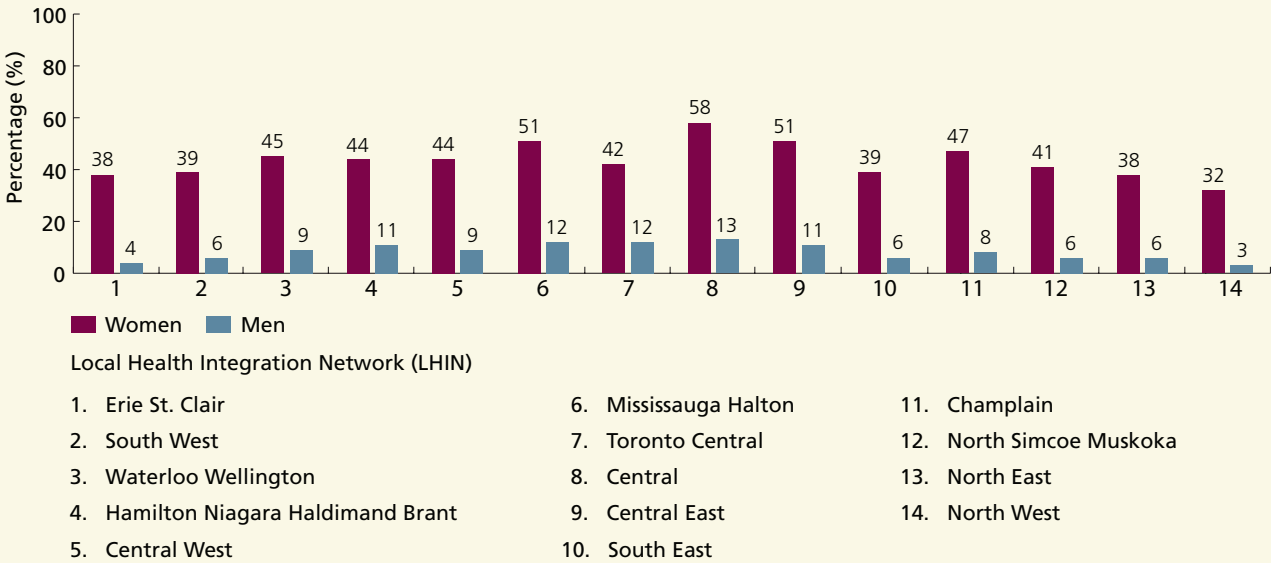
## BASELINE BONE MINERAL DENSITY TESTING IN OLDER ADULTS

**Indicator:** This indicator measures the percentage of adults aged 68-70 who had not had a bone mineral density (BMD) test between the ages of 55-65 and who received a BMD test after they turned age 65.

**Background:** The risk for osteoporosis and fracture increases with age and prevalence of risk factors. Bone density measurements predict the risk for fractures and treating asymptomatic people with osteoporosis reduces their risk for fracture.<sup>206</sup> Canadian guidelines recommend that BMD should be measured in post-menopausal women or men over the age of 50 with one of the other major risk factors for fracture; since adults aged 65 and older are considered to be at moderate risk for fracture and they should receive a baseline BMD test if not previously tested.<sup>206</sup> However, there are controversies as to who should be screened and screening guidelines for osteoporosis vary internationally. Since current Ontario Health Insurance Plan (OHIP) guidelines allow people who are not at high-risk for a fracture to undergo BMD testing every three years, a minimum three year window was examined. To determine the proportion of adults who underwent BMD testing after age 65, adults who were aged 68 as of April 1, 2007 were assessed during the previous three year period while those who were 70 as of April 1, 2007 were assessed during the previous five year period. Data from the Ontario Health Insurance Plan were used to measure BMD testing.

**Findings:** In Ontario, among adults aged 68-70 who had not had a BMD test between the ages of 55-65, 21 percent had a BMD test completed after they turned age 65. Women were five times as likely to be tested as men; 45 percent versus nine percent, respectively.

**Exhibit 8D.9** | Age-standardized percentage of eligible adults^ aged 68-70 as of April 1, 2007 who underwent bone mineral density testing after age 65, by sex and Local Health Integration Network (LHIN), in Ontario



**DATA SOURCE:** Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB)

^ Adults who had a bone mineral density test between the ages of 56-65 were excluded

### FINDINGS

- The percentage of adults aged 68-70 who had not received a baseline BMD test who received one after age 65 varied across LHINs. The percentage ranged from 32 percent (North West LHIN) to 58 percent (Central LHIN) for women and from three percent (North West LHIN) to 13 percent (Central LHIN) among men.
- The percentage of women who had not had a baseline BMD test who received one after age 65 varied by neighbourhood income; 41 percent of women living in lower-income neighbourhoods were tested as compared to 47 percent of women living in higher-income neighbourhoods. Income differences among men were not significant (data not shown).
- The percentage of adults who had not had a baseline BMD test who were tested after age 65 varied by rural/urban residency; 46 percent of women and 10 percent of men who lived in urban areas were tested compared to 39 percent of women and 6 percent of men who lived in rural areas (data not shown).

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## CONTINUATION OF PHARMACOLOGIC THERAPY ONE YEAR AFTER INITIATION

**Indicator:** This indicator measures the percentage of adults aged 66 and older who filled a new prescription for a medication to treat osteoporosis and who had continually used their medication up to one year after initiation of treatment (see [Appendix 8.3](#) for a list of osteoporosis medications and details on measuring continued drug use).

**Background:** It is acknowledged that pharmacologic therapy is an important strategy to reduce fracture risk. There are effective drug therapies available for osteoporosis but fracture prevention will only occur if patients are adherent to their drug therapy.<sup>219</sup>

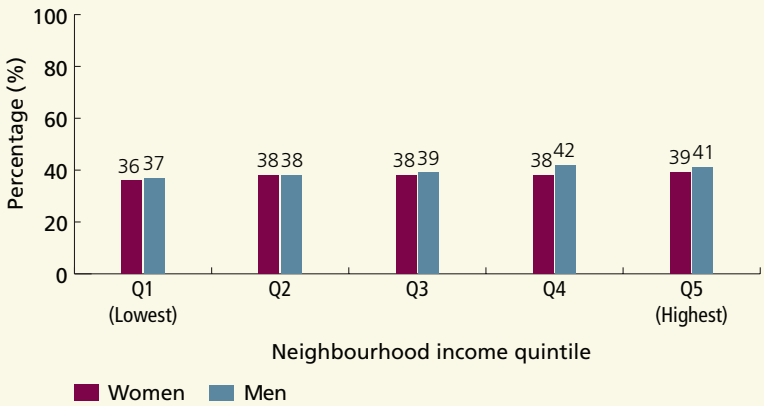
Data from the Ontario Drug Benefits (ODB) database were used to measure this indicator. Adults aged 66 and older who had filled a new prescription for a drug to treat osteoporosis were followed for one year to determine continuous drug use (see [Appendix 8.3](#) for details).<sup>220</sup> The sample was restricted to adults aged 66 and older because of access to provincially funded drug benefits (ODB) in adults aged 65 and older and because the indicator specifically identified new prescriptions and one year of data were needed to ensure that patients were not previously on these medications. Adults who had died within one year of starting their medication were excluded.

**Findings:** In Ontario, 38 percent of adults aged 66 and older who had newly initiated use of an osteoporosis medication were continually on their medication one year after initiation of treatment. This did not vary by sex; 38 percent of women and 39 percent of men had continually used their osteoporosis medication up to one year after initiation of treatment.

**Exhibit 8D.10** | Age-standardized percentage of adults aged 66 and older who were started on osteoporosis treatment\* who had continually used their medication up to one year after initiation, by sex and neighbourhood income quintile, in Ontario, 2007/08

**FINDINGS**

- Across all income groups, over half of men and women started on medication for osteoporosis did not continue on their medications one year after initiation.
- The percentage of adults who continued on drug therapy one year after the initiation of treatment varied by neighbourhood income quintile, however these differences were small.
- The rates among women ranged from 36 percent among those living in lower-income neighbourhoods to 39 percent among women living in higher-income neighbourhoods.
- Among men, 37 percent of those living in lower-income neighbourhoods continued to use their osteoporosis medication as compared to 41 percent of men living in higher-income neighbourhoods.
- Drug continuation varied across Local Health Integration Networks (LHINs). The rates ranged from 30 percent (Central West LHIN) to 43 percent (Waterloo Wellington LHIN) (data not shown).



**DATA SOURCES:** Ontario Drug Benefits (ODB) database; Registered Persons Database (RPDB); Statistics Canada 2006 Census

¥ For a list of included prescription medications, see [Appendix 8.3](#)

**NOTE:** See [Appendix 8.3](#) for details of neighbourhood income quintile calculation

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## LONG-TERM CARE AFTER HIP FRACTURE

**Indicator:** This indicator measures the percentage of people aged 65 and older who were placed in long-term care within one year post-discharge after being treated in hospital for a hip fracture.

**Background:** Among those who were living independently prior to a hip fracture, one in six people in Ontario are discharged to a long-term care facility immediately following a hip fracture, resulting in considerable cost to the health care system.<sup>15, 221</sup> Almost half of the total public and private expenditures for all hip fracture patients is attributed to expenditures for nursing home and other long-term care services.<sup>222</sup> The ability to return home after suffering a hip fracture is an increasingly important outcome measure because of the high cost of long-term institutional care.<sup>15</sup> Timely surgery, effective post-operative clinical management and rehabilitation can reduce the need for long-term care placement among older adults who have had a hip fracture.

Data for this indicator were based on individuals aged 65 and older who were living independently prior to being treated in hospital for a hip fracture and discharged during the 2007/08 fiscal year. Patients who were treated more than one week after admission or who were not treated were not included to exclude patients who were too sick to undergo treatment or who may not have had a hip fracture. Admission to a long-term care facility was determined based on physician claims (Ontario Health Insurance Plan data) that were coded as occurring in a long-term care facility or prescriptions that were filled (Ontario Drug Benefits database) in a long-term care facility or from records in the Continuing Care Reporting System (CCRS). Long-term care facilities include nursing homes or homes for the aged (see [Appendix 8.3](#) for details).

**Findings:** In Ontario, 21 percent of adults aged 65 and older who were previously living independently were placed in long-term care within one year of having a hip fracture. This did not vary by sex; 22 percent of women and 20 percent of men were placed in long-term care.

### Exhibit 8D.11 | Age-standardized percentage of adults aged 65 and older<sup>^</sup> who were placed in long-term care<sup>¥</sup> within one year of a hip fracture, by sex and Local Health Integration Network (LHIN), in Ontario, 2007/08

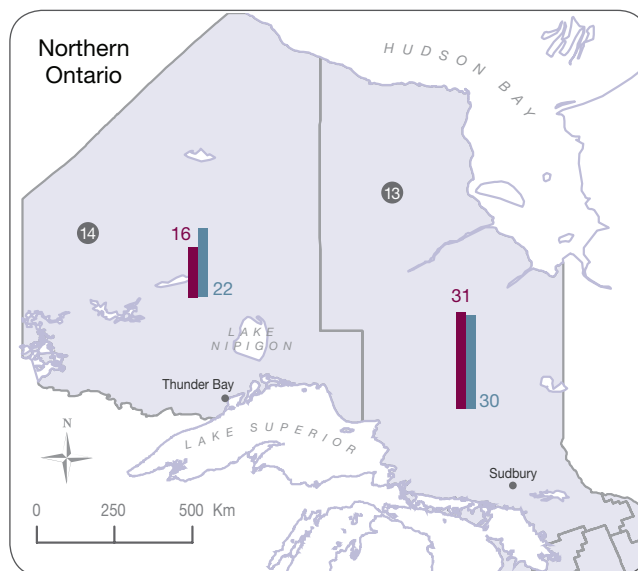
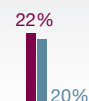
#### FINDINGS

- The percentage of adults who were placed into long-term care after having suffered a hip fracture varied across LHINs.
- The percentage of women who were placed into long-term care after a hip fracture ranged from 15 percent (Mississauga Halton and Toronto Central LHINs) to 31 percent (North East LHIN).
- The percentage of men who were placed into long-term care after a hip fracture ranged from 10 percent (Mississauga Halton LHIN) to 31 percent (Champlain LHIN).
- The proportion of adults who were placed in long-term care within one year of having a hip fracture increased with age, from nine percent among those aged 65-69 to 25 percent among adults aged 85-89 and 34 percent among those aged 90 and older (data not shown).
- The variation by neighbourhood income or by neighbourhood education was not significant for women or for men (data not shown).

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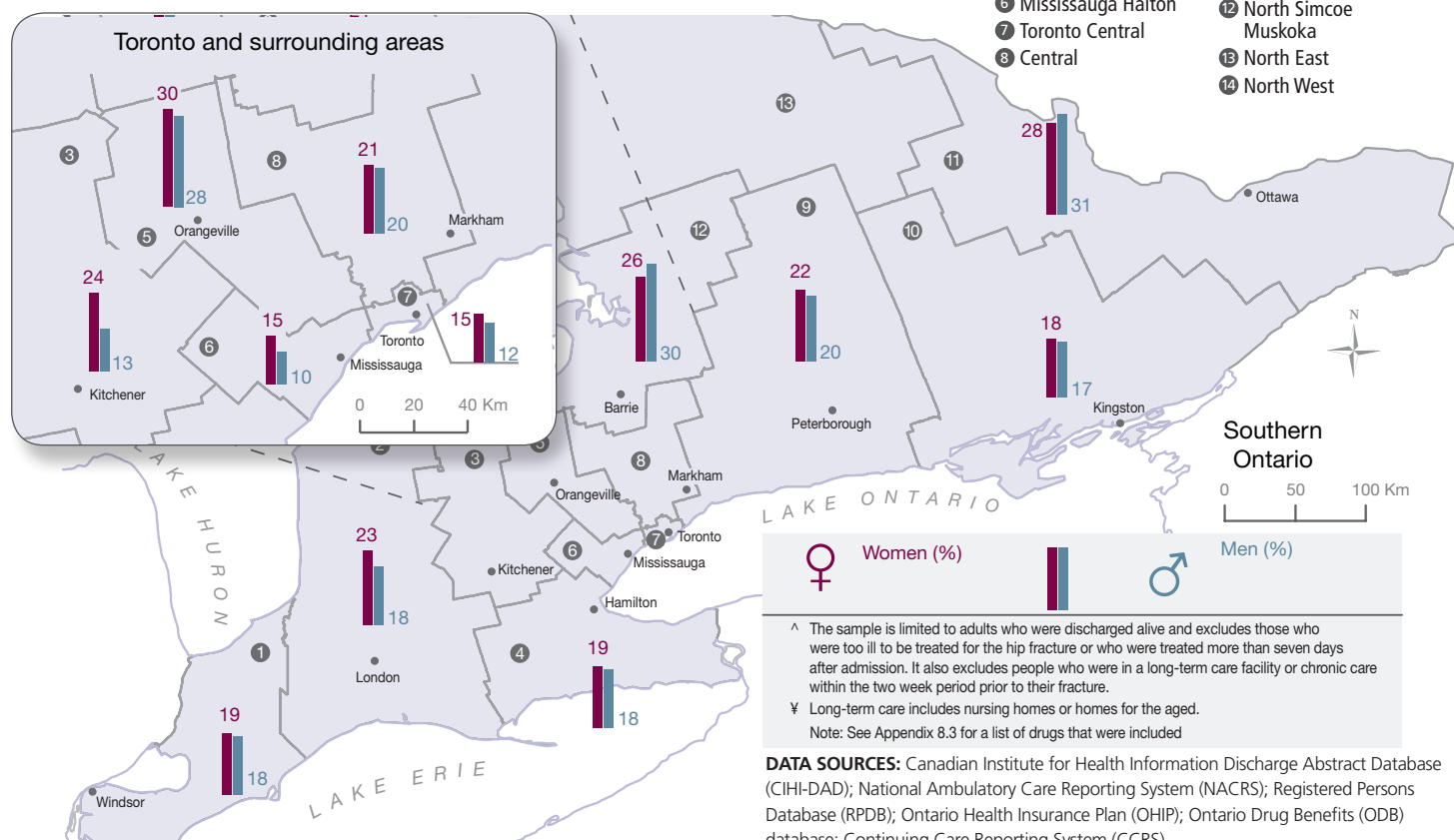
#### Overall Ontario

In Ontario, 22 percent of women and 20 percent of men aged 65 and older were placed in long-term care within one year of having a hip fracture.



#### Local Health Integration Networks (LHINs)

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



<sup>^</sup> The sample is limited to adults who were discharged alive and excludes those who were too ill to be treated for the hip fracture or who were treated more than seven days after admission. It also excludes people who were in a long-term care facility or chronic care within the two week period prior to their fracture.

<sup>¥</sup> Long-term care includes nursing homes or homes for the aged.

Note: See Appendix 8.3 for a list of drugs that were included

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Drug Benefits (ODB) database; Continuing Care Reporting System (CCRS)

## ONE-YEAR MORTALITY AMONG HIP FRACTURE PATIENTS

**Indicator:** This indicator measures the percentage of adults aged 50 and older who were treated in hospital for a hip fracture who died within one year of the hip fracture.

**Background:** There is a high prevalence of hip fractures among seniors, particularly for women; the lifetime risk is 18 percent in women and 6 percent in men.<sup>223, 224</sup> Of all fall-related fractures, hip fractures cause the greatest number of deaths and lead to the most severe health problems and reduced quality of life.<sup>225</sup>

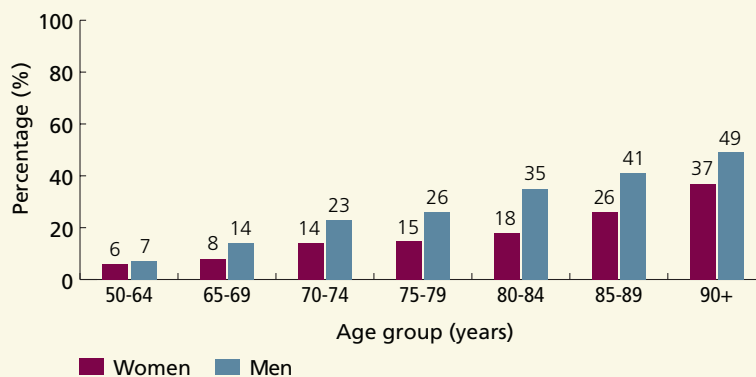
Data for this indicator were based on individuals who were treated in hospital for a hip fracture during the 2007/08 fiscal year. Patients who were treated more than one week after admission, who were not treated or who died before being treated were not included to exclude patients who were too sick to undergo treatment or who may not have had a hip fracture. Mortality within one year was determined using data from the Registered Persons Database (RPDB).

**Findings:** In Ontario, among adults aged 50 and older who were admitted to hospital in the 2007/08 fiscal year for treatment of a hip fracture, 23 percent died within a year of their hip fracture. The one-year mortality rate was significantly lower for women than for men (20 percent versus 32 percent, respectively).

### Exhibit 8D.12 | One-year mortality rate (percentage) among adults aged 50 and older treated in hospital for a hip fracture, by sex and age group, in Ontario, 2007/08

#### FINDINGS

- The one-year mortality rate after a hip fracture increased with age for both women and men, with the highest rates observed among those aged 90 and older.
- With the exception of adults aged 50-64, the mortality rate among men was higher than the rate among women.
- There were no differences in one-year mortality rates by neighbourhood income, neighbourhood education, rural/urban residency or Local Health Integration Network (LHIN) (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstracts Database (CIHI-DAD); Registered Persons Database (RPDB)

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# Section 8D

## SUMMARY OF FINDINGS

This section reports on indicators of quality of care for osteoporosis, including: the rate of low-trauma fracture likely due to osteoporosis (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm); bone mineral density testing following a low-trauma fracture; diagnosis and treatment after a low-trauma fracture; bone mineral density (BMD) testing in adults aged 65 and older who did not undergo previous BMD testing; continuation of osteoporosis medication one year after initiation; long-term care admission after hip fracture and mortality rates after hip fracture. These indicators were evaluated using administrative data and as such could be compared by sex, age group, neighbourhood income, neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN).

Findings for the indicators reported in this section are summarized below.

### Low-trauma Fracture Rates

Among adults aged 50 and older, women were more than twice as likely as men to suffer a low-trauma fracture (91 per 10,000 women versus 44 per 10,000 men). This pattern persisted across age groups, neighbourhood income and LHIN. Fracture rates varied by neighbourhood income, neighbourhood educational attainment, age, rural/urban residency and LHIN. Fracture rates decreased as neighbourhood income increased, but the differences were small. Fracture rates increased dramatically with age from 27 per 10,000 adults aged 50-54 to 414 per 10,000 adults aged 90 and older.

### BMD Testing Following Low-trauma Fracture

Twenty-three percent of adults who had suffered a low-trauma fracture likely due to osteoporosis underwent BMD testing. Women were more likely to be tested than men (26 percent versus 13 percent, respectively). Testing rates varied by neighbourhood income, neighbourhood educational attainment, age, rural/urban residency and LHIN. The percentage of women who underwent BMD testing after a low-trauma fracture decreased with age—from almost four in ten women aged 50-69 to less than one in five women aged 80-84 and less than one in twenty women aged 90 and older. Lower rates of testing among those in the oldest age groups may reflect either underuse or appropriate clinical decision making due to health status and competing risks. While testing rates were lower among men, the pattern was similar. Adults living in urban areas, those living in higher-income neighbourhoods or neighbourhoods with higher average educational attainment were more likely to undergo BMD testing after a low-trauma fracture than their counterparts.

### Diagnosis and Treatment Post-fracture in Older Adults

Adults who sustain a low-trauma fracture should ideally undergo BMD testing to determine if the underlying cause of the fracture is osteoporosis and they should be prescribed medication to treat osteoporosis if diagnosed. Sixty-three percent of adults aged 66 and older who had not had a previous BMD test and were not on medication to treat osteoporosis did not receive either assessment or medication within one year of

having a low-trauma fracture. Men were more likely than women to receive neither BMD testing nor prescription drug treatment (74 percent versus 58 percent, respectively). This indicator did not vary by neighbourhood income quintile but did vary by neighbourhood education, age, rural/urban residency and LHIN. Adults from neighbourhoods with lower average educational attainment or from rural areas were less likely to be assessed or treated than their counterparts. While women aged 85 and older were less likely than younger women to undergo assessment or receive prescription medications for osteoporosis, the reverse was true for men. Men aged 65-69 had the lowest rates of assessment or treatment.

### **Baseline BMD Testing Among Older Adults**

When an individual turns age 65, they should undergo BMD testing if they have not had a baseline test between ages 56-65. Among adults aged 68-70 at the time of measurement who did not have a prior BMD test, 21 percent were assessed after age 65. Women were five times more likely to be assessed than men (45 percent versus nine percent, respectively) and the sex variation persisted across age, rural/urban residency and LHIN. Women living in higher-income neighbourhoods and adults from urban areas were more likely to be assessed than their counterparts. The percentage of eligible women and men who underwent BMD testing also varied by LHIN from 32 percent of women and three percent of men (North West LHIN) to 58 percent of women and 13 percent of men (Central LHIN).

### **Continuation of Pharmacologic Therapy One Year After Initiation**

Thirty-eight percent of adults aged 66 and older—or less than four in ten—who had started on an osteoporosis medication had continually used their medication

up to one year after initiation. This did not vary by age, neighbourhood education or rural/urban residency but did vary by neighbourhood income and by LHIN. Adults living in lower-income neighbourhoods were slightly less likely to continually use their osteoporosis medication than adults from the highest-income neighbourhoods (36 percent versus 40 percent, respectively). The income differences for women and men were not significant.

### **Long-term Care After Hip Fracture**

In Ontario, 21 percent of adults aged 65 and older who were living independently prior to their hip fracture were admitted to a long-term care institution within one year of being treated for a hip fracture. This did not vary by sex, neighbourhood income, average neighbourhood educational attainment or rural/urban residency but did vary by age and LHIN. The proportion of adults admitted to long-term care after a hip fracture increased from nine percent among those aged 65-69 to 34 percent among adults aged 90 and older.

### **One-year Mortality Among Hip Fracture Patients**

Among adults who were treated in hospital for a hip fracture, 23 percent died within one year of their fracture. The one-year mortality rate was lower for women than for men (20 percent versus 32 percent, respectively). Mortality rates did not vary by neighbourhood income, average neighbourhood educational attainment or rural/urban residency but did vary by age. As would be expected, mortality rates increased with age, from six percent among adults aged 50-64, 22 percent among adults aged 80-84, 29 percent among adults aged 85-89 to 39 percent among adults aged 90 and older.



# Chapter Summary of Findings

In this chapter, we report on the health and functional status of Ontarians with musculoskeletal (MSK) conditions and their use of health care services. We present results on the performance of Ontario's health care system on indicators of care for MSK conditions: osteoarthritis, rheumatoid arthritis and osteoporosis.

**The chapter includes the following four sections:**

- A. General MSK Indicators
- B. Osteoarthritis
- C. Rheumatoid Arthritis
- D. Osteoporosis

Table 1 provides a summary of where differences were observed by sex, age, income, education, immigration, ethnicity, rural/urban residency and Local Health Integration Network (LHIN). Women and men with MSK conditions had much worse health and functional status and higher rates of disability than those without MSK conditions. Among adults with MSK conditions, women were more likely to have worse health and functional status than men. Women were more likely to have more than one chronic condition, having probable depression, limitations in their instrumental activities of daily living (IADL) and their activities of daily living (ADL) and activities prevented by pain. Opportunities to improve care for musculoskeletal conditions were identified. For example, only 40 percent of adults with rheumatoid arthritis were seen by a specialist during the course of a year and low-income and rural women were less likely to see a specialist than their counterparts. As well, a substantial percentage (63 percent) of women and men who had fragility fractures (which have a high probability of being due to osteoporosis) did not receive recommended diagnostic tests or drug therapy.

**General MSK Indicators**

Women and men with MSK conditions had higher rates of comorbidity than adults without MSK conditions; they were more than twice as likely to report having another chronic condition as adults without an MSK condition but with another chronic condition (38 percent versus 18 percent, respectively). Among adults with an MSK condition, women were more likely to have another chronic condition than men (40 percent versus 35 percent, respectively), the presence of multiple chronic conditions increased with age and low-income adults with an MSK condition were more likely to have more than one chronic condition than those with higher incomes. Adults with an MSK condition had similar rates of probable depression as adults with other chronic conditions, but higher than among adults with no chronic conditions. As seen in other POWER Study chapters, probable depression was more common among women and lower-income adults.

Rates of activity limitations, limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL) and activities prevented by pain were significantly higher (10-20 percent higher rates) among adults with an MSK condition than among adults with another chronic condition and five- to ten-fold higher than among adults without any chronic conditions. Among adults with an MSK condition, for all three measures of functional status, women were more likely to report limitations than men and the rates increased with age. As well, the percentage of adults reporting activity limitations, limitations in IADLs and/or ADLs and activities prevented by pain increased as annual household income decreased.

One in five adults aged 25-64 with an MSK condition were not participating in the labour force (not

currently employed and not looking for a job), which represents a significant proportion of the working-age population. The proportion not in the labour force was higher among women, lower income adults and those with less education as compared to their counterparts.

The POWER Study Burden of Illness chapter reported that more than 50 percent of Ontarians were overweight or obese.<sup>48</sup> In this chapter, we found that this proportion was higher among people with an MSK condition compared to those without one (60 percent versus 52 percent). The percentage of adults with an MSK condition who were overweight or obese was higher among men, those with less education, those who were Canadian-born and those living in rural areas as compared to their counterparts. Being overweight contributes to the development and worsening of arthritis and as such, weight reduction is an important self-management strategy for people with MSK conditions.

Adults with an MSK condition were more likely to report using at least two types of medications (pain relievers (narcotic and/or non-narcotic) and/or anti-depressants) in the past month than adults without an MSK condition but with another chronic condition (16 percent versus 9 percent, respectively). The percentage of adults with an MSK condition who reported using at least two types of medications in the past month increased with the number of chronic conditions they had, from 14 percent among adults with no other chronic conditions to 30 percent among adults with at least two other chronic conditions. Data for this indicator should be interpreted with caution due to lower response rates for narcotic use.

Sixteen percent of adults with an MSK condition reported having unmet health care needs in the previous twelve months compared to eleven percent of adults with another chronic condition and seven percent of adults without any chronic conditions. Among those with MSK conditions, women were more likely than men to report unmet health care

needs. Fifty-eight percent of adults with an MSK condition had seen a primary care physician at least four times within one year and 57 percent had seen any type of specialist at least once during the same period. Utilization rates for adults with MSK conditions were similar to utilization rates for those with other chronic conditions, but higher than the rates for adults without any chronic conditions. The percentage of adults who had seen a primary care physician four or more times or any type of specialist at least once was higher among women, increased with age and varied across LHINs. Fifteen percent of adults with an MSK condition reported consulting with a physiotherapist at least once in the previous 12 months and 18 percent had consulted with a chiropractor during the same period. Use of physiotherapists and chiropractors increased with income and with educational attainment. Adults living in rural areas were more likely than those living in urban areas to have seen a chiropractor (21 percent versus 17 percent respectively) but were less likely to have seen a physiotherapist (12 percent versus 15 percent, respectively). Use of physiotherapy and chiropractic care among adults with an MSK condition also varied by LHIN.

In Ontario, adults aged 65 and older are eligible for provincial drug benefits. For those under age 65, insurance coverage for prescription medications may overcome financial barriers to adequate treatment. Among adults aged 25-64 with an MSK condition, 79 percent reported having some type of health insurance (private, employer-sponsored, government) that covered prescription medications, which means that one in five did not have prescription drug coverage. This did not vary by sex, but did vary by age (for men only), income and education. Adults with an MSK condition who had lower annual household incomes, with less education, were immigrants, visible minorities and those from rural areas were less likely to have some prescription drug coverage than their counterparts.

## Osteoarthritis

The prevalence of arthritis and rheumatism in Ontario was 25 percent and was higher among women than among men (30 percent versus 19 percent, respectively). The prevalence varied by income, education, age, rural/urban residency and by LHIN. Lower-income women and men, older adults and rural residents were more likely to have arthritis or rheumatism than their counterparts. Based on current evidence, approximately three-quarters of those who report arthritis and rheumatism are expected to have osteoarthritis. The prevalence of moderate to severe osteoarthritis in adults aged 55 and older from two communities in Ontario was 12 percent and was higher in women than in men (14 percent versus 8 percent, respectively). The prevalence of osteoarthritis increased with age and was slightly higher in the rural community than in the urban community (12 percent versus 10 percent, respectively).

Potential need for total joint replacement surgery (hip or knee) was defined as meeting criteria for, but not being on a waiting list for, surgery. Unmet need was defined as having a potential need and indicating willingness to undergo total joint replacement surgery, but not being on a waiting list. Among adults aged 55 and older with moderate to severe hip or knee osteoarthritis, 45 percent of women and 39 percent of men had a potential need for total joint replacement surgery. After adjusting for willingness to undergo surgery, 29 percent of women and 30 percent of men had an unmet need for total joint replacement surgery. The need for surgery was higher among lower-income adults and those with less education. However, as willingness to consider surgery as a treatment option was lower among those with lower socioeconomic status, unmet need did not differ substantially by income or educational attainment. For Ontario adults who underwent total joint replacement surgery in 2007/08, 64 percent (primary total hip replacement) and 54 percent (primary total knee replacement) had

their surgery within the recommended wait time of 26 weeks. This did not vary by sex or by income, but did vary by Local Health Integration Network (LHIN). Wait times data are based on patients who are referred for procedures, and as such, are not able to capture referral biases or delays in referrals. While progress has been made in shortening wait times for hip and knee replacement, many Ontarians still wait too long.

In Ontario, among adults who had undergone a primary total joint replacement, 42 percent were admitted to rehabilitation (either to an acute care hospital or to a rehabilitation hospital) within 14 days; women were more likely to be admitted to rehabilitation than men. The percentage of adults who were admitted to rehabilitation did not vary by income but did increase with age. There was also substantial LHIN variation in rehabilitation admission rates and rural residents were less likely than urban residents to be admitted to rehabilitation after joint replacement surgery. The mean length of stay for adults who had been admitted to inpatient rehabilitation after total joint replacement surgery was nine days and did not vary by sex or by income. Lengths of stay were highest among adults aged 85 and older and lengths of stay varied by LHIN from 7 days (North West LHIN) to 15 days (South East LHIN).

The prevalence of back pain in the Ontario population was 21 percent. The prevalence of back pain did not vary by sex, but did vary by household income, educational attainment and age. Adults from lower-income households and those with less than a secondary school education were more likely to report physician-diagnosed back pain than their counterparts. The prevalence of back pain also increased with age.

## Rheumatoid Arthritis

Slightly less than one percent of Ontario adults aged 25 and older had rheumatoid arthritis as of April 1, 2005. Women were more likely to have rheumatoid arthritis than men (1.2 percent versus 0.6 percent,

respectively). The prevalence of rheumatoid arthritis increased with age and was more common in rural areas than in urban areas though these differences were small. The prevalence of rheumatoid arthritis also varied by LHIN, ranging from 0.8 percent (Toronto Central and Central LHINs) to 1.2 percent (North East LHIN).

Of adults with rheumatoid arthritis, only 40 percent were seen by a specialist (including rheumatologists, orthopaedic surgeons, physical medicine specialists or general internists) during the 2005/06 fiscal year. Women, adults living in higher-income neighbourhoods and women living in urban areas were more likely to see a specialist during the course of the year than their counterparts. Access to specialist care also varied by age and LHIN. Among adults aged 65 and older with rheumatoid arthritis, only 47 percent had filled a prescription for a DMARD or a biologic agent during the 2005/06 fiscal year. As with specialist care, women were more likely than men to have filled a prescription, but prescription rates did not vary by neighbourhood income.

### **Osteoporosis**

Among adults aged 50 and older, women were more than twice as likely as men to suffer a low-trauma fracture (91 per 10,000 women versus 44 per 10,000 men). This pattern persisted across age groups, neighbourhood income and LHIN. Fracture rates varied by neighbourhood income, neighbourhood educational attainment, age, rural/urban residency and LHIN. Fracture rates decreased as neighbourhood income increased, but the differences were small. Fracture rates increased dramatically with age from 27 per 10,000 adults aged 50-54 to 414 per 10,000 adults aged 90 and older.

Adults who sustain a low-trauma fracture should ideally undergo bone mineral density assessment to determine if the underlying cause of the fracture is osteoporosis. Twenty-three percent of adults aged 50

and older who had suffered a low-trauma fracture likely due to osteoporosis underwent bone mineral density testing. Women were more likely to be tested than men (26 percent versus 13 percent, respectively) and testing rates decreased with age. Adults living in urban areas, those living in higher-income neighbourhoods or neighbourhoods with higher average educational attainment were more likely to undergo bone mineral density testing after a low-trauma fracture than their counterparts.

As well as bone mineral density testing, adults who sustain a low-trauma fracture should be prescribed medication to treat osteoporosis if diagnosed. Data from the Ontario Drug Benefits (ODB) database were used to evaluate medication use in adults patients aged 65 and older. The sample was restricted to this age group because of access to provincially funded drug benefits in this population. Among adults aged 66 and older who had not had a previous bone mineral density test and were not on medication to treat osteoporosis, 63 percent did not receive either assessment or medication within one year of having a low-trauma fracture. Men were more likely than women to receive neither bone mineral density assessment nor prescription drug treatment (74 percent versus 58 percent, respectively). Adults from neighbourhoods with lower average educational attainment or from rural areas were less likely to be assessed or treated than their counterparts. While women aged 85 and older were less likely than younger women to undergo assessment or receive prescription medications for osteoporosis, the reverse was true for men. Men aged 65-69 had the lowest rates of assessment or treatment. This indicator also varied by LHIN.

Only 38 percent of adults aged 66 and older—or less than four in ten—who had started on an osteoporosis medication had continually used their medication up to one year after initiation. This did not vary by age, neighbourhood education or rural/urban residency

but did vary by neighbourhood income and by LHIN. Adults living in lower-income neighbourhoods were slightly less likely to continually use their osteoporosis medication than adults from the high-income neighbourhoods (36 percent versus 40 percent, respectively).

When an individual turns age 65, they should undergo bone mineral density testing if they have not had a baseline test between ages 56-65. Among adults aged 68-70 (as of April 1, 2007) who did not have a prior bone mineral density assessment, 21 percent were tested after age 65. Women were five times more likely to be assessed than men (45 percent versus nine percent, respectively) and the sex variation persisted across age, rural/urban residency and LHIN. Women living in higher-income neighbourhoods and adults from urban areas were more likely to be assessed than their counterparts. The percentage of eligible women and men who underwent bone mineral density

assessment also varied by LHIN from 32 percent of women and three percent of men (North West LHIN) to 58 percent of women and 13 percent of men (Central LHIN).

In Ontario, 21 percent of adults aged 65 and older who were living independently prior to their hip fracture were admitted to a long-term care institution within one year of being treated for a hip fracture. This did not vary by sex, neighbourhood income, neighbourhood education, rural/urban residency but did vary by LHIN and increased with age. Among adults who were treated in hospital for a hip fracture, 23 percent died within one year of their fracture. The one-year mortality rate was lower for women than for men (20 percent versus 32 percent, respectively). Mortality rates increased with age, from six percent among adults aged 50-64 to 39 percent among adults aged 90 and older.





**Table 1** | Factors associated with differences in care for musculoskeletal (MSK) conditions care

Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
General MSK Indicators (14 indicators)										
Health and functional status										
Percentage with at least one other chronic condition <sup>a</sup>	38%	Y	Y	Y	Y	N	Y^	N	N	Y
Prevalence of probable depression	10%	Y	Y	Y	Y	Y^	N	N	Y	N
Percentage with activity limitations	51%	Y	Y	Y	Y	N	N	N	N	N
Percentage with limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)	32%	Y	Y	Y	Y	N	N	Y	N	N
Percentage who reported that their activities were prevented due to pain or discomfort	33%	Y	Y	N	Y	Y	N	N	Y^	N
Percentage of adults aged 25-64 who were without a job and not looking for one in the past year	21%	Y	•	Y	Y	Y	N	N	N	N
Percentage who were overweight or obese	60%	Y	Y	Y	N	Y	Y	Y	Y	N



Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
Access and utilization of services										
Percentage who were taking two or more types of medication (pain relievers, narcotic medications and/or anti-depressants) in the past month <sup>a</sup>	16%	Y	Y	Y <sup>^</sup>	Y	N	Y	Y	N	N
Percentage who reported that there was a time during the past 12 months when they needed health care but did not receive it (unmet health care needs)	16%	Y	Y	Y	Y <sup>^</sup>	Y <sup>^</sup>	N	N	N	N
Primary or specialty care within one year										
• Four or more general practitioner/ family physician (GP/FP) visits	58%	Y	Y	Y	Y <sup>^</sup>	Y <sup>^</sup>	Y <sup>^</sup>	Y	N	Y <sup>^</sup>
• At least one visit to any type of specialist	57%	Y	Y	Y	N	N	N	N	Y <sup>^</sup>	Y
Percentage who reported difficulties accessing specialized services (specialist care; elective diagnostic testing; elective surgery)	28%	N	Y	Y	N	N	N	N	N	N

Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
Percentage who reported receiving any home care services	9%	Y	Y	Y	Y	N	Y^	N	N	N
Percentage who reported seeing an allied health professional at least once in the previous 12 months										
• Physiotherapist	15%	Y	•	Y	Y	Y	N	N	Y	Y
• Chiropractor	18%	N	•	Y	Y	Y	Y	Y	Y^	Y
Percentage of adults aged 25-64 who reported having health insurance for prescription medications										
• Any insurance	79%	N	•	Y*	Y	Y	Y	Y	Y	N
• Employer sponsored	66%	Y	•	N	Y	Y	Y^	Y^	Y*	N
<b>Osteoarthritis (7 indicators)</b>										
Prevalence of arthritis and rheumatism	25%	Y		Y	Y	Y	Y	Y	Y	Y
Prevalence of moderate to severe hip/knee osteoarthritis	12%	Y		Y	•	•	•	•	Y	•
Percentage who underwent total joint replacement within the recommended wait time of 26 weeks										
• Knee replacement	54%	N		Y	N	N	•	•	N	Y
• Hip replacement	64%	N		Y	N	N	•	•	N	Y
Percentage who were admitted to inpatient rehabilitation after a total joint replacement										
• After knee replacement	42%	Y		Y	N	Y	•	•	Y	Y
• After hip replacement	38%	Y		Y	N	Y	•	•	Y	Y

Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
Mean length of stay (LOS) in inpatient rehabilitation after total joint replacement	9 days	N		Y	N	N	•	•	N	Y^
Prevalence of back problems	21%	N		Y	Y	Y	Y	Y	Y	Y
<b>Rheumatoid Arthritis (3 indicators)</b>										
Prevalence of rheumatoid arthritis	1%	Y		Y	N	Y	•	•	Y	Y
Percentage of adults with rheumatoid arthritis who were seen by a specialist (rheumatologist, orthopaedic surgeon, general internist or physical medicine specialist) during a 12 month period	40%	Y		Y	Y	Y	•	•	Y	Y
Percentage of adults aged 65 and older who filled a prescription for a disease modifying anti-rheumatic drug (DMARD) or biologic agent during a 12 month period	46%	Y		Y	N	N	•	•	Y	Y

Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
Osteoporosis (7 indicators)										
Low-trauma fracture rate	71 <sup>#</sup>	Y		Y	Y	Y	•	•	Y	Y
Percentage of adults who suffered a low-trauma fracture who underwent bone mineral density (BMD) testing within one year of discharge	23%	Y		Y	Y	Y	•	•	Y	Y
Percentage of adults aged 66 and older who suffered a low-trauma fracture who received neither BMD testing nor prescription drug treatment within one year of discharge	63%	Y		Y <sup>^</sup>	Y <sup>^</sup>	Y	•	•	Y	Y
Percentage aged 68-70 who had not had a BMD testing between the ages of 56-65 who received a BMD test after the age of 65	21%	Y		Y	Y	Y	•	•	Y	Y
Percentage of adults aged 66 and older who were on osteoporosis medication who had continually used their medication up to one year after initiation	38%	N		N	Y	N	•	•	N	Y

Indicators	Overall Result	Stratification Factor								
		Sex	MSK Status (Overall)	Age	Income	Education	Immigration	Ethnicity	Rural/Urban Residency	LHIN
Percentage of adults aged 65 and older who were admitted to long-term care within one year of discharge after a hip fracture	21%	N		Y	N	N	•	•	N	Y
One-year mortality rate among hip fracture patients	21%	Y		Y	N	N	•	•	N	N
<sup>a</sup> The comparison by MSK status is between people with MSK conditions and those without an MSK condition but with another chronic condition • Data not available		# Rate per 10,000 population ^ Significant overall and in women, but not in men ¥ Significant overall and in men, but not in women								

POWER Study

# Discussion

In this chapter, we examined the burden of illness due to musculoskeletal (MSK) conditions in Ontario, the quality of care for common MSK conditions and how illness burden and quality of care vary among women and men due to age, income, education and where one lives.

Stratifying data in this way allowed us to identify the population subgroups with greatest need. Women are more often affected by these conditions and their burden is highest among low-income women. MSK conditions often go undiagnosed and under treated or untreated. There is enormous opportunity both for prevention and to reduce the impact of pain and disability among women and men resulting from these conditions.

The data in this chapter largely come from two sources, population surveys and administrative data. The first is limited in being reliant on patient self-report. For most MSK conditions, there is no definitive diagnostic test; rather, the diagnosis is based on the patient's history, findings on clinical examination, and results of laboratory and x-ray investigations. This leaves much room for imprecision and inaccurate diagnoses. Administrative data are subject to the same limitations with respect to diagnostic codes, but additionally provide no information about the severity of the condition. As a result, the picture we developed on the impact of MSK conditions on Ontario women's health and care is by no means complete. Data gaps identified can inform efforts to improve data capacity to assess access, quality and outcomes of care among individuals at risk or who have MSK conditions.

Despite these current data gaps, we identified many opportunities for improvement, present objective evidence to inform priority setting and provide a baseline from which to measure progress.

## **MSK conditions are a significant cause of pain and disability in Ontario.**

MSK conditions affect over one-third of the population. In this chapter, we focused on MSK conditions that are important causes of morbidity and mortality, among women in Ontario: osteoarthritis, rheumatoid arthritis and osteoporosis. Osteoarthritis, a common condition that is often suboptimally managed, represents approximately two-thirds of the burden due to MSK conditions.

## **The burden of MSK conditions is greatest among older women, particularly those with less education or low income.**

All the indicators of disease prevalence and severity identified a greater burden of illness due to MSK condition among women than men, with increasing age, and for those with lower versus higher socioeconomic status. While these differences may reflect differential risk for developing MSK conditions (e.g., due to exposure to occupational risk factors or other risk factors, like obesity); greater disease severity or differences in the availability of social support, they may also reflect gender and socioeconomic inequities in access to and quality of health care.

## **MSK conditions commonly occur in the setting of other chronic conditions.**

People living with other common chronic conditions, such as diabetes and heart disease, are likely to also

have an MSK condition. The increased risk of MSK conditions with older age, the association between inflammatory arthritis and heart disease and the commonality of risk factors (diet, being overweight or obese and sedentary lifestyle) all contribute to the high rate of co-existing illness (comorbidity) among people affected by MSK conditions. Women with MSK conditions have a higher burden of comorbidity than men with these conditions. Yet, the impact of MSK conditions on the management of these other conditions has been greatly under appreciated. For example, physical activity and weight loss in a person with diabetes may be difficult in the setting of painful hip or knee arthritis. On the other hand, these other conditions may also impact appropriate management of MSK conditions. For example, use of non-steroidal anti-inflammatory medications may be unsafe in the setting of hypertension. This has implications for Ontario's chronic disease strategy and underscores the necessity of patient-centred models of chronic disease prevention and management. As our population ages, there will be a greater number of individuals with multiple health conditions and they will most likely have a comorbid MSK condition, which will add to the complexity of their chronic disease management. These findings point to an urgent need to implement a comprehensive chronic disease prevention and management strategy.

### **MSK conditions were associated with high rates of depression.**

Among individuals with MSK conditions, ten percent had probable depression, with the proportion higher among women than men, and among those with low versus high income, such that 21 percent of low-income women with MSK conditions also had probable depression. This is concerning as research has shown that comorbid depression may worsen treatment outcomes and increase health care utilization. For those with painful osteoarthritis, concomitant depression has been associated with

greater pain and disability<sup>73-75</sup> and worse outcomes following knee replacement surgery.<sup>226, 227</sup> In other chronic pain conditions, comorbid depression has also been linked to reduced adherence to effective pain interventions<sup>86, 87</sup> and reduced effectiveness of these therapies.<sup>88</sup> Thus, the recognition and treatment of comorbid depression has the potential to improve outcomes for people with MSK conditions. Yet, mental health conditions appear to be under recognized and consequently, under treated in older adults, the same population that is disproportionately affected by MSK conditions.<sup>228, 229</sup>

### **MSK conditions have a greater impact on disability than other chronic conditions.**

Compared with Ontarians who reported having a chronic condition, not including an MSK condition, those with an MSK condition were more likely to report moderate to severe activity limitations. As was the case for other indicators, the impact was greatest among older women; 53 percent of women aged 65 and older with MSK conditions reported limitations in their ability to perform instrumental activities of daily living (IADL) and or activities of daily living (ADL), such as shopping, meal preparation or bathing. Such limitations have been linked with inability to work, greater out of pocket costs for informal and formal care giving, reduced mobility leading to loss of independence and need for long-term care. This greater burden due to MSK conditions may reflect not only the nature of these conditions, but also their relative under management (studies have documented an under recognition of these conditions as important and treatable) and barriers to management (e.g., lack of physician skill in examination for MSK conditions). In particular, research suggests that exercise and optimizing pain management in these individuals has the potential to substantially reduce disability associated with MSK conditions in our population.



### **MSK conditions are associated with greater use of multiple pain medications.**

We found that 16 percent of adults with MSK conditions were using two or more types of medications to manage the symptoms of pain including pain relievers (non-narcotic and/or narcotic) and/or anti-depressants compared with only nine percent of adults with another chronic condition. This finding suggests that the population with MSK conditions may be at increased risk for adverse drug events leading to hospitalization and mortality. Perhaps not surprisingly, the highest use of multiple pain medications was among women with MSK conditions (18 percent), in whom the risk of comorbid depression is highest and for whom disease severity may be greater. We also documented a decrease in reported medication use with increasing age. Research suggests this decrease is not associated with reduced need, but rather reflects an increased prevalence of other conditions which preclude the safe use of pharmacological treatments for MSK conditions and/or physician discomfort managing these complex patients and suboptimal pain management in this population. Currently, no guidelines exist for the management of MSK conditions in the setting of other common chronic conditions in older adults. Our findings suggest this gap needs to be addressed.

### **Allied health care providers are under utilized for MSK conditions.**

Physical therapy and chiropractic care are integral to the management of most MSK conditions. Yet, consistent with previous studies, our results indicate they are being under utilized. Only 15 percent of adults with an MSK condition reported consulting a physiotherapist at least once in the previous year. While the numbers who had ever seen a physiotherapist may be higher, our findings nonetheless suggest an important care gap. Underuse of allied health care providers for MSK conditions may be related to cost barriers (many services provided by these health care providers are not covered) as well

as a lack of appreciation of the role of these health care providers in the management of MSK conditions. Greater use of allied health care by those with higher incomes and those living in an urban region likely reflects enhanced access for these subgroups. While the correct rate of use of allied health care providers is unclear, development and implementation of guidelines for use of allied health care providers coupled with mechanisms to facilitate access when indicated has the potential to enhance the care and thus outcomes of people with MSK conditions.

### **One in five adults aged 25-64 with an MSK condition had no prescription drug insurance coverage.**

Medical management of most MSK conditions includes pharmacologic agents to manage pain and inflammation. Particularly for inflammatory arthritis conditions, recommended drug therapies may be costly. Surveys have documented that lack of insurance coverage for expensive disease modifying anti-rheumatic drugs (DMARDs) or biologic agents for inflammatory arthritis is a major barrier to timely and effective management of these conditions. This is particularly concerning in light of the fact that the proportion of adults aged 25-64 who lacked drug insurance coverage was highest among those with the lowest annual household incomes, in whom the burden—and thus need for medication—is likely to be greatest (36 percent of low-income adults with MSK conditions reported no drug coverage).

### **Wait times for hip and knee replacement surgery have improved, but could still be better.**

Osteoarthritis is the most common MSK condition and accounts for the vast majority of hip and knee replacement surgeries currently performed. Joint replacement in the setting of advanced hip or knee osteoarthritis has been shown to be highly effective and cost-effective in relieving pain and reducing disability.

Hip and knee replacement surgeries help people return to work and get on with their lives. However, wait times for joint replacement surgery in Ontario have historically been identified as unacceptable. In 2001, approximately 20 percent of patients waited more than a year for a first hip replacement, and almost 30 percent waited this long for a first knee replacement. In 2004, fewer than half received an elective hip or knee replacement within six months: the need for strategies to reduce these unacceptable wait times has been recognized. In 2004, fewer than half received an elective hip or knee replacement within six months. Wait times have improved since the implementation of this strategy. In 2007/08, 64 percent received their hip replacement, and 54 percent a knee replacement, within six months. The Ontario Health Quality Council (OHQC) 2010 Report on Ontario's Health System report showed continued gradual improvement through October 2009, but many Ontarians still wait too long for hip and knee replacement surgery.<sup>230</sup> The good news is that wait times did not vary by sex or income. While this is encouraging, it is important to note that our estimates of wait times are based on the time period from the last orthopaedic surgeon visit to the date of surgery; we are not able to assess wait times from physician referral to surgical evaluation. The measurement of wait times does not take into consideration the period prior to when the decision to undergo surgery was made or the delay between the referral to an orthopaedic surgeon and the first visit, which may also vary regionally and by other patient and provider characteristics. A limitation of this measure is that it does not capture referral biases or delays in referral for joint replacements. Our objective was to determine whether wait times differed by sex or socioeconomic status.

#### **Rates of joint replacement based on administrative data tell us about who got care, not who did not.**

Additionally, it is important to note that while the joint replacement wait time strategy has addressed

wait times for those getting surgery, there is, to date, no evidence to suggest that this increased access to joint replacement surgery has reduced inequities in access to this procedure. Further, examining rates of joint replacement surgery is useful in telling us who received care, but provides no information about the numbers who may need care, but who were not offered the procedure. Using administrative data alone, it is impossible to identify who needed the procedure but was not offered it or to control for the effects of patients' preferences for care (i.e., their willingness to consider surgery). Since joint replacement surgery is performed to improve quality of life, not to reduce mortality, patients' preferences must be considered. To address these limitations, we used data collected through the Ontario Hip/Knee Osteoarthritis Cohort, a population survey to estimate the numbers of men and women with advanced hip or knee osteoarthritis who were good candidates for surgery, and who were willing to consider this surgery, but who had not been offered this treatment. We found that women and those with lower education and income were far more likely than men and those with higher socioeconomic status to have need for surgery. Willingness to consider a joint replacement was lower among those with less education or income than their better educated or wealthier counterparts. Research suggests that the major reason for these differences is that individuals with lower socioeconomic status are more likely to overestimate the risks and underestimate the benefits of joint replacement surgery. Thus, after controlling for willingness, in fact unmet need for joint replacement was greater among individuals with higher education or income. Collectively, these findings are concerning; these data indicate clear inequities in the provision of this very effective procedure. Subsequent research has pointed to the need for educational interventions and improved patient-physician communication to address misperceptions about, and thus unwillingness to consider, joint replacement surgery as well as to

address the gender or socioeconomic disparities that persist in the receipt of these procedures among those who may benefit.

### **There was substantial variability in rates of discharge to rehabilitation after total joint replacement surgery.**

For those who are able to be discharged home, there is evidence that outcomes following inpatient rehabilitation are not superior to those following home-based post-operative care. In the absence of guidelines for post-operative discharge, we found substantial variability by LHIN in the proportion of patients discharged to an inpatient setting following a primary hip or knee replacement surgery. This variability likely reflects a number of factors, including the availability of inpatient rehabilitation beds and surgeon/hospital practice variation. Again, what constitutes the right rate is unclear. We found no relationship between patients' income or education and this indicator. However, as the potential need might be expected to be higher among those with lower education or income, the absence of a gradient may reflect overuse among patients with higher socioeconomic status.

### **Back pain was higher among those with lower versus higher education or income.**

Although no gender differences were observed, the prevalence of back pain was associated with income such that the proportion affected was highest among low-income women and men (in whom approximately 28 percent reported a back pain diagnosis). Further, the sharpest increase in prevalence occurred in the middle age group (aged 45-64). Both findings are consistent with greater risk for back pain associated with physically demanding occupations, particularly those requiring heavy lifting, and the high rates of work disability in this age group associated with back pain.

### **Rheumatoid arthritis is a serious MSK condition that is under treated in Ontario.**

The most common inflammatory arthritis is rheumatoid arthritis. Rheumatoid arthritis, a systemic autoimmune disease that affects approximately twice as many women as men, is associated with substantial morbidity as well as mortality. Using an administrative data algorithm, we estimated that approximately one percent of Ontarians aged 25 and older had rheumatoid arthritis and the rate among women was twice that among men. There was variability across the province by LHIN in the prevalence of rheumatoid arthritis, with the highest rates in the Northwest. This finding is likely related to the known higher prevalence of rheumatoid arthritis among the Aboriginal population of Canada; rheumatoid arthritis is up to two and a half times more common in the Aboriginal community living off reserve than in non-Aboriginal Canadians. However, arthritis receives little attention as a significant health issue within the Aboriginal community.

Guidelines for diagnosis and treatment of this condition recommend early initiation of immune suppressing medications to prevent joint destruction that leads to disability. However, these medications are associated with substantial adverse events and require routine monitoring; thus, many primary care physicians are uncomfortable prescribing these medications. For this reason, it is recommended that patients with possible rheumatoid arthritis be referred to a specialist, specifically a rheumatologist, to confirm the diagnosis and institute evidence-based care. Of the approximately one percent of Ontarians with rheumatoid arthritis, only 40 percent had been seen by a specialist during a one-year period (42 percent in women and 35 percent in men), likely representing a substantial care gap for these individuals. The proportion that had seen a specialist was higher among those from higher-income neighbourhoods, potentially reflecting increased awareness

of, and/or demand for, care and possibly indicating inequities in care and access barriers among disadvantaged populations. In the absence of available prescription drug information for individuals under age 65, we were able to examine the proportion of patients with rheumatoid arthritis who were on first line therapies only among those receiving Ontario Drug Benefits; fewer than half of these individuals were receiving effective therapy for rheumatoid arthritis. Interpretation of these findings is difficult. However, as disease remission is uncommon, it is likely that these low drug treatment rates represent substantial under treatment of this condition.

Interestingly, although specialist care for rheumatoid arthritis was higher in urban than rural regions of the province, likely related to enhanced access to specialist care, the proportion receiving appropriate medications was actually higher among those residing in a rural areas. One potential explanation for this observation is that among those referred to a specialist for treatment of rheumatoid arthritis, disease severity, and thus need for treatment, may be substantially higher for those residing in a rural versus urban region (i.e., the threshold for referral to a specialist is higher among rural rather than urban physicians due to specialist availability). Unfortunately, we cannot control for disease severity using administrative health data.

There is a major need for data in younger populations in order to assess rates of medication use post diagnosis, timing of treatment and adverse events. There is also a need to address the problem of insufficient numbers of rheumatologists to care for the growing numbers of people with rheumatoid arthritis. Improved capacity within primary care to manage these individuals—once the diagnosis is established and treatment initiated—would enhance our capacity to care for patients with inflammatory arthritis. Models of care such as shared care between specialists and primary care physicians and use

of technology such as telemedicine to improve access to specialty care may help to achieve this goal.

### **Substantial gaps in care for osteoporosis persist.**

Osteoporosis is a very common MSK condition which predominantly affects older women and men, and which is characterized by increased risk for fracture. Over the past two decades, a number of studies have documented care gaps in osteoporosis. To address the growing numbers of osteoporosis-related fractures in Ontario, the Ontario Ministry of Health and Long-Term Care (MOHLTC) established the Osteoporosis Strategy. This multi-pronged strategy has largely targeted interventions to individuals who have experienced a fracture, as: these individuals are at particularly high risk for another fracture; effective treatment exists and benchmarks for quality of post-fracture care have been developed. Risk for fracture is associated with a number of factors, including older age, falls, specific medical conditions and low bone mineral density (BMD). Fracture rates are higher among women than men due to a higher propensity of these risk factors among women. We examined a number of indicators for osteoporosis quality of care. Collectively, our findings indicate an ongoing care gap. Only one-third of men and women received a BMD test to assess for low bone mass, or a prescription for an effective bone-sparing agent within a year of experiencing a low-trauma fracture. Unlike other indicators in this chapter, the care gap for osteoporosis is wider for men than for women; however similar rural/urban and socioeconomic gradients persist with worse care noted among lower socioeconomic groups and for Ontarians from rural areas. A number of barriers to appropriate care have been identified and are being aggressively targeted for intervention. These include lack of awareness of the link between fracture and osteoporosis, a propensity to rely on BMD results alone to determine treatment (whereas comprehensive fracture risk assessment is

recommended), and under recognition that men are also at risk for osteoporosis and fracture. Further, as shown previously by others, even among those in whom treatment is initiated, continuation of effective treatment remains relatively low; only 38 percent of those aged 65 and older remained continually on medication one year following a first prescription. This is concerning as high adherence to medications is required to optimize benefit. Non-adherence has been linked with patients' inability to 'feel' the drug working (bone loss/gain is silent) and relatively large side effect profiles for these medications.

### What can we do to improve prevention and clinical management of MSK conditions?

In 2002, the MSK community in Canada held a Summit in Ottawa to establish national standards for prevention and care. A research agenda was also laid out to address current knowledge gaps, and has been taken up by many of the federal funding agencies, including the Canadian Institutes for Health Information (CIHR). There is a lack of awareness of the high prevalence and major impact of MSK conditions, including the role of these conditions on the prevention and management of other common chronic conditions, in particular diabetes and heart disease. Further, there is a lack of understanding that the largest burden is in older women, a subgroup in our population that is anticipated to grow substantially over the next two decades.

Prevention of MSK conditions should incorporate evidence-based interventions to reduce sports and occupational knee injuries, which are strong risk factors for subsequent development of osteoarthritis and need for joint replacement surgery. Such interventions exist, but have not been widely implemented or mandated in schools, elite sports or workplace environments.

MSK conditions—arthritis and osteoporosis—need to be explicitly incorporated into the province's chronic disease strategy. A more global perspective

and patient-centred approach to chronic disease management that takes into account the multiplicity of chronic conditions within individuals is necessary. Many of the strategies required for prevention and management of these conditions are common across conditions (e.g., weight loss, increased physical activity, self-management), facilitating an opportunity for a more unified approach to these common chronic conditions. Through an enhanced chronic disease strategy that incorporates MSK conditions along with other health initiatives, Ontarians can be informed about the importance of achieving and maintaining a healthy body weight and actively encouraged to engage in physical activity to prevent the onset and worsening of low back pain and osteoarthritis.

Educational interventions at the undergraduate, post-graduate and continuing education levels are needed to ensure that all relevant health professionals can perform a valid, standardized, age appropriate MSK screening assessment. This will help to ensure that individuals with inflammatory arthritis—including rheumatoid arthritis—are identified and treated appropriately soon after the onset of their symptoms in order to prevent disability.

Enhanced medical education is required to improve health professionals' knowledge of osteoarthritis, and to ensure quality of osteoarthritis care according to current treatment guidelines. Included in this is the need to inform primary care physicians about the role of total joint replacement surgery in the management of hip and knee osteoarthritis to ensure timely referral to surgery of those who have failed medical management and who may benefit from this procedure.

Ongoing work to enhance the provision of surgical care for MSK conditions should include: the development of guidelines for referral to orthopaedic surgery for hip or knee replacement; evaluation of other orthopaedic surgical procedures (including spine surgery and surgery on other joints such as the ankles and shoulders); routine collection of both data on wait times for



surgical consultation for hip and knee replacement surgery as well as data on the wait times from the decision to proceed for surgery to the date of surgery and development of guidelines for post-surgical management following hip or knee replacement, including indications for discharge to inpatient versus home-based/outpatient rehabilitation care.

Through the Ontario Osteoporosis Strategy, guidelines for BMD testing in younger women, around the menopause transition and in men, will reduce unnecessary overuse of these tests for the former and hopefully increase underuse among older men. Creation of a province-wide database for BMD scans and reports will provide a platform for quality assurance for BMD testing, and enable evaluation of current strategies to improve post-fracture care.

## LIMITATIONS

As noted above, our results are largely based on self-reported diagnoses of MSK conditions, which are known to lack precision. For most MSK conditions, there is no definitive test or finding that confirms a diagnosis—rather, diagnosis is based on the constellation of clinical findings, history, examination and various laboratory tests or criteria sets. While criteria exist to diagnose most common MSK conditions, many patients do not seek care for their complaints, and thus are not appropriately assessed or diagnosed. For others who may seek a clinical opinion, the diagnosis may be inaccurate; in particular, it is well documented that primary care physicians have difficulty discriminating degenerative osteoarthritis from types of inflammatory arthritis and few patients have their diagnosis confirmed by an appropriate specialist. Thus, self-reported information and even physician diagnoses in administrative data are subject to misclassification.

We have used an administrative data algorithm comprised of a sequence of physician visits for rheumatoid arthritis (a diagnostic code of 714),

including one specialist visit for rheumatoid arthritis, to identify individuals with rheumatoid arthritis. However, this algorithm has not been validated against physician records or patient clinical assessment. Thus, the sensitivity and specificity of this algorithm is unknown. In light of the concerns noted above regarding physicians' ability to make an accurate rheumatoid arthritis diagnosis, validation studies are needed to document the accuracy of such an algorithm.

For most MSK conditions, there is a large spectrum of disease severity, including both symptoms, like pain and fatigue, as well as level of disability. Disease severity is strongly related to need for care and prognosis. In general, women have been shown to be more likely to develop MSK conditions and to have greater disease severity when affected, compared with men. Neither population surveys nor administrative data evaluate severity of disease. Inability to adjust analyses for disease severity means that we may have both under- and over-estimated care gaps.

Using health administrative data to examine variations in rates of use of care is useful in describing Ontarians who are accessing such care, but are not informative with respect to identifying unmet need for care—that is, individuals who might need care, but either have not sought care or were not offered care. Only through population surveys can we fully understand gaps in care. Additionally, using administrative data precludes the ability to factor in the effect of peoples' health care preferences, the influence of social network and other factors, such as social support and the role of physician factors, including possible bias. As most MSK conditions are associated with morbidity but not mortality, preferences for care and physician practice (knowledge, attitudes and beliefs) have been shown to play a significant role in determining access to and outcomes following care.

Using administrative data, the delivery of a BMD test can be determined with high accuracy. However, these

data do not provide any information about the test results—thus, in our evaluation of quality of post-fracture osteoporosis care, we have made the assumption that the occurrence of a low-trauma fracture indicates high risk for another fracture, and thus need for medical therapy, including prescription of a bone-sparing agent.

### WHAT WE CANNOT MEASURE

There are important gaps in what we can measure to assess access, quality and outcomes of care among individuals with MSK conditions. Due to the unavailability of prescription drug data on individuals under age 65, we are unable to evaluate the quality of medical management for inflammatory arthritis in individuals in this age group, when most present clinically. Early aggressive institution of drug therapies has been shown to reduce the risk for joint damage and thus disability. The inability to assess prescription drug use in individuals under age 65 represents a significant barrier to assessment of care in this population.

In addition, MSK conditions are often managed with non-prescription over the counter medications and health products, including acetaminophen and glucosamine, which are not covered by provincial drug programs. As such, using data on medications from the Ontario Drug Benefits database means that we are unable to evaluate the use of these therapies.

Wait times for joint replacement surgery are based on the time period between the surgeon visit closest to the date of surgery and the surgery itself. However, this may underestimate the patients' wait time; patients who are waiting for surgery may be seen by the surgeon on an intermittent basis prior to the surgery. Currently there is no documentation available of the date on which the patient and surgeon made the decision to proceed with surgery using administrative data. It has been recommended that two wait time periods be documented: first, the time period from the primary

care physician's referral to the date of the surgical consultation; and second, the period of time from the decision to proceed with surgery to the date of surgery. Additionally, delays in surgery that may have been imposed by the patient—for example, wishing to avoid surgery during the summer—cannot be accounted for using administrative data on hospitalizations.

The quality of BMD testing—technical performance and reporting—cannot be evaluated using Ontario Health Insurance Plan (OHIP) data. Through data capture of the actual BMD scan and report, there is an opportunity to more fully evaluate the current quality of osteoporosis care in Ontario. This is a current objective of the Ontario Osteoporosis Strategy.

We have largely evaluated disability due to MSK conditions based on self-reported limitation in activities of daily living and work; however, it is increasingly appreciated that the impact of MSK conditions on individuals' ability to participate in valued social and recreational activities is equally if not more important to understand and measure. Yet, currently, participation restrictions are seldom evaluated.

Importantly, income, education, ethnicity, language and geography do not operate alone to influence health and well-being. Rather they operate together and interact to shape the health of women and men. We were only able to examine these factors separately. Thus, we do not capture the impact of their intersectionality. We were unable to assess differences on these measures by ethnicity. Sample size among those reporting MSK conditions was too small in the Canadian Community Health Survey and administrative data do not include information on ethnicity. Better data on ethnicity and language can be obtained through oversampling specific populations in surveys to increase sample size, targeted surveys specifically assessing the health of populations of interest, collecting data on ethnicity and language in administrative data, or linking datasets containing this information to health data.



## KEY MESSAGES

We took a broad look at MSK conditions in the province, focusing on gender, socioeconomic and regional variations in MSK-associated burden and, where possible, health system performance. However, unlike many other chronic conditions that affect Ontarians, relatively few indicators of health system performance exist for MSK conditions that can be measured with existing data in Ontario.

Our findings point to a number of key areas for intervention and improvement. We found sizable variations by gender, socioeconomic status, and rural/urban residency for many indicators. These findings are important for the LHINs to consider in their priority setting, planning and quality improvement activities. The following five actions can help accelerate progress in reducing the burden of MSK conditions, improving health outcomes among people with these conditions and reducing related health inequities. Successful adoption of these actions needs to take into account gender and socioeconomic differences in the incidence, prevalence, burden and experiences with care for people with MSK conditions as well as the social context of the lives of women and men with these conditions.

### **Increase focus on prevention and health promotion to reduce the burden of MSK conditions.**

- MSK conditions share many risk factors with other common chronic conditions, including diet, being overweight or obese and sedentary lifestyle. A common approach to the prevention of chronic conditions that highlights the benefits of risk factor modification in preventing MSK conditions and reducing their associated morbidity and functional limitations is needed.

- Health promotion strategies focused on physical activity and healthy weight maintenance must also take into consideration the high prevalence of hip and knee arthritis. These conditions may limit patients' abilities to comply with recommendations to increase physical activity, which is an important component of chronic disease management.

### **Wide implementation of a patient-centred approach to chronic disease management can help improve the quality of life and health outcomes of women and men with MSK conditions.**

- The common occurrence of MSK conditions (predominantly osteoarthritis) with other chronic conditions (e.g., depression, diabetes and heart disease) has implications for the management and outcomes of each of these conditions. Self-management is a cornerstone of the management of all chronic conditions and has been shown to reduce depression and increase physical activity among people with MSK conditions and other chronic conditions. Expanded use of chronic disease self-management models is required to optimize patient outcomes.
- Chronic disease self-management must also take into consideration the high prevalence of multi-morbidity among older Ontarians. The adoption of a more patient-centred focus to chronic disease management that acknowledges the high prevalence of MSK conditions among people with other common chronic conditions, such as diabetes and heart disease is needed.

**Increase the focus on early diagnosis and treatment of people with inflammatory arthritis, in particular rheumatoid arthritis, to reduce associated disability.**

- Inflammatory rheumatoid arthritis and like conditions affect 1-2 percent of Ontarians, with their greatest impact on women during their child-bearing years. Much research has clearly shown that getting these individuals onto effective disease-modifying drug therapies within the first few months of symptoms can substantially change their risk for long-term disability and thus improve their quality of life. Strategies are needed to raise arthritis awareness and to ensure that those with possible inflammatory arthritis receive a timely referral to rheumatology for diagnosis and treatment.

**Continued support for the Ontario Osteoporosis Strategy is needed to reduce persistent gaps in care.**

- Care gaps persist in the management of osteoporosis following a low-trauma fracture as well as in screening and diagnosis. The rate of low-trauma fracture varied across LHINs and by income with higher rates in lower-income neighbourhoods. Follow up for osteoporosis after fracture is less than optimal. Only one-quarter of adults received a BMD test to check for osteoporosis after a fracture. The percentage of adults who were placed into long-term care after having suffered a hip fracture also varied across LHINs, suggesting opportunities exist to reduce these rates.

- Among adults aged 66 and older with a new fracture, two-thirds were not assessed or treated for osteoporosis. In addition, among adults aged 68-70 who did not have a previous BMD test, 45 percent of women and nine percent of men were screened using BMD testing after age 65. The percentage of eligible adults who were screened varied across LHINs and by neighbourhood income.

**Improve the quality, availability and timeliness of data to assess MSK conditions and their care in the province.**

- MSK conditions are predominantly managed in the ambulatory care setting. As a result, high quality data regarding these conditions is lacking. Better and more comprehensive data on management of these conditions in primary care and other ambulatory care settings is needed. There is a need for validation studies to evaluate the current accuracy of diagnostic coding for MSK conditions. There is a need to expand surveillance of prescription drug use for younger individuals, in order to enable assessment of the quality of care for many MSK conditions, but in particular inflammatory arthritis. For osteoporosis, quality of care cannot be adequately evaluated without knowledge of the results of BMD testing.



# Appendix 8.1

## INDICATORS AND THEIR LINKS TO PROVINCIAL STRATEGIC OBJECTIVES

### APPENDIX 8.1 | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8A – General MSK Indicators</b>			
Comorbidity		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> </ul>
Probable depression		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical and population health outcomes</li> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> </ul>
Activity limitations		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centred</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL)		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centred</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Activities prevented by pain or discomfort		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centred</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Labour force participation		<ul style="list-style-type: none"> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve health status of Ontarians</li> </ul>
Overweight or obese		<ul style="list-style-type: none"> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>



## APPENDIX 8.1 | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8A – General MSK Indicators (Continued)</b>			
Use of two or more medications: pain relievers (narcotic and/or non-narcotic) and/or anti-depressants		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> <li>• Patient-centred</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> </ul>
Unmet health care needs		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Patient-centred</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve patient-centeredness</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Primary care (four or more) and/or speciality care (one or more) visits within one year		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Increase equity of the health system</li> </ul>
Difficulties accessing specialized services		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> </ul>
Home care services		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Patient-centred</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve patient-centeredness</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>

## APPENDIX 8.1 | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8A – General MSK Indicators (Continued)</b>			
Consultations with allied health professionals (physiotherapists and chiropractors)		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Patient-centred</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use and appropriate distribution of resources across the system</li> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
Insurance coverage for prescription medications		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Improve health status of Ontarians</li> <li>• Increase equity of the health system</li> </ul>
<b>Section 8B – Osteoarthritis Indicators</b>			
Prevalence of arthritis and rheumatism		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>
Prevalence of moderate to severe osteoarthritis		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>
Potential and unmet need for total joint replacement (hip and knee)		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Patient-centred</li> <li>• Equitable</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve patient-centeredness</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>

## APPENDIX 8.1 | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8B – Osteoarthritis Indicators (Continued)</b>			
Percentage undergoing planned primary total joint replacement (hip and knee) within recommended wait times		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Admission to inpatient rehabilitation after a total joint replacement (hip and knee)		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Efficient</li> <li>• Appropriately resourced</li> <li>• Integrated</li> </ul>	<ul style="list-style-type: none"> <li>• Improve integration of health services, providers, processes and systems</li> <li>• Increase productive use and appropriate distribution of resources across the system</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Length of stay in inpatient rehabilitation after total joint replacement (hip and knee)		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> <li>• Equitable</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Prevalence of back problems		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>



## APPENDIX 8.1 | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8C – Rheumatoid Arthritis Indicators</b>			
Prevalence of rheumatoid arthritis		<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>
Specialist care for patients with rheumatoid arthritis		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use and appropriate distribution of resources across the system</li> <li>• Improve access to appropriate health services</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Treatment with a disease modifying anti-rheumatic drug (DMARD) or a biologic agent		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
<b>Section 8D – Osteoporosis Indicators</b>			
Low-trauma fracture	<ul style="list-style-type: none"> <li>• Promote bone health and prevent osteoporosis (1° prevention)</li> <li>• Detect osteoporosis early (2° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>

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Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8D – Osteoporosis Indicators (Continued)</b>			
Bone mineral density (BMD) testing after a low-trauma fracture	<ul style="list-style-type: none"> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Integrate Fracture care, rehabilitation and Osteoporosis management (3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve integration of health services, providers, processes and systems</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
Diagnosis (BMD testing) and treatment post low-trauma fracture	<ul style="list-style-type: none"> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Integrate Fracture care, rehabilitation and Osteoporosis management (3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve integration of health services, providers, processes and systems</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
Baseline bone mineral density (BMD) testing in older adults	<ul style="list-style-type: none"> <li>• Promote bone health and prevent osteoporosis (1° prevention)</li> <li>• Detect osteoporosis early (2° prevention)</li> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Promote self-management and falls prevention (2°/3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> <li>• Increase sustainability of the health system</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>
Continuation of pharmacologic therapy one year after initiation	<ul style="list-style-type: none"> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Promote self-management and falls prevention (2°/3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>

**APPENDIX 8.1** | Musculoskeletal (MSK) Conditions Indicators: links to the Osteoporosis Strategy for Ontario; Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Osteoporosis Strategy for Ontario	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 8D – Osteoporosis Indicators (Continued)</b>			
Long-term care after hip fracture	<ul style="list-style-type: none"> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Integrate fracture care, rehabilitation and osteoporosis management (3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Equitable</li> <li>• Appropriately resourced</li> <li>• Integrated</li> </ul>	<ul style="list-style-type: none"> <li>• Improve integration of health services, providers, processes and systems</li> <li>• Increase productive use and appropriate distribution of resources across the system</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
Mortality after hip fracture	<ul style="list-style-type: none"> <li>• Provide evidence-based treatment (2° prevention)</li> <li>• Integrate fracture care, rehabilitation and osteoporosis management (3° prevention)</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>

# Appendix 8.2

## INDICATORS AND THEIR SOURCES

### APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8A – General MSK Indicators</b>		
Comorbidity	<ul style="list-style-type: none"> <li>• Association of Public Health Epidemiologists of Ontario (APHEO)<sup>30</sup></li> <li>• Australian Institute of Health and Welfare. Burden of disease and injury in Australia (1999)<sup>25</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Probable depression	<ul style="list-style-type: none"> <li>• Association of Public Health Epidemiologists of Ontario (APHEO)<sup>231</sup></li> <li>• Statistics Canada: Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>• Public Health Research, Education and Development: Report on the Health Status of the Residents of Ontario<sup>23</sup></li> <li>• Health Canada: Women's Health Surveillance Report, 2003<sup>20</sup></li> <li>• ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)
Activity limitations	<ul style="list-style-type: none"> <li>• Association of Public Health Epidemiologists of Ontario (APHEO)<sup>30</sup></li> <li>• Statistics Canada: Comparable Health Indicators: Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>• ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL)	<ul style="list-style-type: none"> <li>• Association for Public Health Epidemiologist of Ontario (APHEO)<sup>30</sup></li> <li>• Statistics Canada: Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>• Public Health Research, Education and Development: Report on the Health Status of the Residents of Ontario<sup>23</sup></li> <li>• ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

## APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources<sup>^</sup>

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8A – General MSK Disorders Indicators (Continued)</b>		
Activities prevented by pain or discomfort	<ul style="list-style-type: none"> <li>Statistics Canada: Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>ICES Atlas: Adding Years to Life and Life to Years: Life and Health Expectancy in Ontario, January 2001<sup>24</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)
Labour force participation	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1, sub-sample 3)
Overweight or obese	<ul style="list-style-type: none"> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>30</sup></li> <li>Statistics Canada: Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> <li>Arthritis Foundations Quality Indicator Set for Osteoarthritis<sup>14</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Use of two or more medications: analgesics (narcotic and/or non-narcotic) and/or anti-depressants	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)
Unmet health care needs	<ul style="list-style-type: none"> <li>Ontario District Health Council's Local Health System Monitoring Technical Working Group: Access, equity and integration indicators for local health system monitoring in Ontario<sup>27</sup></li> <li>Health Canada: A Profile of Women's Health indicators in Canada<sup>18</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)
Primary care (four or more) and speciality care (one or more) visits within one year	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Ontario Health Insurance Plan (OHIP)
Difficulties accessing specialized services	<ul style="list-style-type: none"> <li>Statistics Canada, Access to Health Care Services in Canada, January to December, 2005<sup>21</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1, sub-sample 3) and 2007

## APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources<sup>^</sup>

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8A – General MSK Disorders Indicators (Continued)</b>		
Home care services	<ul style="list-style-type: none"> <li>Statistics Canada: Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>31</sup></li> <li>Public Health Research, Education and Development: Report on the Health Status of the Residents of Ontario<sup>23</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Consultations with allied health professionals (physiotherapists and chiropractors)	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Insurance coverage for prescription medications	<ul style="list-style-type: none"> <li>POWER Study Technical Expert Panel recommendation</li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1, sub-sample 3)
<b>Section 8B – Osteoarthritis Indicators</b>		
Prevalence of arthritis and rheumatism	<ul style="list-style-type: none"> <li>Statistics Canada: Arthritis in Canada—an Ongoing Challenge, 2003<sup>19</sup></li> <li>MacLean C. Quality Indicators for the Management of Osteoarthritis in Vulnerable Elders. <i>Annals of Internal Medicine</i>: 2001; 135:711-721<sup>232</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)
Prevalence of moderate to severe osteoarthritis	<ul style="list-style-type: none"> <li>Statistics Canada: Arthritis in Canada—an Ongoing Challenge, 2003<sup>19</sup></li> <li>MacLean C. Quality Indicators for the Management of Osteoarthritis in Vulnerable Elders. <i>Annals of Internal Medicine</i>: 2001; 135:711-721<sup>232</sup></li> </ul>	Ontario Hip/Knee Osteoarthritis Cohort
Potential and unmet need for total joint replacement (hip and knee)	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> <li>MacLean C. Quality Indicators for the Management of Osteoarthritis in Vulnerable Elders. <i>Annals of Internal Medicine</i>: 2001; 135:711-721<sup>232</sup></li> <li>American College of Rheumatology: Recommendations for the Medical Management of Osteoarthritis of the Hip and Knee<sup>11</sup></li> <li>Hawker G. et al. Differences between men and women in the rate of use of hip and knee arthroplasty. <i>N Engl J Med</i> 2000;342:1016-22<sup>1</sup></li> </ul>	Ontario Hip/Knee Osteoarthritis Cohort

## APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources<sup>^</sup>

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8B – Osteoarthritis Indicators (Continued)</b>		
Percentage undergoing planned primary total joint replacement (hip and knee) within recommended wait times	<ul style="list-style-type: none"> <li>Institute for Clinical Evaluative Sciences: Access to health services in Ontario. April 2005<sup>16</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP)
Admission to inpatient rehabilitation after a total joint replacement (hip and knee)	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Rehabilitation Reporting System (NRS)
Length of stay in inpatient rehabilitation after total joint replacement (hip and knee)	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Rehabilitation Reporting System (NRS)
Prevalence of back problems	<ul style="list-style-type: none"> <li>Primary Care Atlas: Chapter 12—Indicators of primary care based on administrative data<sup>22</sup></li> <li>Health Behaviours and Lifestyle Practices in southwestern Ontario: Results from the CCHS (2000/2001) August 2004<sup>233</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
<b>Section 8C – Rheumatoid Arthritis Indicators</b>		
Prevalence of rheumatoid arthritis	<ul style="list-style-type: none"> <li>Statistics Canada: Arthritis in Canada—an Ongoing Challenge, 2003<sup>19</sup></li> <li>American College of Rheumatology Subcommittee on Rheumatoid Arthritis Guidelines (2002): Guidelines for the Management of Rheumatoid Arthritis 2002 Update<sup>12</sup></li> </ul>	Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB); ICES Physician Database (IPDB)
Specialist care for patients with rheumatoid arthritis	<ul style="list-style-type: none"> <li>Statistics Canada: Arthritis in Canada—an Ongoing Challenge, 2003<sup>19</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> <li>Arthritis Foundations Quality Indicator Set for Rheumatoid Arthritis<sup>13</sup></li> </ul>	Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Registered Persons Database



## APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources<sup>^</sup>

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8C – Rheumatoid Arthritis Indicators (Continued)</b>		
Treatment with a disease modifying anti-rheumatic drug (DMARD) or a biologic agent	<ul style="list-style-type: none"> <li>Statistics Canada: Arthritis in Canada—an Ongoing Challenge, 2003<sup>19</sup></li> <li>ICES Atlas: Arthritis and related conditions in Ontario, September 2004<sup>17</sup></li> <li>Arthritis Foundations Quality Indicator Set for Rheumatoid Arthritis<sup>13</sup></li> <li>National Committee for Quality Assurance (NCQA). HEDIS 2006. Healthcare Effectiveness data &amp; information set. Vol. 2, Technical specifications<sup>26</sup></li> </ul>	Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Ontario Drug Benefits (ODB) database; Registered Persons Database
<b>Section 8D – Osteoporosis Indicators</b>		
Low-trauma fracture	<ul style="list-style-type: none"> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management<sup>28</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)
Bone mineral density (BMD) testing within 12 months after a low-trauma fracture	<ul style="list-style-type: none"> <li>National Committee for Quality Assurance (NCQA). HEDIS 2006. Healthcare Effectiveness data &amp; information set. Vol. 2, Technical specifications<sup>26</sup></li> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management<sup>28</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB)
Diagnosis (BMD testing) and treatment post low-trauma fracture	<ul style="list-style-type: none"> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management<sup>28</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB); Ontario Drug Benefits (ODB) database
Baseline bone mineral density (BMD) testing in older adults	<ul style="list-style-type: none"> <li>National Committee for Quality Assurance (NCQA). HEDIS 2006. Healthcare Effectiveness data &amp; information set. Vol. 2, Technical specifications<sup>26</sup></li> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management<sup>28</sup></li> </ul>	Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB)

**APPENDIX 8.2 | Access to health care services indicators—indicator sources and data sources<sup>^</sup>**

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 8D – Osteoporosis Indicators (Continued)</b>		
Continuation of pharmacologic therapy one year after initiation	<ul style="list-style-type: none"> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management<sup>28</sup></li> </ul>	Ontario Drug Benefits (ODB) database; Registered Persons Database (RPDB)
Long-term care after hip fracture	<ul style="list-style-type: none"> <li>ICES Atlas: Arthritis and related conditions, 1998<sup>29</sup></li> <li>Ontario Women’s Health Council (2000). A Framework and Strategy for the Prevention and Management of Osteoporosis—Report of the Strategic Action Working Group on Osteoporosis<sup>15</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI–DAD); Ontario Health Insurance Plan (OHIP); Ontario Drug Benefits (ODB) database; Continuing Care Reporting System (CCRS)
Mortality after hip fracture	<ul style="list-style-type: none"> <li>The Joint Commission (2008): Improving and Measuring Osteoporosis Management.<sup>28</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database (CIHI–DAD); Registered Persons Database (RPDB)

# Appendix 8.3

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

The indicators we report are the result of a rigorous selection process which included an extensive literature search of peer-reviewed and grey literature (see [Introduction to the POWER Study, chapter 1](#) for a more detailed description of the indicator selection process).<sup>234</sup> The review of literature identified a number of indicators that were reviewed by the working group using defined indicator selection criteria (see [The POWER Study Framework, chapter 2](#)).<sup>235</sup> A final list containing 46 potential indicators was prepared for review by a Technical Expert Panel (TEP). Indicators were then selected through a modified Delphi process by the TEP using a two step process—first through an online questionnaire and then at a face-to-face meeting on September 19, 2008. The final list included 17 indicators that apply to general musculoskeletal (MSK) disorders, 7 indicators for osteoarthritis, 3 indicators for rheumatoid arthritis and 7 indicators for osteoporosis (see [Appendix 8.1](#) for a complete indicator list).

All the indicators are reported at the provincial level and at the Local Health Integration Network (LHIN) level when sample size allowed. At the provincial level, these indicators were first stratified by sex, and then further stratified by age, income level, education level, ethnicity, years since immigration and rural/urban residency, as allowed by sample size and data availability. At the LHIN level, indicators were stratified by sex and then by age and income level as allowed by sample size and data availability. Age-adjustment was done using indirect standardization.

### 2A. Datasets—Survey Data

#### Canadian Community Health Survey (CCHS)

The CCHS is a nationally representative cross-sectional survey of the Canadian community-dwelling population

conducted every two years by Statistics Canada. The CCHS is offered in English and in French. To remove language as a barrier to conducting interviews, each of the Statistics Canada Regional Offices recruits interviewers with a wide range of language competencies. When necessary, cases are transferred to an interviewer with the language competency needed to complete an interview. In addition, the survey questions are translated into the following languages: Chinese, Punjabi and Inuktitut. Chinese and Punjabi are the most common language barriers identified by the regional offices. The Inuktitut translation is used to facilitate collection in Nunavut. The survey is conducted via face-to-face interviews and covers material that alternates between a general overview of the health of Canadians (the x.1 cycle surveys) and more in-depth issues (the x.2 cycle surveys). In 2007, major changes were made to the CCHS design. Data are now collected on an ongoing basis with annual releases rather than every two years as was the case prior to 2007. As such, as of 2007, the naming convention has also changed to reflect the year of the survey rather than the cycle. Residents living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces and residents of certain remote regions are excluded from the survey. The Ontario share files for the survey were used for all analyses. The analyses for several indicators were based on data from the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); 2005 (Cycle 3.1) and 2007.

For some of the indicators, it was possible to use data from the combined CCHS, 2005 (Cycle 3.1) and 2007. This was only possible when questions were similarly asked in both cycles and response options were also the same. The cycles were combined using a method

developed by Statistics Canada<sup>236</sup> that adjusted the sample weights for each of the cycles by a function of their sample sizes. It was not necessary to adjust for health regions as the 36 health region borders of CCHS 2005 (Cycle 3.1) and 2007 remained the same. To use the combined cycles, it was necessary to assume the two share files to be independent, i.e., no duplicate respondents. This is because the probability of duplicate records is very low and it would be difficult to identify duplicates across cycles and years.

For all the CCHS-based indicators, we included all respondents aged 25 and older who had responded to the questions about musculoskeletal (MSK) conditions including questions about physician diagnosed arthritis or rheumatism (question CCC\_Q051) and back pain (CCC\_Q061). The sample was restricted in this manner to exclude people in whom the presence of physician-diagnosed MSK conditions could not be determined. For some indicators, adults with MSK conditions were compared to adults with other chronic conditions (Alzheimer's or other dementias; emphysema, asthma or chronic obstructive pulmonary disease; non-gestational diabetes or insulin use; heart disease, current cancer, stroke, urinary incontinence, bowel disorders, Crohn's disease or colitis) or adults with none of the noted chronic conditions.

For the overall population and for women and men we assessed the relationship between these indicators and income, education, age, ethnicity, immigrant status

and rural/urban residence. The variable measuring rural/urban residency is a derived variable by Statistics Canada based on population density and size. In analyses that use the CCHS, income levels were based on information collected about annual household income, a variable derived by Statistics Canada that accounts for total household income and household size (see [Table 2](#) for more detail regarding variable categories). Income data were missing for 13 percent of the sample from the CCHS, 2005 (Cycle 3.1) and CCHS, 2007 combined sample. The studentized range test was used to assess the significance of differences among the rates. The standard errors of the rates and 95 percent confidence intervals were calculated using 500 bootstrap weights provided by Statistics Canada. In addition, relative rates were calculated for women-to-men, lowest-to-highest neighbourhood income quintile and rural-to-urban residence.

Statistics Canada rules were followed in the reporting of estimates using the Ontario share file as follows:

- Estimates should not be reported if the unweighted sample is less than 10
- Estimates are adequate and can be reported if the coefficient of variation is 16.5 or less
- Estimates should be reported with caution if the coefficient of variation is between 16.6 and 33.3
- Estimates should be suppressed if the coefficient of variation is greater than 33.3.

**Table 2 | Stratifying variables for CCHS indicators**

<b>Sex</b>	
Female	
Male	
<b>Age (years)</b>	
25–44	
45–64	
65–79	
80+	
<b>Household income – Provincial level analyses</b>	
Lowest income	< \$15,000 if 1 or 2 people < \$20,000 if 3 or 4 people < \$30,000 if 5+ people
Lower middle income	\$15,000 to \$29,999 if 1 or 2 people \$20,000 to \$39,999 if 3 or 4 people \$30,000 to \$59,999 if 5+ people
Upper middle income	\$30,000 to \$59,999 if 1 or 2 people \$40,000 to \$79,999 if 3 or 4 people \$60,000 to \$79,999 if 5+ people
Highest income	>= \$60,000 if 1 or 2 people >= \$80,000 if 3+ people
<b>Household income – LHIN level analyses</b>	
Lower income (Lowest / Lower Middle)	< \$30,000 if 1 or 2 people < \$40,000 if 3 or 4 people < \$60,000 if 5+ people
Higher income (Upper Middle / Highest)	>= \$30,000 if 1 or 2 people >= \$40,000 if 3 or 4 people >= \$60,000 if 5+ people
<b>Education – Provincial level analyses</b>	
Less than secondary school graduation	
Secondary school graduation	
At least some post-secondary school	
Bachelor's degree or higher	

**Education – LHIN level analyses**

Lower education	Secondary school graduation or less
Higher education	At least some post-secondary education

**Immigration**

0-9 years of residency in Canada
10+ years of residency in Canada
Born in Canada

**Ethnicity**

White	
Black	
East and Southeast Asian	Filipino, Japanese, Korean, Chinese, Southeast Asian
Arab, West and South Asian	South Asian, Arab, and West Asian
Other	Latin American, other racial or cultural origins, multiple racial origins
Aboriginal people	North American Indian, Métis or Inuit

**Rural/urban**

Urban	Urban core; Urban fringe; Urban area outside CMAs and CAs Secondary urban core
Rural	Missing; Rural fringe inside CMAs and CAs; Rural fringe outside CMAs and CAs

## 2B. Administrative and Research Data

### Ontario Health Insurance Plan (OHIP)

The OHIP claims database covers all reimbursement claims to the Ontario Ministry of Health and Long-Term Care (MOHLTC) made by fee-for-service physicians, community-based laboratories and radiology facilities. The OHIP database at ICES contains encrypted patient and physician identifiers, code for service provided, date of service and the associated diagnosis and fee paid. Services which are missing from the OHIP claims data include some lab services, services received in provincial psychiatric hospitals, services provided by health service organizations and other alternate funding plans, diagnostic procedures performed on an inpatient basis and lab services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through Alternate Fee Plans (AFPs). Their concentration in certain specialties or geographic areas could distort an analysis.

### Canadian Institute for Health Information Discharge Abstracts Database (CIHI-DAD)

The CIHI-DAD is a database of information abstracted from hospital records. It includes patient-level data for acute and chronic care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. The CIHI-DAD database at ICES contains encrypted patient identifiers, patient demographics (age, sex, and geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay).

### National Ambulatory Care Reporting System (NACRS)

NACRS is a data collection tool used to capture patient and clinical information on patient visits to hospital and community-based ambulatory care: day surgery, outpatient clinics and emergency departments. Client visit data are collected at the time of service in participating facilities, but data collection methods may vary by facility.

### National Rehabilitation Reporting System (NRS)

The NRS contains client data collected from participating adult inpatient rehabilitation facilities and programs across Canada. The NRS data elements include socio-demographic information, administrative data such as referral, admission and discharge; activities and participation (e.g., ADL, communication, social interaction) and interventions.

### Ontario Drug Benefit Program (ODB)

The ODB database contains information about the use of medications in seniors aged 65 and older as well as individuals on welfare assistance who are covered by the ODB. The ODB tracks all filled prescriptions for medications listed in its formulary and each record represents a unique drug claim (i.e., a dispensed prescription) paid for by the MOHLTC. The ODB database at ICES contains patient, pharmacy and physician identifiers, drug identifiers (drug identification numbers) quantity supplied, cost and dispensing date.

### Continuing Care Reporting System (CCRS)

The CCRS has been developed for clinical and demographic information on residents receiving facility-based continuing care services. The CCRS is appropriate for a wide range of continuing care services including hospital-based continuing care (e.g., complex continuing care, extended/chronic care) and residential care providing 24-hour nursing services (e.g., nursing home, home for the aged).

### Registered Persons Database (RPDB)

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex, address, date of death (where applicable) and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address is removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data from the RPDB are enhanced



with available information through other administrative data sources at ICES; however, even event the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality.<sup>237</sup> To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada. The adjusted dataset was used to determine population denominators.

### ICES Physician Database (IPDB)

The IPDB contains information on physician demographics and specialty training. The IPDB incorporates information from the Corporate Provider Database (CPDB), the Ontario Physician Human Resource Data Centre (OPHRDC) database and the OHIP database of physician billings. The CPDB contains information about physician demographics, specialty training and certification and practice location. This information is validated against the OPHRDC database, which verifies this information through periodic telephone interviews with all physicians practicing in Ontario.

### Ontario Hip/Knee Osteoarthritis Cohort

The Ontario Hip and Knee Osteoarthritis cohort recruited participants between 1995 and 1997 through a screening survey of 100 percent of the population aged 55 and older residing in two regions of Ontario, Canada, one urban (the Borough of East York in metropolitan Toronto) and one rural (Oxford county). Individuals were selected for cohort inclusion if they: i) reported difficulty in the last three months with each of the following: stair climbing, rising from a chair, standing and walking; ii) swelling, pain or stiffness in any joint lasting at least six weeks; and iii) indicated on a diagram that a hip or knee had been 'troublesome'.

Ninety-six percent of those who met screening criteria had hip or knee arthritis on examination. Based on these criteria, a cohort of 2,411 individuals was established; 2,225 had osteoarthritis. After adjusting for eligibility, participation rates for the initial baseline surveys were 80.6 percent and 75.4 percent for the rural and urban regions, respectively. Follow up has been conducted annually by standardized telephone interviews. Participants have provided information on sociodemographics (age, sex, race, level of education, annual household income, living circumstances [alone, with others, institution]); body mass index and severity of hip/knee symptoms and disability were identified using the Western Ontario McMaster Universities OA Index [WOMAC] pain and function subscale and summary scores,<sup>1, 5</sup> for which higher scores indicate worse symptoms or disability. This population cohort is unique; although the data are not current, no other similar data source are available that provides diagnosis and disease severity in a population-based cohort. We believe these findings most likely reflect current patterns.

## 3. Analyses and Regional and Socioeconomic Variables

### Analysis

For survey data (CCHS), analyses were conducted at the provincial level, first by sex and then by annual household income, educational attainment, age group, ethnicity, time since immigration, language, rural/urban residence and LHIN. Where possible, relative rates were calculated for women-to-men, lowest-to-highest income groups and rural-to-urban residence. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. At the LHIN level, due to small cell sizes, the analysis was done by sex, age group, income level and education.

Depending on the indicator and its purpose, we reported crude or age-adjusted rates. When age-adjusted rates were reported, we used indirect standardization which compares the age-specific rates to the standard population average for that age group.

For this chapter, the standard population was adults aged 25 and older who had an MSK condition (back pain, arthritis or rheumatism). The standardized rates will differ from the crude rates in a way that reflects: (i) how the indicator varies by age and (ii) how the strata differ by age. The observed over the expected rate tells us how a particular stratum compares to the overall population and the relative rate tells us how a specific stratum compares to another (i.e., women versus men or low versus high income).

The results based on CCHS data should be interpreted with caution for the following reasons:

- The survey relies on self-reports and voluntary participation of randomly selected participants, and thus the data reflect individuals' interpretation of questions and how they perceive their own health. Hence, results may be an under- or over-estimation of the prevalence of some conditions.
- The CCHS does not survey Aboriginal people living on reserves, institutionalized individuals, individuals unable to be surveyed because of language restrictions, or persons in the armed forces. While the findings pertain to a large proportion of Ontarians (those living in households), they may be biased if the groups not surveyed have significantly different need or utilization rates.
- The CCHS survey sampling strategy is based on health regions and thus may not be fully representative of the LHINs and in there may be inadequate sample size for some measures for some LHINs. This prevents comparative analysis at the LHIN level for some indicators.

For administrative data, analyses were conducted at the provincial level, first by sex and then by neighbourhood income quintile, neighbourhood educational attainment, age group, rural/urban residency and LHIN. Analyses at the LHIN level were stratified first by sex and by neighbourhood income for select indicators. For indicators based on administrative data, indirect age-standardization, using the 2005 Registered Persons Database (adjusted for the Statistics Canada Census) was applied. Where numbers were too small, results

were either not reported or were aggregated. Where possible, relative rates were calculated for women-to-men and lowest-to-highest income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons.

### Neighbourhood Income Quintile

Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person equivalent (IPPE), which is a household size adjusted measure of household income based on 2006 Census summary data at the dissemination area and using person-equivalents implied by the 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as proxy for overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilizations. Individual geographic information from ICES databases was used to define the best known postal code for each person on July 1 of each year (available from 1991 to 2004). Postal codes were then used to assign people to enumeration areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Two-level income data compares people from the first two income quintiles (Q1, Q2) against people from the remaining three quintiles (Q3, Q4, Q5). Enumeration areas and dissemination areas are small adjacent geographic areas, designated for collection of census data. Dissemination areas replaced enumeration areas in 2001 and have a population of 400–700 persons.

### Neighbourhood Educational Attainment Quartile

Since individual level information on education is not available in the administrative data, the analysis is done using neighbourhood level information obtained from

the Statistics Canada 2006 Census. The percentage of the population (age 25-64) with a post-secondary certificate, diploma, or degree was calculated for each dissemination area (DA). Ontario neighbourhoods were classified into one of four approximately equal-sized groups (education quartiles), ranked from the quartile containing neighbourhoods with the lowest percentages of post-secondary education (Q1) to the quartile containing neighbourhoods with the highest percentages of post-secondary education (Q4). Using postal codes, each person was linked to their DA (using the Postal Code Conversion File from Statistics Canada) and then assigned the education quartile associated with that DA.

### **Location of Residence (Urban Versus Rural)**

In the administrative data, rural/urban residency was assigned based on a Statistics Canada derived variable. Urban areas are those continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts. Areas are designated as rural, urban core, urban fringe, urban area outside CMAs and CAs, secondary urban code and mix or urban/rural areas. This variable is further dichotomized into rural and urban location by Statistics Canada.

### **Patients' Residence**

For all analyses presented in the report, the definition of "Local Health Integration Network (LHIN) of patient residence" is based on where each person lived.

## **4. Indicators**

### **Comorbidity**

The percentage of adults who reported having another chronic condition (Alzheimer's or other dementias; emphysema, asthma or chronic obstructive pulmonary disease; non-gestational diabetes or insulin use; heart disease, current cancer, stroke, urinary incontinence, bowel disorders, Crohn's disease or colitis) among

those with either an MSK condition or another chronic condition was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Probable Depression**

Among adults with and without MSK conditions, past-year depression was measured using the CCHS, 2000/01 (Cycle 1.1) using a cut-off score of 0.9 on the Composite International Diagnostic Interview-Short Form for Major Depression (CIDI-SFMD). The CIDI-SFMD probability score of  $>0.9$  was considered to predict probable depression. Since the CIDI-SFMD was designed to predict the probability that a person would be considered depressed using the full set of CIDI depression questions, it may somewhat overestimate prevalence. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Activity Limitations**

Among adults with and without MSK conditions, the percentage who reported that their activities at home, school or work were limited due to a long-term (one that is expected to last or has already lasted six months or more) physical or mental condition or health problem (activity limitation) was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Limitations in Instrumental Activities of Daily Living (IADL) and/or Activities of Daily Living (ADL)**

Among adults with and without MSK conditions, the percentage who reported having IADL and/or ADL limitations was measured using data from the CCHS, 2005 (Cycle 3.1). ADL limitations include washing, dressing, eating and moving about inside the house.

IADLs include housework, laundry, meal preparation, transportation, grocery shopping, using the telephone and money management. IADL limitations represent difficulties in carrying out routine life activities and are generally interpreted as an indicator of mild to moderate disability. Limitations in ADLs reflect difficulty in carrying out self-care activities, and therefore represent a more severe disability. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Activities Prevented Due to Pain or Discomfort**

Among adults with and without MSK conditions, the percentage who reported that at least some of their activities were limited due to pain or discomfort was measured using data from the CCHS, 2000/01 (Cycle 1.1). We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Labour Force Participation**

Among adults with MSK conditions who were aged 25-64, the percentage that did not participate in the labour force, based on respondents who reported that they were without a job and were not looking for one in the past year, was measured using data from the CCHS, 2005 (Cycle 3.1, sub-sample 3). We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Overweight or Obese**

Among adults with and without MSK conditions, the percentage who reported being overweight or obese, defined as a Body Mass Index (BMI)  $\geq 25$ , calculated from self-reported height and weight, was measured using data from the CCHS 2005 (Cycle 3.1) and 2007 combined dataset. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Multiple Medication Use**

Among adults with MSK conditions or with another chronic condition, the percentage who reported taking two or more medications (pain relievers (narcotic and/or non-narcotic) and/or anti-depressants) in the past four weeks was measured using data from the CCHS, 2000/01 (Cycle 1.1). Respondents were asked about their medication usage in the past month including the use of pain relievers (e.g., aspirin, acetaminophen, arthritis medicine or anti-inflammatories); narcotic medications (codeine, Demerol or morphine); or anti-depressants (e.g., Prozac, Paxil or Effexor). Only respondents who had answered the relevant questions about the types of medications reported were included in the denominator. The medication module of CCHS 1.1 was an optional module and sampling regions within the South East Local Health Integration Network (LHIN) and the Champlain LHIN did not include this module. As well, the proportion of individuals who responded to the various medication questions was significantly lower for the question about narcotic use than for other medications. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Unmet Health Care Needs**

Among adults with and without MSK conditions, the percentage of adults who reported that there was a time during the past 12 months when they needed health care and did not receive it was measured using the CCHS, 2005 (Cycle 3.1). We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### **Primary and Specialty Care**

Data from the CCHS, 2000/01 (Cycle 1.1) were linked to administrative data using encrypted health card numbers. The linked data for Ontario include all respondents from Ontario with a valid health card

number who, when surveyed, agreed not only to share their data but also to allow their responses to be linked to administrative data for research purposes.

For adults with and without MSK conditions whose data could be linked, OHIP claims within one year of the survey date were obtained. Visits in physicians' offices, long-term care facilities and patients' homes that were billed to OHIP were included. Records were categorized as visits to general practitioners/family physicians (GP/FP) or to specialists based on the physician specialty code recorded in the OHIP claim. The median number of visits per person to GP/FPs (three) and to specialists (zero) was determined. The percentage of adults who had four or more visits to a GP/FP during the year or one or more visit to a specialist—higher than average users of health services—were reported. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Access to Specialized Services

Among adults with and without MSK conditions, the percentage who reported no difficulties in accessing specialized services was measured using the CCHS, 2005 (Cycle 3.1, sub-sample 3) and 2007 combined dataset. The types of services included were:

- Specialist care for diagnosis or consultation of a new or existing condition;
- Non-emergent diagnostic testing, specifically magnetic resonance (MR) imaging, computed tomography (CT) scanning or angiography;
- Elective (non-emergent) surgery.

To assess access to specialist care, adults who reported needing to visit to a medical specialist (e.g., cardiologist, allergist, gynecologist or psychiatrist, excluding optometrists) for a diagnosis or a consultation in the past 12 months were asked: "In the past 12 months, did you ever experience any difficulties getting the specialist care you needed for a diagnosis or consultation?"

To assess access to specialized diagnostic tests, adults who reported requiring MR imaging, CT scanning or angiography in the past 12 months were asked: "In the past 12 months, did you ever experience any difficulties getting the tests you needed?"

To assess access to elective surgery, adults who reported requiring surgery (e.g., cardiac surgery, joint surgery, caesarean sections and cataract surgery, excluding laser eye surgery) in the past 12 months were asked: "In the past 12 months, did you ever experience any difficulties getting the surgery you needed?"

The samples for each type of service were restricted to respondents who indicated that they required the service. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Home Care Services

Among adults with and without MSK conditions, the percentage who reported that they received any home care services including services that were partially or completely covered by the government or services that were not covered by the government (i.e., paid for privately) was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Home care services included health care, home maker or other support services received at home that were provided because of a health problem or condition. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Consultations with Allied Health Professionals

Among adults with MSK conditions, the percentage who reported that they had seen a physiotherapist and/or a chiropractor at least once in the previous 12 months was reported. To assess use of physiotherapy, adults who reported that they had seen or talked on the telephone about their physical, emotional or mental health with a physiotherapist at least once were included.



To assess use of chiropractic care, adults who reported that they had seen or talked on the telephone about their physical, emotional or mental health with a chiropractor at least once were included. This indicator was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Insurance Coverage for Prescription Medications

Among adults with MSK conditions who were aged 25-64, the percentage who reported that they had insurance that covered all or part of their prescription medications were included. Adults aged 65 and older were excluded from the sample because they are entitled to provincial drug coverage through the ODB. Participants were also asked to identify the types of prescription drug insurance that they had: government insurance; employer-paid insurance and private insurance. This indicator was measured using data from the CCHS, 2005 (Cycle 3.1, sub-sample 3). We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Prevalence of Arthritis or Rheumatism

The percentage of adults who reported that they had arthritis or rheumatism excluding fibromyalgia that had been diagnosed by a health professional was reported was measured using the CCHS, 2005 (Cycle 3.1). We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Prevalence of Moderate to Severe Osteoarthritis

Data for this variable were derived from the Ontario Hip/Knee Osteoarthritis Cohort. From a screening survey of 100 percent of the population of two Ontario regions aged 55 and older (n~50,000), individuals were identified as having moderate to severe hip

or knee osteoarthritis, and thus selected for cohort inclusion, if: they reported difficulty in the previous three months with each of stair climbing, rising from a chair, standing and walking; and they reported swelling, pain or stiffness in any joint lasting at least six weeks; and they indicated on a diagram that a hip or knee had been 'troublesome'. Ninety-six percent of those who met these criteria had hip or knee osteoarthritis on examination.

### Unmet Need for Total Joint Replacement (Hip or Knee)

Data for this variable were derived from the Ontario Hip/Knee Osteoarthritis Cohort. On a screening survey of 100 percent of the population of two Ontario regions aged 55 and older (n~50,000), individuals were identified as having moderate to severe hip or knee osteoarthritis, and thus selected for cohort inclusion. Cohort participants were defined as having **a potential need** for total joint replacement based on the following criteria: a Western Ontario McMaster University Osteoarthritis Index summary score of at least 39/100, radiographic and clinical evidence of arthritis of the hip or knee, and no absolute contraindications to total joint replacement. **Unmet need** for surgery was defined as having potential need and reporting willingness (probable or definite) to undergo the surgery.

### Wait Times for Planned Primary Total Joint Replacement (Hip or Knee)

Data from CIHI-DAD were used to identify adults who had an elective, primary total joint replacement with a discharge date during 2007/08. Replacements associated with a diagnosis of cancer, fracture or trauma were excluded. CIHI-DAD data from the period 2002/03-2007/08 were obtained to exclude individuals with a previous joint replacement to ensure the sample was restricted to adults who were having their first joint replacement.

The wait time was calculated from the date of the most recent surgical consult prior to surgery (based on physician claims data from OHIP) to the admission date when the surgery occurred. The measurement of wait times does not take into consideration the period prior to when the decision to undergo surgery was made or the delay between the referral to an orthopaedic surgeon and the first visit, which may also vary regionally and by other patient and provider characteristics. We calculated the crude percentage of patients who underwent their procedure within the recommended maximum wait time (26 weeks) and the associated 95 percent confidence intervals.

### Admission to Inpatient Rehabilitation After a Total Joint Replacement (Hip or Knee)

Data from CIHI-DAD and from the NRS were used to identify adults who had elective, primary total joint replacements with a discharge date during 2006/07. Data for the next fiscal year (2007/08) were used to measure admission to inpatient rehabilitation. Replacements associated with a diagnosis of cancer, fracture or trauma were excluded. CIHI-DAD data from the period 2002/03-2007/08 were obtained to exclude individuals with a previous joint replacement to ensure the sample was restricted to adults who were having their first joint replacement. Patients who underwent a primary total joint replacement and who received either rehabilitation care or home care were included in the sample. Those who were admitted within 14 days of discharge to a rehabilitation hospital or to another long-term care facility with a diagnostic code indicating rehabilitation/convalescence: physical therapy NEC (Z50.1); occupational/vocational therapy (Z50.7); rehabilitation procedure NEC (Z50.8); rehabilitation procedure NOS (Z50.9); convalescence NEC (Z54.7, Z54.8, Z54.9); surgical convalescence (Z54.0); surgical follow up (Z09.0, Z09.7, Z09.8, Z09.9) were identified as admitted to inpatient rehabilitation. For acute care hospitals, rehabilitation provided during the initial hospitalization for the joint replacement was not included.

We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Length of Stay in Inpatient Rehabilitation After Total Joint Replacement (Hip or Knee)

For the sample that was identified as having been admitted to inpatient rehabilitation after a total joint replacement (hip or knee), the length of stay in inpatient rehabilitation was based on the time between the admission to the first inpatient rehabilitation episode and the discharge from the last admission to inpatient rehabilitation within the NRS database and the CIHI-DAD. Multiple episodes of inpatient rehabilitation were assumed to still be related to the joint replacement if the subsequent inpatient admission occurred within two days of discharge from the earlier admission (for episodes without missing discharge information from the earlier admission) or if the subsequent admission date was within 25 days of the first admission (for records with missing discharge information from the earlier admission). The cut-points were based on the overall distribution of lengths of stay for patients with single rehabilitation admissions with clear lengths of stay. We calculated the mean lengths of stay and the associated 95 percent confidence intervals.

### Prevalence of Back Problems

The percentage of adults who reported that they had back pain excluding fibromyalgia or arthritis that had been diagnosed by a health professional was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We calculated crude and age-adjusted rates (adjusted to the MSK conditions population) and the associated 95 percent confidence intervals.

### Prevalence of Rheumatoid Arthritis

The prevalence of rheumatoid arthritis as of April 1, 2005 was established using an administrative data algorithm. Adults were identified as having rheumatoid arthritis if they had at least two OHIP records containing a rheumatoid arthritis diagnosis (OHIP diagnosis code



714) that were at least two months apart, but not more than four years apart during the period April 1, 1991 – May 1, 2009, provided that at least one claim was from a specialist (rheumatologist, orthopaedic surgeon, general internist or physical medicine specialist). The earlier of the two diagnoses established the prevalence date; to establish prevalence as of April 1, 2005, the earlier claim had to occur before this date. This cohort was used to measure the other two indicators in the Rheumatoid Arthritis section of the chapter.

### **Specialist Care for Adults with Rheumatoid Arthritis**

The percentage of adults identified as having rheumatoid arthritis as of April 1, 2005 (based on the above described algorithm) seen by a specialist (rheumatologist, orthopaedic surgeon, general internist or physical medicine specialist) at least once during 2005/06 was reported. People who had died during the course of the year were excluded. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Treatment with a Disease Modifying Anti-Rheumatic Drug (DMARD) or a Biologic Agent**

Adults identified as having rheumatoid arthritis as of April 1, 2005 (based on the algorithm described above) who were aged 65 and older and alive during the 2005/06 year were included. The percentage of adults who filled at least one prescription for either a DMARD or a biologic agent were reported. The specific medications included were: Abtacept; Adalimumab; Anakinra; Auranofin; Aurothioglucose; Azathioprine; Chloroquine Phosphate; Cyclosporine; Etanercept; Hydroxychloroquine Sulphate; Infliximab; Leflunomide; Methotrexate Sodium; Sodium Aurothiomalate; Sulfasalazine; Tacrolimus. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Low-Trauma Fracture**

The rate per 10,000 adults aged 50 and older who had a hospital admission or emergency department visit indicating a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic and lumbar spine), wrist, forearm shoulder and upper arm) probably due to osteoporosis in 2007/08 was measured. Records were identified through CIHI-DAD (most responsible diagnosis) and NACRS (diagnosis codes 1-3) and had to include an external cause of injury code that indicated that the fracture was due to a minor fall (i.e., a fall that would not usually result in a fracture) and could not include a code indicating a transportation accident. Patients with a record during that year or in the two years prior to April 1, 2007 that included a diagnosis of epilepsy, malignant neoplasms of breast, bone, colon, rectum, lung or multiple myeloma were excluded, as their fractures may not be due to osteoporosis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Bone Mineral Density (BMD) Testing After a Low-Trauma Fracture**

This indicator measures the percentage of people aged 50 and older who had a low-trauma fracture that underwent BMD testing within 12 months of discharge. The identification of low-trauma fractures is based on the indicator described above. Adults who already had a BMD test in the 12 months prior to a fracture or who died within 12 months of their fracture were excluded. OHIP data were used to identify BMD testing and included fee codes for the following tests: baseline test (X145, X146); subsequent test—low risk patient (X152, X153); subsequent test—high risk patient (X149, X155). We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

## Diagnosis and Treatment Post-Fracture in Older Adults

This indicator measures the percentage of people aged 66 and older who had a low-trauma fracture who did not subsequently undergo BMD testing to diagnose osteoporosis or receive treatment for osteoporosis (bone-sparing medications) at any time between the date of their fracture and 12 months after discharge. The identification of low-trauma fractures is based on the indicator described above. Adults who had a BMD test or who had filled a prescription for a bone-sparing medication in the 12 months prior to fracture or who died within 12 months of their fracture were excluded. The sample was restricted to adults aged 66 and older because access to provincially funded drug benefits (ODB) is restricted to adults aged 65 and older. Because the indicator excludes people already being treated for osteoporosis, one year of data was needed to ensure that patients were not already taking these medications.

OHIP data were used to identify BMD testing for diagnosis of osteoporosis and included fee codes as described above. Prescriptions for the following bone-sparing medications were included as treatments for osteoporosis: Alendronate Sodium; Alendronate Sodium and vitamin D3; Risedronate Sodium; Risedronate Sodium and calcium; Risedronate Sodium and calcium and vitamin D3; Etidronate and Calcium Carbonate; Calcitonin Salmon; Calcitonin Salmon synthetic; Calcitonin; Raloxifene HCL; Teriparatide; Zoledronic acid. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Baseline BMD Testing in Older Adults

This indicator measures the percentage of people aged 68-70 as of April 1, 2007 who had a BMD test conducted after age 65 and is one way of measuring the degree to which at-risk people are being tested. The denominator is all Ontarians aged 68-70 at the start of the designated year who had not received a BMD test at any time in the 10 years before they turned

65. Because all 65 year olds are considered to be at moderate risk of osteoporosis due to their age, irrespective of other risk factors, and should therefore have a BMD test if they have not already had a "recent" one, everyone in the denominator should have been tested at some point after their 65th birthday; and everyone in the denominator had a minimum of 3 years to receive the test. The numerator is those BMD-eligible people in the denominator who underwent a BMD test between their 65th birthday and the end of the fiscal year in question. BMD testing was identified using the codes identified above and additional codes in use prior to mid-1998 (J888, J688, J856, J656, J854, and J654).

## Continuation of Pharmacologic Therapy One Year After Initiation

This indicator measures the percentage of adults aged 66 and older who filled a new prescription for a medication to treat osteoporosis who were continually on their medication for one year after initiation of treatment. Adults aged 66 and older who had filled a new prescription for a drug to treat osteoporosis were followed for one year to determine continuous drug use. The sample was restricted to adults aged 66 and older because access to provincially funded drug benefits (ODB) is restricted to adults aged 65 and older. The indicator was restricted to new prescriptions and one year of data was needed to ensure that patients were not previously on these medications. Adults who died within one year of starting their medication were excluded.

Continuous drug use was defined as ongoing medication use (of one of the types of osteoporosis medications included) in an interval composed of the days supply (based on ODB fields "days supply" and "quantity") plus a grace period of 50 percent as described by Melo and colleagues.<sup>220</sup> Prescriptions for the following bone-sparing medications were included as treatments for osteoporosis: Alendronate Sodium; Alendronate Sodium and vitamin D3; Risedronate

Sodium Risedronate Sodium and calcium; Risedronate Sodium and calcium and vitamin D3; Etidronate and Calcium Carbonate; Calcitonin Salmon; Calcitonin Salmon synthetic; Salcatonin; Raloxifene HCL; Teriparatide; Zoledronic acid. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Long-Term Care After Hip Fracture

This indicator measures the percentage of people aged 65 and older who were placed in long-term care within one year of having a hip fracture. For acute care discharges during 2007/08, patients were identified as having a hospital admission for a hip fracture if they had a most responsible diagnosis of hip fracture (ICD10 code S72). Patients were excluded if they were in long-term care within two weeks prior to their hip fracture, if they died before being treated or if they were too sick to be treated (that is they were treated for their hip fracture more than seven days post admission or they were not treated for their hip fracture).

Admission to long-term care was determined using a combination of data from OHIP, ODB and CCRS and by looking at records within one year of hospital discharge after a hip fracture. OHIP records with a fee code containing a 'W' represent physician visits to patients who are in either long-term care or chronic care. The type of facility was identified using the institution type in the Master Numbering System generated by the MOHLTC. ODB records with a long-term care flag represent prescriptions filled while the patient was in long-term care. The CCRS database maintains records of admissions to long-term care and chronic

care facilities. Patients with a record from any of the three sources indicating a long-term care admission within one year of discharge after a hip fracture were considered to be admitted to long-term care. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### One-Year Mortality After Hip Fracture

This indicator measures the percentage of people aged 50 and older who died within one year of having a hip fracture. For acute care discharges during 2007/08, patients were identified as having a hospital admission for a hip fracture if they had a most responsible diagnosis of hip fracture (ICD10 code S72). Patients were excluded if they were in long-term care within two weeks prior to their hip fracture, if they died before being treated or if they were too sick to be treated (that is they were treated for their hip fracture more than seven days post-admission or they were not treated for their hip fracture). If the hip fracture occurred prior to admission, the date of admission was used as a proxy for the date of fracture; if the fracture occurred post-admission, then the date of treatment was used as a proxy for the date of fracture. Mortality was identified using data from the RPDB. Because of the limitations associated with measuring mortality using the RPDB, these rates may be underestimated. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

## REFERENCE LIST

- (1) Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, et al. Differences between men and women in the rate of use of hip and knee arthroplasty. *N Engl J Med* 2000;342(14):1016-1022.
- (2) Bach PB, Schrag D, Brawley OW, Galaznik A, Yakren S, Begg CB. Survival of blacks and whites after a cancer diagnosis. *JAMA* 2002;287(16):2106-2113.
- (3) Dominick KL, Dudley TK, Grambow SC, Oddone EZ, Bosworth HB. Racial differences in health care utilization among patients with osteoarthritis. *J Rheumatol* 2003;30(10):2201-2206.
- (4) Kiefe CI. Race/ethnicity and cancer survival: the elusive target of biological differences. *JAMA* 2002;287(16):2138-2139.
- (5) Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, et al. Determining the need for hip and knee arthroplasty: the role of clinical severity and patients' preferences. *Med Care* 2001;39(3):206-216.
- (6) Borkhoff CM, Hawker GA, Kreder HJ, Glazier RH, Mahomed NN, Wright JG. The effect of patients' sex on physicians' recommendations for total knee arthroplasty. *CMAJ* 2008;178(6):681-687.
- (7) Fiscella K, Franks P, Gold MR, Clancy CM. Inequality in quality: addressing socioeconomic, racial, and ethnic disparities in health care. *JAMA* 2000;283(19):2579-2584.
- (8) Schulman KA, Berlin JA, Harless W, Kerner JF, Sistrunk S, Gersh BJ, et al. The effect of race and sex on physicians' recommendations for cardiac catheterization. *N Engl J Med* 1999;340(8):618-626.
- (9) Jaglal SB, Hawker G, Cameron C, Canavan J, Beaton D, Bogoch E, et al. The Ontario Osteoporosis Strategy: implementation of a population-based osteoporosis action plan in Canada. *Osteoporos Int* 2010;21(6):903-908.
- (10) Ministry of Health and Long-Term Care. Ontario wait times: Ontario's wait time strategy. Accessed June 14, 2010 at <http://www.health.gov.on.ca/en/public/programs/waittimes/>.
- (11) American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. *Arthritis Rheum* 2000;43(9):1905-1915.
- (12) American College of Rheumatology Subcommittee on Rheumatoid Arthritis Guidelines. Guidelines for the management of rheumatoid arthritis: 2002 update. *Arthritis Rheum* 2002;46(2):328-346.
- (13) Khanna D, Arnold EL, Pencharz JN, Grossman JM, Traina SB, Lal A, et al. Measuring process of arthritis care: the Arthritis Foundation's quality indicator set for rheumatoid arthritis. *Semin Arthritis Rheum* 2006;35(4):211-237.
- (14) Pencharz JN, MacLean CH. Measuring quality in arthritis care: the Arthritis Foundation's quality indicator set for osteoarthritis. *Arthritis Rheum* 2004;51(4):538-548.
- (15) A framework and strategy for the prevention and management of osteoporosis. A report of the strategic action working group on osteoporosis. Toronto: Ontario Women's Health Council, 2000.
- (16) Alter DA, Bell CM, Bourne RB, Cernat G, Cohen EA, DeBoer D, et al. In: Tu JV, Pinfold SP, McColgan P, Laupacis A, editors. Access to health services in Ontario: ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2005.
- (17) Badley EM, Boyle E, Corrigan L, DeBoer D, Glazier RH, Guan J, et al. Arthritis and related conditions in Ontario: ICES research atlas. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (18) Colman R. A profile of women's health indicators in Canada. Prepared for the Women's Health Bureau, Health Canada. Glen Haven, NS: GPIAtlantic, 2003.
- (19) Health Canada. Arthritis in Canada. An ongoing challenge. Ottawa: Health Canada, 2003.
- (20) Health Canada, the Canadian Institute for Health Information. Women's health surveillance report: a multidimensional look at the health of Canadian women. Ottawa: Canadian Institute for Health Information, 2003.

- (21) Health Statistics Division. Access to health care services in Canada: waiting times for specialized services (January to December 2005). Ottawa: Statistics Canada, 2005.
- (22) Jaakkimainen L, Klein-Geltink JE, Guttmann A, Barnsley J, Zagorski BM, Kopp A, et al. Chapter 12: Indicators of primary care based on administrative data. In: Jaakkimainen L, Upshur R, Klein-Geltink JE, Leong A, Maaten S, Schultz SE, et al., editors. Primary care in Ontario: ICES atlas. Toronto: Institute for Clinical Evaluative Sciences, 2006.
- (23) Johnson I, Goettler F, Goral A, Leffley A, Lueske B, Lee-Han H, et al. Report on the health status of the residents of Ontario. Ontario: Public Health Research, Education & Development, 2000.
- (24) Manuel DG, Schultz SE. Adding years to life and life to years: life and health expectancy in Ontario. Toronto: Institute for Clinical Evaluative Sciences, 2001.
- (25) Mathers C, Vos T, Stevenson C. The burden of disease and injury in Australia. Canberra: Australian Institute of Health and Welfare, 1999.
- (26) National Committee for Quality Assurance (NCQA). HEDIS 2006. Healthcare effectiveness data & information set. Vol. 2, Technical specifications. Washington, DC: National Committee for Quality Assurance, 2005.
- (27) Ontario District Health Councils, Local Health System Monitoring Technical Working Group. Access, equity and integration indicators for local health system monitoring in Ontario. Toronto: Ontario District Health Councils, 2005.
- (28) The Joint Commission. Improving and measuring osteoporosis management. Oakbrook Terrace, IL: The Joint Commission, 2008.
- (29) Williams J, Badley E. Patterns of health care in Ontario: arthritis and related conditions. Arthritis and related conditions: an ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences, 1998.
- (30) Association of Public Health Epidemiologists in Ontario (APHEO). Core indicators for public health in Ontario. Accessed May 26, 2010 at <http://www.apheo.ca/index.php?pid=55#7>.
- (31) Statistics Canada. Comparable health indicators 2004— Canada, provinces and territories. Accessed March 31, 2010 at <http://www.statcan.gc.ca/pub/82-401-x/2002000/index-eng.htm>.
- (32) Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatol* 1994;21(3):505-514.
- (33) Theis KA, Helmick CG, Hootman JM. Arthritis burden and impact are greater among U.S. women than men: intervention opportunities. *J Womens Health (Larchmt)* 2007;16(4):441-453.
- (34) del Rincon ID, Williams K, Stern MP, Freeman GL, Escalante A. High incidence of cardiovascular events in a rheumatoid arthritis cohort not explained by traditional cardiac risk factors. *Arthritis Rheum* 2001;44(12):2737-2745.
- (35) Mikuls TR. Co-morbidity in rheumatoid arthritis. *Best Pract Res Clin Rheumatol* 2003;17(5):729-752.
- (36) Caporali R, Cimmino MA, Sarzi-Puttini P, Scarpa R, Parazzini F, Zaninelli A, et al. Comorbid conditions in the AMICA study patients: effects on the quality of life and drug prescriptions by general practitioners and specialists. *Semin Arthritis Rheum* 2005;35(1 Suppl 1):31-37.
- (37) Schellevis FG, van der Velden J, van de Lisdonk E, van Eijk JT, van Weel C. Comorbidity of chronic diseases in general practice. *J Clin Epidemiol* 1993;46(5):469-473.
- (38) Gabriel SE, Crowson CS, O'Fallon WM. Comorbidity in arthritis. *J Rheumatol* 1999;26(11):2475-2479.
- (39) Public Health Agency of Canada. Life with arthritis in Canada: A personal and public health challenge. Ottawa: Public Health Agency of Canada, In press 2010.
- (40) Caughey GE, Vitry AI, Gilbert AL, Roughead EE. Prevalence of comorbidity of chronic diseases in Australia. *BMC Public Health* 2008;8:221.
- (41) Dunlop DD, Lyons JS, Manheim LM, Song J, Chang RW. Arthritis and heart disease as risk factors for major depression: the role of functional limitation. *Med Care* 2004;42(6):502-511.



- (42) He Y, Zhang M, Lin EH, Bruffaerts R, Posada-Villa J, Angermeyer MC, et al. Mental disorders among persons with arthritis: results from the World Mental Health Surveys. *Psychol Med* 2008;38(11):1639-1650.
- (43) Huyser BA, Parker JC. Negative affect and pain in arthritis. *Rheum Dis Clin North Am* 1999;25(1): 105-121, vi.
- (44) Parker JC, Wright GE. The implications of depression for pain and disability in rheumatoid arthritis. *Arthritis Care Res* 1995;8(4):279-283.
- (45) Power JD, Badley EM, French MR, Wall AJ, Hawker GA. Fatigue in osteoarthritis: a qualitative study. *BMC Musculoskelet Disord* 2008;9:63.
- (46) Somers TJ, Keefe FJ, Godiwala N, Hoyler GH. Psychosocial factors and the pain experience of osteoarthritis patients: new findings and new directions. *Curr Opin Rheumatol* 2009;21(5):501-506.
- (47) Kaptein SA, Gignac MA, Badley EM. Differences in the workforce experiences of women and men with arthritis disability: a population health perspective. *Arthritis Rheum* 2009;61(5):605-613.
- (48) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of illness. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (49) Badley EM. The impact of disabling arthritis. *Arthritis Care Res* 1995;8(4):221-228.
- (50) Verbrugge LM, Juarez L. Profile of arthritis disability. *Public Health Rep* 2001;116(Suppl 1):157-179.
- (51) Verbrugge LM, Juarez L. Profile of arthritis disability: II. *Arthritis Rheum* 2006;55(1):102-113.
- (52) Felson DT, Chaisson CE. Understanding the relationship between body weight and osteoarthritis. *Baillieres Clin Rheumatol* 1997;11(4):671-681.
- (53) Felson DT, Lawrence RC, Dieppe PA, Hirsch R, Helmick CG, Jordan JM, et al. Osteoarthritis: new insights. Part 1: the disease and its risk factors. *Ann Intern Med* 2000;133(8):635-646.
- (54) Brady TJ, Jernick SL, Hootman JM, Snizek JE. Public health interventions for arthritis: expanding the toolbox of evidence-based interventions. *J Womens Health (Larchmt)* 2009;18(12):1905-1917.
- (55) Brady TJ, Snizek JE. Implementing the National Arthritis Action Plan: new population-based approaches to increasing physical activity among people with arthritis. *Arthritis Rheum* 2003;49(3): 471-476.
- (56) Fransen M, McConnell S. Land-based exercise for osteoarthritis of the knee: a metaanalysis of randomized controlled trials. *J Rheumatol* 2009;36(6):1109-1117.
- (57) Jordan JL, Holden MA, Mason EE, Foster NE. Interventions to improve adherence to exercise for chronic musculoskeletal pain in adults. *Cochrane Database Syst Rev* 2010(1):CD005956.
- (58) van Middelkoop M, Rubinstein SM, Verhagen AP, Ostelo RW, Koes BW, van Tulder MW. Exercise therapy for chronic nonspecific low-back pain. *Best Pract Res Clin Rheumatol* 2010;24(2):193-204.
- (59) Chou R. Pharmacological management of low back pain. *Drugs* 2010;70(4):387-402.60. March L, Amaty B, Osborne RH, Brand C. Developing a minimum standard of care for treating people with osteoarthritis of the hip and knee. *Best Pract Res Clin Rheumatol* 2010;24(1):121-145.
- (61) Lineker SC, Bell MJ, Boyle J, Badley EM, Flakstad L, Fleming J, et al. Implementing arthritis clinical practice guidelines in primary care. *Med Teach* 2009;31(3): 230-237.
- (62) Chung W, Xu S, Eken A, He J. Current status of complementary and alternative medicine in the treatment of rheumatic disease pain. *Curr Rheumatol Rev* 2009;5(4):194-198.
- (63) Kasman NM, Badley EM. Beyond access: who reports that health care is not being received when needed in a publicly-funded health care system? *Can J Public Health* 2004;95(4):304-308.
- (64) Badley EM, Ibanez D. Socioeconomic risk factors and musculoskeletal disability. *J Rheumatol* 1994;21(3): 515-522.

- (65) Canizares M, Power JD, Perruccio AV, Badley EM. Association of regional racial/cultural context and socioeconomic status with arthritis in the population: a multilevel analysis. *Arthritis Rheum* 2008;59(3):399-407.
- (66) Deyo RA, Tsui-Wu YJ. Functional disability due to back pain. A population-based study indicating the importance of socioeconomic factors. *Arthritis Rheum* 1987;30(11):1247-1253.
- (67) Lotters F, Burdorf A. Prognostic factors for duration of sickness absence due to musculoskeletal disorders. *Clin J Pain* 2006;22(2):212-221.
- (68) Bierman AS, Angus J, Ahmad F, Degani N, Vahabi M, Glazier RH, et al. Access to health care services. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2010.
- (69) Patten SB, Beck CA, Kassam A, Williams JV, Barbu C, Metz LM. Long-term medical conditions and major depression: strength of association for specific conditions in the general population. *Can J Psychiatry* 2005;50(4):195-202.
- (70) Beaudet MP. Depression. *Health Rep* 1996;7(4):11-24, 11-25.
- (71) Boyle MH, Offord DR, Campbell D, Catlin G, Goering P, Lin E, et al. Mental health supplement to the Ontario Health Survey: methodology. *Can J Psychiatry* 1996;41(9):549-558.
- (72) Lin E, Diaz-Granados N, Stewart DE, Rhodes AE, Yeritsyan N, Johns A, et al. Depression. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (73) Alvarenga ME, Caniato RN, Mauritz A, Braun A, Aljeesh Y, Baune BT. Health service utilization in patients with major depression and co-morbid pain. *Psychiatry Clin Neurosci* 2009;63(1):101-106.
- (74) Emptage NP, Sturm R, Robinson RL. Depression and comorbid pain as predictors of disability, employment, insurance status, and health care costs. *Psychiatr Serv* 2005;56(4):468-474.
- (75) Mossey JM, Gallagher RM. The longitudinal occurrence and impact of comorbid chronic pain and chronic depression over two years in continuing care retirement community residents. *Pain Med* 2004;5(4):335-348.
- (76) Lopez-Martinez AE, Esteve-Zarazaga R, Ramirez-Maestre C. Perceived social support and coping responses are independent variables explaining pain adjustment among chronic pain patients. *J Pain* 2008;9(4):373-379.
- (77) Ferreira VM, Sherman AM. The relationship of optimism, pain and social support to well-being in older adults with osteoarthritis. *Aging Ment Health* 2007;11(1):89-98.
- (78) Esteve R, Ramirez-Maestre C, Lopez-Marinez AE. Adjustment to chronic pain: the role of pain acceptance, coping strategies, and pain-related cognitions. *Ann Behav Med* 2007;33(2):179-188.
- (79) Nicassio PM, Wallston KA. Longitudinal relationships among pain, sleep problems, and depression in rheumatoid arthritis. *J Abnorm Psychol* 1992;101(3):514-520.
- (80) Adams H, Thibault P, Davidson N, Simmonds M, Velly A, Sullivan MJ. Depression augments activity-related pain in women but not in men with chronic musculoskeletal conditions. *Pain Res Manag* 2008;13(3):236-242.
- (81) Geerlings SW, Twisk JW, Beekman AT, Deeg DJ, van Tilburg W. Longitudinal relationship between pain and depression in older adults: sex, age and physical disability. *Soc Psychiatry Psychiatr Epidemiol* 2002;37(1):23-30.
- (82) Heidrich SM, Ryff CD. The role of social comparison processes in the psychological adaptation of elderly adults. *J Gerontol* 1993;48(3):127-136.
- (83) McIlvane JM, Schiaffino KM, Paget SA. Age differences in the pain-depression link for women with osteoarthritis. Functional impairment and personal control as mediators. *Womens Health Issues* 2007;17(1):44-51.
- (84) Whalen HR, Lachman ME. Social support and strain from partner, family, and friends: costs and benefits for men and women in adulthood. *J Soc Pers Relat* 2000;17:5-30.



- (85) Williamson GM, Schulz R. Activity restriction mediates the association between pain and depressed affect: a study of younger and older adult cancer patients. *Psychol Aging* 1995;10(3):369-378.
- (86) DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000;160(14):2101-2107.
- (87) Wing RR, Phelan S, Tate D. The role of adherence in mediating the relationship between depression and health outcomes. *J Psychosom Res* 2002;53(4):877-881.
- (88) Axford J, Heron C, Ross F, Victor CR. Management of knee osteoarthritis in primary care: pain and depression are the major obstacles. *J Psychosom Res* 2008;64(5):461-467.
- (89) Ford ES, Mokdad AH, Li C, McGuire LC, Strine TW, Okoro CA, et al. Gender differences in coronary heart disease and health-related quality of life: findings from 10 states from the 2004 behavioral risk factor surveillance system. *J Womens Health (Larchmt)* 2008;17(5):757-768.
- (90) Reuben DB, Rubenstein LV, Hirsch SH, Hays RD. Value of functional status as a predictor of mortality: results of a prospective study. *Am J Med* 1992;93(6):663-669.
- (91) Fielden JM, Gander PH, Horne JG, Lewer BMF, Green RM, Devane PA. An assessment of sleep disturbance in patients before and after total hip arthroplasty. *J Arthroplasty* 2003;18(3):371-376.
- (92) Leigh TJ, Hindmarch I, Bird HA, Wright V. Comparison of sleep in osteoarthritic patients and age and sex matched healthy controls. *Ann Rheum Dis* 1988;47(1):40-42.
- (93) Moldofsky H. Sleep and pain. *Sleep Med Rev* 2001;5(5):385-396.
- (94) Wilcox S, Brenes GA, Levine D, Sevick MA, Shumaker SA, Craven T. Factors related to sleep disturbance in older adults experiencing knee pain or knee pain with radiographic evidence of knee osteoarthritis. *J Am Geriatr Soc* 2000;48(10):1241-1251.
- (95) Laborde JM, Powers MJ. Life satisfaction, health control orientation, and illness-related factors in persons with osteoarthritis. *Res Nurs Health* 1985;8(2):183-190.
- (96) Downe-Wamboldt B. Coping and life satisfaction in elderly women with osteoarthritis. *J Adv Nurs* 1991;16(11):1328-1335.
- (97) Badley EM, Cott CA, Gignac MAM, Parthimos M. Determinants of good health for persons with chronic diseases and disability. A report on the 1994 National Population Health Survey. Toronto: Arthritis Community Research and Evaluation Unit, 1997.
- (98) Jakobsson U, Hallberg IR. Pain and quality of life among older people with rheumatoid arthritis and/or osteoarthritis: a literature review. *J Clin Nurs* 2002;11(4):430-443.
- (99) Brandt KD, Heilman DK, Slemenda C, Katz BP, Mazucca S, Braunstein EM, et al. A comparison of lower extremity muscle strength, obesity, and depression scores in elderly subjects with knee pain with and without radiographic evidence of knee osteoarthritis. *J Rheumatol* 2000;27(8):1937-1946.
- (100) Slemenda C, Brandt KD, Heilman DK, Mazucca S, Braunstein EM, Katz BP, et al. Quadriceps weakness and osteoarthritis of the knee. *Ann Intern Med* 1997;127(2):97-104.
- (101) van Baar ME, Dekker J, Lemmens JA, Oostendorp RA, Bijlsma JW. Pain and disability in patients with osteoarthritis of hip or knee: the relationship with articular, kinesiological, and psychological characteristics. *J Rheumatol* 1998;25(1):125-133.
- (102) Keefe FJ, Caldwell DS. Cognitive behavioral control of arthritis pain. *Med Clin North Am* 1997;81(1):277-290.
- (103) Bidaut-Russell M, Gabriel SE. Adverse gastrointestinal effects of NSAIDs: consequences and costs. *Best Pract Res Clin Gastroenterol* 2001;15(5):739-753.
- (104) Perruccio AV, Badley EM, Guan J. Chapter 2: Burden of disease. In: Badley EM, Glazier RH, editors. *Arthritis and related conditions in Ontario: ICES research atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.

- (105) Shiri R, Karppinen J, Leino-Arjas P, Solovieva S, Viikari-Juntura E. The association between obesity and low back pain: a meta-analysis. *Am J Epidemiol* 2010;171(2):135-154.
- (106) Altman RD, Hochberg MC, Moskowitz RW, Schnitzer TJ. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. *Arthritis Rheum* 2000;43(9):1905-1915.
- (107) Pendleton A, Arden N, Dougados M, Doherty M, Bannwarth B, Bijlsma JW, et al. EULAR recommendations for the management of knee osteoarthritis: report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Ann Rheum Dis* 2000;59(12):936-944.
- (108) Muhlberg W, Platt D. Age-dependent changes of the kidneys: pharmacological implications. *Gerontology* 1999;45(5):243-253.
- (109) Abernethy DR. Aging effects on drug disposition and effect. *Geriatr Nephrol Urol* 1999;9(1):15-19.
- (110) Griffin MR, Yared A, Ray WA. Nonsteroidal antiinflammatory drugs and acute renal failure in elderly persons. *Am J Epidemiol* 2000;151(5):488-496.
- (111) Langman MJ. Adverse effects of conventional non-steroidal anti-inflammatory drugs on the upper gastrointestinal tract. *Fundam Clin Pharmacol* 2003;17(4):393-403.
- (112) Solomon DH, Gurwitz JH. Toxicity of nonsteroidal anti-inflammatory drugs in the elderly: is advanced age a risk factor? *Am J Med* 1997;102(2):208-215.
- (113) Heerdink ER, Leufkens HG, Herings RM, Ottervanger JP, Stricker BH, Bakker A. NSAIDs associated with increased risk of congestive heart failure in elderly patients taking diuretics. *Arch Intern Med* 1998;158(10):1108-1112.
- (114) Johnson AG. NSAIDs and blood pressure. Clinical importance for older patients. *Drugs Aging* 1998;12(1):17-27.
- (115) Whelton A. Nephrotoxicity of nonsteroidal anti-inflammatory drugs: physiologic foundations and clinical implications. *Am J Med* 1999;106(5 Suppl 2):13S-24S.
- (116) Sale JE, Gignac M, Hawker G. How “bad” does the pain have to be? A qualitative study examining adherence to pain medication in older adults with osteoarthritis. *Arthritis Rheum* 2006;55(2):272-278.
- (117) Allin S, Grignon M, Le Grand J. Subjective unmet need and utilization of health care services in Canada: what are the equity implications? *Soc Sci Med* 2009;70(3):465-472.
- (118) Bryant T, Leaver C, Dunn J. Unmet healthcare need, gender, and health inequalities in Canada. *Health Policy* 2009;91(1):24-32.
- (119) MacKay C, Canizares M, Davis AM, Badley EM. Health care utilization for musculoskeletal disorders. *Arthritis Care Res (Hoboken)* 2010;62(2):161-169.
- (120) Power JD, Glazier RH, Boyle E, Badley EM. Chapter 4: Primary and specialist care. In: Badley EM, Glazier RH, editors. *Arthritis and related conditions in Ontario: ICES research atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (121) Tepper JD, Schultz SE, Rothwell DM, Chan BTB. Physician services in rural and Northern Ontario. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2005.
- (122) Shipton D, Badley EM. Chapter 3: Availability of services. In: Badley EM, Glazier RH, editors. *Arthritis and related conditions in Ontario: ICES research atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (123) Ministry of Health and Long-Term Care. The wait time strategy: about the wait time information system. Accessed April 20, 2010 at [http://www.health.gov.on.ca/transformation/wait\\_times/providers/wt\\_strategy.html](http://www.health.gov.on.ca/transformation/wait_times/providers/wt_strategy.html).
- (124) Ontario's MRI and CT Expert Panel. Ontario best practice guidelines for managing the flow of patients requiring an MRI or CT examination. Accessed February 12, 2010 at [http://www.health.gov.on.ca/transformation/wait\\_times/providers/reports/mri\\_ct\\_bp\\_report\\_20090528.pdf](http://www.health.gov.on.ca/transformation/wait_times/providers/reports/mri_ct_bp_report_20090528.pdf).

- (125) Bijlsma JW, Weinblatt ME. Optimal use of methotrexate: the advantages of tight control. *Ann Rheum Dis* 2007;66(11):1409-1410.
- (126) Pincus T, Yazici Y, Sokka T, Aletaha D, Smolen JS. Methotrexate as the "anchor drug" for the treatment of early rheumatoid arthritis. *Clin Exp Rheumatol* 2003;21(5 Suppl 31):S179-S185.
- (127) Visser K, van der Heijde D. Optimal dosage and route of administration of methotrexate in rheumatoid arthritis: a systematic review of the literature. *Ann Rheum Dis* 2009;68(7):1094-1099.
- (128) Smolen JS, Aletaha D, Koeller M, Weisman MH, Emery P. New therapies for treatment of rheumatoid arthritis. *Lancet* 2007;370(9602):1861-1874.
- (129) Doan T, Massarotti E. Rheumatoid arthritis: an overview of new and emerging therapies. *J Clin Pharmacol* 2005;45(7):751-762.
- (130) Bukhari MA, Wiles NJ, Lunt M, Harrison BJ, Scott DG, Symmons DP, et al. Influence of disease-modifying therapy on radiographic outcome in inflammatory polyarthritis at five years: results from a large observational inception study. *Arthritis Rheum* 2003;48(1):46-53.
- (131) van der Heide A, Jacobs JW, Bijlsma JW, Heurkens AH, van Booma-Frankfort C, van der Veen MJ, et al. The effectiveness of early treatment with "second-line" antirheumatic drugs. A randomized, controlled trial. *Ann Intern Med* 1996;124(8):699-707.
- (132) van Dongen H, van Aken J, Lard LR, Visser K, Ronday HK, Hulsmans HM, et al. Efficacy of methotrexate treatment in patients with probable rheumatoid arthritis: a double-blind, randomized, placebo-controlled trial. *Arthritis Rheum* 2007;56(5):1424-1432.
- (133) Shipton D, Badley EM, Bookman AA, Hawker GA. Barriers to providing adequate rheumatology care: implications from a survey of rheumatologists in Ontario, Canada. *J Rheumatol* 2002;29(11):2420-2425.
- (134) Lawrence JS. Rheumatism in populations. London: William Heinemann Medical Books, 1977.
- (135) Bergstrom G, Bjelle A, Sorensen LB, Sundh V, Svanborg A. Prevalence of rheumatoid arthritis, osteoarthritis, chondrocalcinosis and gouty arthritis at age 79. *J Rheumatol* 1986;13(3):527-534.
- (136) Felson DT, Naimark A, Anderson J, Kazis L, Castelli W, Meenan RF. The prevalence of knee osteoarthritis in the elderly. The Framingham Osteoarthritis Study. *Arthritis Rheum* 1987;30(8):914-918.
- (137) Forman MD, Malamet R, Kaplan D. A survey of osteoarthritis of the knee in the elderly. *J Rheumatol* 1983;10(2):282-287.
- (138) Hart DJ, Leedham-Green M, Spector TD. The prevalence of knee osteoarthritis (OA) in the general population using different clinical criteria: the Chingford Study [abstract]. *Br J Rheumatol* 1991;30(Suppl 2):72.
- (139) Fife RS. Osteoarthritis: epidemiology, pathology, and pathogenesis. In: Klippel JH, Weyand CM, Wortmann RL, editors. *Primer on the rheumatic diseases*. Atlanta: Atlanta Arthritis Foundation, 1997.
- (140) Lawrence RC, Felson DT, Helmick CG, Arnold LM, Choi H, Deyo RA, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum* 2008;58(1):26-35.
- (141) Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998;41(5):778-799.
- (142) Tepper S, Hochberg MC. Factors associated with hip osteoarthritis: data from the First National Health and Nutrition Examination Survey (NHANES-I). *Am J Epidemiol* 1993;137(10):1081-1088.
- (143) Lapsley HM, March LM, Tribe KL, Cross MJ, Brooks PM. Living with osteoarthritis: patient expenditures, health status, and social impact. *Arthritis Rheum* 2001;45(3):301-306.
- (144) Hannan MT, Anderson JJ, Pincus T, Felson DT. Educational attainment and osteoarthritis: differential associations with radiographic changes and symptom reporting. *J Clin Epidemiol* 1992;45(2):139-147.

- (145) Kaplan RM, Alcaraz JE, Anderson JP, Weisman M. Quality-adjusted life years lost to arthritis: effects of gender, race, and social class. *Arthritis Care Res* 1996;9(6):473-482.
- (146) Leigh JP, Fries JF. Occupation, income, and education as independent covariates of arthritis in four national probability samples. *Arthritis Rheum* 1991;34(8):984-995.
- (147) Gignac MA, Cott C, Badley EM. Adaptation to chronic illness and disability and its relationship to perceptions of independence and dependence. *J Gerontol B Psychol Sci Soc Sci* 2000;55(6):P362-372.
- (148) Badley EM, Wang P. Determinants of consultation with health professionals for musculoskeletal disorders in a population with universal health insurance. *Arthritis Rheum* 1996;39:S26.
- (149) Peyron JG, Altman RD. The epidemiology of osteoarthritis. In: Moskowitz RW, Howell DS, Goldberg VM, Mankin HJ, editors. *Osteoarthritis: diagnosis and medical/surgical management*. 2nd edition. Philadelphia: WB Saunders Company, 1992.
- (150) Verbrugge LM. Physical and social disability in adults. In: Hibbard HH, Nutting PA, Grady ML, editors. *Functional and health status measures for primary care*. Washington, D.C.: US Department of Health and Human Services, 1991.
- (151) Creamer P, Hochberg MC. The relationship between psychosocial variables and pain reporting in osteoarthritis of the knee. *Arthritis Care Res* 1998;11(1):60-65.
- (152) McAlindon TE, Cooper C, Kirwan JR, Dieppe PA. Knee pain and disability in the community. *Br J Rheumatol* 1992;31(3):189-192.
- (153) Guidelines and Protocols Advisory Committee. *Osteoarthritis in peripheral joints—diagnosis and treatment*. Victoria, BC: Ministry of Health Services, 2008.
- (154) Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, et al. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. *Osteoarthritis Cartilage* 2008;16(2):137-162.
- (155) Glazier RH, Badley EM, Wright JG, Coyte PC, Williams JI, Harvey B, et al. Patient and provider factors related to comprehensive arthritis care in a community setting in Ontario, Canada. *J Rheumatol* 2003;30(8):1846-1850.
- (156) Power JD, Cott CA, Badley EM, Hawker GA. Physical therapy services for older adults with at least moderately severe hip or knee arthritis in 2 Ontario counties. *J Rheumatol* 2005;32(1):123-129.
- (157) Glazier RH, Dalby DM, Badley EM, Hawker GA, Bell MJ, Buchbinder R. Determinants of physician confidence in the primary care management of musculoskeletal disorders. *J Rheumatol* 1996;23(2):351-356.
- (158) Zautra AJ, Smith BW. Depression and reactivity to stress in older women with rheumatoid arthritis and osteoarthritis. *Psychosom Med* 2001;63(4):687-696.
- (159) Coyte PC, Asche CV, Croxford R, Chan B. The economic cost of musculoskeletal disorders in Canada. *Arthritis Care Res* 1998;11(5):315-325.
- (160) Liang MH, Larson M, Thompson M, Eaton H, McNamara E, Katz R, et al. Costs and outcomes in rheumatoid arthritis and osteoarthritis. *Arthritis Rheum* 1984;27(5):522-529.
- (161) Badley EM. Chapter 1: Emerging issues. In: Badley EM, Glazier RH, editors. *Arthritis and related conditions in Ontario: ICES research atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (162) Health Canada. *Economic burden of illness in Canada, 1998*. Ottawa: Policy Research Division Strategic Policy Directorate Population and Public Health Branch, Health Canada, 1998.
- (163) World Health Organization. *International classification of functioning, disability and health*. Geneva: World Health Organization, 2001.
- (164) Bunker JP, Frazier HS, Mosteller F. Improving health: measuring effects of medical care. *Milbank Q* 1994;72(2):225-258.
- (165) Chang RW, Pellisier JM, Hazen GB. A cost-effectiveness analysis of total hip arthroplasty for osteoarthritis of the hip. *JAMA* 1996;275(11):858-865.

- (166) Hawker G, Wright J, Coyte P, Paul J, Dittus R, Croxford R, et al. Health-related quality of life after knee replacement. *J Bone Joint Surg Am* 1998;80(2):163-173.
- (167) Canadian Institute for Health Information. Canadian Joint Replacement Registry (CJRR) 2006 Annual Report Hip and Knee Replacements in Canada. Ottawa: Canadian Institute for Health Information, 2006.
- (168) Mukhi S, Marin M. Hospitalization for elective joint replacements in Canada. *Healthc Q* 2008;11(3):16-18.
- (169) Baron JA, Barrett J, Katz JN, Liang MH. Total hip arthroplasty: use and select complications in the US Medicare population. *Am J Public Health* 1996;86(1):70-72.
- (170) Escalante A, Barrett J, Del Rincom E. Total hip replacement is associated with a reduced probability of Spanish surname in the Medicare population of four states [abstract]. *Arthritis Rheum* 2000;43(Suppl):S106.
- (171) Hawker GA, Wright JG, Glazier RH, Coyte PC, Harvey B, Williams JL, et al. The effect of education and income on need and willingness to undergo total joint arthroplasty. *Arthritis Rheum* 2002;46(12):3331-3339.
- (172) Hoaglund FT, Oishi CS, Gialamas GG. Extreme variations in racial rates of total hip arthroplasty for primary coxarthrosis: a population-based study in San Francisco. *Ann Rheum Dis* 1995;54(2):107-110.
- (173) Skinner J, Weinstein JN, Sporer SM, Wennberg JE. Racial, ethnic, and geographic disparities in rates of knee arthroplasty among Medicare patients. *N Engl J Med* 2003;349(14):1350-1359.
- (174) Wilson MG, May DS, Kelly JJ. Racial differences in the use of total knee arthroplasty for osteoarthritis among older Americans. *Ethn Dis* 1994;4(1):57-67.
- (175) Weinstein JN, Birkmeyer JD. The Dartmouth atlas of musculoskeletal health care. Chicago, IL: American Hospital Association Press, a division of Health Forum, Inc, 2000.
- (176) Bourne RB, DeBoer D, Hawker G, Kreder H, Mahomed N, Paterson JM, et al. Chapter 5: Total hip and knee replacement. In: Tu JV, Pinfold SP, McColgan P, Laupacis A, editors. *Access to health services in Ontario: ICES Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2005.
- (177) Jaglal SB, MacKay C, Corrigan L. Chapter 7: Rehabilitation for total joint replacement. In: Badley EM, Glazier RH, editors. *Arthritis and related conditions in Ontario: ICES research atlas*. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (178) Cassidy JD, Carroll LJ, Cote P. The Saskatchewan health and back pain survey: the prevalence of low back pain and related disability in Saskatchewan adults. *Spine* 1998;23(17):1860-1867.
- (179) Manchikanti L, Singh V, Datta S, Cohen SP, Hirsch JA. Comprehensive review of epidemiology, scope, and impact of spinal pain. *Pain Physician* 2009;12(4):E35-70.
- (180) Urquhart DM, Bell R, Cicuttini FM, Cui J, Forbes A, Davis SR. Low back pain and disability in community-based women: prevalence and associated factors. *Menopause* 2009;16(1):24-29.
- (181) Walker BF, Muller R, Grant WD. Low back pain in Australian adults: prevalence and associated disability. *J Manipulative Physiol Ther* 2004;27(4):238-244.
- (182) Badley E. Personal communication, May 14, 2010.
- (183) Isomaki H. Long-term outcome of rheumatoid arthritis. *Scand J Rheumatol Suppl* 1992;95:3-8.
- (184) Mitchell DM, Spitz PW, Young DY, Bloch DA, McShane DJ, Fries JF. Survival, prognosis, and causes of death in rheumatoid arthritis. *Arthritis Rheum* 1986;29(6):706-714.
- (185) Pincus T, Callahan LF, Sale WG, Brooks AL, Payne LE, Vaughn WK. Severe functional declines, work disability, and increased mortality in seventy-five rheumatoid arthritis patients studied over nine years. *Arthritis Rheum* 1984;27(8):864-872.
- (186) Scott DL, Symmons DP, Coulton BL, Popert AJ. Long-term outcome of treating rheumatoid arthritis: results after 20 years. *Lancet* 1987;329(8542):1108-1111.
- (187) Wolfe F. The natural history of rheumatoid arthritis. *J Rheumatol Suppl* 1996;44:13-22.



- (188) Pincus T, Callahan LF. Early mortality in RA predicted by poor clinical status. *Bull Rheum Dis* 1992;41(4):1-4.
- (189) Bohndorf K, Schalm J. Diagnostic radiography in rheumatoid arthritis: benefits and limitations. *Baillieres Clin Rheumatol* 1996;10(3):399-407.
- (190) Machold KP, Stamm TA, Eberl GJ, Nell VK, Dunky A, Uffmann M, et al. Very recent onset arthritis--clinical, laboratory, and radiological findings during the first year of disease. *J Rheumatol* 2002;29(11):2278-2287.
- (191) Plant MJ, Jones PW, Saklatvala J, Ollier WE, Dawes PT. Patterns of radiological progression in early rheumatoid arthritis: results of an 8 year prospective study. *J Rheumatol* 1998;25(3):417-426.
- (192) van der Heijde DM. Joint erosions and patients with early rheumatoid arthritis. *Br J Rheumatol* 1995;34 Suppl 2:74-78.
- (193) Wolfe F, Sharp JT. Radiographic outcome of recent-onset rheumatoid arthritis: a 19-year study of radiographic progression. *Arthritis Rheum* 1998;41(9):1571-1582.
- (194) Dugowson CE, Koepsell TD, Voigt LF, Bley L, Nelson JL, Daling JR. Rheumatoid arthritis in women. Incidence rates in group health cooperative, Seattle, Washington, 1987-1989. *Arthritis Rheum* 1991;34(12):1502-1507.
- (195) Goemaere S, Ackerman C, Goethals K, De Keyser F, Van der Straeten C, Verbruggen G, et al. Onset of symptoms of rheumatoid arthritis in relation to age, sex and menopausal transition. *J Rheumatol* 1990;17(12):1620-1622.
- (196) Mitchell DM. Epidemiology, rheumatoid arthritis, etiology, diagnosis and treatment. Philadelphia: J. B. Lippincott Company, 1985.
- (197) Hawker G. Chapter 1: Epidemiology of arthritis and osteoporosis. In: Williams JI, Badley EM, editors. Patterns of health care in Ontario: Arthritis and related conditions, an ICES Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 1998.
- (198) Lacaille D, Anis AH, Guh DP, Esdaile JM. Gaps in care for rheumatoid arthritis: a population study. *Arthritis Rheum* 2005;53(2):241-248.
- (199) American College of Rheumatology's starter set of measures for quality in the care for rheumatic and musculoskeletal diseases. February 2006.
- (200) Edworthy S, Zummer M, Garner S, Boire G, Leclercq S, Bykerk V, et al. Smoldering rheumatoid arthritis: is the Canadian healthcare system neglecting a significant disease population? *J Rheumatol* 2008;35(8):1506-1512.
- (201) Navarro-Cano G, Del Rincon I, Pogolian S, Roldan JF, Escalante A. Association of mortality with disease severity in rheumatoid arthritis, independent of comorbidity. *Arthritis Rheum* 2003;48(9):2425-2433.
- (202) Kasman NM, Power JD, Mamdani MM, Badley EM. Chapter 5: Use of medication. In: Badley EM, Glazier RH, editors. Arthritis and related conditions in Ontario: ICES research atlas. 2nd ed. Toronto: Institute for Clinical Evaluative Sciences, 2004.
- (203) Guidelines and Protocols Advisory Committee. Rheumatoid arthritis: diagnosis and management. Victoria, BC: Ministry of Health Services, 2006.
- (204) Smolen JS, Aletaha D, Bijlsma JW, Breedveld FC, Boumpas D, Burmester G, et al. Treating rheumatoid arthritis to target: recommendations of an international task force. *Ann Rheum Dis* 2010;69(4):631-637.
- (205) Osteoporosis Canada. What is Osteoporosis? Accessed May 3, 2010 at [http://www.osteoporosis.ca/index.php/ci\\_id/5526/la\\_id/1.htm](http://www.osteoporosis.ca/index.php/ci_id/5526/la_id/1.htm).
- (206) Brown JP, Josse RG, Scientific Advisory Council of the Osteoporosis Society of Canada. 2002 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada. *CMAJ* 2002;167(10 Suppl):S1-34.
- (207) Cadarette SM, Jaglal SB, Hawker GA. Fracture prevalence and treatment with bone-sparing agents: are there urban-rural differences? A population based study in Ontario, Canada. *J Rheumatol* 2005;32(3):550-558.
- (208) Elliot-Gibson V, Bogoch ER, Jamal SA, Beaton DE. Practice patterns in the diagnosis and treatment of osteoporosis after a fragility fracture: a systematic review. *Osteoporos Int* 2004;15(10):767-778.

- (209) Giangregorio L, Papaioannou A, Cranney A, Zytaruk N, Adachi JD. Fragility fractures and the osteoporosis care gap: an international phenomenon. *Semin Arthritis Rheum* 2006;35(5):293-305.
- (210) Hajcsar EE, Hawker G, Bogoch ER. Investigation and treatment of osteoporosis in patients with fragility fractures. *CMAJ* 2000;163(7):819-822.
- (211) Juby AG, De Geus-Wenceslau CM. Evaluation of osteoporosis treatment in seniors after hip fracture. *Osteoporos Int* 2002;13(3):205-210.
- (212) Khan SA, de Geus C, Holroyd B, Russell AS. Osteoporosis follow-up after wrist fractures following minor trauma. *Arch Intern Med* 2001;161(10):1309-1312.
- (213) Solomon DH, Finkelstein JS, Katz JN, Mogun H, Avorn J. Underuse of osteoporosis medications in elderly patients with fractures. *Am J Med* 2003;115(5):398-400.
- (214) Jaglal SB, Weller I, Mamdani M, Hawker G, Kreder H, Jaakkimainen L, et al. Population trends in BMD testing, treatment, and hip and wrist fracture rates: are the hip fracture projections wrong? *J Bone Miner Res* 2005;20(6):898-905.
- (215) Farahmand BY, Persson PG, Michaelsson K, Baron JA, Parker MG, Ljunghall S. Socioeconomic status, marital status and hip fracture risk: a population-based case-control study. *Osteoporos Int* 2000;11(9):803-808.
- (216) Zingmond DS, Soohoo NF, Silverman SL. The role of socioeconomic status on hip fracture. *Osteoporos Int* 2006;17(10):1562-1568.
- (217) Demeter S, Leslie WD, Lix L, MacWilliam L, Finlayson GS, Reed M. The effect of socioeconomic status on bone density testing in a public health-care system. *Osteoporos Int* 2007;18(2):153-158.
- (218) Klotzbuecher CM, Ross PD, Landsman PB, Abbott TA, 3rd, Berger M. Patients with prior fractures have an increased risk of future fractures: a summary of the literature and statistical synthesis. *J Bone Miner Res* 2000;15(4):721-739.
- (219) Seeman E, Compston J, Adachi J, Brandi ML, Cooper C, Dawson-Hughes B, et al. Non-compliance: the Achilles' heel of anti-fracture efficacy. *Osteoporos Int* 2007;18(6):711-719.
- (220) Melo M, Qiu F, Sykora K, Juurlink D, Laupacis A, Mamdani M. Persistence with bisphosphonate therapy in older people. *J Am Geriatr Soc* 2006;54(6):1015-1016.
- (221) Jaglal SB. Chapter 8: Osteoporotic fractures: incidence and impact. In: Williams JI, Badley EM, editors. *Patterns of health care in Ontario: Arthritis and related conditions, an ICES Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 1998.
- (222) Wiktorowicz ME, Goeree R, Papaioannou A, Adachi JD, Papadimitropoulos E. Economic implications of hip fracture: health service use, institutional care and cost in Canada. *Osteoporos Int* 2001;12(4):271-278.
- (223) Chrischilles EA, Butler CD, Davis CS, Wallace RB. A model of lifetime osteoporosis impact. *Arch Intern Med* 1991;151(10):2026-2032.
- (224) Kanis JA, Johnell O, Oden A, De Laet C, Mellstrom D. Epidemiology of osteoporosis and fracture in men. *Calcif Tissue Int* 2004;75(2):90-99.
- (225) Sambrook P, Cooper C. Osteoporosis. *Lancet* 2006;367(9527):2010-2018.
- (226) Brander V, Gondek S, Martin E, Stulberg SD. Pain and depression influence outcome 5 years after knee replacement surgery. *Clin Orthop Relat Res* 2007;464:21-26.
- (227) Brander VA, Stulberg SD, Adams AD, Harden RN, Bruehl S, Stanos SP, et al. Predicting total knee replacement pain: a prospective, observational study. *Clin Orthop Relat Res* 2003;416:27-36.
- (228) Dalby DM, Hirdes JP, Hogan DB, Patten SB, Beck CA, Rabinowitz T, et al. Potentially inappropriate management of depressive symptoms among Ontario home care clients. *Int J Geriatr Psychiatry* 2008;23(6):650-659.



- (229) Wang PS, Schneeweiss S, Brookhart MA, Glynn RJ, Mogun H, Patrick AR, et al. Suboptimal antidepressant use in the elderly. *J Clin Psychopharmacol* 2005;25(2):118-126.
- (230) Ontario Health Quality Council. State of Ontario's healthcare system. Toronto: Ontario Health Quality Council, 2010.
- (231) Association of Public Health Epidemiologists in Ontario. Core indicators for public health in Ontario: Depression prevalence. Accessed April 2, 2010 at <http://www.apheo.ca/index.php?pid=159>.
- (232) MacLean CH. Quality indicators for the management of osteoarthritis in vulnerable elders. *Ann Intern Med* 2001;135(8 Pt 2):711-721.
- (233) Southwest Region Health Status Working Group. Health behaviours and lifestyle practices in Southwestern Ontario: results from the Canadian Community Health Survey (2000/2001). London, ON: Southwest Region Health Information Partnership, 2004.
- (234) Shiller SK, Bierman AS. Introduction to the POWER Study. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (235) Clark JP, Bierman AS. The POWER Study Framework. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (236) Thomas S. Combining cycles of the Canadian Community Health Survey. Proceedings of Statistics Canada Symposium 2006: Methodological Issues in Measuring Population Health. Ottawa, 2006.
- (237) Iron K, Zagorski BM, Sykora K, Manuel DG. Living and dying in Ontario: An opportunity for improved health information. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2008.



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### Echo: Improving Women's Health in Ontario

Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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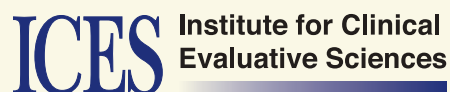
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resources. ICES knowledge is highly regarded in Canada and abroad, and is widely used by government, hospitals, planners, and practitioners to make decisions about care delivery and to develop policy.

# Diabetes

## Chapter 9

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### INSIDE

- Health and Functional Status
- Access and Utilization of Care
- Screening, Assessment and Monitoring
- Pharmacological Treatment
- Health Outcomes
- Diabetes and Pregnancy



Project for an Ontario Women's Health Evidence-Based Report



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# Executive Summary

## ISSUE

In Canada, more than three million Canadians have diabetes and this number is expected to climb significantly over the next decade.

It is predicted that between 2007 and 2017, 1.9 million Canadians will develop diabetes. Recent data from Ontario indicate that the rate of diabetes has increased dramatically over the last decade and has already surpassed the global prevalence predicted by the World Health Organization for 2030. Diabetes is one of the leading causes of blindness, the most common cause of end-stage renal disease in the developed world, and a major cause of cardiovascular complications such as heart attack and stroke. Furthermore, the treatment is complex and costly with the direct health care costs of diabetes ranging from 2.5 to 15 percent of health budgets. The increasing prevalence, associated complications and treatment costs make diabetes one of the most costly and burdensome chronic diseases of our time.

Approximately 10 percent of people with diabetes have type 1 diabetes, which mainly presents in children and young adults and is caused by autoimmune destruction of insulin-producing cells in the pancreas. The increase in diabetes prevalence has largely been attributed to a rise in new cases of type 2 diabetes, which has an older age of onset and results in part from impaired insulin function, primarily due to a combination of behavioural risk factors and genetics. The increase in type 2 diabetes may be partly explained by the rise in risk factors such as obesity, sedentary lifestyle, unhealthy diets and the aging of the population. The increased migration of susceptible populations, accompanied by shifts in lifestyle, have added to the diabetes burden in the developed world. In addition, increased survival among people with diabetes has contributed to increasing prevalence.

Diabetes differentially affects certain populations—in terms of both incidence and complications. For example, low-income populations have a higher risk of developing diabetes and have worse outcomes once they have it. The risk of diabetes is also higher in certain immigrants and ethnic groups, such as those of South Asian, African, Hispanic and Aboriginal descent. Canadians living in rural regions have higher rates of diabetes compared to their urban counterparts. Evidence indicates that rural residents have worse access to care, lower incomes, and are more likely to have some behavioural risk factors that place them at risk for developing diabetes and other chronic conditions. While the prevalence of diabetes remains higher among men than women, recent data suggest that young women (aged 20-49) have seen the greatest relative increase in diabetes prevalence over the last decade. Not only do young women with diabetes have a potentially higher lifetime risk of complications because of an earlier diagnosis, but they may face other health issues such as reproductive problems and complications during pregnancy.

To address the burden of diabetes, Ontario has launched a comprehensive diabetes strategy that builds on internationally accepted best practices and the growing body of evidence supporting the organization of health care around chronic disease management. The strategy includes efforts to prevent diabetes onset; improve access to information and educational materials to promote diabetes self-management; enhance access to comprehensive, team-based care for people with diabetes; and support the optimal management of diabetes in clinical practice through the development of a province-wide diabetes registry.

## ABOUT THIS CHAPTER

### The chapter has six sections:

- A. Health and Functional Status
- B. Access and Utilization of Care
- C. Screening, Assessment and Monitoring
- D. Pharmacological Treatment
- E. Health Outcomes
- F. Diabetes and Pregnancy

In the first section, the **health and functional status** of Ontario women and men with diabetes is profiled including: prevalence, morbidity (the presence of other chronic conditions or probable depression), activity limitations, self-rated health and health behaviours. The second section includes indicators of **access and utilization of care**, including measures of primary and specialty physician care. In the section on **screening, assessment and monitoring**, clinical and self-monitoring of blood glucose and foot care as well as clinical monitoring of kidney function and eye examination are measured. In the section on **pharmacological treatment**, self-reported use of insulin and oral glucose-lowering medications is measured as well as the use of medications to treat hypertension and cholesterol among adults aged 65 and older with diabetes. The section on diabetes-related **health outcomes** includes measures of diabetes complications including glucose-related emergencies, retinopathy, cardiovascular, cerebrovascular and peripheral vascular disease and kidney damage. Finally, the section on **diabetes and pregnancy** measures indicators of prenatal care, obstetrical complications and fetal complications in women with pregestational diabetes and gestational diabetes compared to women without diabetes.

## STUDY

The indicators we report are the result of a rigorous selection process which included an extensive literature review of existing indicators, as well as input and agreement from experts in the field (see [Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through a number of sources including for example: Statistics Canada; Health Canada; the Canadian Diabetes Association; the Association of Public Health Epidemiologists of Ontario; the Institute for Clinical Evaluative Sciences; the National Quality Measures Clearinghouse and the US Department of Health and Human Resources. Many of these indicators are widely used to measure quality of care. We build on these reports by incorporating a gender and equity analysis (see [the POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts and different experiences with health care which, together with differences in biology, contribute to observed gender differences in health. Furthermore, well documented health inequities among women and men associated with sociodemographic factors are such that differences between subgroups of women may be larger than overall differences between women and men.

Data from several sources were used to produce this section. These include: Statistics Canada's 2006 Census; Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1), 2005 (Cycle 3.1) and 2007; Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Drug Benefit (ODB) database; Ontario Health Insurance Plan (OHIP) database; National Ambulatory Care Reporting System (NACRS); Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB) and ICES Mother-Baby (MOMBABY) Linked Database. Indicators that were measured using the CCHS were first stratified by sex and then further stratified by socioeconomic variables including annual household income, educational attainment, age, ethnicity, years



of immigration and Local Health Integration Network (LHIN) and analysed as allowed by sample size. Indicators that were measured using administrative data were first stratified by sex and then by neighbourhood income quintile, age group and LHIN and analysed as allowed

by sample size. Age-adjustment was done using indirect standardization and data were standardized to the population with diabetes. A complete list of the indicators in this chapter and their data sources can be found in [Appendix 9.2](#).

## KEY FINDINGS

### Diabetes is one of the most common conditions in our society.

Nearly one in ten adults in Ontario have been diagnosed with diabetes—however, by age 65, this figure reaches nearly one in four. Diabetes prevalence was higher in men (10.5 percent) than in women (8.4 percent), however, prevalence in women of reproductive age (aged 20–44) was similar to the rate in young men (2.7 percent versus 2.6 percent, respectively) ([Exhibit 9A.2](#)). Developing diabetes at an early age can have devastating consequences for both sexes, but in women there are additional implications; we found that diabetes prior to pregnancy is associated with a substantially increased risk of adverse pregnancy outcomes and, if poorly controlled, can cause serious harm to an unborn child.

### People with diabetes have worse functional status and self-rated health than those without diabetes.

Having diabetes was associated with worse self-rated health ([Exhibit 9A.7](#)), higher rates of comorbidity (two or more additional chronic health conditions) ([Exhibit 9A.4](#)) and probable depression ([Exhibit 9A.5](#)) and greater limitations in instrumental activities of daily living (IADLs) and activities of daily living (ADLs). Among women and men with diabetes, 56 percent reported having two or more additional chronic health conditions besides diabetes (compared to 28 percent of adults without diabetes), increasing the complexity of care delivery. Among adults with diabetes, there were

important gender differences; women had worse health and functional status than men including higher rates of comorbidity (63 percent versus 51 percent, respectively), depression (11.1 percent versus 4.3 percent, respectively) and IADL and/or ADL limitations (49 percent versus 27 percent, respectively). Lower-income groups fared even worse than higher-income groups with respect to their health status ([Exhibit 9A.7](#)) and disability ([Exhibit 9A.8](#)). They were more likely to report their health as fair or poor (52 percent versus 33 percent, respectively) and among men, they were more likely to have at least two other chronic conditions (66 percent versus 41 percent, respectively). Comorbidity can have a considerable impact on quality of life and complicate diabetes management. For practitioners, competing medical and social issues may detract from diabetes care; for patients, disability and coexisting conditions such as depression and osteoarthritis can impede the ability to make changes in diet or activity levels, to lose weight, to self-manage diabetes and to adhere to medications. These findings have implications for Ontario's chronic disease strategy and underscore the necessity of patient-centred models of chronic disease management that address multiple conditions concurrently.

### The ongoing rise in diabetes prevalence creates a significant challenge for those who provide and fund health care.

Diabetes is one of the most commonly encountered conditions in primary practice, accounting for nearly seven million visits to family physicians each year in Ontario alone. Innovation and improvement of diabetes

prevention and management in primary care are critical to addressing this challenge. We found that people with diabetes visited a primary care provider an average of 7.3 times per year. Similar to the overall gender differences reported in [The POWER Study Access to Health Care Services](#) chapter, women with diabetes had greater utilization of health services than men. Adults living in lower-income neighbourhoods also had a higher mean number of visits to primary care physicians than adults living in higher-income neighbourhoods (7.7 versus 6.8 visits per year, respectively) ([Exhibit 9B.2](#)), yet they suffered more complications from diabetes, suggesting that current models of care are not sufficient to meet their health needs.

### **Men had higher rates of diabetes complications than women.**

This included more cardiovascular disease (CVD); however, the observed gender gap in revascularization procedures exceeded gender differences in the burden of CVD ([Exhibit 9E.7](#))—suggesting a potential underutilization of these procedures in women with diabetes or gender-related differences in the appropriateness of revascularization. Gender differences in hospitalizations for acute myocardial infarction (AMI), congestive heart failure (CHF) ([Exhibit 9E.8](#)) and stroke ([Exhibit 9E.11](#)) and gender differences in dialysis ([Exhibit 9E.17](#)) and laser photocoagulation therapy for diabetic eye disease were greatest in younger age groups and tended to diminish with increasing age—which may reflect differences between men and women in the biology leading to complications or worse control of risk factors in young men. Health care utilization was higher in women with diabetes which could provide women with more opportunities for intervention. Young men and men living in lower-income neighbourhoods ([Exhibits 9E.1, 9E.2](#)) were more likely to visit a hospital for emergency management of hyper- or hypoglycemia—a complication that may be avoided through good access to outpatient management and improved self-management.

Another important gender difference was in the rates of amputation and peripheral revascularization ([Exhibit 9E.13](#)). Men were more likely than women to undergo minor amputations (109 per 100,000 versus 44 per 100,000, respectively), major amputations (143 per 100,000 versus 72 per 100,000, respectively) or peripheral revascularization (143 per 100,000 versus 77 per 100,000, respectively). These differences persisted across most age groups ([Exhibit 9E.14](#)). Men and women may vary with respect to risk factors for peripheral vascular disease, attention to routine foot care or treatment of foot ulcers/infections, or they may have differential exposures to minor trauma—a common precipitating event that can lead to infection and potentially to gangrene and amputation. From our data, self-reported rates of foot examination by a health professional (50 percent of women and 51 percent of men) and performing a self foot examination at least annually (69 percent of women and 67 percent of men) did not vary by gender ([Exhibits 9C.3, 9C.4](#)); however, the latter may be an insensitive measure of routine foot care and both measures may be biased due to self-report. Men may be more likely than women to delay seeking care for foot ulcers until they reach a stage where the process is unlikely to be reversed. With fewer primary care visits per year, there are perhaps fewer opportunities for men to receive preventive counselling and management.

### **Diabetes in pregnancy is associated with higher rates of complications.**

Compared to pregnant women without diabetes, pregnant women with pregestational diabetes (diabetes that predates pregnancy) were at one and a half to three times greater risk for serious obstetrical complications, including hypertension (12.5 percent versus 4.4 percent, respectively), preeclampsia (3.9 percent versus 1.2 percent, respectively), and shoulder dystocia (3.2 percent versus 1.7 percent, respectively); and had higher rates of caesarean section (44.5 percent versus 27.4 percent, respectively) ([Exhibit 9F.4](#)). Women with

gestational diabetes (diabetes diagnosed in pregnancy) were also at higher risk for complications than women without diabetes. Of great concern, infants of women with pregestational diabetes had nearly twice the rate of fetal complications compared to infants of women without diabetes, including major and minor congenital anomalies (7.7 percent versus 4.8 percent, respectively) and stillbirth/in-hospital mortality (5.2 per 1,000 versus 2.5 per 1,000, respectively) ([Exhibit 9F.8](#))—outcomes that can be prevented through optimal control of glucose and blood pressure at the time of conception and during pregnancy. Infants of younger women with diabetes (aged 20-29) had the highest rates of fetal complications ([Exhibit 9F.10](#)), reflecting a need in this group for more targeted pre-pregnancy counselling and better pregnancy care. We also found that a significant percentage of pregnant women with diabetes were not being seen by specialists with experience in intensive diabetes management and the special circumstances of pregnancy, and the rate of specialist use varied across LHINs ([Exhibits 9F.1, 9F.2](#)). LHIN variation may partly be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete or due to out of province use of specialists. The prevalence of diabetes in pregnancy is rising in Ontario. Strategies are required to ensure accessibility of specialized services throughout the province and to promote appropriate referral to care.

### **Income matters when it comes to diabetes prevalence and complications.**

Lower-income groups share a disproportionate burden of diabetes and suffer more diabetes complications. In fact, socioeconomic status was a strong and inverse risk factor for virtually all diabetes complications that we studied, including CVD ([Exhibit 9E.7](#)) and renal disease. Income-related gradients were steeper in men with respect to hyper- or hypoglycemic emergencies ([Exhibit 9E.1](#)), amputations and end-stage renal disease requiring dialysis ([Exhibit 9E.16](#)). Coronary revascularization procedures were largely unaffected by neighbourhood income,

despite a higher burden of vascular disease in adults living in lower-income neighbourhoods, suggesting a potential underutilization of these procedures in this population. Of note, no significant income-related differences in eye procedures were found.

In Ontario, lower-income groups with diabetes have worse outcomes despite greater use of primary care services suggesting missed opportunities for intervention. Evidence suggests that lower-income groups need more frequent and more intensive interactions with a health care team to achieve improvements in diabetes control. Rates of specialist visits were unaffected by socioeconomic status; however, this may reflect problems accessing these services, given the greater burden of complications among lower-income groups. Moreover, we found that men living in the lowest-income neighbourhoods were more likely to not receive any care (primary or specialist care) within a two-year period than men living in the highest-income neighbourhoods (8.0 percent versus 5.6, respectively) ([Exhibit 9B.5](#)), suggesting that they have problems accessing care or a preference for not seeking care as it is currently offered. Changes in services and focused outreach could help to address this problem.

### **Performance on many measures varied across the province.**

We found that where you live in Ontario matters with respect to the risk of diabetes complications. The highest rates of complications were found in northern and rural areas of the province where access to care is more challenging ([Exhibits 9E.4, 9E.9, 9E.10, 9E.15, 9E.18](#)). Regional differences in prevalence, population characteristics and risk factors may have also contributed to these findings. The proportion of people with no primary care physician or specialist visits within a two-year period may be high in some LHINs due to a shortage of doctors in underserved or differently serviced areas or to variations in access to services due to language,

socioeconomic or cultural barriers to care. As well, LHIN variation may be due to AFPs where OHIP billing may be incomplete or due to out of province use of specialists.

### **Age is a strong risk factor for diabetes complications.**

Therefore, the burden of diabetes complications will likely continue to rise with the aging of the population. This has tremendous implications for the planning and provision of health services including the need for hospital beds, dialysis and cardiac rehabilitation services, among others. Seniors with diabetes already exhibit high rates of use of primary care services and will continue to do so. We found that age was associated with a reduced likelihood of seeing a specialist (endocrinologist, general internist, or geriatrician) among adults with diabetes ([Exhibit 9B.3](#)). Older individuals may have mild disease with recent onset and doctors may be less likely to refer older patients either due to patient preference or a more conservative approach to treatment in this group.

### **Despite growing evidence on best practices for diabetes, gaps in care persist.**

We found that rates of foot exams ([Exhibit 9C.4](#)) and dental care ([Exhibit 9C.5](#)) were suboptimal. Among those with diabetes, rates of dental care in the past 12 months were particularly low for adults aged 65 and older (47 percent), those in the lowest-income group (40 percent) and adults with less than a secondary school education (40 percent). These differences may reflect a decreased propensity to seek care and/or financial barriers to accessing care due to a lack of insurance coverage for these services. We also found that rates of eye examination in the two years following the diagnosis of diabetes were low (58 percent) ([Exhibit 9C.2](#)) and this was consistent across all Ontario LHINs. Based on our findings, the likelihood of receiving an eye examination within two years of diagnosis appears to be no higher today than it was a decade ago. However, our data rely solely on fee-for-service claims and do not

include reimbursement from private insurance providers, out-of-pocket payment for retinal photography, or telemedicine and mobile eye programs in Northern Ontario—which may have led to an underestimation of the true level of retinal screening in the province and in specific LHINs. It is also not clear whether wait times for eye care services has influenced these rates, or alternatively, whether people with diabetes are not accessing available services. The delisting of general optometry visits from OHIP may have unwittingly impaired access to eye care particularly in areas that are dependent on these services despite the fact that individuals with diabetes are exempted from this policy.

### **There was good news as well.**

A large proportion of seniors with diabetes are receiving therapies proven to reduce the risk of CVD. In fact, we noted a dramatic increase in the use of glucose-lowering medications ([Exhibit 9D.1](#)) and the use of medications for CVD risk reduction ([Exhibit 9D.2](#)) compared to the late 1990s and early 2000s. Furthermore, there was virtually no variation in medication use among seniors by sex, age, income or LHIN, except where expected (e.g., glucose-lowering medication use increases with age). This implies that when drug costs are universally covered, income has little influence on access to important therapies. Out-of-pocket costs of medications are likely to be substantial in the absence of insurance coverage, thus income-related differences in access to therapies may exist for younger groups with diabetes, but could not be examined in our study.

Finally, our report illustrates the **importance of looking at subgroups of individuals** when evaluating quality of care. Stratification by age, sex, income or other factors allows us to identify specific subgroups of individuals who are more vulnerable which in turn can identify areas for further study or facilitate targeted improvement efforts.

## KEY MESSAGES

We took a broad look at the burden of diabetes and quality and outcomes of care for diabetes in the province, focusing on gender, socioeconomic, demographic and regional variations. While much progress has been made in improving quality and outcomes of care for diabetes, much work remains to be done. Our findings point to a number of key areas for intervention and improvement. Inequities in health and functional status associated with gender and socioeconomic status were much greater than inequities in the provision of diabetes care, underscoring the need to address the social determinants of health to reduce the burden of diabetes. For many indicators, there was sizable LHIN variation. The Ontario Diabetes Strategy is working to reduce regional variations in diabetes care. The results of our analyses are available for the LHINs to use in their priority setting, planning and quality improvement activities. By implementing interventions at the policy, population health and practice levels and coordinating these interventions for maximum impact, it will be possible to hasten progress. To address regional needs, the Ontario Diabetes Strategy has established 14 Diabetes Regional Coordination Centres, within each LHIN, to provide leadership in integration of diabetes best practices across service providers, and to further strengthen coordination within the system and support improved care across the continuum.

The following five actions can help accelerate progress in reducing the burden of diabetes, improve health outcomes among women and men with diabetes and reduce health inequities related to diabetes. For these actions to be truly successful, gender and socioeconomic differences in the burden of diabetes and experiences with care will need to be addressed.

### **Strategies to halt the diabetes epidemic are critically needed in order to minimize future burden on the health care system caused by diabetes and other obesity-related illnesses.**

- Halting the obesity and consequent diabetes epidemics will require a multifaceted approach that promotes positive lifestyle changes at the population level and acknowledges the need to address enabling factors such as access to healthy food and safe, walkable neighbourhoods to promote physical activity. Obesity prevention needs to start in childhood as it is very hard to treat once present. Using anti-smoking campaigns as a model, a strategy that combines social and public policy changes, public awareness campaigns and clinical interventions aimed at promoting physical activity and healthier eating could help curb the ongoing rise in diabetes.
- More intensive diabetes prevention strategies should be targeted towards high-risk populations, including those from lower-income groups, immigrants, Aboriginal communities and women with gestational diabetes. Overcoming socioeconomic and demographic barriers to achieving a healthy lifestyle are likely to require innovative and cross-sectoral approaches. Culturally appropriate programs and services are also needed to enhance levels of physical activity and promote healthier eating patterns in ethnically diverse groups. For women with recent gestational diabetes, the demands of child-rearing in the postpartum period in combination with the balancing of work, family and other commitments pose additional barriers to lifestyle change.

### **Reduce income-related disparities in diabetes outcomes.**

- Focusing efforts upstream through cross-sectoral collaboration can serve to address the root causes of income-related health inequities while reducing the burden of diabetes in the population. A multifaceted



approach would likely be required to tackle the many complex problems which contribute to greater diabetes prevalence and poorer health in these groups.

- Measures to improve the health of low-income groups and other high-risk populations will also have to address barriers to accessing care related to poverty and immigration such as language barriers and high medication costs if health promotion and chronic disease prevention and management programs are to be successful.

**Comprehensive, patient-centred, chronic disease management can improve quality and outcomes of care for diabetes.**

- Diabetes is a complex chronic disease that requires close follow up by a multidisciplinary diabetes health care team for optimal management. Individuals with diabetes often have multiple chronic conditions making diabetes management more challenging. Therefore, implementation of a comprehensive, coordinated, patient-centred chronic disease prevention and management strategy—one that addresses the needs of at-risk populations—is the key to improving quality and outcomes of care for people with diabetes.

**Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.**

- We found sizable regional variations in diabetes outcomes likely due in part to differences in human resources and regional capacity, as well as regional differences in practice patterns and the complexity of the population being served. Interventions such as performance measurement and quality improvement in primary care, the regional coordination of care, use of telemedicine, enhancing the availability of diabetes team members and providing training and support for local practitioners are approaches that—when coupled

with better patient education and support for healthy lifestyle changes—could reduce regional variations in care. Technological approaches such as telemedicine can improve access to effective care in underserved communities. Including performance measurement and quality improvement initiatives when these programs are being implemented will provide timely information on what is working.

**Improve quality, availability and timeliness of data to assess diabetes outcomes and care delivery in the province.**

- While data to assess diabetes care in the province have improved, there is still much to be done to improve the quality, completeness, availability and timeliness of data. Specifically, medication data on people under age 65, laboratory data on screening and monitoring indicators and clinical data (e.g., blood pressure levels or foot examinations) to assess the quality of diabetes management in routine care settings are needed. As well, given the importance of eye examination to detect early changes from retinopathy, data on the frequency of retinopathy screening are also needed.
- Diabetes is primarily managed in the ambulatory care setting through primary care and specialty care. As a result, high quality clinical data are lacking. Better and more comprehensive data collection on management of diabetes in primary care and other ambulatory care settings is needed. Especially needed, is more complete data on care that is provided through AFPs.
- Given the known variation in diabetes prevalence in different ethnic communities as well as issues of access to care in recent immigrant populations, data on diabetes care and outcomes that can be stratified by ethnicity and recency of immigration would allow us to assess disease burden, target interventions, as well as to evaluate access, quality, and outcomes of care in Ontario's diverse communities.

# Introduction

The number of people with diabetes has increased dramatically over the last 20 years,<sup>1-3</sup> making it one of the most costly and burdensome chronic diseases of our time.

More than three million Canadians have diabetes and this number is expected to climb significantly over the next decade. It is predicted that between 2007 and 2017, another 1.9 million adults—or about nine out of every 100 adults without diabetes—will develop diabetes. Recent data from Ontario indicate that diabetes prevalence has increased dramatically over the last decade, and have already surpassed the global prevalence predicted by the World Health Organization for 2030.<sup>3, 4</sup> It is one of the leading causes of blindness, the most common cause of end-stage renal disease in the developed world,<sup>5, 6</sup> and a major cause of cardiovascular complications such as heart attack and stroke.<sup>7, 8</sup> Furthermore, the treatment is complex and costly with the direct health care costs of diabetes ranging from 2.5 to 15 percent of health care budgets.<sup>9</sup> Approximately 10 percent of people with diabetes have type 1 diabetes, which mainly presents in children and young adults, and is caused by autoimmune destruction of insulin-producing cells in the pancreas. The increase in diabetes prevalence has largely been attributed to a rise in new cases of type 2 diabetes,<sup>10</sup> which has an older age of onset and results in part from impaired insulin function, primarily due to a combination of behavioural risk factors and genetics. The increase in type 2 diabetes may be explained by the rise in risk factors such as obesity,<sup>11</sup> sedentary lifestyle, unhealthy diets, and the aging of the population.<sup>12-14</sup> The increased migration of susceptible populations, accompanied by shifts in lifestyle, have added to the diabetes burden in the developed world. In addition, increased survival among people with diabetes also contributes to increasing prevalence.<sup>15, 16</sup>

## The chapter has six sections:

- A. Health and Functional Status
- B. Access and Utilization of Care
- C. Screening, Assessment and Monitoring
- D. Pharmacological Treatment
- E. Health Outcomes
- F. Diabetes and Pregnancy

Data also suggest that certain populations are at higher risk for diabetes and diabetic complications. For example, low-income populations, in particular women, have a higher risk of developing diabetes<sup>17</sup> and have worse outcomes once they have it.<sup>18</sup> The risk of diabetes is also higher in certain immigrants and ethnic groups, such as those of South Asian, African, Hispanic, and Aboriginal descent.<sup>19-22</sup> Canadians living in rural regions have higher rates of diabetes compared to their urban counterparts. Evidence indicates that rural residents have worse access to care, lower income, and behavioural risk factors that place them at risk for developing the disease.<sup>23</sup>

While the prevalence of diabetes is higher among men than women, recent data suggest that young women (aged 20-49) have seen the greatest increase in diabetes over the last decade.<sup>4</sup> Not only do young women with diabetes have a potentially higher lifetime risk of complications because of an earlier diagnosis, but they may face other health issues such as reproductive problems<sup>24</sup> and complications during pregnancy.<sup>25-30</sup> As more women develop type 2 diabetes during childbearing age,



pregnancies complicated by diabetes are becoming increasingly common.<sup>31</sup> This trend has substantial implications for women, their offspring and the health care system. Pregnant women with pregestational diabetes have higher rates of pregnancy-induced hypertension, preeclampsia, obstructed labour and caesarean section.<sup>25-30, 32</sup> In addition, their infants have higher rates of birth defects, perinatal mortality, shoulder dystocia and jaundice.<sup>25-30</sup> Consequently, women with diabetes and their offspring have longer hospital stays and more neonatal intensive care unit (NICU) admissions, which imposes a greater burden on the health care system. Gestational diabetes, a temporary condition that generally develops later in pregnancy, is less likely to be associated with adverse maternal and fetal outcomes compared to pregestational diabetes. However, women with gestational diabetes are also at greater risk of obstetrical complications compared to the general population and their offspring have higher rates of macrosomia (high birth weight) and shoulder dystocia. Pregnancy-related complications can be prevented with appropriate pre-pregnancy and prenatal care. We need a better understanding of inequities in care and outcomes, to optimize maternal and fetal health for the growing number of diabetic pregnancies across Ontario.

There is good evidence that the long-term complications from diabetes can be reduced or prevented through strategies aimed at lowering glucose, blood pressure and cholesterol levels.<sup>33-39</sup> However, not all groups benefit equally from these strategies. In general, men and women with lower income or lower levels of education report worse health status and have higher rates of mortality than those who have higher socioeconomic status.<sup>40, 41</sup> Similar trends are seen in people with diabetes.<sup>42-44</sup> Thus, differences in illness burden between subgroups of women may be larger than overall differences between women and men.<sup>45</sup> There is also evidence that minority and Aboriginal populations with diabetes have a greater rate of

diabetic complications and mortality compared to the White population.<sup>46-51</sup> There may be several reasons for these disparities. First, new immigrants and minority groups often earn less income than longer-term residents. Therefore, these trends may reflect income-based inequities in access to care and medication. Indeed, while mortality rates among men and women with diabetes fell significantly over the last decade, improvements in survival have been substantially greater among wealthier individuals.<sup>18</sup> Diabetes poses a tremendous financial burden on people affected by this disease, and improved diabetes outcomes have been partly achieved through a shift to more complex medical care involving a greater number of drug therapies.<sup>52</sup> Thus, socially disadvantaged populations may not have benefited as much from advances in diabetes care due to financial barriers to needed treatments and services. Lower-income populations also have a higher prevalence of behavioural risk factors such as smoking, poor diet and sedentary lifestyle.<sup>53</sup> Low health literacy and cultural barriers in disadvantaged populations may have a greater impact on their ability and motivation to follow more complex medical regimens.<sup>54</sup> These barriers—which differentially affect socially disadvantaged populations—contribute to higher rates of preventable complications.

Not only is diabetes associated with numerous complications, but people with diabetes are more likely to have other comorbid conditions than those without diabetes.<sup>55, 56</sup> They are also more likely to experience limitations in their activities of daily living<sup>57-59</sup> and depression<sup>60</sup> which have a significant impact on their health and functional status and on the social and financial burden of diabetes due to lost productivity. In general, women report multiple chronic conditions,<sup>61-64</sup> depression<sup>61, 65-68</sup> and limitations in activities of daily living more often than men,<sup>61, 69, 70</sup> thus diabetes may disproportionately burden women. On the other hand men are more likely to experience adverse outcomes associated with diabetes, such as amputation.<sup>71</sup>

The ongoing rise of diabetes in our population will continue to place a growing demand on the health care system and negatively impact quality of life. This has important policy implications and addressing these issues is fundamental to health system sustainability.<sup>72</sup> Diabetes has been shown to be preventable with lifestyle modification,<sup>73</sup> thus, an increased focus on preventive strategies is urgently needed. We need to adopt wider public health initiatives to curb the epidemic of obesity and sedentary lifestyle so that new diabetes cases can be prevented. As well, we will not only need to ensure adequate resource allocation for the growing number of people who will need chronic diabetes care, and place greater emphasis on health system redesign to implement models of chronic disease prevention and management that improve quality and outcomes of care in this high-risk population.

A greater understanding of inequities in prevalence, quality of care and outcomes is necessary in order to better target resources and interventions. There is evidence for practice and health system-based interventions to improve the overall quality of diabetes care. Performance measurement and reporting has been shown to be a driver of change in this area. There are also interventions that have been shown to reduce inequities in care and outcomes in socially disadvantaged populations, including culturally tailored and community-based programs, and interventions delivered more frequently and for a longer duration.<sup>74</sup> A better understanding of where the gaps in diabetes care exist would help target such interventions appropriately.

This chapter examines the burden of diabetes in Ontario, with a focus on indicators of diabetes care and potential gender and income disparities. In the first section, the **health and functional status** of Ontario women and men with diabetes is profiled including: morbidity (the presence of other chronic conditions or probable depression), activity limitations, self-rated health and health behaviours. The second section includes indicators of **access and utilization of care**,

including measures of primary and specialty physician care. In the section on **screening, assessment and monitoring**, clinical and self-monitoring of blood glucose and foot care as well as clinical monitoring of kidney function and eye examination are measured. In the section on **pharmacological treatment**, self-reported use of insulin and oral glucose-lowering medications is measured as well as the use of medications to treat hypertension and cholesterol among adults aged 65 and older with diabetes. The section on diabetes-related **health outcomes** includes measures of diabetes complications including glucose-related emergencies, retinopathy, cardiovascular, cerebrovascular and peripheral vascular disease and kidney damage. Finally, the section on **diabetes and pregnancy** measures indicators of prenatal care, obstetrical complications and fetal complications in women with pregestational diabetes and gestational diabetes compared to women without diabetes.

The indicators we report are the result of a systematic review of the literature and rigorous selection process (see [Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through many sources including for example: Statistics Canada; Health Canada; the Canadian Diabetes Association; the Association of Public Health Epidemiologists of Ontario; the Institute for Clinical Evaluative Sciences; National Quality Measures Clearinghouse and the US Department of Health and Human Resources. Many of these indicators are widely used to measure quality of care. We build on these reports by incorporating a gender and equity analysis (see [the POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts and different experiences with health care which, together with differences in biology, contribute to observed gender differences in health. Furthermore, well documented health inequities among women and men associated with sociodemographic

factors are such that differences between subgroups of women may be larger than overall differences between women and men.

Data from several sources were used to produce this section. These include: Statistics Canada's 2006 Census; Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1), 2005 (Cycle 3.1) and 2007; Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Drug Benefit (ODB) database; Ontario Health Insurance Plan (OHIP) data; National Ambulatory Care Reporting System (NACRS); Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB); and ICES Mother-Baby (MOMBABY) Linked Database.

Depending on the data sources available to assess each indicator, we determined whether people had diabetes either based on self-report (for indicators using survey data) or using a validated administrative data algorithm that uses Ontario health care databases (for indicators using administrative data). Estimates of diabetes prevalence that are based on self-report are known to be lower than estimates based on diagnoses contained in health care databases.<sup>75</sup> Thus, the data based on self-reported diabetes should be interpreted with caution, as these people may have a higher

awareness of their diabetes due to more advanced stage, greater health literacy, or greater interest in their health. These factors may in turn increase preventive health behaviours and health care utilization patterns. Data from the CCHS were first stratified by sex and then further stratified by annual household income, educational attainment, age, ethnicity, immigration, rural/urban residency and Local Health Integration Network (LHIN). Data from administrative sources were first stratified by sex and then further stratified by neighbourhood income quintiles, age and LHIN. Analyses were conducted as allowed by sample size. Age-adjustment, where appropriate, was done using indirect standardization and data were adjusted to the population with diabetes. [Appendix 9.3](#) provides a more detailed description of research methods.

A complete list of the indicators in this chapter and their data sources can be found in [Appendix 9.2](#). [Appendix 9.1](#) indicates which of the Ontario Health Quality Council's (OHQC) nine attributes of a high-performing health system the indicator assesses. It also identifies which of the strategic objectives included in the Ontario Ministry of Health and Long-Term Care strategy map and the Ontario Diabetes Strategy would be met through improvement on this indicator.

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## SECTION 9F

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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

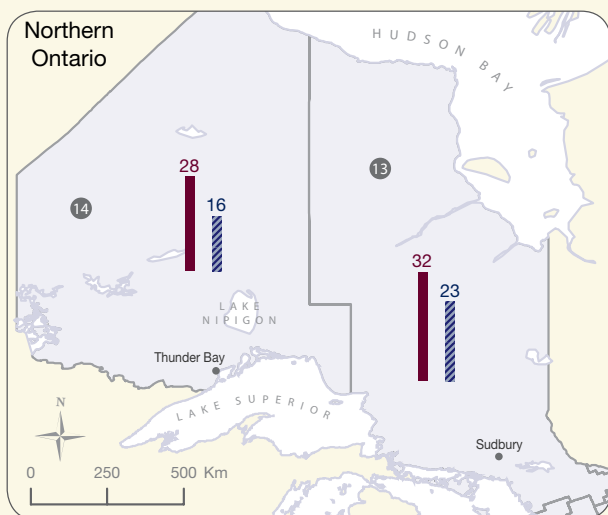
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

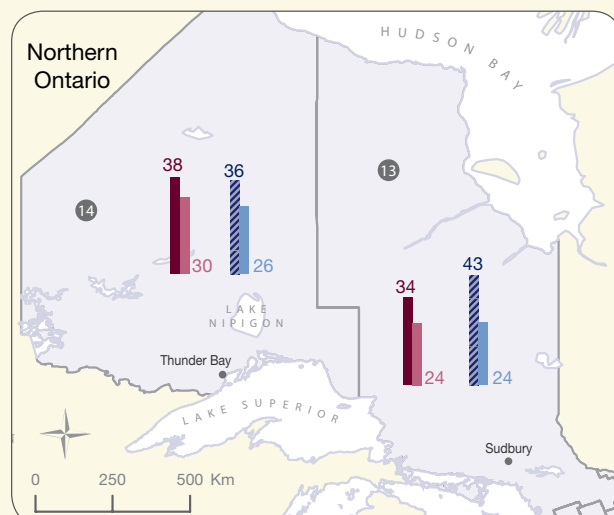
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

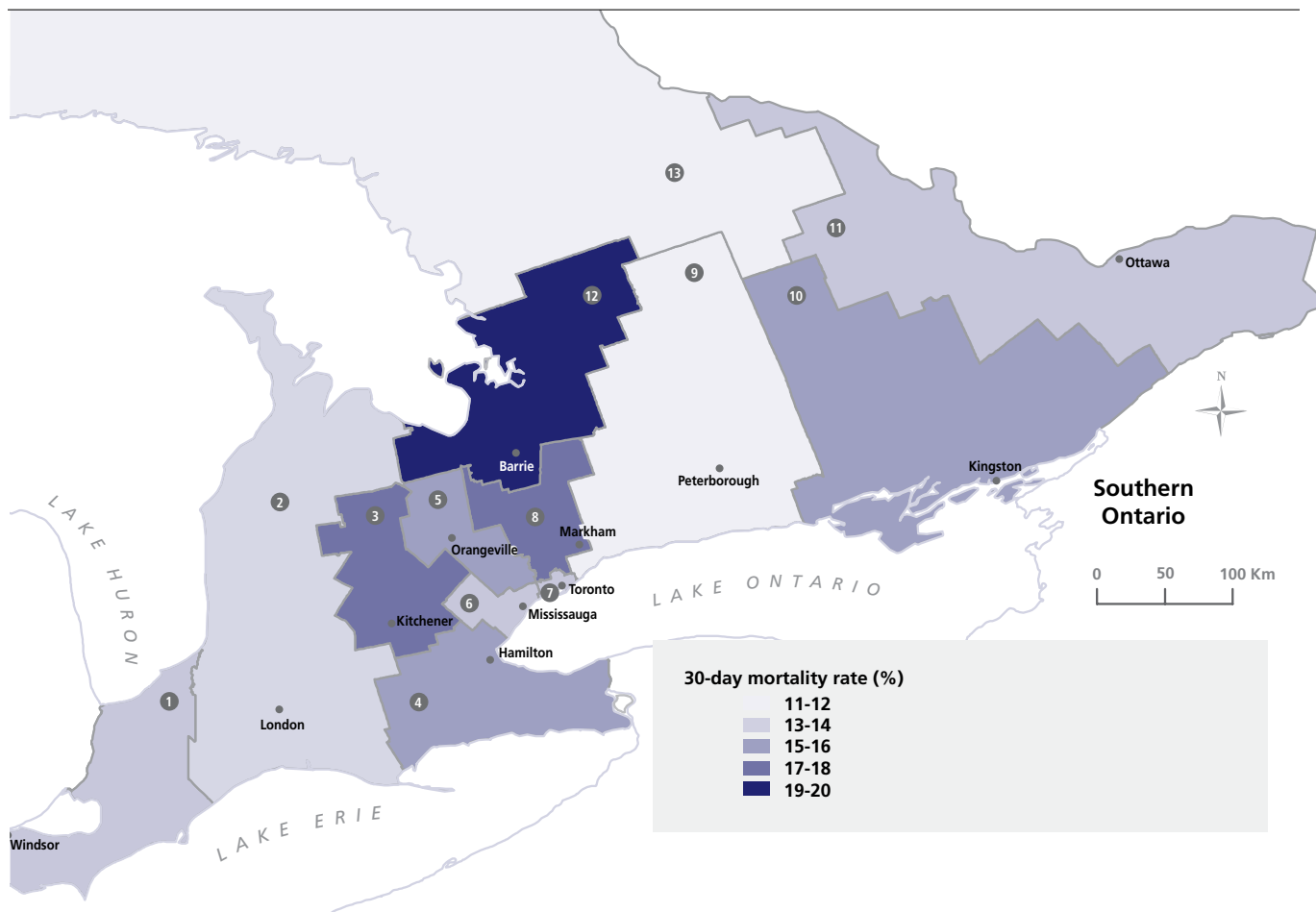


## CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**



# Section 9A

## *Health and Functional Status*

### INTRODUCTION

Recent data from Ontario indicate that diabetes prevalence has increased dramatically over the last decade, due to increased incidence and reduced mortality.

By 2005, age- and sex-adjusted diabetes prevalence had increased by 69 percent from 5.2 percent in 1995 to 8.8 percent and had already surpassed the global prevalence predicted by the World Health Organization for 2030.<sup>3, 4</sup> Manuel and colleagues predicted, based on a validated model, that between 2007 and 2017, an additional 1.9 million Canadians would develop diabetes. This is the equivalent of nine percent of the adult population being newly diagnosed with diabetes during the 10-year period.<sup>76</sup> Diabetes rates are higher in older people and in men, however, the biggest rise in diabetes prevalence from 1995 to 2005 was seen in women aged 20-49, such that their prevalence is now equal to that of similarly aged men.<sup>4</sup>

Not only is diabetes associated with significant complications, but people with diabetes are more likely to have other comorbid conditions than those without diabetes.<sup>55, 56</sup> They are also more likely to experience limitations in their activities of daily living (ADL)<sup>57-59</sup> and depression,<sup>60</sup> which have a significant impact on their health and functional status and on the social and financial burden of diabetes due to lost productivity. In general, women report multiple chronic conditions,<sup>61-64</sup> depression<sup>61, 65-68</sup> and limitations in ADLs more often than men,<sup>61, 69, 70</sup> thus the burden of diabetes may be more significant in women than in men.

The majority of diabetes cases in adults are due to type 2 diabetes,<sup>10, 77</sup> which is associated with a number of modifiable risk factors including physical inactivity, poor nutrition and being overweight or obese.<sup>73, 78-81</sup>

Diabetes has been shown to be preventable with lifestyle modification aimed at increased physical activity and better nutrition.<sup>73</sup> The treatment of diabetes should include aggressive targeting and modification of behavioural risk factors;<sup>82</sup> the persistence of these risk factors among people with diabetes highlights a significant unmet need in the care of diabetes. While women are more likely than men to be physically inactive, men are more likely than women to be overweight, have poor nutrition or to smoke;<sup>61, 83, 84</sup> smoking increases the risk of diabetes complications. A better understanding of differences in risk factors among population subgroups would help target preventive strategies.

Type 2 diabetes is more prevalent among lower-income populations and low income is a bigger risk factor for diabetes among women.<sup>17</sup> This trend may be because lower-income people are more susceptible to risk factors such as sedentary lifestyle, poor diet, and smoking.<sup>53</sup> The prevalence of diabetes is also higher among certain ethnic groups, such as those of South Asian, African, Aboriginal or Hispanic descent.<sup>19, 20, 22</sup> Low-income

populations and ethnic minorities populations may also have added socio-cultural barriers to adequate health care, which may increase their risk of diabetes complications and decrease their survival.<sup>18</sup> Canadians living in rural regions have higher rates of diabetes compared to their urban counterparts. Evidence indicates that rural residents have worse access to care, have lower income and more behavioural risk factors.<sup>23</sup> Rural regions may therefore be important to target for enhanced diabetes care and prevention.

In this section, we report the prevalence of diabetes and provide an analysis of the health and functional status of people who report having diabetes. Differences associated with sex, age, income, education, ethnicity, immigration status, rural/urban residency and Local Health Integration Network (LHIN) are examined, where data are available and sample size allows.

#### **The indicators include:**

##### **Diabetes prevalence and comorbidity**

- Prevalence of diabetes
- Comorbidity (multiple chronic conditions)
- Probable depression
- Hypertension

##### **Health and functional status**

- Self-rated health
- Limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)

##### **Health behaviours**

- Physical inactivity
- Inadequate fruit and vegetable intake
- Being overweight
- Being obese
- Current smoking

Diabetes prevalence was assessed using the Ontario Diabetes Database (ODD); combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess diabetes prevalence in ethnic groups. Combined data from the CCHS, 2005 (Cycle 3.1) and 2007 were also used to assess the prevalence of having at least two additional chronic conditions (comorbidity), prevalence of hypertension, self-rated health and health behaviours; data from CCHS, 2000/01 (Cycle 1.1) were used to assess the prevalence of probable depression and data from CCHS, 2005 (Cycle 3.1) were used to assess limitations in IADLs and/or ADLs among adults who reported having diabetes (see [Appendix 9.3](#) for details).

## EXHIBITS AND FINDINGS

### DIABETES PREVALENCE AND COMORBIDITY

#### DIABETES PREVALENCE

**Indicator:** This indicator measures the prevalence of diabetes among adults aged 20 and older in Ontario.

**Background:** Diabetes is a large and growing health problem for Ontarians.<sup>1-4</sup> The high prevalence of diabetes has important implications for health care resources given the burden of diabetes and the projected growth of the affected population.<sup>3, 85</sup> It has been estimated that as many as one-third of all cases of diabetes are undiagnosed in Canada.<sup>86</sup> Diabetes is preventable;<sup>73</sup> therefore, improved prevention strategies are needed to stem the epidemic of diabetes.

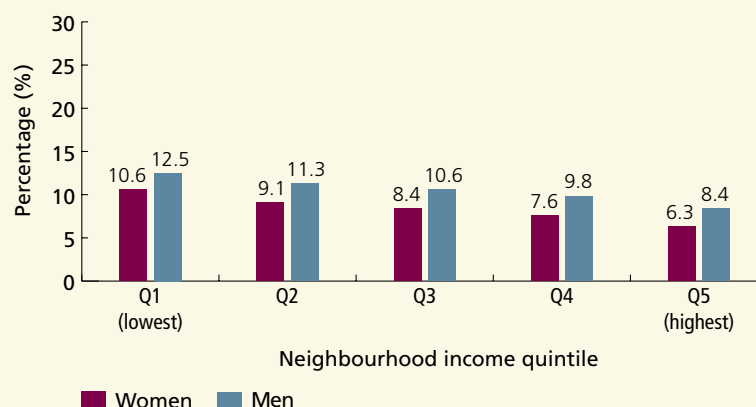
The prevalence of diabetes was established using a validated administrative data algorithm that uses Ontario health care databases to identify all Ontario adults who have been diagnosed with diabetes. Women with gestational diabetes are excluded (see [Appendix 9.3](#) for more detail). Because information on ethnicity is not currently available from Ontario's health care databases, the prevalence of diabetes within ethnic groups was based on self-reported information from the Canadian Community Health Survey (CCHS), rather than physician diagnosis. [The POWER Study Burden of Illness chapter](#) found that the self-reported prevalence of diabetes among Ontario adults was six percent, which is lower than the prevalence reported using administrative data.<sup>61</sup> True prevalence is likely to be even higher than estimates based on administrative data as we are only able to report on those who have received a diagnosis of diabetes and some individuals with type 2 diabetes may go undiagnosed for many years. Furthermore, this may minimize our ability to identify inequities as low-income women and men may be less likely to have their condition diagnosed.

**Findings:** In Ontario, 9.4 percent of adults aged 20 and older had diabetes in 2006/07. Men were more likely than women to have diabetes (10.5 percent versus 8.4 percent, respectively).

### Exhibit 9A.1 | Age-standardized prevalence of diabetes in adults aged 20 and older, by sex and neighbourhood income quintile, in Ontario, 2006/07

#### FINDINGS

- Diabetes prevalence increased with decreasing neighbourhood income in both women and men.
- The prevalence of diabetes ranged from 10.6 percent among women living in the lowest-income neighbourhoods to 6.3 percent among women living in the highest-income neighbourhoods.
- The prevalence of diabetes ranged from 12.5 percent among men living in the lowest-income neighbourhoods to 8.4 percent among men living in the highest-income neighbourhoods.
- Based on survey data, the prevalence of self-reported diabetes was almost twice as high among Black, Aboriginal and Arab, South and West Asian adults compared to White adults (10.6 percent, 9.2 percent, 9.2 percent versus 5.2 percent, respectively) (data not shown). Due to small sample sizes we were unable to report sex differences across ethnic groups (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Statistics Canada 2006 Census

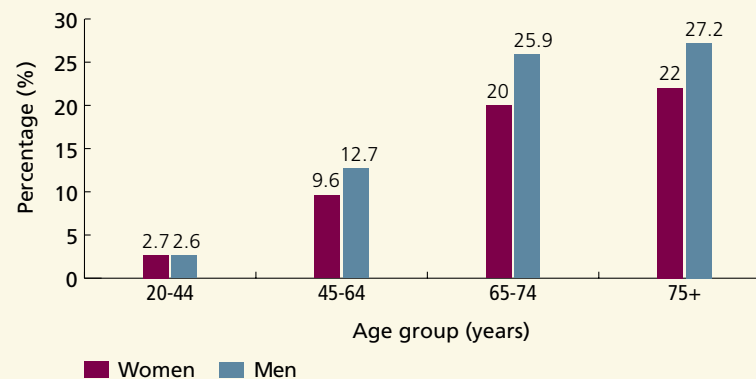
**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

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### Exhibit 9A.2 | Prevalence of diabetes in adults aged 20 and older, by sex and age group, in Ontario, 2006/07

#### FINDINGS

- The prevalence of diabetes increased with age in both women and men.
- More than one in five women and one in four men aged 65 and older had diabetes, compared to less than one in thirty adults aged 20-44.
- With the exception of adults aged 20-44, in whom there were no sex differences, men had higher rates of diabetes than women.



**DATA SOURCE:** Ontario Diabetes Database (ODD)

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**Exhibit 9A.3 |** Age-standardized prevalence of diabetes in adults aged 20 and older, by sex, neighbourhood income and Local Health Integration Network (LHIN), in Ontario, 2006/07

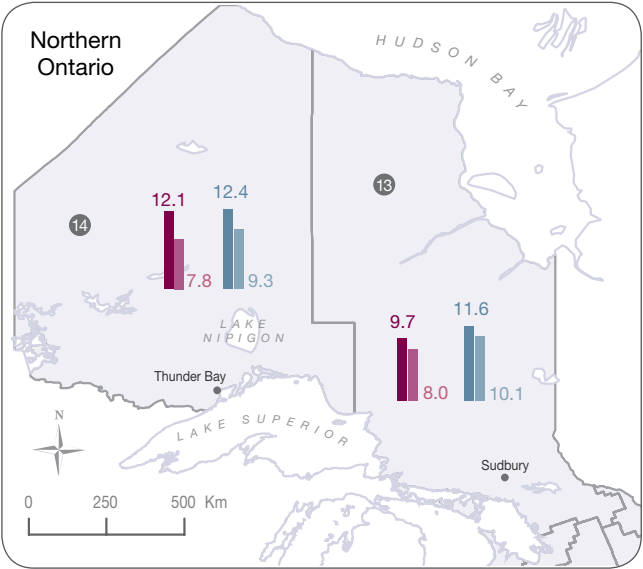
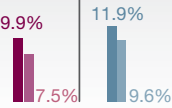
**FINDINGS**

- Prevalence of diabetes varied across LHINs. Diabetes rates were higher among men than among women in all LHINs.
- The prevalence of diabetes ranged from 7.9 percent in the North Simcoe Muskoka LHIN to 13.1 percent in the Central West LHIN among women living in lower-income neighbourhoods and from 6.4 percent in the Waterloo Wellington LHIN to 9.7 percent in the Central West LHIN among women living in higher-income neighbourhoods.
- Among men, prevalence of diabetes ranged from 9.7 percent in the Waterloo Wellington and North Simcoe Muskoka LHINs to 15.1 percent in the Central West LHIN among those living in lower-income neighbourhoods and from 8.2 percent in the Waterloo Wellington LHIN to 11.8 percent in the Central West LHIN among men living in higher-income neighbourhoods.

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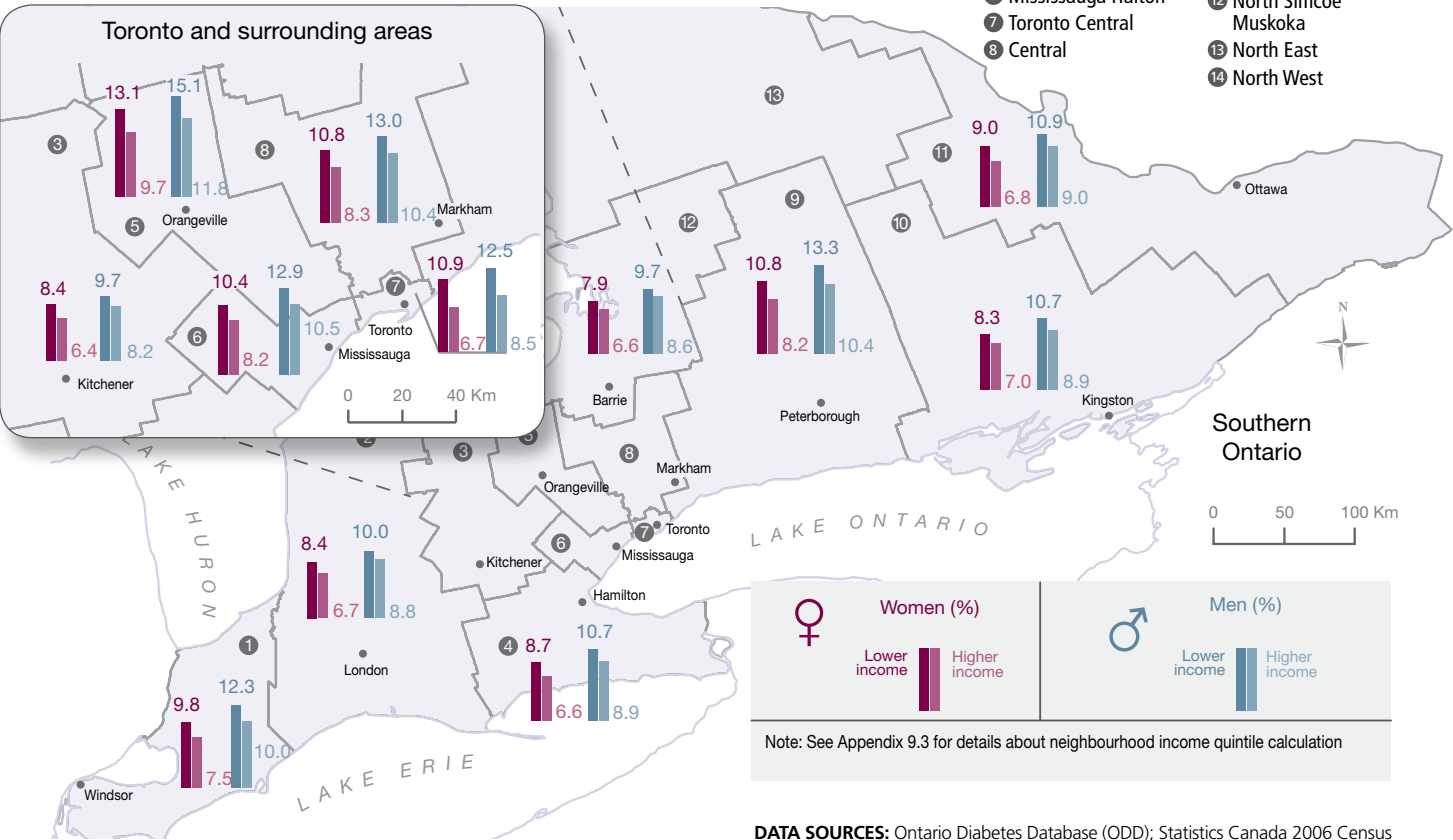
**Overall Ontario**

In Ontario, 9.9 percent of lower-income women, 7.5 percent of higher-income women, 11.9 percent of lower-income men and 9.6 percent of higher-income men aged 20 and older had been diagnosed with diabetes.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



DATA SOURCES: Ontario Diabetes Database (ODD); Statistics Canada 2006 Census



## PREVALENCE OF COMORBIDITY (MULTIPLE CHRONIC CONDITIONS)

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported having at least two additional chronic conditions besides diabetes (comorbidity) diagnosed by a health professional. We compared the prevalence of comorbidity among people with and without diabetes.

**Background:** There are disparities in chronic disease prevalence in Ontario associated with gender, socioeconomic status, and ethnicity.<sup>61</sup> The burden of illness associated with diabetes is increased by the presence of other chronic conditions.<sup>55, 56, 60</sup> Risk factors for diabetes such as obesity, physical inactivity and inadequate fruit and vegetable intake are also risk factors for other common chronic conditions including cardiovascular and musculoskeletal disease, increasing the risk of multiple chronic conditions in people with these risk factors. Diabetes care itself is intensive, and the presence of other chronic conditions greatly increases the complexity of care for these patients.<sup>87-89</sup> This has significant implications regarding the allocation of resources and provision of diabetes care. The POWER Study Burden of Illness chapter reported that 29 percent of Ontarians (31 percent of women and 25 percent of men) had two or more chronic conditions in 2005.<sup>61</sup> Rates reported in this chapter will differ from those reported in the earlier chapter because of differences in the conditions included.

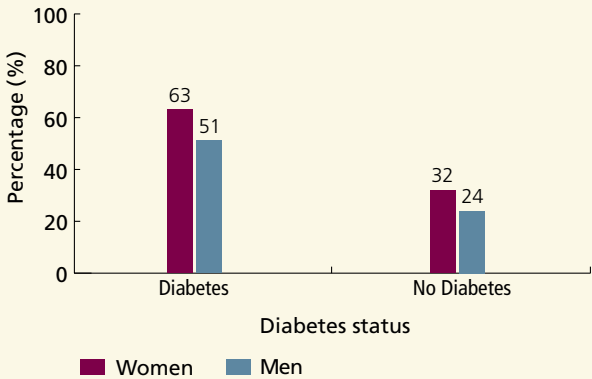
Data for this variable were derived from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007. Chronic conditions included in this indicator were: Alzheimer's disease or other dementia; bowel disorders; cancer; heart disease; stroke; high blood pressure; urinary incontinence; arthritis, rheumatism, or back problems (excluding fibromyalgia); and obstructive lung disease (for details, see [Appendix 9.3](#)). Because this indicator was derived from the CCHS, diabetes status and the presence of other conditions were based on self-reported information rather than physician diagnosis. Among people with diabetes, this indicator measures the percentage that had at least two additional chronic conditions besides diabetes (i.e., a total of three or more chronic conditions). Among people without diabetes, this indicator measures the percentage that had two or more chronic conditions.

**Findings:** In Ontario, 56 percent of adults aged 20 and older who reported having diabetes reported having at least two additional chronic conditions diagnosed by a health professional compared to 28 percent of adults without diabetes. Among those with diabetes, women were more likely than men to report having at least two additional chronic conditions (63 percent versus 51 percent, respectively).

**Exhibit 9A.4** | Age-standardized percentage of adults aged 20 and older who reported having at least two chronic conditions^ diagnosed by a health professional, by sex and diabetes status, in Ontario, 2005 and 2007

**FINDINGS**

- Adults who reported having diabetes were more likely to have at least two additional chronic conditions than adults without diabetes.
- Women with diabetes were more likely to report having at least two additional chronic conditions compared to men with diabetes (63 percent versus 51 percent, respectively).
- Among people with diabetes, the likelihood of having at least two additional chronic conditions increased with age (28 percent of women and 20 percent of men aged 20-44 compared to 78 percent of women and 64 percent of men aged 65 and older). Irrespective of age, women were more likely than men to report having at least two additional chronic conditions (data not shown).
- The lowest-income men with diabetes were more likely than the highest-income men with diabetes to have at least two additional chronic conditions (66 percent versus 41 percent, respectively). This did not vary by income among women with diabetes (data not shown).
- Canadian born women with diabetes were more likely to report having at least two other chronic conditions compared to immigrant women (67 percent of Canadian born women versus 57 percent of immigrant women). This did not vary by immigration status among men with diabetes (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

^ Among people with diabetes, this refers to at least two chronic conditions in addition to diabetes

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## PREVALENCE OF PROBABLE DEPRESSION

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who had probable depression. We compared the prevalence of probable depression in people with and without diabetes.

**Background:** Depression is twice as common in people with diabetes as in the general population.<sup>60</sup> Depression is associated with worse blood glucose management, health complications and decreased quality of life, and so poses additional health risks to individuals with diabetes.<sup>87</sup> Patient-centred care that focuses on identifying and treating comorbid depression is an important component of diabetes management.<sup>82</sup> According to [the POWER Study Depression chapter](#), 7.4 percent of Ontarians aged 15 and older (9.8 percent of women and 4.9 percent of men) met the criteria for having probable depression in 2001.<sup>90</sup>

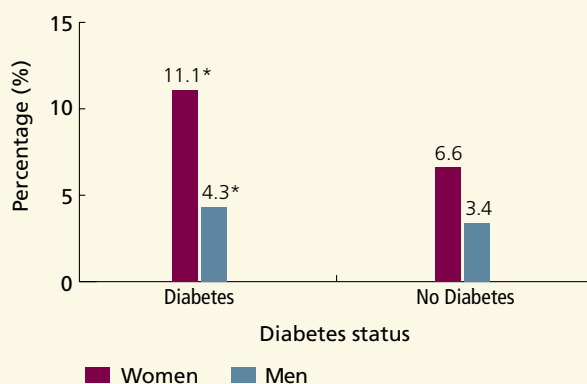
This measure was based on data from the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1) which measures depression using the Composite International Diagnostic Interview-Short Form (CIDI-SF) for Major Depression (see [Appendix 9.3](#) for details). This scale was never fully validated, so rates reported here may differ from actual population prevalence. Because this indicator was derived from the CCHS, diabetes status was based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 7.4 percent of adults aged 20 and older who reported having diabetes had probable depression compared to 5.0 percent of adults without diabetes. Among adults with diabetes, women were more than twice as likely as men to have probable depression (11.1 percent versus 4.3 percent, respectively). These estimates should be interpreted with caution due to small numbers.

### Exhibit 9A.5 | Age-standardized percentage of adults aged 20 and older who had probable depression,<sup>^</sup> by sex and diabetes status, in Ontario, 2000/01

#### FINDINGS

- Women were more likely to have probable depression than men, irrespective of diabetes status.
- Almost twice as many women who reported having diabetes had probable depression compared to women without diabetes (11.1 percent versus 6.6 percent, respectively); however, this difference was not significant, possibly due to small sample size and limited power to detect differences. The rates of probable depression did not vary by diabetes status among men.
- The differences in rates of probable depression by diabetes status were greater among women than among men.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

<sup>^</sup> Composite International Diagnostic Interview-Short Form for Major Depression score of > 0.9

\* Interpret with caution due to high sampling variability

POWER Study

## PREVALENCE OF HYPERTENSION

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who also reported having been diagnosed with hypertension (high blood pressure) by a health professional. We compared the prevalence of hypertension in people with and without diabetes.

**Background:** Hypertension is an important risk factor for many complications of diabetes, including diabetic eye disease, kidney disease and cardiovascular disease.<sup>91</sup> A large proportion of patients with type 2 diabetes also have hypertension, since these two conditions share similar risk factors.<sup>92</sup> The presence of hypertension increases the risk of diabetic complications significantly, and multiple medications are often required to control blood pressure in addition to diabetes treatment.<sup>93</sup> The additional costs incurred with the increased number of medications needed for these patients may serve as a barrier to adequate care for more vulnerable patients and may worsen their prognosis.<sup>18</sup>

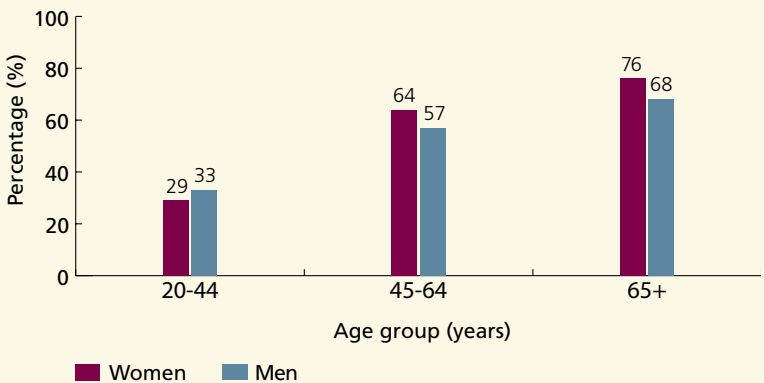
Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. Because this indicator was derived from the CCHS, diabetes status and hypertension were based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 61 percent of adults aged 20 and older who reported having diabetes also reported ever being diagnosed with hypertension by a health professional compared to 21 percent of adults who did not have diabetes. Rates of self-reported hypertension were similar between women and men with diabetes (64 percent versus 59 percent, respectively).

### Exhibit 9A.6 | Percentage of adults aged 20 and older who reported having diabetes who reported having hypertension, by sex and age group, in Ontario, 2005 and 2007

#### FINDINGS

- Among adults who reported having diabetes, the percentage who reported having hypertension increased with age, from 31 percent among adults aged 20-44 to 72 percent among adults aged 65 and older. This was true for women and for men.
- The percentage who reported having hypertension did not vary by income (data not shown).
- Among adults with diabetes, the percentage who reported ever having been diagnosed with hypertension was higher among Canadian born adults as compared to immigrants who had been in Canada for less than 10 years (65 percent versus 42 percent, respectively) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

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## HEALTH AND FUNCTIONAL STATUS

### SELF-RATED HEALTH

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who rated their health as fair or poor. We compared the self-rated health of people with and without diabetes.

**Background:** Self-rated health—also referred to as global, self-reported or self-perceived health—is an indicator of how people rate their overall health status. Self-rated health is a well-validated measure of health status and has been shown to predict numerous health outcomes including mortality, health care utilization and health care costs in diverse populations.<sup>94-96</sup> People with diabetes are more likely to have poor self-rated health compared to people without diabetes.<sup>43, 97, 98</sup> In people with diabetes, poor self-rated health is associated with a higher risk for diabetes complications, cardiovascular events and mortality.<sup>99-101</sup>

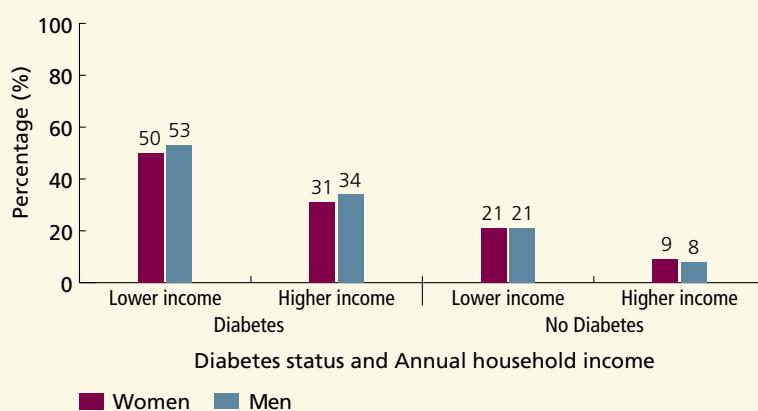
Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. Because this indicator was derived from the CCHS, diabetes status was based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 40 percent of adults aged 20 and older who reported having diabetes rated their health as fair or poor compared to 11 percent of adults without diabetes. Among adults with diabetes, this did not vary by sex (41 percent of women and 40 percent of men).

#### Exhibit 9A.7 | Age-standardized percentage of adults aged 20 and older who reported having diabetes who rated their own health as fair or poor, by sex, annual household income and diabetes status, in Ontario, 2005 and 2007

##### FINDINGS

- Adults who reported having diabetes were more than twice as likely to report fair or poor health as adults without diabetes, irrespective of household income.
- More than one-half of lower-income adults and one-third of higher-income adults with diabetes reported their health to be fair or poor compared to 21 percent of lower-income adults and less than 10 percent of higher-income adults without diabetes.
- Lower-income women and men were more likely to rate their health as fair or poor than higher-income adults, irrespective of diabetes status.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

**NOTE:** See [Appendix 9.3](#) for definitions of annual household income categories

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## LIMITATIONS IN IADLS (INSTRUMENTAL ACTIVITIES OF DAILY LIVING) AND/OR ADLS (ACTIVITIES OF DAILY LIVING)

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported that they needed the assistance of another person to carry out IADLs (instrumental activities of daily living—meal preparation, running errands, light and heavy household chores and money management) and/or ADLs (activities of daily living—washing, dressing, eating, taking medications, moving about inside the house). We compared IADL and/or ADL limitations among people with and without diabetes.

**Background:** People with diabetes have worse functional status (including greater limitations in IADLs and ADLs) than the general population.<sup>57-59, 102, 103</sup> Limitations in functional status can result from a multitude of factors, including diabetes complications, comorbid conditions and behavioural risk factors.<sup>104</sup> ADL limitations among people with diabetes have been shown to predict higher rates of hospitalizations.<sup>105</sup> The functional status of people with diabetes may be improved or maintained through proper disease management and promotion of healthy behaviours.<sup>106</sup>

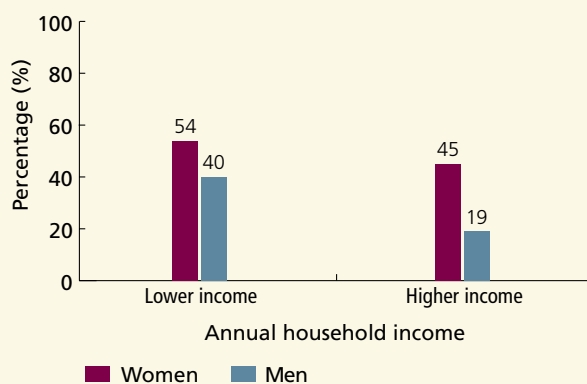
IADL limitations represent difficulties in carrying out routine life activities and are generally interpreted as an indicator of mild to moderate disability. Limitations in ADLs reflect difficulty in carrying out self-care activities, and therefore represent a more severe disability. IADL and ADL limitations may result from either physical or mental impairments. Most people who report ADL limitations will also have IADL limitations. [The POWER Study Burden of Illness chapter](#) reported that 16 percent of Ontarians aged 25 and older (20 percent of women and 11 percent of men) reported having IADL and/or ADL limitations in 2005.<sup>61</sup> Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to assess this indicator. Because this indicator was derived from the CCHS, diabetes status was based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, adults who reported having diabetes were more than twice as likely to report limitations in IADLs and/or ADLs than adults without diabetes (37 percent versus 16 percent, respectively). Women with diabetes were more likely than men with diabetes to experience limitations in carrying out IADLs and/or ADLs (49 percent versus 27 percent, respectively).

**Exhibit 9A.8** | Age-standardized percentage of adults aged 20 and older who reported having diabetes who reported limitations in instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs), by sex and annual household income, in Ontario, 2005

**FINDINGS**

- Among adults who reported having diabetes, lower-income women and men were more likely to report IADL and/or ADL limitations than higher-income women and men. Over half of lower-income women reported these limitations.
- Irrespective of income, women with diabetes were more likely than men to report IADL and/or ADL limitations.
- Women and men aged 65 and older were more likely to report limitations in IADLs and/or ADLs than those aged 20-64 (62 percent of women and 39 percent of men aged 65 and older compared to 39 percent of women and 19 percent of men aged 20-64) (data not shown).
- Almost two-thirds of women aged 65 and older with diabetes reported IADL and/or ADL limitations (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 9.3](#) for definitions of annual household income categories

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## HEALTH BEHAVIOURS

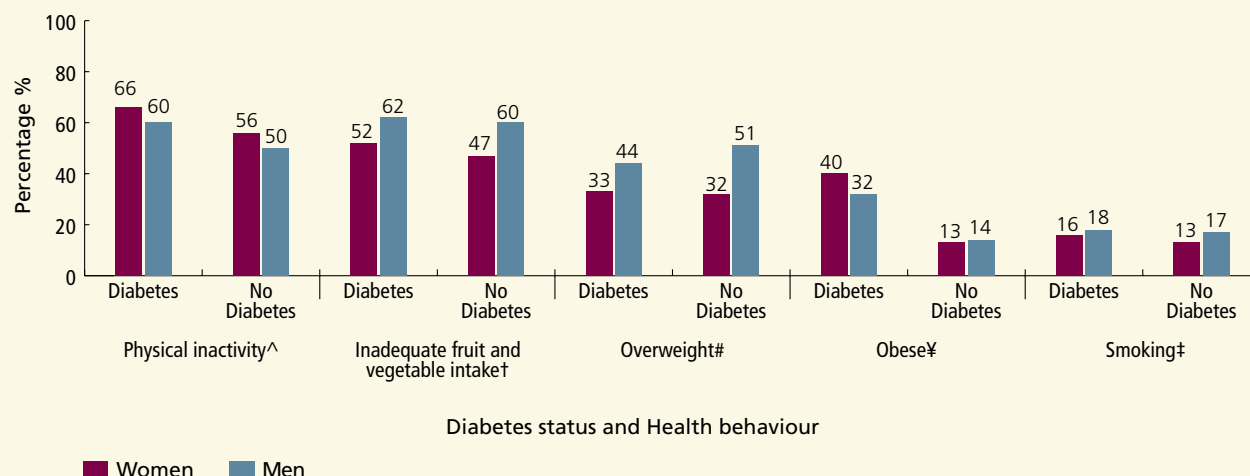
**Indicator:** This group of indicators measures the percentage of people who reported having diabetes who reported four major factors that increase the risk of diabetes, diabetes complications and premature mortality: physical inactivity, inadequate daily intake of fruits and vegetables, being overweight or obese, and smoking (see [Appendix 9.3](#) for details on measurement of these indicators). We compared the health behaviours of people with and without diabetes.

**Background:** Inadequate physical activity, poor nutrition and being overweight or obese are risk factors for diabetes and are therefore important for diabetes prevention.<sup>73,78-81</sup> Promoting healthy behaviour is also an integral component of diabetes management;<sup>82</sup> physical activity, a healthy diet and weight management play an important role in the control of blood glucose, blood pressure and blood lipid levels.<sup>107-109</sup> The combined control of these endpoints has been shown to decrease the risk of diabetes complications and increase life expectancy.<sup>34, 110</sup> Smoking can aggravate many problems that people with diabetes already face (e.g., heart, blood vessel, kidney and eye disease), can lower life expectancy and can reduce quality of life.<sup>111</sup> According to [the POWER Study Burden of Illness chapter](#), 51 percent of Ontario adults aged 25 and older were physically inactive, 57 percent reported inadequate fruit and vegetable intake, 53 percent were overweight or obese and 22 percent were current smokers.<sup>61</sup> Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess these indicators. Because these indicators were derived from the CCHS, diabetes status was based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, among adults aged 20 and older who reported having diabetes, 62 percent were physically inactive, 58 percent had inadequate fruit and vegetable intake, 39 percent were overweight, 35 percent were obese, and 17 percent were current smokers. Among adults without diabetes, 53 percent were physically inactive, 54 percent had inadequate fruit and vegetable intake, 42 percent were overweight, 13 percent were obese, and 15 percent were current smokers.

Among women with diabetes, 66 percent were physically inactive, 52 percent reported inadequate fruit and vegetable intake, 33 percent were overweight, 40 percent were obese and 16 percent were current smokers. Among men with diabetes, 60 percent were physically inactive, 62 percent reported inadequate fruit and vegetable intake, 44 percent were overweight, 32 percent were obese, and 18 percent were current smokers.

**Exhibit 9A.9** | Age-standardized percentage of adults aged 20 and older who reported physical inactivity,<sup>^</sup> inadequate fruit and vegetable intake,<sup>†</sup> being overweight,<sup>#</sup> being obese,<sup>¥</sup> or being current smokers,<sup>‡</sup> by sex and diabetes status, in Ontario, 2005 and 2007



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> Physical Activity Index of < 1.5 kcal/kg/day

<sup>†</sup> Daily consumption of less than five servings of fruits and vegetables

<sup>#</sup> Overweight refers to a Body Mass Index (BMI)  $\geq 25$  but < 30 from self-reported height and weight

<sup>¥</sup> Obese refers to a BMI  $\geq 30$ ; BMI calculated from self-reported height and weight

<sup>‡</sup> Current smokers (daily or occasional)

## FINDINGS

- The percentage of adults who reported inadequate fruit and vegetable intake, being overweight and smoking did not vary by diabetes status.
- Over 60 percent of men and women who reported having diabetes reported being physically inactive compared to 53 percent of adults without diabetes. Over half of all Ontarians reported being physically inactive.
- Women with diabetes were more than three times as likely as women without diabetes to be obese (40 percent versus 13 percent, respectively). Men with diabetes were more than twice as likely as men without diabetes to be obese (32 percent versus 14 percent, respectively). These percentages are lower than expected, which may be due to underestimation of BMI based on self-reported height and weight.
- Men were more likely to report inadequate fruit and vegetable intake than women and women were more likely than men to be physically inactive, irrespective of diabetes status.
- Women with diabetes were more likely to be obese than men with diabetes (40 percent versus 32 percent, respectively), whereas men with diabetes were more likely to be overweight compared to women with diabetes (44 percent versus 33 percent, respectively).
- Among those with diabetes, a greater proportion of people aged 20-64 were obese compared to those aged 65 and older (42 percent versus 26 percent). The proportion who were overweight increased with age (data not shown).
- Among those with diabetes, higher-income men were slightly less likely to be obese but more likely to be overweight than lower-income men (data not shown). The percentage of women with diabetes who reported being overweight or obese did not vary by income.

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# Section 9A

## SUMMARY OF FINDINGS

This section reports on indicators for adults with diabetes and compared to people without diabetes. The indicators include measures of morbidity, health and functional status and health behaviours that increase the risk for diabetes and its complications. The indicators were measured in people who reported having diabetes in the Canadian Community Health Survey (CCHS), with the exception of diabetes prevalence. In general, adults with diabetes had worse health and functional status and were more likely to be physically inactive and obese. Indicators varied by gender and age and somewhat by income. Findings for the indicators reported in this section are summarized below.

### Diabetes Prevalence

Almost one in ten Ontarians aged 20 and older had diabetes based on physician diagnosis, which is higher than the self-reported prevalence of diabetes based on survey data (six percent). Men were more likely to have diabetes than women, across all neighbourhood income quintiles and Local Health Integration Networks (LHINs). Men aged 45 and older were more likely to have diabetes than similarly aged women; however, diabetes prevalence did not vary by sex among adults aged 20-44. Diabetes prevalence increased as neighbourhood income quintile decreased, from 7.3 percent among adults living in the highest-income neighbourhoods to 11.5 percent among adults living in the lowest-income neighbourhoods. Diabetes prevalence also increased by age and varied by LHIN. Self-reported diabetes prevalence (based on CCHS data) varied by ethnicity, with lower rates reported in White adults compared to adults who were from visible minority populations.

### Comorbidity (Multiple Chronic Conditions)

This indicator measured the percentage of adults who reported having diabetes who reported having at least

two additional chronic conditions (for a total of three or more chronic conditions) and compared this to the percentage of adults without diabetes who had at least two chronic conditions. Adults with diabetes were twice as likely to report having at least two additional chronic conditions as adults without diabetes (56 percent versus 28 percent, respectively). Women with diabetes were more likely to have two or more additional chronic conditions than men with diabetes (63 percent versus 51 percent, respectively) and the prevalence of comorbidity increased as age increased. Low-income men with diabetes were more likely to have two other chronic conditions than those with higher incomes. Canadian born women with diabetes were more likely to have two or more other chronic conditions than immigrant women.

### Prevalence of Probable Depression

Adults who reported having diabetes were slightly more likely to have probable depression than adults without diabetes (7.4 percent versus 5.0 percent, respectively). Among adults with diabetes, women were more likely to have probable depression than men (11.1 percent versus 4.3 percent, respectively); this is similar to the pattern seen in the population without diabetes. The differences in rates of probable depression by diabetes status were greater among women than among men.

### Prevalence of Hypertension

Adults who reported having diabetes were almost three times as likely to have hypertension as adults without diabetes (61 percent versus 21 percent, respectively). The prevalence of hypertension among adults with diabetes did not vary by sex or income, but did increase with age.

### Self-Rated Health

Forty percent of adults who reported having diabetes rated their health as fair or poor compared to 11 percent of adults without diabetes. This did not vary by sex but did vary by income. Among adults with diabetes more than one half of lower-income women and men reported their health as fair or poor compared to less than one-third of higher-income adults.

### Limitations in IADLs and/or ADLs

The percentage of adults who reported limitations in their IADLs and/or ADLs was more than two times higher among those who reported having diabetes than among those without diabetes (37 percent versus 16 percent, respectively). Among adults with diabetes, women were more likely to report IADL and/or ADL limitations than men (49 percent versus 27 percent, respectively) and rates also varied by income and age. Lower-income women and men and older adults were more likely to report limitations in their IADLs and/or ADLs than their counterparts. Almost two-thirds of women with diabetes aged 65 and older reported IADL and/or ADL limitations.

### Health Behaviours

Among adults who reported having diabetes, 62 percent were physically inactive, 58 percent had inadequate fruit and vegetable intake, 39 percent were overweight, 35 percent were obese, and 17 percent were current smokers. Rates of inadequate fruit and vegetable intake, being overweight or current smoking did not vary by diabetes status. Adults with diabetes were more likely to be physically inactive and were two to three times more likely to be obese than adults without diabetes. Given that obesity rates were based on self-reported height and weight, it is expected that these rates are an underestimate of the true rates.



# Section 9B

## *Access and Utilization of Care*

### INTRODUCTION

Diabetes is a complex condition which benefits greatly from proactive and coordinated medical care where patients are actively involved in their management.<sup>82</sup>

This section includes indicators that measure access and utilization of care among adults with diabetes. These are important indicators of care because the literature shows that intensive management of risk factors for diabetes complications can reduce the rate of major complications such as heart attacks, stroke, amputation and death by 50 percent.<sup>110</sup> Studies have found that having a regular primary care provider is associated with better quality of diabetes care,<sup>112, 113</sup> and research on the management of chronic conditions has found that continuity of care is associated with better outcomes for chronic diseases such as diabetes.<sup>114</sup> Though the majority of diabetes patients are managed by primary care providers, access to specialists is important for more complex cases or for patients with type 1 diabetes.<sup>115</sup>

For diabetes care, access to and quality of care received has been shown to vary by socioeconomic status, race/ethnicity and age in the US.<sup>116-121</sup> Older women are more likely than older men to have worse access to effective care and to receive suboptimal levels of recommended health care services.<sup>122</sup> In Ontario, minority and immigrant women have worse access to health care services than white and Canadian born women.<sup>116</sup> Lower socioeconomic groups are less likely

to have adequate access to health care and are more likely to receive fewer recommended evidence-based health care services.<sup>117</sup> Furthermore, disadvantaged populations encounter more barriers to care despite greater need, and benefit more from intensive and tailored programs to improve access, quality, and outcomes of diabetes care.<sup>74</sup> The magnitude of these disparities varies across systems and models of care, thus by effectively organizing care and addressing barriers encountered by disadvantaged populations it is possible to achieve more equitable access.<sup>123</sup>

Access to health care providers is key to high quality diabetes care, though this can be challenging. In Ontario, with universal health insurance coverage, the overwhelming majority (93 percent) of people report having a regular primary care provider.<sup>116, 124</sup> However, there are over 730,000 Ontarian adults who do not have a family doctor and over half of those are actively looking for a doctor but are unable to find one.<sup>124</sup> Importantly, when primary care is not organized efficiently, individuals may report difficulty accessing needed care including timely appointments despite having a primary care provider.<sup>116, 124</sup> Of the 2.8 million Canadians who visited a medical specialist in 2005, 19 percent reported that they faced difficulties accessing



care. Of these, 67 percent said they waited too long for an appointment and 27 percent said they had difficulty in getting an appointment.<sup>125</sup> In addition, as prescription drug coverage is not universal in Canada, 25 percent of Canadians with a chronic condition reported not filling prescriptions, visiting a doctor or performing a test due to costs, compared to seven percent of people in the Netherlands and 54 percent in the United States.<sup>126</sup> This is important because diabetes usually requires ongoing use of chronic medications to prevent complications.

In this section, we report on indicators of access to and utilization of care and examine the differences associated with sex, age, neighbourhood income and Local Health Integration Network (LHIN).

**The indicators include:**

- The percentage of adults aged 20 and older with diabetes who had continuity of primary care (i.e., with a general practitioner/family physician) (GP/FP)
- The average number of visits to a GP/FP per year among adults with diabetes
- The percentage of adults with diabetes who visited a specialist (endocrinologist, general internist, or geriatrician) in a two-year period
- The percentage of adults with diabetes who did not see a GP/FP or a specialist over a two-year period

The indicators of access to and utilization of care were assessed using the Ontario Diabetes Database (ODD) and the Ontario Health Insurance Plan (OHIP) physician claims data. The ODD was used to identify adults aged 20 and older who had prevalent diabetes as of March 31, 2005. The sample was linked to the OHIP database to assess access to primary and specialist care over the next two years. The Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB) was used to identify specialists (endocrinologist, general internist, or geriatrician) (see [Appendix 9.3](#) for details).

## EXHIBITS AND FINDINGS

### CONTINUITY OF PRIMARY CARE

**Indicator:** This indicator measures the percentage of adults aged 20 and older with diabetes who had continuity of primary care. Only those who accessed primary care at least three times in the two-year follow up period were included.

**Background:** Access to diabetes care and regular check-ups with a primary care provider are important for the optimal management of diabetes. Having an ongoing relationship with the same provider facilitates continuity of care and offers an opportunity for proactive care. Regular screening and management of risk factors together with optimal self-management can reduce rates of complications from the disease.<sup>113, 114</sup>

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes (see [Appendix 9.3](#) for details). 'Continuity of primary care' was defined as having at least 50 percent of primary care visits over a two-year period (April 1, 2005 to March 31, 2007) to the same primary care provider (general practitioner/family physician (GP/FP)) based on Ontario Health Insurance Plan (OHIP) claims. Only one visit per primary care provider per day was counted. Patients were excluded if they had less than three primary care visits over the two-year period, which means that individuals who do not regularly access primary care or who had a usual care provider who was not a GP/FP would not be included in the denominator.

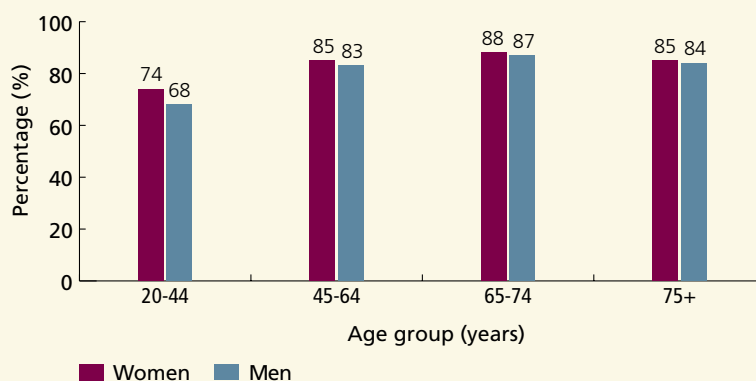
**Findings:** In Ontario, 83 percent of adults aged 20 and older with diabetes had continuity of primary care over a two-year period. Rates were slightly higher among women than men, though the difference was small (84 percent versus 82 percent, respectively).



### Exhibit 9B.1 | Percentage of adults aged 20 and older with diabetes who had continuity of primary care, by sex and age group, in Ontario, 2005/06-2006/07

#### FINDINGS

- Adults aged 20-44 with diabetes were less likely to have continuity of primary care than those aged 45 and older (71 percent versus 85 percent, respectively).
- Among adults under age 65 with diabetes, women were more likely than men to have continuity of primary care than men. The gender difference was larger in the younger age group.
- The percentage of adults with diabetes who had continuity of primary care varied somewhat by neighbourhood income, however, the differences were small (data not shown).
- The percentage of women and men with diabetes who had continuity of primary care varied across Local Health Integration Networks (LHINs), ranging from 75 percent (North West LHIN) to 85 percent (Central East and South West LHINs) (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

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## MEAN NUMBER OF VISITS TO A GENERAL PRACTITIONER/FAMILY PHYSICIAN (GP/FP)

**Indicator:** This indicator measures the mean number of visits made to a general practitioner/family physician (GP/FP) per year among adults aged 20 and older with diabetes.

**Background:** Access to diabetes care and regular check-ups with a primary care provider is important for optimal management of diabetes. While it is unclear what the right number of visits should be, all adults with diabetes should undergo annual screening for complications of diabetes and most require three or more assessments per year to control their disease.<sup>82</sup> Regular diabetes care is important because of the large number of routine screening tests and adjustment to treatment regimens required to optimize control of diabetes and associated risk factors.

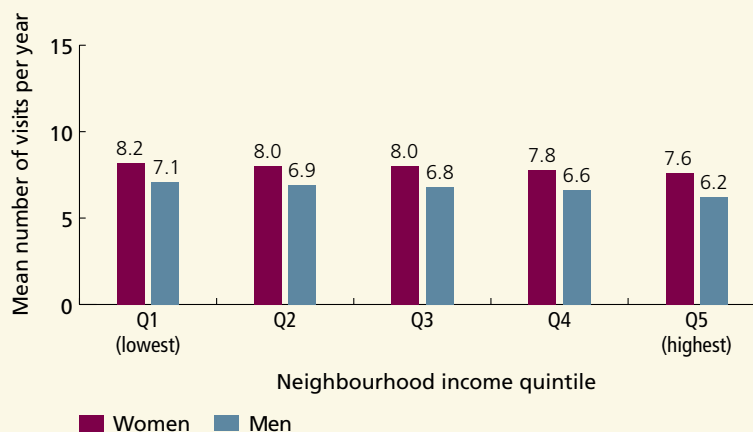
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes (see [Appendix 9.3](#) for details). The mean number of primary care visits (for any reason) per year was calculated based on Ontario Health Insurance Plan (OHIP) data over a two-year period (April 1, 2005 to March 31, 2007). Primary care visits were based on fee-for-service claims submitted to OHIP; inpatient and emergency department visits were excluded. Services provided by physicians paid through alternate funding plans (AFPs) may not be completely captured using OHIP data. Their concentration in certain specialties or geographic areas may result in bias to our estimates.

**Findings:** In Ontario, adults aged 20 and older with diabetes had a mean of 7.3 GP/FP visits per year. Women had a higher mean number of GP/FP visits per year than men (8.0 versus 6.7 visits, respectively).

## Exhibit 9B.2 | Age-standardized mean number of visits to a general practitioner/family physician (GP/FP) per year among adults aged 20 and older with diabetes, by sex and neighbourhood income quintile, in Ontario, 2005/06-2006/07

### FINDINGS

- Women and men with diabetes who lived in lower-income neighbourhoods had a higher mean number of GP/FP visits than adults who lived in higher-income neighbourhoods (7.7 versus 6.8 visits per year, respectively). This income gradient was observed among both women and men.
- Among adults with diabetes, men had a lower mean number of GP/FP visits than women, irrespective of neighbourhood income.
- The mean number of GP/FP visits per year increased with age for both women and men, ranging from 6.8 visits for women and 4.9 visits for men aged 20-44 to 9.8 visits for women and 8.8 visits for men aged 75 and older. Women had more GP/FP visits than men across all age groups, though the gap decreased with increasing age (data not shown).
- The mean number of GP/FP visits per year among people with diabetes varied widely across Local Health Integration Networks (LHINs). Among women with diabetes, the mean number of visits ranged from 5.5 visits in the North West LHIN to 9.0 visits in the Toronto Central LHIN. Among men with diabetes, the mean number of GP/FP visits per year ranged from 4.8 visits in the North West LHIN to 7.7 in the Toronto Central LHIN (data not shown).
- Some of the variation across LHINs may be due to regional variations in the use of alternate funding plans (AFPs) where OHIP billing information may be incomplete.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

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## SPECIALIST CARE FOR ADULTS WITH DIABETES

**Indicator:** This indicator measures the percentage of adults aged 20 and older with diabetes who visited a specialist (endocrinologist, general internist, or geriatrician) at least once within a two-year period.

**Background:** Though primary care physicians provide the bulk of diabetes care, specialists are important members of a diabetes care team, particularly for patients with type 1 diabetes.<sup>82, 127, 128</sup> Access to specialist care and specialized diabetes services may be important for optimal management in complex patients, though mild cases of type 2 diabetes can be effectively managed in primary care and do not generally need specialist care. Individuals with type 1 diabetes (who tend to be younger) or those with more severe or complex disease are most likely to benefit from specialist care.

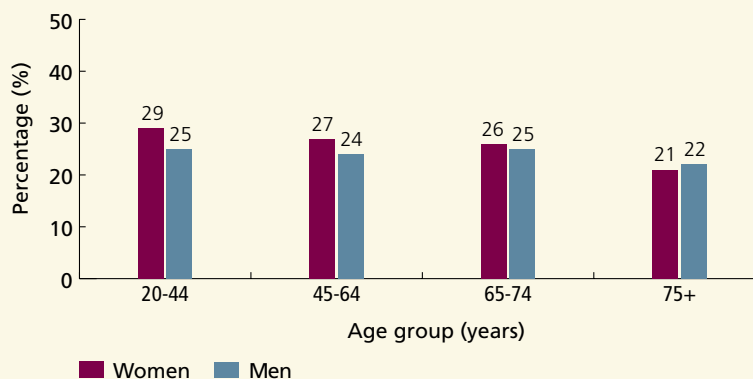
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes (see [Appendix 9.3](#) for details). We were unable to distinguish between adults with type 1 and type 2 diabetes. This indicator includes all office visits to endocrinologists, general internists or geriatricians within a two-year period (April 1, 2005 to March 31, 2007). These three types of specialists are most likely to provide specialty care related to diabetes; however, general internists and geriatricians may vary in their capacity to provide diabetes specialty care. Services provided by physicians paid through alternate funding plans (AFPs) may not be completely captured using OHIP data. Their concentration in certain specialties or geographic areas may result in bias to our estimates.

**Findings:** In Ontario, 25 percent of adults aged 20 and older with diabetes saw a specialist (endocrinologist, general internist or geriatrician) at least once over a two-year period. Women were slightly more likely than men to have seen a specialist, though this difference was small (26 percent versus 24 percent, respectively).

### Exhibit 9B.3 | Percentage of adults aged 20 and older with diabetes who saw a specialist<sup>†</sup> at least once over a two-year period, by sex and age group, in Ontario, 2005/06-2006/07

#### FINDINGS

- Younger people with diabetes were more likely to see a specialist than older people (27 percent of those aged 20-44 versus 21 percent of those aged 75 and older), likely due to the higher proportion of type 1 diabetes, and thus greater need for specialty care, in young adults.
- Among adults aged 20-44 with diabetes, women were more likely than men to see a specialist. Specialty care also differed by sex for adults with diabetes aged 45 and older, however, these differences were small.
- People with diabetes who lived in the lowest-income neighbourhoods were slightly less likely to have visited a specialist than those who lived in the highest-income neighbourhoods, however, this difference was small (24 percent versus 26 percent, respectively) (data not shown).

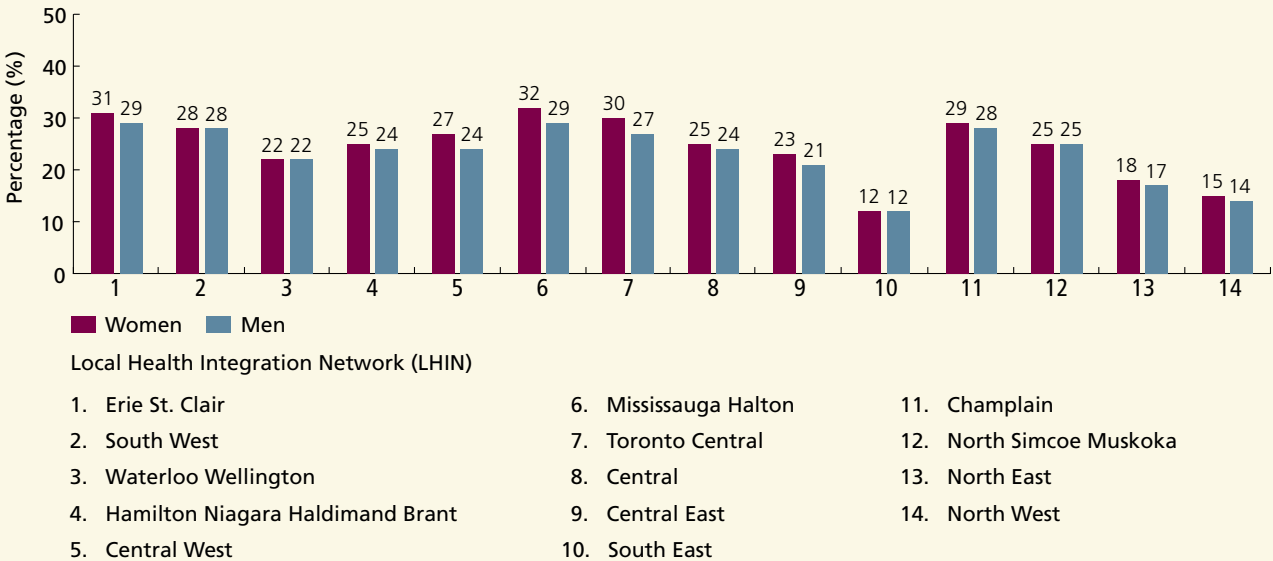


**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)

<sup>†</sup> Includes visits to endocrinologists, general internists or geriatricians

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**Exhibit 9B.4** | Age-standardized percentage of adults aged 20 and older with diabetes who saw a specialist<sup>†</sup> at least once over a two-year period, by sex and Local Health Integration Network (LHIN), in Ontario, 2005/06-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)

<sup>†</sup> Includes visits to endocrinologists, general internists or geriatricians

### FINDINGS

- The percentage of adults with diabetes who saw a specialist varied across LHINs.
- Among women with diabetes, the percentage that had seen a specialist at least once in two years ranged from 12 percent in the South East LHIN to 32 percent in the Mississauga Halton LHIN.
- Among men with diabetes, the percentage that had seen a specialist at least once in two years ranged from 12 percent in the South East LHIN to 29 percent in the Erie St. Clair and Mississauga Halton LHINs.
- Some of the variation may be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete, as occurs in the South East LHIN, or due to out of province use of specialists, as occurs in the North West LHIN.

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## NO VISITS TO PRIMARY CARE PHYSICIANS OR SPECIALISTS

**Indicator:** This indicator measures the percentage of adults aged 20 and older with diabetes who did not have any visits to a general practitioner/family physician (GP/FP) or a specialist (endocrinologist, general internist, or geriatrician) over a two-year period.

**Background:** Regular physician visits (either to a GP/FP or a specialist) are necessary to make sure that patients receive the screening and monitoring activities required to manage diabetes and to ensure receipt of high quality diabetes care. Optimal management is also contingent on individualization and modification of treatment during these visits.<sup>82</sup>

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes (see [Appendix 9.3](#) for details). This indicator includes people who had no visits to a GP/FP or specialist (endocrinologist, general internist, or geriatrician) over a two-year period (April 1, 2005 to March 31, 2007), based on Ontario Health Insurance Plan (OHIP) data. Inpatient and emergency department visits were not included. Services provided by physicians paid through alternate funding plans (AFPs) may not be completely captured using OHIP claims data. Their concentration in certain specialties or geographic areas may result in bias to our estimates.

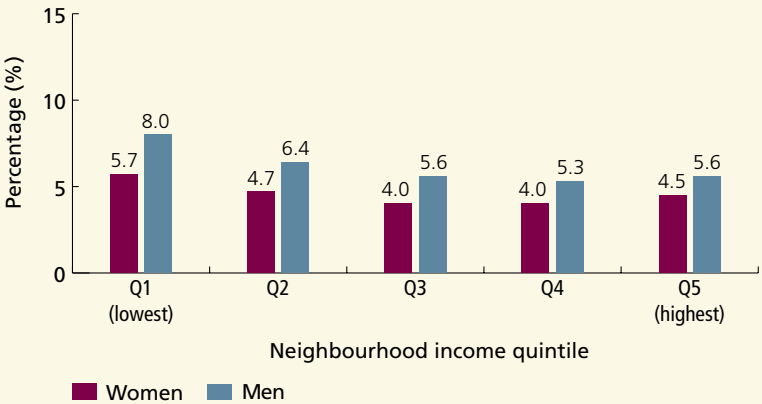
**Findings:** In Ontario, 5.5 percent of adults aged 20 and older with diabetes had no visits to a GP/FP or a specialist (endocrinologist, general internist, or geriatrician) over a two-year period. Men were more likely than women to have not seen these types of physicians (6.3 percent versus 4.7 percent, respectively).



**Exhibit 9B.5** | Age-standardized percentage of adults aged 20 and older with diabetes who had no visits to a general practitioner/family physician (GP/FP) or a specialist<sup>†</sup> over a two-year period, by sex and neighbourhood income quintile, in Ontario, 2005/06-2006/07

**FINDINGS**

- The percentage of adults with diabetes who had not seen a GP/FP or a specialist in a two-year period varied by neighbourhood income.
- Among women with diabetes, 5.7 percent of those living in the lowest-income neighbourhoods had not seen either type of physician in two years compared to 4.0 and 4.5 percent of women living in the middle- to highest-income neighbourhoods.
- The income difference among men with diabetes was larger than the difference among women. Eight percent of men with diabetes who were living in the lowest-income neighbourhoods had not seen a GP/FP or a specialist in two years compared to 5.3 and 5.6 percent of men living in the middle- to highest-income neighbourhoods.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

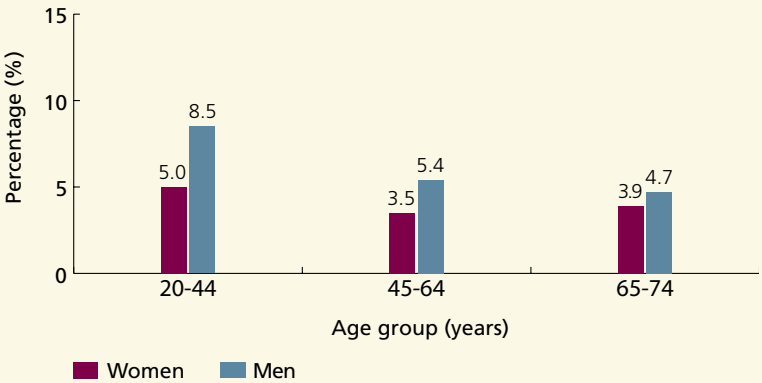
<sup>†</sup> Includes visits to endocrinologists, general internists or geriatricians

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**Exhibit 9B.6** | Percentage of adults aged 20-74 with diabetes who had no visits to a general practitioner/family physician (GP/FP) or a specialist<sup>†</sup> over a two-year period, by sex and age group, in Ontario, 2005/06-2006/07

**FINDINGS**

- Across all age groups, men were more likely than women to have had no visits to a GP/FP or a specialist over a two-year period; however, this gap was widest among adults aged 20-44.
- A sizable proportion (8.5 percent) of men with diabetes who were aged 20-44 had not seen a GP/FP or a specialist during a two-year period.

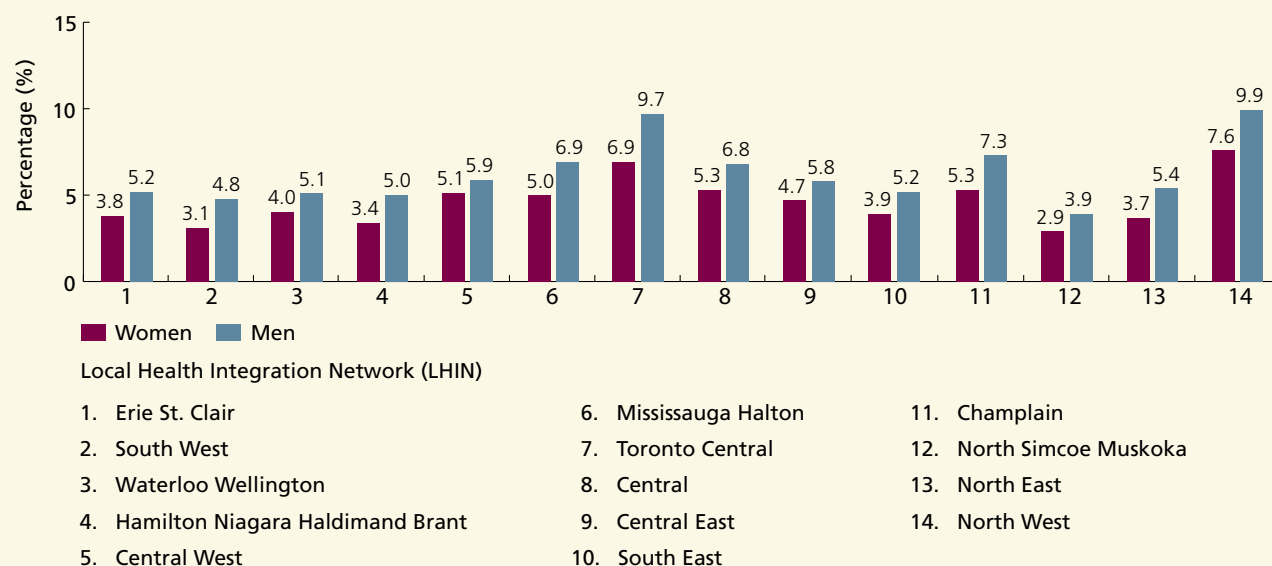


**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB);

<sup>†</sup> Includes visits to endocrinologists, general internists or geriatricians

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**Exhibit 9B.7** | Age-standardized percentage of adults aged 20 and older with diabetes who had no visits to a general practitioner/family physician (GP/FP) or a specialist<sup>†</sup> over a two-year period, by sex and Local Health Integration Network (LHIN), in Ontario, 2005/06-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)

<sup>†</sup> Includes visits to endocrinologists, general internists or geriatricians

## FINDINGS

- The percentage of people with diabetes who had no visits to a GP/FP or a specialist over a two-year period varied significantly by LHIN.
- The percentage of women with diabetes who had no visits to a GP/FP or a specialist over a two-year period ranged from 2.9 percent (North Simcoe Muskoka LHIN) to 7.6 percent (North West LHIN).
- The percentage of men with diabetes who had no visits to a GP/FP or a specialist over a two-year period ranged from 3.9 percent (North Simcoe Muskoka LHIN) to 9.9 percent (North West LHIN).
- Some of the variation may be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete, as occurs in the South East or Toronto Central LHINs or due to out of province use of specialists, as occurs in the North West LHIN.

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# Section 9B

## SUMMARY OF FINDINGS

This section reports on indicators of access and utilization of services for adults with diabetes. Overall, women had greater utilization of health services than men; low-income men and younger men were particularly disadvantaged. Access to care varied significantly by Local Health Integration Network (LHIN); however, some of the variation may be due to federally funded physicians, alternate funding plans (AFPs) where Ontario Health Insurance Plan (OHIP) billing information may be incomplete, or regional variations in care delivery. Equity can only be determined by measuring need and utilization of services, but since robust measures of need are not available in existing datasets, it cannot be reliably measured. For instance, the somewhat higher number of visits among low-income individuals—who may have more severe disease—may be reflective of greater need rather than ‘better’ access to care. With currently available data, it is not possible to determine whether their access to care is sufficient for their need.

Findings for the indicators reported in this section are summarized below.

### Percentage of Adults with Diabetes who have Continuity of Primary Care

Among adults aged 20 and older with diabetes, 83 percent had continuity of primary care (more than 50 percent of their primary care visits were to the same general practitioner/family physician (GP/FP)). This varied across LHINs. There were small differences by sex and neighbourhood income. Younger men with diabetes (those aged 20–44) were least likely to have continuity of primary care (68 percent) compared to 74 percent of similarly aged women and 85 percent of older women and men with diabetes.

### Mean Number of Primary Care Visits

Ontarians with diabetes aged 20 and older had a mean of 7.3 GP/FP visits per year over a two-year period from April 1, 2005 to March 31, 2007. Women had consistently higher mean numbers of GP/FP visits per year than men, irrespective of neighbourhood income, age or LHIN. Adults living in lower-income neighbourhoods had a slightly higher mean number of GP/FP visits per year than those living in higher-income neighbourhoods, which may represent missed opportunities to improve disease management. The mean number of GP/FP visits per year increased with age for women and for men. The mean number of GP/FP visits per year among people with diabetes varied widely across LHINs.

### The Percentage of Adults with Diabetes who Visited a Specialist in a Two-Year Period

One-quarter of adults with diabetes had seen a specialist within a two-year period, with slightly higher rates among women than among men (26 percent versus 24 percent, respectively) and among adults living in higher-income neighbourhoods. Younger people with diabetes were more likely to have seen a specialist than older people, likely due to the higher proportion of type 1 diabetes in young adults. The percentage of adults with diabetes who had seen a specialist in a two-year period varied significantly by LHIN. Some of the variation may be due to alternate funding plans (AFPs) where physicians are salaried and shadow billing data to track the number of visits are incomplete. However, the number of specialists in practice also varies by region which may also partially account for the variation seen.

### **The Percentage of Adults with Diabetes Who Did Not See a GP/FP or a Specialist in a Two-Year Period**

Among Ontarians with diabetes, 5.5 percent had not seen a GP/FP or a specialist (endocrinologist, general internist or geriatrician) during a two-year period. This varied by sex, income, age and LHIN. Men were more likely to have not received care from any of these types of physicians than women, irrespective of neighbourhood income, age or LHIN. Eight percent of men living in the lowest-income neighbourhoods and 8.5 percent

of men aged 20-44 had not seen a GP/FP or specialist during the two-year period. The proportion of people with no primary care physician or specialist visits within a two-year period was particularly high in the North West LHIN, a region where much of diabetes care is delivered by nurses because of a paucity of doctors, and the Toronto Central LHIN, a region where services abound but poverty is more concentrated. Additionally, some patients in the North West LHIN may receive care out of province.



# Section 9C

## *Screening, Assessment and Monitoring*

### INTRODUCTION

Diabetes management is complex and requires ongoing assessment and comprehensive screening for the prevention, early identification and treatment of complications.

Current clinical practice guidelines provide recommendations for ongoing screening and monitoring among people with diabetes, including regular monitoring of blood glucose levels, testing for microalbumin, foot examinations, and eye examinations.<sup>82</sup> Good glycemic (glucose) control is associated with the delay or prevention of diabetes complications—including diabetic eye disease, kidney disease and neuropathy.<sup>129, 130</sup> In addition, involving patients in their care is associated with better outcomes. For example, early detection of foot ulcers and infections—either by health care providers or by patients themselves—can allow for earlier treatment and prevent amputation, so regular screening is important.<sup>131, 132</sup> In addition, routine monitoring of blood glucose levels at home (self-monitoring) helps patients on insulin and possibly those on oral agents with poor control of blood glucose to improve glycemic control.<sup>133, 134</sup>

Quality of care for diabetes is suboptimal in most jurisdictions and Canada ranks in the middle in many international comparison studies of the quality of diabetes care. Routine screening measures like hemoglobin A1c (a measure of the average blood glucose in the past three months) is high at 90 percent, but foot exams and eye exams to screen for complications are lower, at 53 percent and 69 percent, respectively.<sup>135</sup> The large number of recommended screening activities for diabetes makes consistent, comprehensive care

challenging, with only 29 percent of Canadian adults with diabetes receiving all screening measures (A1c, foot exams, eye exams and microalbumin tests) within the recommended interval.<sup>135</sup> In 2007, Ontario was slightly above the national average, with 31 percent receiving all four tests.<sup>135</sup> There are numerous examples of strategies to improve care for diabetes across a health system, most notably the Veteran's Administration QUERI-DM program and ongoing improvements documented in the United Kingdom.<sup>136-138</sup> These changes occurred in large and varied systems accompanying major episodes of health reform, suggesting that similar results are possible in Ontario.

This section assesses performance on indicators of the quality of screening, assessment and monitoring of diabetes in Ontario, covering key elements of care recommended by clinical practice guidelines. We also report on access to dental care. The indicators were measured among people who reported having diabetes in the Canadian Community Health Survey (CCHS), with the exception of eye examination. The choice of indicators was guided by clinical relevance (i.e., recommended in clinical practice guidelines), but limited by what data are available. Where possible and where data were available, we examined the differences associated with sex, income, education, age, ethnicity, immigration status, rural/urban residency and Local Health Integration Network (LHIN).



**The indicators include:****Screening, assessment and monitoring for diabetes**

- The percentage who were taking insulin who reported self-monitoring their blood glucose levels at least once per day.
- The percentage who reported that a health care professional had tested them for hemoglobin A1c within the past 12 months.
- The percentage who reported that a health care professional had tested them for microalbumin in the past 12 months.
- The percentage of adults (aged 30 and older) who had an eye examination within two years of diagnosis of diabetes.
- The percentage who reported usually performing a self foot examination at least once per year.
- The percentage who reported that a health care professional checked their feet for sores or irritations in the past 12 months.

**Other preventive screening strategies**

- The percentage who reported that they had visited a dentist in the past 12 months.

Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess the percentage of adults who reported having diabetes: who were on insulin or oral glucose-lowering medications who self-monitored their blood glucose levels at least daily; who performed self foot examinations at least annually; reported that a health care professional had checked their feet for sores or irritations, tested them for hemoglobin A1c, or tested them for microalbumin. Data from CCHS, 2005 (Cycle 3.1) were used to assess dental visits among people with diabetes. The Ontario Diabetes Database (ODD) was used to identify newly diagnosed cases of diabetes; these records were linked to Ontario Health Insurance Plan (OHIP) data to determine the percentage who had an eye examination within two years following their diabetes diagnosis date (see [Appendix 9.3](#) for details).



## EXHIBITS AND FINDINGS

### SCREENING, ASSESSMENT AND MONITORING FOR DIABETES

#### SELF-MONITORING OF BLOOD GLUCOSE

**Indicator:** Among adults aged 20 and older who reported having diabetes who were currently taking insulin, this indicator measures the percentage who reported monitoring their blood glucose levels at least daily.

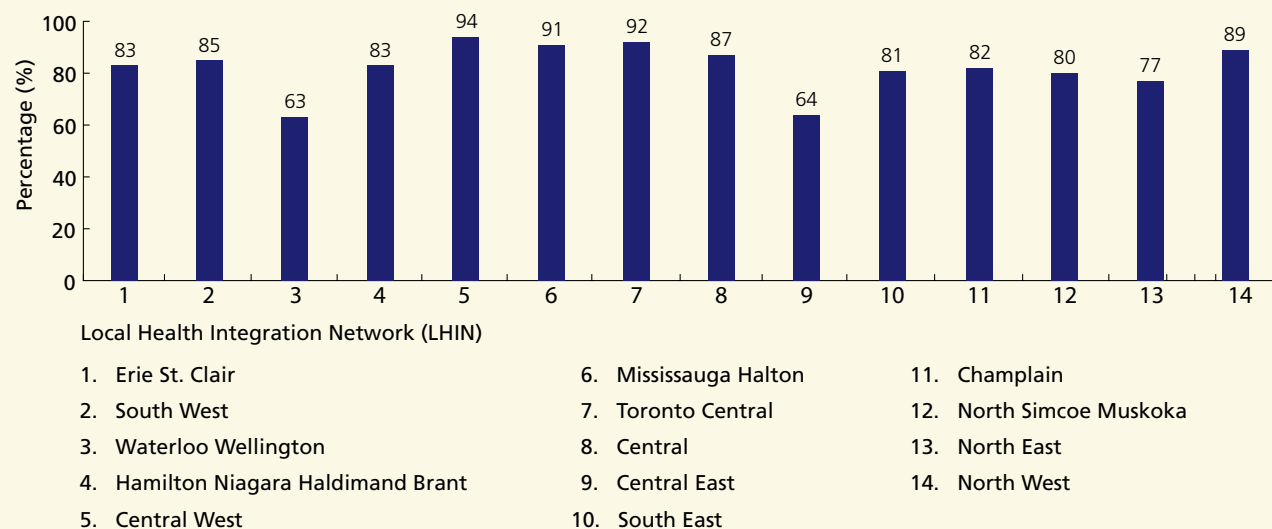
**Background:** Self-management education, including a focus on appropriate monitoring and interpretation of blood glucose levels, contributes to good control of diabetes.<sup>133, 134</sup> Ongoing monitoring of blood glucose is an important component of diabetes self-care for patients on insulin, while the benefit for those on oral agents is not as clear.<sup>139</sup> Therefore, we also measured this indicator for adults with diabetes who were not on insulin but were on an oral glucose-lowering medication, but we report only overall rates for women and men.

Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. People with diabetes were asked, “How often do you usually have your blood checked for glucose or sugar by yourself or by a family member or friend?” Respondents who indicated that they monitored their blood glucose at least daily were included. Because this indicator was derived from the CCHS, diabetes status, use of insulin and use oral glucose-lowering medications were based on self-reported information rather than physician information.

**Findings:** In Ontario, 81 percent of adults aged 20 and older who reported having diabetes and currently taking insulin reported self-monitoring their blood-glucose levels at least daily. This indicator did not vary by sex (84 percent of women and 78 percent of men). Among adults aged 20 and older who reported having diabetes and taking oral glucose-lowering medications, 49 percent reported daily self-monitoring of their blood glucose levels. This did not vary by sex (52 percent of women and 47 percent of men).



**Exhibit 9C.1** | Age-standardized percentage of adults aged 20 and older who reported having diabetes who were on insulin who reported self-monitoring their blood glucose levels<sup>^</sup> at least daily, by Local Health Integration Network (LHIN), in Ontario, 2005 and 2007



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> Refers to having their blood glucose levels checked by themselves, a family member or friend

### FINDINGS

- The percentage of adults who reported having diabetes who were taking insulin and who self-monitored their blood glucose levels at least daily varied across LHINs, ranging from 63 percent in the Waterloo Wellington LHIN to 94 percent in the Central West LHIN. These data could not be reported by sex because of small numbers.
- Daily self-monitoring of blood glucose levels did not vary by age, income, education or rural/urban residency (data not shown).

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## HEMOGLOBIN A1C MONITORING

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional had tested them for hemoglobin A1c at least once in the past year.

**Background:** Hemoglobin A1c is a marker of long-term control of diabetes. This test measures the average level of blood glucose over a three-month period. Clinical practice guidelines recommend that people with diabetes should be tested every three to six months.<sup>82</sup> Regular monitoring of blood glucose may lead to better control, which in turn will result in fewer complications among people with type 1 and type 2 diabetes.

Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. People with diabetes were asked, "In the past 12 months, has a health care professional tested you for hemoglobin 'A-one-C'? (An 'A-one-C' hemoglobin test measures the average level of blood sugar over a three-month period.)" Because this indicator was derived from the CCHS, people with diabetes were identified based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 80 percent of adults aged 20 and older who reported having diabetes reported that a health care professional tested them for hemoglobin A1c at least once in the past 12 months. This did not vary by sex (79 percent of women and 82 percent of men) or by annual household income, educational attainment, age, visible minority status, immigrant status, rural/urban residence (data not shown). Due to small numbers and limited power to detect differences, we did not report variation by Local Health Integration Network (LHIN).

## MICROALBUMIN MEASUREMENT

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional had tested them for microalbumin (protein in the urine) at least once in the past year.

**Background:** The microalbumin test is used to screen for kidney damage and early signs of diabetic nephropathy. As kidney damage is frequently seen in chronic diseases such as diabetes and hypertension, early detection and management may delay progression to end-stage renal disease. Based on expert opinion, the Canadian Diabetes Association (CDA) guidelines recommend annual screening for microalbumin.<sup>82</sup>

Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. People with diabetes were asked, “In the past 12 months, has a health care professional tested your urine for protein (i.e., microalbumin)?” Because this indicator was derived from the CCHS, people with diabetes were identified based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 73 percent of adults aged 20 and older who reported having diabetes reported that a health care professional tested them for microalbumin at least once in the past year. This did not vary by sex (71 percent of women and 75 percent of men) or by annual household income, educational attainment, age, visible minority status, immigration status or rural/urban residence (data not shown). Due to small numbers and limited power to detect differences, we did not report variation by Local Health Integration Network (LHIN).

## EYE EXAMINATION

**Indicator:** This indicator measures the percentage of adults aged 30 and older with newly diagnosed diabetes who had a visit to a general practitioner/family physician (GP/FP), optometrist, or ophthalmologist for an eye examination within two years of diagnosis.

**Background:** As the prevalence of diabetes increases in Ontario, it is expected that blindness due to diabetic retinopathy will also increase. Diabetic retinopathy is the leading cause of new cases of blindness in adults aged 20-74.<sup>140</sup> Previous research has shown that systematic screening, referral and treatment for diabetic retinopathy can significantly reduce new onset of blindness<sup>141</sup> and is a cost-effective way to prevent or delay vision loss.<sup>142</sup> However, despite the proven benefits of screening, many Canadians with diabetes do not receive a regular dilated eye examination as recommended by the Diabetes Clinical Practice Guidelines.<sup>82</sup> The Canadian Diabetes Association (CDA) recommends that adults with diabetes receive a dilated eye examination every one to two years.<sup>82</sup>

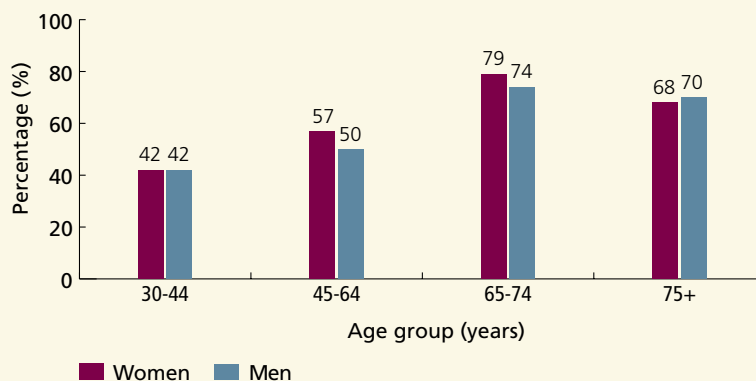
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes (see [Appendix 9.3](#) for details). We were unable to distinguish between adults with type 1 and type 2 diabetes. The percentage of people who had an eye examination within two years of diabetes diagnosis was determined using Ontario Health Insurance Plan (OHIP) data. Adults aged 30 and older with newly diagnosed diabetes who had seen an ophthalmologist, optometrist, or a GP/FP for a major eye examination or assessment within 730 days of being newly diagnosed with diabetes were included. The analysis was limited to adults aged 30 or older at diagnosis to select people who were more likely to have new onset type 2 diabetes; prompt screening would be recommended for them. There is no specific OHIP fee code for retinopathy screening. Accordingly, OHIP claims were used to identify physician or optometry visits during which a dilated retinal examination would likely have occurred (see [Appendix 9.3](#) for details). Services provided by physicians paid through alternate funding plans (AFPs) may not be completely captured using OHIP data. Their concentration in certain specialties or geographic areas may result in bias to our estimates. As well, people who may have paid directly or used private insurance to pay for an eye exam will not be captured, leading to further underestimation.

**Findings:** In Ontario, 58 percent of adults aged 30 and older with diabetes had an eye examination within two years of being diagnosed with diabetes. Women were more likely than men to have an eye examination (60 percent versus 56 percent, respectively).

## Exhibit 9C.2 | Percentage of people aged 30 and older who had an eye examination within two years of being diagnosed with diabetes, by sex and age-group, in Ontario, 2003/04-2005/06

### FINDINGS

- The proportion of people newly diagnosed with diabetes who underwent an eye examination within two years of diagnosis increased with age, with a slight decrease after age 75. Only slightly more than four in ten adults aged 30-44 had an eye examination within two years of being diagnosed with diabetes.
- Men aged 30 and older living in the highest-income neighbourhoods were slightly more likely to have an eye examination within two years of diagnosis than men living in the lowest-income neighbourhoods, however, this difference was small (55 percent versus 58 percent, respectively). This indicator did not vary by income among women (data not shown).
- The percentage of adults who underwent an eye examination within two years of being diagnosed with diabetes varied considerably by Local Health Integration Network (LHIN). The rates ranged from 53 percent in the Toronto Central LHIN to 65 percent in the North East and North West LHINs (data not shown). Across all LHINs, less than two-thirds of adults were screened according to recommendations.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

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## SELF FOOT EXAMINATION

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported examining their feet for sores or irritations (or having a friend or relative do it) at least annually.

**Background:** Foot ulcers and lower limb amputations cause a significant amount of morbidity and reduced quality of life in people with diabetes.<sup>143</sup> Approximately 50 percent of all non-traumatic lower extremity amputations occur in people with diabetes.<sup>140</sup> In the US, being an older adult (aged 75 and older), male and African American increases the risk for diabetes-related lower extremity amputation.<sup>144</sup> These complications can be prevented with regular monitoring of feet and the lower legs and with early treatment of ulcers. Due to the preventable nature of these complications, foot care is a very important aspect of diabetes management. Reducing the likelihood of lower limb amputations requires multiple prevention strategies, including regular foot checks by patients as well as by their health care providers.<sup>131, 132</sup>

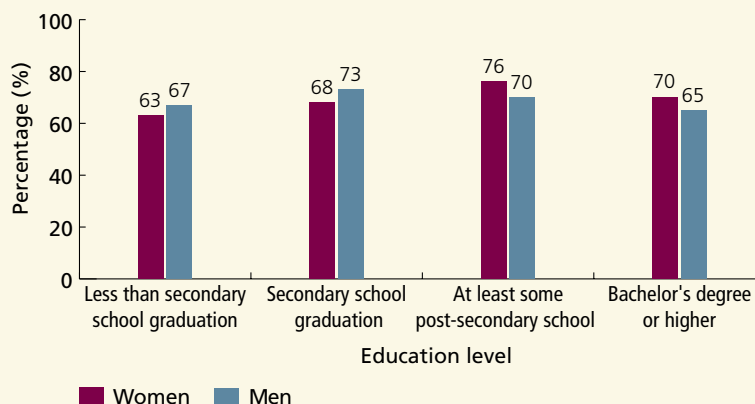
Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. People with diabetes were asked, "How often do you usually have your feet checked for any sores or irritations by yourself or by a family member or friend?" Respondents who answered a minimum of once a year were included in the numerator. Because this indicator was derived from the CCHS, people with diabetes were identified based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 68 percent of adults aged 20 and older who reported having diabetes reported having their feet checked for any sores or irritations by themselves, by a family member or by a friend at least annually. This indicator did not vary by sex (69 percent of women and 67 percent of men).

### Exhibit 9C.3 | Age-standardized percentage of adults aged 25 and older who reported having diabetes who reported performing a self foot examination<sup>^</sup> at least annually, by sex and education level, in Ontario, 2005 and 2007

#### FINDINGS

- Among women who reported having diabetes, those with less than a secondary school education were less likely than more educated women to have their feet checked for sores or irritations by themselves, or by a family member or friend. Self foot examinations did not vary by education among men with diabetes.
- The percentage of people with diabetes who had their feet checked for sores or irritations by themselves, or by a family member or friend at least annually did not vary by age or annual household income (data not shown).
- People with diabetes who were immigrants to Canada were less likely to check their feet at least annually than those who were Canadian born (62 percent versus 73 percent, respectively) (data not shown).
- Men with diabetes who lived in urban communities were less likely to monitor their feet than men who lived in rural communities (66 percent versus 75 percent, respectively). The percentage of women who checked their feet did not differ by rural/urban residency (data not shown).
- The percentage of people with diabetes who checked their feet for sores or irritations at least annually varied across LHINs, ranging from 62 percent (Central and Central East LHINs) to 79 percent (South East LHIN) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> Self foot examination refers to having their feet checked for any sores or irritations by themselves, a family member or friend

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## FOOT EXAMINATION BY A HEALTH CARE PROFESSIONAL

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional checked their feet for sores or irritations in the past 12 months.

**Background:** People with diabetes are at increased risk for foot ulcers and amputations and foot problems are a major cause of morbidity and mortality in people with diabetes. Foot complications contribute to health care costs and are a major reason for hospitalization among people with diabetes. Annual, thorough foot examinations by a health care professional and management of risk factors can prevent or delay adverse outcomes.<sup>132, 145</sup> The Canadian Diabetes Association (CDA) recommends that people with diabetes receive a foot exam annually.<sup>82</sup>

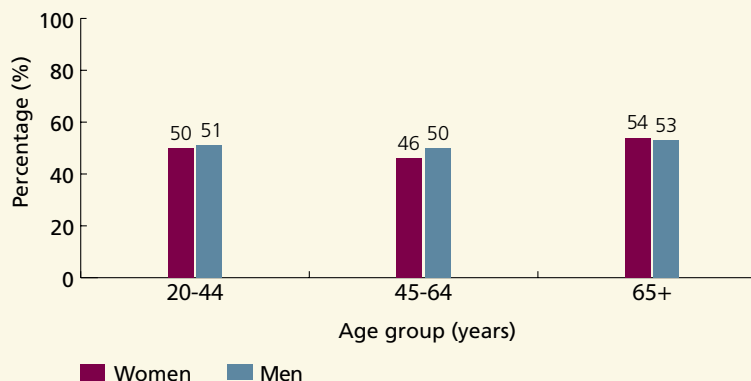
Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. People with diabetes were asked, "In the past 12 months, has a health care professional checked your feet for any sores or irritations?" Because this indicator was derived from the CCHS, people with diabetes were identified based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 51 percent of adults aged 20 and older who reported having diabetes reported that a health care professional had checked their feet for any sores or irritations in the past year. A similar proportion of women and men reported having had their feet checked by a health care professional (50 percent and 51 percent, respectively).

### Exhibit 9C.4 | Percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional checked their feet for any sores or irritations in the past year, by sex and age group, 2005 and 2007

#### FINDINGS

- The percentage of adults who reported having diabetes who reported having had their feet checked by a health care professional did not vary by age for women or for men.
- The percentage of people with diabetes who reported having had their feet checked by a health care professional did not vary by annual household income, education or rural/urban residency. We did not report variation by Local Health Integration Network (LHIN) due to small numbers and limited power to detect differences (data not shown).
- Adults with diabetes who immigrated to Canada less than 10 years ago were half as likely to have had their feet checked for any sores or irritations by a health care professional as immigrants who had been in Canada for 10 or more years or people born in Canada (26 percent versus 52 percent and 53 percent, respectively). This could not be reported by sex because of small numbers (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

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## OTHER PREVENTIVE SCREENING STRATEGIES

### DENTAL CARE

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported that they had visited a dentist in the past year. We compared the percentage who had seen a dentist among people with and without diabetes.

**Background:** People with diabetes are at increased risk for destructive periodontitis (severe inflammation of their gums).<sup>146</sup> In addition, untreated periodontitis in people with diabetes may complicate glycemic control and is associated with heart and kidney disease.<sup>147-151</sup> Regular dental visits provide opportunities for prevention, early detection and treatment of periodontal problems.<sup>152</sup>

In Canada, dental care is not a universally insured benefit. Some Canadians receive dental insurance as an employment benefit, others must fund dental care using their own resources and government programs provide care to some. The literature shows that the burden of oral diseases and associated complications are more likely to affect low-income adults and children, the elderly and certain ethnic groups.<sup>153, 154</sup> In the POWER Study Access to Health Care Services chapter, 68 percent of Ontarians aged 25 and older had visited a dentist in the past 12 months (32 percent had not visited a dentist in the past 12 months) and this varied by income, education, ethnicity and length of time in Canada.<sup>116</sup>

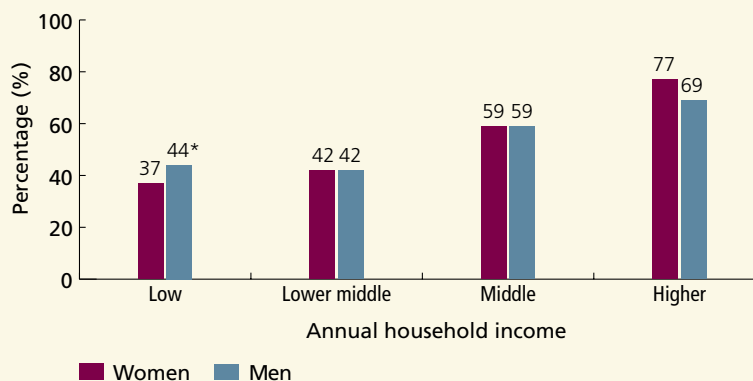
Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to assess this indicator. Adults were asked if they had visited a dentist in the past 12 months. Because this indicator was derived from the CCHS, diabetes status was identified based on self-reported information rather than physician diagnosis.

**Findings:** In Ontario, 56 percent of adults aged 20 and older who reported having diabetes reported that they visited a dentist in the past year compared to 65 percent of adults without diabetes. Among those with diabetes, the percentage who had a dental visit in the past year did not vary by sex (55 percent of women versus 56 percent of men).

### Exhibit 9C.5 | Age-standardized percentage of adults aged 20 and older who reported having diabetes who reported having had a dentist visit in the past year, by sex and annual household income, in Ontario, 2005

#### FINDINGS

- The percentage of women and men who reported having diabetes who had a dentist visit in the past year increased with annual income. Low-income adults with diabetes were much less likely to visit a dentist than higher-income adults with diabetes (40 percent versus 72 percent, respectively). This was true for women and for men.
- The percentage of adults with diabetes who reported that they had visited a dentist in the past year increased with educational attainment for both women and men (36 percent of women and 43 percent of men with less than secondary school graduation compared to 75 percent of women and 69 percent of men with a Bachelor's degree or higher) (data not shown).
- Adults aged 65 and older with diabetes were less likely to visit a dentist than those under age 65 (47 percent versus 62 percent, respectively) (data not shown).
- Adults with diabetes who self-identified as visible minorities were less likely to visit a dentist than White individuals (46 percent versus 58 percent, respectively) (data not shown).
- The percentage of people with diabetes who had visited a dentist in the past year did not vary by rural/urban residency (data not shown). We did not report variation by Local Health Integration Network (LHIN) due to small numbers and limited power to detect differences.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

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# Section 9C

## SUMMARY OF FINDINGS

This section reports on indicators of screening, monitoring and assessment of diabetes and dental care for adults with and without diabetes. Rates were compared across subgroups in the population and we found that, for the most part, care was comparable. However, there were significant gaps in dental care, similar to those noted in [the POWER Study Access to Health Care Services chapter](#).<sup>116</sup> Findings for the indicators reported in this section are summarized below.

### Daily Self-Monitoring of Blood Glucose Levels for Adults with Diabetes who were on Insulin

Eighty-one percent of adults who reported having diabetes who were taking insulin reported daily self-monitoring of their blood glucose levels; 49 percent of adults with diabetes who were not taking insulin but were on oral glucose-lowering medications also reported daily self-monitoring. Clinical practice guidelines currently recommend self-monitoring by all people with diabetes, but the evidence is stronger for those on insulin than those on oral medications alone.<sup>139</sup> Among adults with diabetes who were on insulin, the percentage who reported daily self-monitoring of blood glucose did not vary by sex, annual household income, educational attainment, age or rural/urban residency but did vary by LHIN.

### A1c Monitoring in the Past 12 Months

Eighty percent of adults who reported having diabetes reported that they had a hemoglobin A1c to assess their blood glucose control in the past 12 months. This indicator did not vary by sex, annual household income, educational attainment, age, visible minority status or rural/urban residency.

### Microalbumin Testing in the Past 12 Months

Among adults who reported having diabetes, 73 percent reported that they had a microalbumin test to assess for kidney disease in the past 12 months. This indicator did not vary by sex, annual household income, educational attainment, age, visible minority status, immigration status or rural/urban residency.

### Eye Examination in Two Years of Diagnosis of Diabetes for Adults Aged 30 and Older

Less than six in ten adults had an eye examination within two years of being diagnosed with diabetes; while this indicator showed significant regional variation, in all LHINs, less than two-thirds of adults with diabetes underwent an eye examination within two years of being diagnosed. The percentage of adults who underwent an eye exam did not differ by sex or by income for women, however, the rate did increase with age with a slight decrease after age 75. Of concern, only slightly more than four in ten adults aged 30-44 had an eye examination within two years of being diagnosed with diabetes.

### Self Foot Examination at Least Once Per Year

Almost 70 percent of adults who reported having diabetes reported having their feet checked for sores or irritation by themselves, a family member or by a friend (self foot examination) at least once per year. This did not vary by sex, annual household income or by age. Women with less than a secondary school education, immigrants to Canada and men who lived in urban communities were less likely than their counterparts to conduct self foot examination at least annually.

### Foot Examination by a Health Professional in the Past 12 Months

Among adults who reported having diabetes, 51 percent reported that a health professional had checked their feet for any sores or irritations in the past 12 months. This indicator did not vary by sex, annual household income, educational attainment, age, visible status or rural/urban residency. Adults with diabetes who had been in Canada for less than 10 years were less likely to have had a foot examination by a health professional than immigrants who had been in Canada for a longer time or those who were Canadian born (26 percent versus 52 percent and 53 percent, respectively).

### Dental Care in the Past 12 Months

Adults who reported having diabetes were less likely to have seen a dentist in the past 12 months than adults without diabetes (56 percent versus 65 percent, respectively). Among adults with diabetes, the percentage who had a dental visit in the past year did not vary by sex, but did vary by income, age, educational attainment and ethnicity. Adults from visible minority communities, those under age 65, those with lower annual household incomes or less education were less likely than their counterparts to have seen a dentist in the past 12 months.



# Section 9D

## *Pharmacological Treatment*

### INTRODUCTION

Medications are an important part of managing diabetes.

In combination with lifestyle measures (including weight control, adequate physical activity and proper nutrition), medications can assist in controlling blood glucose levels and so reduce the risk of long-term diabetes complications.<sup>36-38, 130, 155, 156</sup> In addition to managing diabetes, other medications can be used to control blood pressure and reduce cholesterol, which, along with diabetes, are risk factors for cardiovascular disease (CVD), the most important cause of death for people with diabetes.<sup>34, 110</sup> Angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARB), which are used to treat high blood pressure, also protect against the development of kidney disease and cardiovascular outcomes.

In type 1 diabetes, insulin is needed to sustain life. In contrast, for people with type 2 diabetes, Canadian clinical practice guidelines recommend controlling blood glucose with a step-wise approach, starting with lifestyle measures and then adding first oral medications and then insulin as needed.<sup>82</sup> Studies have shown that blood glucose control gradually deteriorates over time for people with type 2 diabetes, necessitating gradual intensification of glucose-lowering therapy.<sup>130</sup> Several categories of oral medications are available, and often an individual patient may require medications from two or three different classes to control their blood glucose. For either type of diabetes, guidelines recommend a target fasting blood glucose of 4.0-7.0 mmol/L and a level two hours after eating of between 5.0-10.0 mmol/L.<sup>82</sup> In addition, patients are advised to have their A1c tested (a laboratory test that estimates the average blood glucose levels from the preceding three months)

regularly. The target A1c is 7.0% or less.<sup>82</sup> However, individual goal setting based on patient risk and other clinical factors may be necessary and is often complex, particularly in the elderly where the risks of tight glycemic control (e.g., hypoglycemia) may outweigh the potential benefits of long-term prevention of complications. The recently-published ACCORD trial has spearheaded this debate, as study patients who tried to normalize their blood sugar levels had an increase in mortality compared to those attempting to achieve more standard blood glucose control.<sup>157</sup>

Because CVD leads to such significant morbidity and mortality for people with diabetes, and because people with diabetes are at significantly increased risk for these events,<sup>158</sup> control of cardiovascular risk factors such as hypertension and dyslipidemia are very important. The recommended blood pressure target for people with diabetes is systolic blood pressure less than 130 mmHg and diastolic blood pressure less than 80 mmHg.<sup>82</sup> Virtually all diabetes patients aged 65 and older will require at least one medication to control their blood pressure; many will require medications from three or more classes.<sup>39</sup> The recommended first-line agent is either an ACE inhibitor or an ARB.<sup>82</sup> These medications have the additional benefit of providing independent vascular protection and of being used for the treatment of microalbuminuria and diabetic kidney disease or nephropathy.<sup>159-164</sup> The primary cholesterol target for people with diabetes who are at high risk for vascular events (i.e., diabetic men aged 45 and older and diabetic women aged 50 and older, or those with multiple cardiovascular risk factors) is to achieve a low



density lipoprotein (LDL)-cholesterol level of 2.0 mmol/L or less.<sup>82</sup> The vast majority of seniors with diabetes will have levels above this without pharmacological intervention.<sup>165</sup> Although there are several lipid-lowering medications available, the statins have an overwhelming amount of clinical evidence to support their use, and are considered first-line therapy. In addition, statins have also been shown to reduce cardiovascular risk in people with diabetes, independent of their cholesterol levels.<sup>166</sup> The POWER Study Cardiovascular Disease chapter found few gender differences in medication use for ACE inhibitors, ARBs, other antihypertensive medications; however, women were less likely than men to receive statins.<sup>167</sup> Although there are limited data on inequities in performance on these indicators in Canada, disparities in performance associated with gender, socioeconomic status and ethnicity have been documented elsewhere.<sup>168-172</sup>

Another medication commonly prescribed for its cardiovascular protective effect is aspirin, however, aspirin therapy for patients with diabetes is controversial, as recent evidence has suggested it may not be of benefit, particularly for women.<sup>173-176</sup> Since aspirin can be purchased over-the-counter and is therefore not reliably captured in administrative data records, its use was not measured in this chapter.

There is mounting evidence that an increasing number of medications are needed to control diabetes and prevent complications. Indeed, there has been a marked rise in the complexity and cost of diabetes care over the last decade.<sup>52</sup> While this shift to more intensive treatment has no doubt contributed to an overall improvement in diabetes outcomes, the increasing cost of medications may now pose a greater challenge for lower-income and other disadvantaged populations. Studies have documented both a rise in the cost of diabetes drugs<sup>177</sup> and in the number of people who cannot afford their medications<sup>178, 179</sup> over the last decade. Indeed, higher out-of-pocket medication costs have been shown to lower adherence<sup>180</sup> and increase rates of adverse events.<sup>181</sup> Low health literacy

in disadvantaged populations may also have an impact on adherence due to difficulty following more complex medical regimens.<sup>182-184</sup>

In this section, we report indicators of pharmacological treatment and, where possible and where data were available, we examine the differences associated with sex, income, education, age, ethnicity, immigration status, rural/urban residency and Local Health Integration Network (LHIN). Survey data were used to assess the use of glucose-lowering medications, so we were able to assess self-reported use of these agents among all adult women and men who reported having diabetes. Use of antihypertensive drugs, ACE inhibitors and ARBs, and statins was measured using administrative data that are only available for adults aged 65 and older. For some individuals in this age group decisions about clinical management are complicated by the greater presence of multiple chronic conditions<sup>185</sup> and geriatric syndromes including frailty and dementia.

#### **The indicators include:**

- Percentage of adults who reported having diabetes who were on insulin or at least one oral glucose-lowering medication
- Percentage of older adults (aged 65 and older) with diabetes who filled at least one prescription in a one-year period for:
  - an anti-hypertensive drug from any category
  - an ACE inhibitor and/or an ARB therapy
  - a statin

Combined data from the CCHS, 2005 (Cycle 3.1) and 2007 were used to assess the percentage of adults who reported having diabetes who reported being on insulin or at least one oral glucose-lowering medication. Data from the Ontario Diabetes Database (ODD) were linked to the Ontario Drug Benefit (ODB) database to determine the percentage of adults aged 65 and older with diabetes who filled prescriptions for anti-hypertensive agents and statins (see [Appendix 9.3](#) for details). Data from the ODB are restricted to adults aged 65 and older because of access to provincially funded drug benefits.

## EXHIBITS AND FINDINGS

### USE OF INSULIN OR AT LEAST ONE ORAL GLUCOSE-LOWERING MEDICATION

**Indicator:** This indicator measures the percentage of adults aged 20 and older who reported having diabetes who reported using insulin or at least one oral glucose-lowering medication.

**Background:** Medications are an important part of managing diabetes. In combination with lifestyle measures such as weight control, proper nutrition and adequate exercise, medications can assist in controlling blood glucose levels to reduce the risk of developing long-term diabetes complications.<sup>36-38, 130, 155, 156</sup>

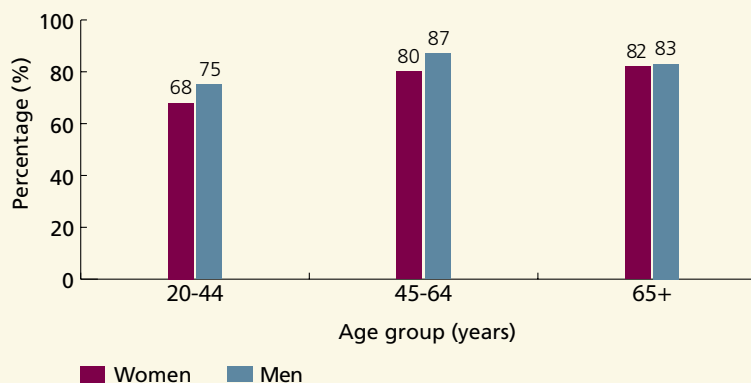
Combined data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007 were used to assess this indicator. Because this indicator was derived from the CCHS, people with diabetes were identified based on self-reported information rather than physician diagnosis. Respondents who indicated that they had diabetes were asked (in two separate questions) if they were currently using insulin or if they had used an oral glucose-lowering medication in the previous month.

**Findings:** In Ontario, 82 percent of adults aged 20 and older who reported having diabetes were on insulin and/or at least one oral glucose-lowering medication. Medication use did not differ between women and men (79 percent of women and 84 percent of men).

### Exhibit 9D.1 | Percentage of adults aged 20 and older who reported having diabetes who were on insulin and/or at least one oral glucose-lowering medication, by sex and age group, 2005 and 2007

#### FINDINGS

- Overall, younger people who reported having diabetes (aged 20-44) were less likely than older people to report using insulin and/or at least one oral glucose-lowering medication; however, the age differences were not significant among men, possibly due to small numbers and limited power to detect differences.
- Across all age groups, women were less likely than men to be on any glucose-lowering medication (including insulin). These differences were more pronounced in those under age 65; however, they were not significant, possibly due to small numbers and limited power to detect differences.
- The percentage of women and men who reported having diabetes who were on insulin and/or at least one oral glucose-lowering medication did not vary by annual household income, time since immigration, rural/urban residency or Local Health Integration Network (LHIN), but did vary somewhat by education among men. We could not assess use of glucose-lowering medication by ethnicity due to small numbers and limited power to detect differences (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

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## USE OF ANTI-HYPERTENSIVE MEDICATIONS OR STATINS

**Indicator:** These indicators measure the percentage of adults aged 65 and older with diabetes who filled at least one prescription for the following medications during a one-year follow up period:

- at least one anti-hypertensive drug from any category
- an angiotensin-converting enzyme (ACE) inhibitor and/or an angiotensin receptor blocker (ARB)
- a statin

**Background:** To reduce the risk of cardiovascular disease (CVD) and other diabetes complications, good control of blood pressure is necessary. The majority of older people with diabetes will require anti-hypertensive drugs to reduce high blood pressure.<sup>39</sup> ACE inhibitors or ARBs are recommended as first-line therapy for people with diabetes.<sup>82</sup> In type 1 and type 2 diabetes, the presence of microalbuminuria or overt nephropathy is an indication for treatment with an ACE inhibitor or an ARB, even in the absence of hypertension, in order to reduce the progression of renal disease.<sup>82</sup> For people at high risk for CVD, ACE inhibitors or ARB therapy are also indicated for risk reduction.<sup>161, 162, 186</sup>

Just as for blood pressure, goals for blood cholesterol levels are stricter for individuals with diabetes than for the general population.<sup>82</sup> Statins reduce low-density lipoprotein (LDL) cholesterol and have modest effects on lowering triglyceride levels and raising high-density lipoprotein (HDL) cholesterol levels. Prescriptions for statins have been increasing but the proportion of people receiving lipid-lowering therapy remains markedly lower than the estimated 90 percent of individuals aged 65 or older whose LDL cholesterol levels are above the recommended target.<sup>165</sup> Most people with diabetes are considered to be at high risk for developing CVD,<sup>82</sup> therefore, treatment of elevated blood cholesterol levels should be broadly instituted to achieve targets.

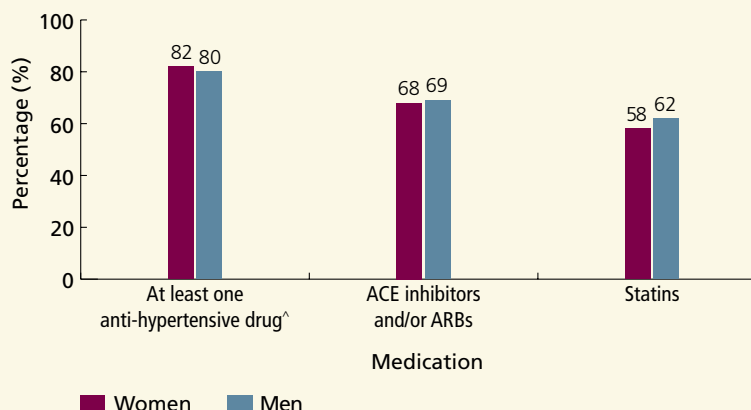
The Ontario Diabetes Database (ODD) was used to identify adult who had been diagnosed with diabetes as of April 1, 2006 (see [Appendix 9.3](#) for details). Data from the Ontario Drug Benefits (ODB) database were used to evaluate medication use in patients with diabetes aged 65 and older. The sample was restricted to this age group because of access to provincially funded drug benefits in this population. The data do not include sufficient clinical information to exclude those with contraindications to medication use. Thus, all patients identified as having diabetes were included in these analyses and there may have been appropriate reasons for not receiving these medications in some cases (see [Appendix 9.3](#) for a list of medications that were included).

**Findings:** In Ontario, 68 percent of adults aged 65 and older with diabetes (68 percent of women and 69 percent of men) filled at least one prescription for an ACE inhibitor or ARB within the one-year follow up period. The percentage who filled a prescription for any antihypertensive drug during this period rose to 81 percent (82 percent of women and 80 percent of men). Sixty percent of adults aged 65 and older with diabetes filled at least one prescription for a statin within the one-year follow up period. Women were slightly less likely than men to fill a prescription for a statin (58 percent versus 62 percent, respectively).

## Exhibit 9D.2 | Age-standardized percentage of adults aged 65 and older with diabetes who filled a prescription for an anti-hypertensive drug or statin, by sex, in Ontario, 2006/07

### FINDINGS

- Among adults aged 65 and older with diabetes, women were slightly less likely than men to have filled a prescription for a statin within the one-year follow up period. The percentage of adults aged 65 and older with diabetes who filled a prescription for an anti-hypertensive drug, or specifically for an ACE inhibitor or ARB therapy, varied minimally by sex and these differences were not clinically meaningful.
- There were small differences in the percentage of adults aged 65 and older with diabetes who filled a prescription for antihypertensive drugs in general, and for ACE inhibitors and/or ARBs specifically, varied somewhat by age and Local Health Integration Network (LHIN), but these differences were not clinically meaningful (data not shown). These indicators did not differ by neighbourhood income (data not shown).
- Adults aged 75 and older with diabetes were less likely to fill a prescription for statins (54 percent) compared to those aged 65-69 or 70-74 (64 percent and 65 percent, respectively) (data not shown). This may represent both underuse of effective therapies and a higher proportion of individuals with contraindications to therapy in this age group.
- There were small but clinically unimportant differences in statin use by LHIN, and no differences by neighbourhood income.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Drug Benefits (ODB) database

<sup>^</sup> Includes ACE Inhibitors and ARBs

**ACE inhibitors** = Angiotensin-converting enzyme inhibitors

**ARBs** = Angiotensin II receptor blockers

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# Section 9D

## SUMMARY OF FINDINGS

This section reports on indicators of pharmacological treatment for people with diabetes in Ontario, including medication management of blood glucose (insulin and/or oral glucose-lowering medications) and medications used to control blood pressure and reduce cholesterol levels. The indicators varied by age, but did not vary by income or meaningfully by Local Health Integration Network (LHIN). Medication use, did not vary by sex, with the exception of statins.

Findings for the indicators reported in this section are summarized below.

### **Percentage of Adults who reported having Diabetes who were on Insulin and/or at Least One Oral Glucose-Lowering Medication**

Most women and men (82 percent) who self-identified as having diabetes were taking some type of medication to control their blood glucose levels, either insulin or oral glucose-lowering medications. However, this suggests that one in five adults with self-reported diabetes were not taking medication to control their blood glucose. As well, because these data relied on self-reported diabetes, it is possible that some people who were not using medications to control their blood sugars also did not acknowledge that they had diabetes; therefore, the observed rates of medication

use may be overestimates. This did not vary by annual household income, time since immigration, rural/urban residency or LHIN, but did vary somewhat by education level among men. Adults aged 20-44 with diabetes were less likely to be on medication to control their diabetes than older adults (71 percent versus 83 percent, respectively). The age difference was not significant among men, however, this may be due to limited power to detect differences due to small sample size.

### **Percentage of Adults Aged 65 and Older with Diabetes who Filled Prescriptions for Anti-Hypertensive Drugs and Statins**

More than 80 percent of seniors with diabetes had filled a prescription for at least one anti-hypertensive medication, with more than two-thirds filling prescriptions for an angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB), which are considered the first-line choices for blood pressure lowering. Sixty percent of seniors with diabetes had filled a prescription for at least one statin. There was virtually no variation in medication use by income or LHIN. However, women were slightly less likely than men to have filled a prescription for a statin (58 percent versus 62 percent, respectively) and statin use was lower in adults aged 75 and older than in younger adults.

# Section 9E

## Health Outcomes

### INTRODUCTION

Diabetes can lead to both acute (short-term) and chronic complications, adding to the cost and burden associated with this disease.

Studies from Ontario have shown that up to 40 percent of hospital admissions for acute myocardial infarction (AMI), stroke and congestive heart failure (CHF), 50 percent of cases starting dialysis, and 70 percent of non-traumatic amputations occur among people with diabetes.<sup>187-190</sup> In addition diabetes is a leading cause of adult-onset blindness and a common cause of disability.<sup>57, 191</sup>

There is compelling evidence that the long-term complications from diabetes can be reduced or prevented through strategies aimed at controlling glucose, blood pressure and cholesterol levels.<sup>33-39</sup> In fact, targeting each of these simultaneously and in combination with lifestyle measures—healthy diet, increased physical activity and smoking cessation—may reduce the incidence of cardiovascular disease (CVD) by as much as 50 percent.<sup>34</sup> However, recent studies suggest that the relationship between glucose levels and CVD risk is more complex than once thought;<sup>38, 157, 192</sup> using near-normal glucose levels as a target in older patients with advanced diabetes was associated with higher mortality compared to usual care.<sup>157</sup>

The last decade has seen a fall in diabetes complication rates, suggesting that the growing body of evidence has influenced routine clinical practice and translated into better care and outcomes for people with diabetes.<sup>18, 187, 193</sup> Between 1995 and 2005, all-cause mortality rates fell by 34 percent in the population with diabetes, while

mortality from AMI and stroke fell by 44 percent and 33 percent, respectively, over a comparable time frame.<sup>187</sup> While these trends have been similarly favourable for men and women, not all groups with diabetes have benefited equally.<sup>18</sup> Improvements in survival have been substantially greater among wealthier individuals suggesting that low-income individuals may have benefited less from advances in diabetes care.

Socioeconomic gradients in mortality have been demonstrated in many countries, including those, like Canada, that have universal access to health services.<sup>194, 195</sup> Low-income groups are also more vulnerable to adverse outcomes related to diabetes than their wealthier counterparts.<sup>18, 196-198</sup> A host of factors is thought to drive socioeconomic-related health inequities. Lower-income populations appear to be more susceptible to unhealthy behaviours such as smoking, poor diet and sedentary lifestyle<sup>61, 199, 200</sup> and they may face more barriers to achieving a healthy lifestyle because of a limited number of affordable opportunities for physical activity and healthy eating in their neighbourhood.<sup>201-204</sup> Diabetes is also an extremely costly condition to manage and high out-of-pocket costs of medications may impede adherence to treatment.<sup>52</sup> Competing social and medical problems<sup>61</sup> together with low health literacy, and language or cultural barriers<sup>184</sup> may also make it more difficult for lower-income groups to achieve target levels of glucose, blood pressure, and cholesterol.<sup>200, 205, 206</sup>



A number of studies have documented variations in the risk of diabetes complications by ethnicity. Among those with diabetes, African American and Hispanic groups in the US experience higher rates of end-stage renal disease, retinopathy and stroke compared to White populations;<sup>47, 48, 51</sup> data from the UK suggest that South Asians experience an excess of CVD and premature mortality;<sup>46</sup> and Canadian data suggest that Aboriginal populations share a disproportionate burden of diabetes complications.<sup>49, 207</sup> Poverty and poor access to care appear to be important predictors for adverse diabetes outcomes in Aboriginal groups, as they are in other populations.<sup>49</sup> It is often difficult to disentangle the influence of socioeconomic status in observational data since ethnic groups that have worse outcomes may also have higher levels of poverty and may, depending on the health system, have inadequate health insurance coverage or worse access to health care. In Canada, although there is universal access to physician care, prescription drugs are not universally covered, therefore socioeconomically disadvantaged groups may experience financial barriers to accessing required, but often expensive, medications to control their diabetes and associated risk factors. Furthermore, it is not clear from the literature whether the impact of socioeconomic status on diabetes complications affects men and women in the same manner.

The influence of gender on diabetes complications appears to vary depending on the complication studied. The incidence of retinopathy is similar between men and women, regardless of diabetes subtype.<sup>208-210</sup> However, retinopathy may progress more quickly in men.<sup>209</sup> In the general population, men have higher rates of CVD than women,<sup>158</sup> however, diabetes appears to greatly attenuate the usual protective effect afforded by female sex, thereby narrowing the relative gender gap in CVD risk.<sup>158</sup> Several studies involving patients in primary care practices in the US and Sweden have found that women with diabetes experienced less aggressive management

of CVD risk factors than men with diabetes did, which may counteract any biological differences leading to lower rates of CVD in women.<sup>211-215</sup>

This section compares differences in diabetes complication rates between women and men, and across subgroups. The indicators include both acute complications (e.g., emergency management of hyper- or hypoglycemia) and chronic complications (e.g., CVD, end-stage kidney disease). Tracking disease outcomes is a critical step to ensuring the appropriate planning and provision of inpatient and outpatient health services. Complication rates also serve as an indicator of the quality of care received, since there are proven strategies to prevent or delay the onset of complications and to slow their progression—and therefore may be modifiable in response to changes in how health care is organized and delivered.

In this section, we report indicators of health outcomes and examine the differences associated with sex, neighbourhood income, age and Local Health Integration Network (LHIN).

The indicators include the number of adults aged 20 and older with diabetes per 100,000 who, over a one-year period had:

- at least one hospital visit (emergency department or admission) for hyperglycemia or hypoglycemia
- at least one hospitalization for skin and soft tissue infections

#### **Cardiac disease**

- at least one hospitalization for an AMI
- at least one hospitalization for CHF
- coronary artery bypass graft (CABG) surgery
- percutaneous coronary intervention (PCI)

#### **Stroke**

- at least one hospitalization for stroke
- carotid endarterectomy

**Peripheral vascular disease**

- major or minor amputation
- a peripheral revascularization procedure

**Chronic dialysis**

- chronic dialysis

**Diabetic retinopathy**

- laser photocoagulation
- a vitrectomy

The indicators of health outcomes among people with diabetes were assessed by linking the Ontario Diabetes Database (ODD) to administrative health care databases. For all outcome indicators, the ODD was used to identify adults aged 20 and older who had prevalent

diabetes as of March 31, 2006. This sample was linked to the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and followed for one year to assess rates of skin and soft tissue infections, acute myocardial infarction, congestive heart failure, coronary artery bypass graft (CABG) surgery, stroke, carotid endarterectomy, minor amputations, major amputations, and peripheral revascularization surgery. The sample was linked to the CIHI-DAD and National Ambulatory Care Reporting System (NACRS) to assess the rate of hospital visits for hypo- or hyperglycemia and the rate of percutaneous coronary interventions. The sample was linked to Ontario Health Insurance Plan (OHIP) data to assess rates of chronic dialysis (see [Appendix 9.3](#) for details).



## EXHIBITS AND FINDINGS

### EMERGENCY ROOM VISITS AND HOSPITAL ADMISSIONS FOR HYPERGLYCEMIA OR HYPOGLYCEMIA

**Indicator:** This indicator measures the number of adults aged 20 and older with diabetes per 100,000 who had at least one hospital visit (emergency department visit or hospitalization) for hyperglycemia or hypoglycemia over a one-year period.

**Background:** Severe hyperglycemia (high blood glucose) and hypoglycemia (low blood glucose) are potentially life-threatening conditions that can be prevented with good outpatient care. Poor glucose control, particularly in the setting of acute illness, can lead to hyperglycemic states—diabetic ketoacidosis or hyperosmolar coma—that constitute a medical emergency. While tight glucose control can improve long-term outcomes for people with diabetes, running levels close to the normal range increases the risk of developing severe hypoglycemia—a state of low glucose that can lead to loss of consciousness.<sup>36, 37</sup> In many cases, these episodes can be averted through patient education to ensure early recognition, self-monitoring of blood glucose and by avoiding errors in management. Access to outpatient care appears to be a key factor influencing admission rates for hyper- and hypoglycemia.<sup>187, 197</sup> Diabetes education programs have also been shown to reduce rates of these admissions.<sup>216</sup>

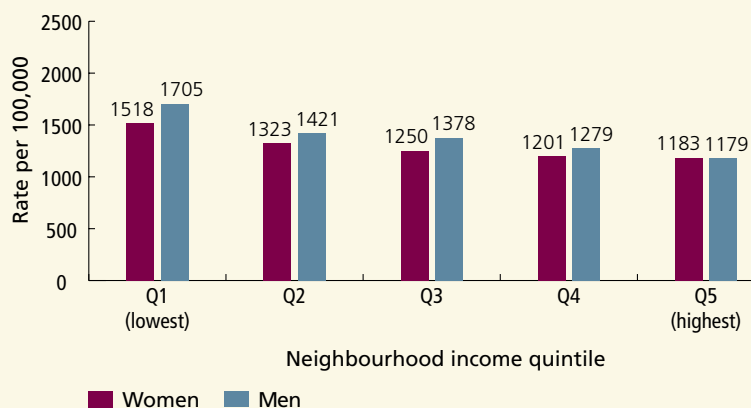
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006 (see [Appendix 9.3](#) for details). Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS) were used to measure the number of people with diabetes who had at least one hospital visit (emergency department visit or hospitalization) for hyper- or hypoglycemia in the 2006/07 fiscal year. Only the first visit per patient was counted during the year so the total number and rate of hospital visits is in fact higher because individuals (particularly those who are poorly controlled, encounter barriers to effective care or who have limited knowledge of self-management skills) may have multiple hospital visits over the course of a year. NACRS does not capture episodes of severe hypoglycemia that are only treated by emergency medical services in the field (i.e., do not lead to an emergency department visit). Conversely, in some regions, family practitioners may see patients in the emergency department for mild hyper- or hypoglycemia, or other aspects of diabetes management, thus inflating rates in some LHINs.

**Findings:** In Ontario, among adults aged 20 and older with diabetes, the rate of hospital visits (emergency department visit or hospitalization) for hyperglycemia or hypoglycemia was 1362 per 100,000 people in 2006/07. Women were slightly less likely to have a hospital visit than men (1316 per 100,000 women versus 1408 per 100,000 men).

### Exhibit 9E.1 | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had at least one hospital visit<sup>^</sup> for hyperglycemia or hypoglycemia, by sex and neighbourhood income quintile, in Ontario, 2006/07

#### FINDINGS

- There was an inverse association between neighbourhood income and rates of hospital visits for hyperglycemia or hypoglycemia among women and men with diabetes.
- Women living in the lowest-income neighbourhoods were almost 30 percent more likely to have a hospital visit for hyperglycemia or hypoglycemia compared to women living in the highest-income neighbourhoods.
- The difference was even greater for men; those living in the lowest-income neighbourhoods were nearly 45 percent more likely to have a hospital visit than men living in the highest-income neighbourhoods.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

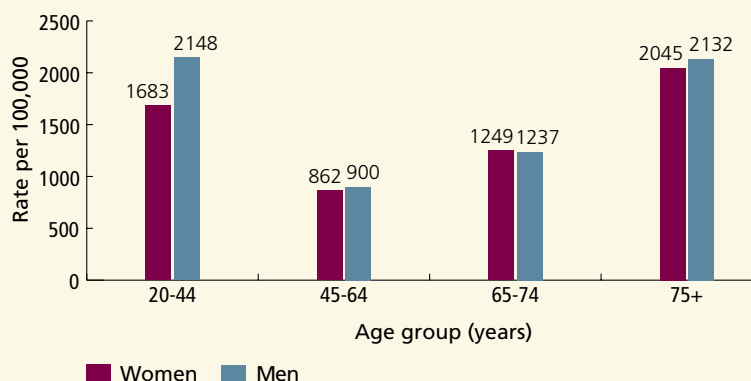
<sup>^</sup> Emergency department visit or hospital admission

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### Exhibit 9E.2 | Number of adults aged 20 and older with diabetes per 100,000 who had at least one hospital visit<sup>^</sup> for hyperglycemia or hypoglycemia, by sex and age group, in Ontario, 2006/07

#### FINDINGS

- The number of adults with diabetes who had at least one hospital visit for hyper- or hypoglycemia was highest in the youngest and oldest age groups. High rates in those under age 45 were likely related to the higher proportion of type 1 diabetes in this age group. High rates of admission among those aged 75 and older likely reflect the high prevalence of multi-morbidity and complexity in this age group.
- In the youngest age group, men were more likely than women to have a hospital visit for hyperglycemia or hypoglycemia. There were no gender differences in visit rates among the older age groups.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

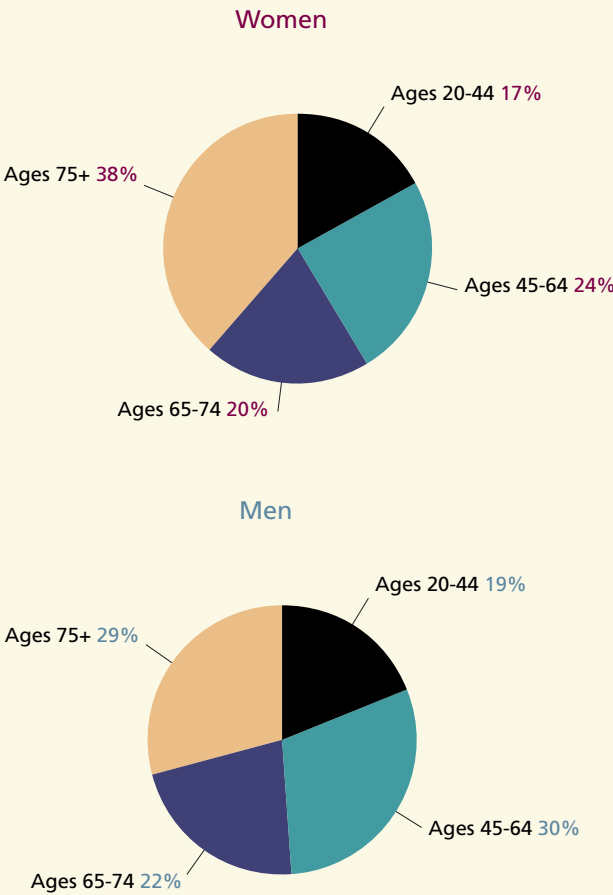
<sup>^</sup> Emergency department visit or hospital admission

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**Exhibit 9E.3** | Age distribution of adults aged 20 and older with diabetes who had at least one hospital visit<sup>^</sup> for hyperglycemia or hypoglycemia, by sex, in Ontario, 2006/07

**FINDINGS**

- The elderly, those aged 65 and older, accounted for over half of all adults with diabetes who had at least one hospital visit for hyperglycemia or hypoglycemia (58 percent of women and 57 percent of men).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> Emergency department visit or hospital admission

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**Exhibit 9E.4 | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had at least one hospital visit<sup>^</sup> for hyperglycemia or hypoglycemia, by sex, neighbourhood income and Local Health Integration Network (LHIN), in Ontario, 2006/07**

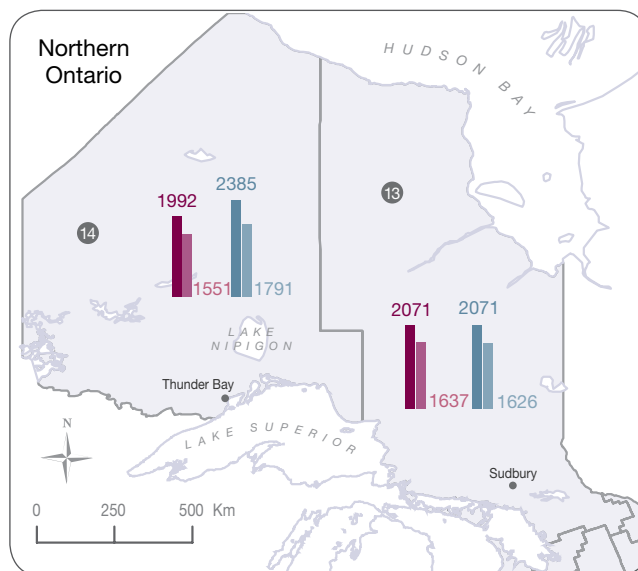
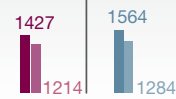
**FINDINGS**

- There was considerable variation across LHINs in the rates of hospital visits for hyperglycemia or hypoglycemia among both women and men with diabetes. In some regions, family practitioners may see patients in the emergency department for mild hyperglycemia or hypoglycemia or for other aspects of diabetes management, thus inflating rates in some LHINs.
- Among women with diabetes, rates of hospital visits ranged from 895 per 100,000 in the Central West LHIN to 2071 per 100,000 in the North East LHIN among women living in lower-income neighbourhoods and from 800 per 100,000 in the Central LHIN to 1865 per 100,000 in the North Simcoe Muskoka LHIN among women living in higher-income neighbourhoods.
- Among men with diabetes, rates of hospital visits ranged from 993 per 100,000 in the Mississauga Halton LHIN to 2392 per 100,000 in the North Simcoe Muskoka LHIN among men living in lower-income neighbourhoods and from 839 per 100,000 in the Central LHIN to 1946 per 100,000 in the South East LHIN among men living in higher-income neighbourhoods.

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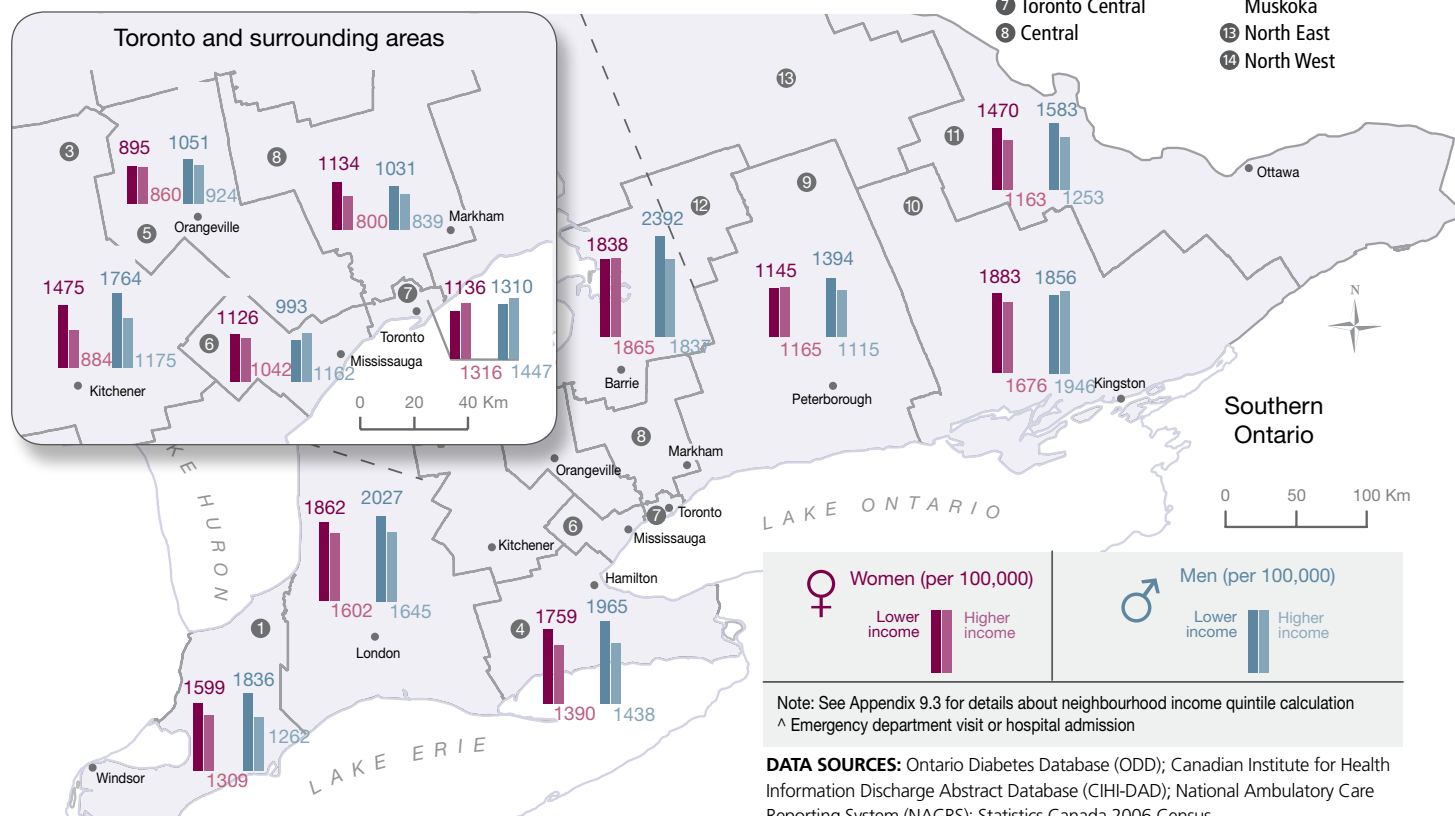
**Overall Ontario**

In Ontario, 1427 per 100,000 lower-income women, 1214 per 100,000 higher-income women, 1564 per 100,000 lower-income men and 1284 per 100,000 higher-income men aged 20 and older with diabetes had at least one hospital visit for hyperglycemia or hypoglycemia during 2006/07.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



♀ Women (per 100,000)  
Lower income Higher income

♂ Men (per 100,000)  
Lower income Higher income

Note: See Appendix 9.3 for details about neighbourhood income quintile calculation  
<sup>^</sup> Emergency department visit or hospital admission

**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2006 Census



## HOSPITALIZATION RATES FOR SKIN AND SOFT TISSUE INFECTIONS

**Indicator:** This indicator measures the number of people aged 20 and older with diabetes per 100,000 who had at least one hospitalization for a skin and soft tissue infection over a one-year period.

**Background:** People with diabetes are more susceptible to common infections, including those of the skin and soft tissue. Foot infections—which make up a significant proportion of this category—are a major cause of morbidity.<sup>217</sup> In the setting of diabetic neuropathy (nerve damage) or vascular disease, minor trauma to the foot can lead to skin ulceration, infection and potentially to gangrene, requiring amputation.<sup>145, 218</sup> Regular foot care and aggressive treatment of foot ulcers and infections early in their course may prevent the need for amputation.<sup>131</sup>

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006 (see [Appendix 9.3](#) for details). Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) were used to measure the number people who were hospitalized for skin and soft tissue infections in the 2006/07 fiscal year. Only one admission was counted per patient so the actual rate of hospitalizations is higher because individuals (particularly those who are poorly controlled, encounter barriers to effective care, or who have limited knowledge of self-management skills) may have multiple hospitalizations over the course of a year.

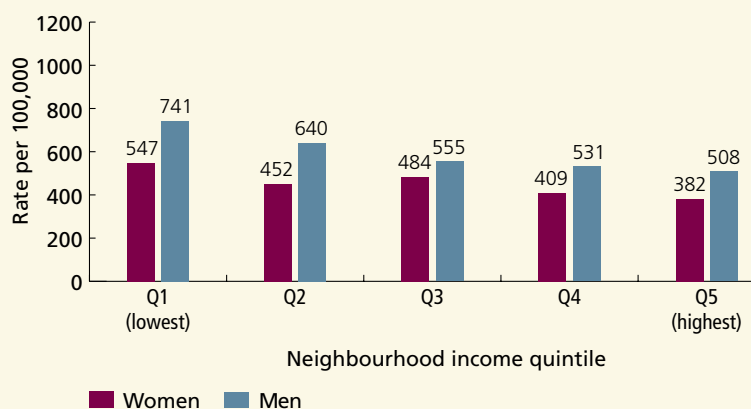
**Findings:** In Ontario, in 2006/07, the hospitalization rate for skin and soft tissue infections was 534 per 100,000 among adults with diabetes aged 20 and older. Women were less likely to be hospitalized than men (464 per 100,000 versus 601 per 100,000, respectively).



**Exhibit 9E.5** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had at least one hospitalization for a skin and soft tissue infection over a one-year period, by sex and neighbourhood income quintile, in Ontario, 2006/07

**FINDINGS**

- Among adults with diabetes, women and men living in the lowest-income neighbourhoods had hospitalization rates for skin and soft tissue infections that were over 40 percent higher than the rates seen among those living in highest-income neighbourhoods.
- Across all income quintiles men were more likely to be hospitalized for skin and soft tissue infections than women.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

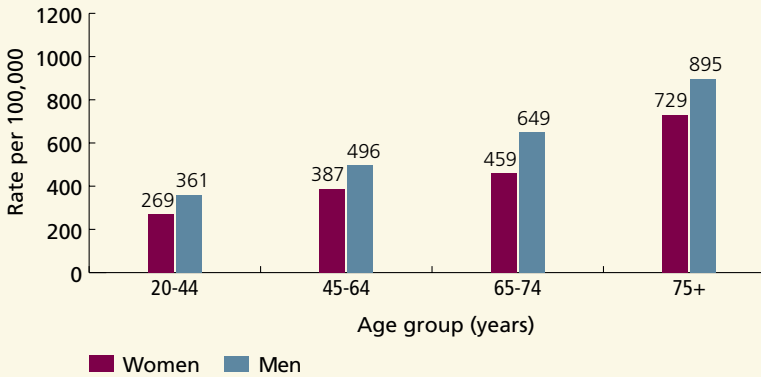
**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

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**Exhibit 9E.6** | Number of adults aged 20 and older with diabetes per 100,000 who had at least one hospitalization for a skin and soft tissue infection over a one-year period, by sex and age group, in Ontario, 2006/07

**FINDINGS**

- The number of adults with diabetes who had at least one hospitalization for a skin and soft tissue infection increased with age; the rate among those aged 75 and older was two and half times higher than the rate among those aged 20-44.
- Men with diabetes had consistently higher rates of hospitalization for skin and soft tissue infections than women with diabetes across all age groups.
- Hospitalization rates for skin and soft tissue infections among adults with diabetes differed across Local Health Integration Networks (LHINs). Rates ranged from 287 per 100,000 (Central West LHIN) to 882 per 100,000 (North West LHIN) among women and from 376 per 100,000 (Central LHIN) to 1064 per 100,000 (North West LHIN) among men (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

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## DIABETES AND CARDIAC DISEASE

**Indicator:** This group of indicators measures the rates of cardiac complications and related procedures among adults with diabetes aged 20 and older. We measured the number of women and men per 100,000 who, over a one-year period, had at least one:

- hospitalization for an acute myocardial infarction (AMI)
- hospitalization for congestive heart failure (CHF)
- coronary artery bypass graft (CABG) surgery
- percutaneous coronary intervention (PCI)

**Background:** Cardiovascular disease (CVD) is the leading cause of death among people with diabetes. Compared to the rest of the population, men and women with diabetes are two to five times more likely to develop CVD,<sup>219</sup> and to develop the condition at an earlier age.<sup>158</sup> Aggressive treatment of risk factors (e.g., high blood pressure, high cholesterol, smoking and sedentary lifestyle) and the use of risk modifying medications have been shown to reduce the risk of AMI and other cardiovascular complications in those with diabetes.<sup>33-37, 39</sup> In fact, a comprehensive, multifaceted approach to risk factor management can reduce the risk of AMI and other cardiovascular complications by as much as 50 percent.<sup>34</sup> While mortality rates have fallen significantly over the past two decades in people with diabetes, gaps in preventive management still remain.<sup>18</sup>

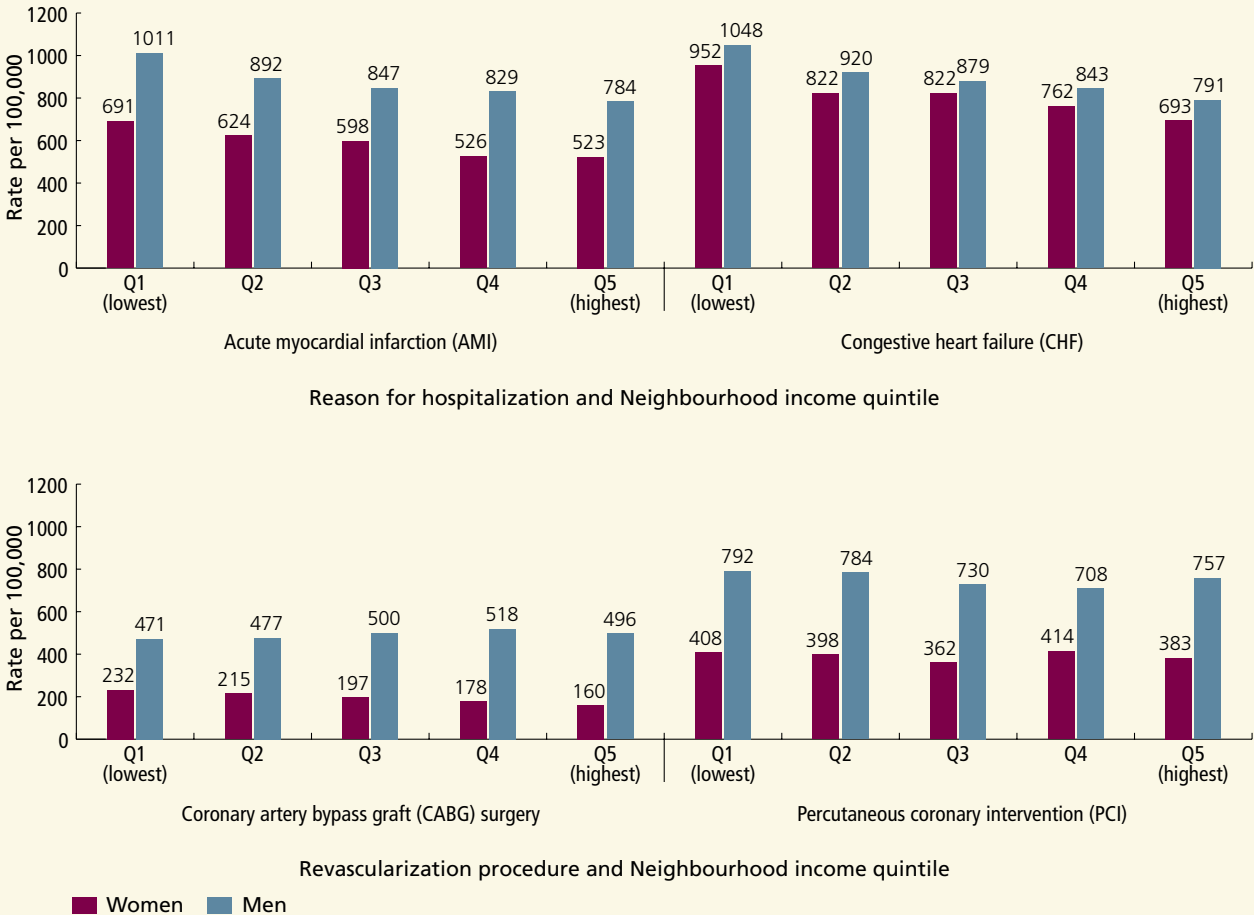
Timely access to cardiac procedures including coronary angiograms, PCI and CABG surgery is important for the detection and treatment of cardiac disease. Those waiting for advanced cardiac procedures may be at risk of serious complications such as AMI or death.<sup>220</sup> In addition, uncontrolled cardiac symptoms requiring intervention may result in reduced quality of life.

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006 (see [Appendix 9.3](#) for details). Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) were used to measure AMI, CHF and CABG surgery rates in the 2006/07 fiscal year. CIHI-DAD and the National Ambulatory Care Reporting System (NACRS) were used to measure PCI rates during the same period. Only one admission or procedure was counted for each patient.

**Findings:** In Ontario in 2006/07, the number of adults aged 20 and older with diabetes who were hospitalized were: 740 per 100,000 for AMI and 863 per 100,000 for CHF. Women were less likely than men to be hospitalized for AMI (603 per 100,000 versus 877 per 100,000, respectively) and CHF (826 per 100,000 versus 903 per 100,000, respectively).

In Ontario, 353 per 100,000 adults aged 20 and older with diabetes underwent CABG surgery and 583 per 100,000 underwent PCI. Women were less likely than men to have CABG surgery (200 per 100,000 versus 491 per 100,000, respectively) and PCI (394 per 100,000 versus 755 per 100,000, respectively).

**Exhibit 9E.7** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had a hospitalization or revascularization procedure for cardiac disease, by sex and neighbourhood income quintile, in Ontario, 2006/07



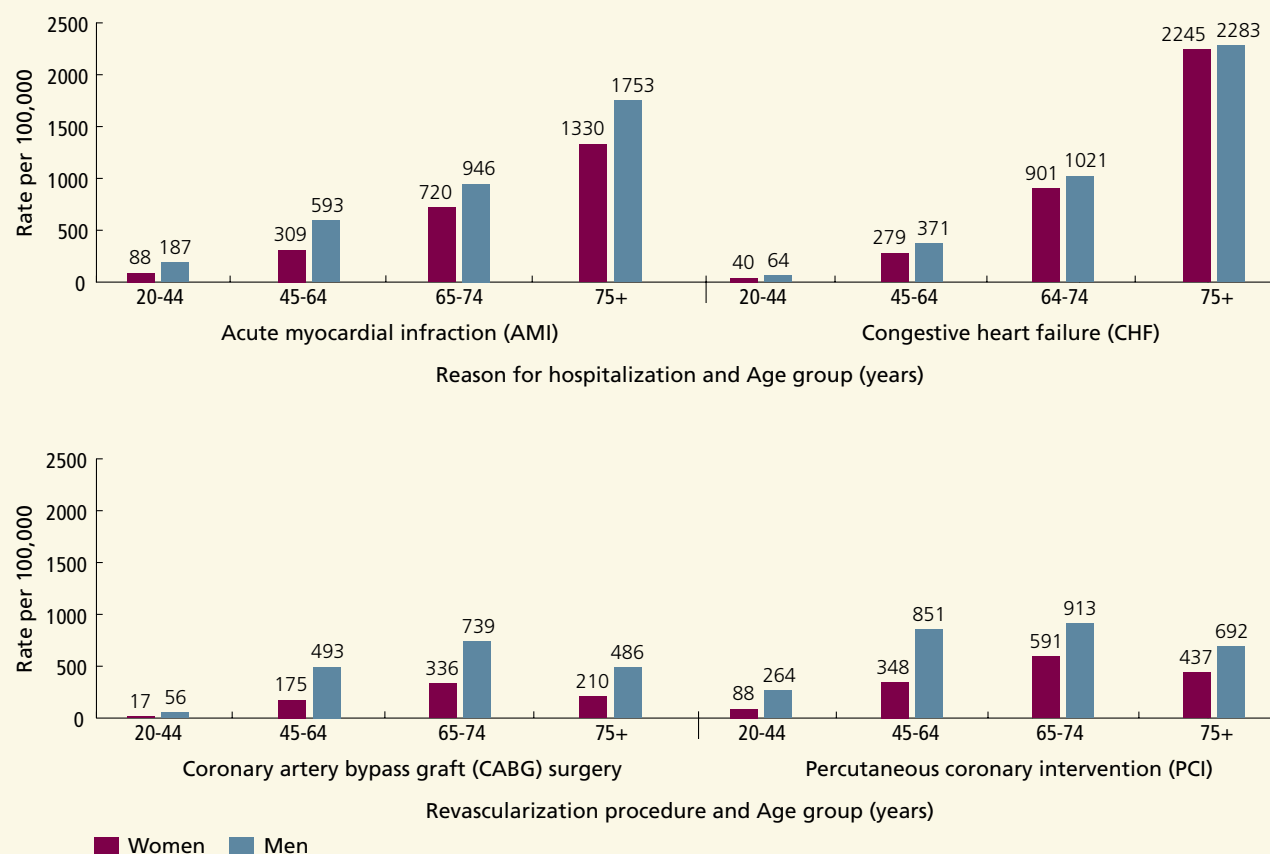
**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

**FINDINGS**

- Adults with diabetes living in the lowest-income neighbourhoods had hospitalization rates for AMI and CHF that were about 30 percent higher than those living in the highest-income neighbourhoods. Similar income gradients were noted for both women and men, though the gradient was less pronounced in women.
- Women with diabetes who lived in the lowest-income neighbourhoods had higher rates of CABG surgery than women living in the highest-income neighbourhoods (232 per 100,000 versus 160 per 100,000, respectively). CABG surgery rates did not vary by neighbourhood income among men.
- Rates of PCI did not vary by neighbourhood income among either women or men, however, this may represent underuse among lower-income individuals who have higher rates of cardiovascular disease.

**Exhibit 9E.8** | Number of adults aged 20 and older with diabetes per 100,000 who had a hospitalization or revascularization procedure for cardiac disease, by sex and age group, in Ontario, 2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

## FINDINGS

- Among adults with diabetes, the proportion hospitalized for an AMI or for CHF increased sharply with age.
- Across most age groups, women with diabetes were less likely than men with diabetes to be hospitalized for AMI and CHF; however, the sex differences lessened with age.
- Among adults with diabetes under age 45, women had 50 percent lower rates of AMI and 40 percent lower rates of CHF than men. The gender difference decreased among those aged 75 and older; women had 25 percent lower rates of AMI but equivalent rates of CHF compared to men.
- Rates of cardiac revascularization procedures (CABG and PCI) among women and men with diabetes increased with age to age 74, and then declined among those aged 75 and older.
- Compared to men, women had lower rates of CABG surgery and PCI across all age groups.
- The sex differences in coronary procedure rates were greater than the observed sex differences in hospitalization rates for cardiac disease.

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### Exhibit 9E.9 | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had a hospitalization for an acute myocardial infarction (AMI), by sex, neighbourhood income and Local Health Integration Network (LHIN), in Ontario, 2006/07

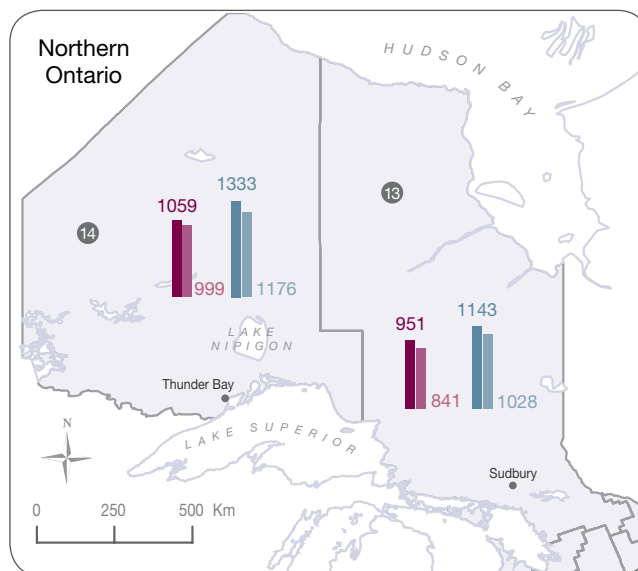
#### FINDINGS

- Among adults with diabetes, hospitalization rates for AMI and congestive heart failure (CHF) varied significantly across LHINs (data on AMI admissions are shown).
- Among women with diabetes, AMI hospitalization rates ranged from 387 per 100,000 in the Mississauga Halton LHIN to 1059 per 100,000 in the North West LHIN among women living in lower-income neighbourhoods and from 355 per 100,000 in the Central LHIN to 999 per 100,000 in the North West LHIN among women living in higher-income neighbourhoods.
- Among men with diabetes, AMI hospitalization rates ranged from 649 per 100,000 in the Toronto Central LHIN to 1345 per 100,000 in the Erie St. Clair LHIN among men living in lower-income neighbourhoods and from 610 per 100,000 in the Erie St. Clair LHIN to 1176 per 100,000 in the North West LHIN among men living in higher-income neighbourhoods.
- Hospitalization rates for CHF ranged from 645 per 100,000 (Central LHIN) to 1263 per 100,000 (North East LHIN) among women and ranged from 677 per 100,000 (Central West LHIN) to 1322 per 100,000 (North West LHIN) among men (data not shown).

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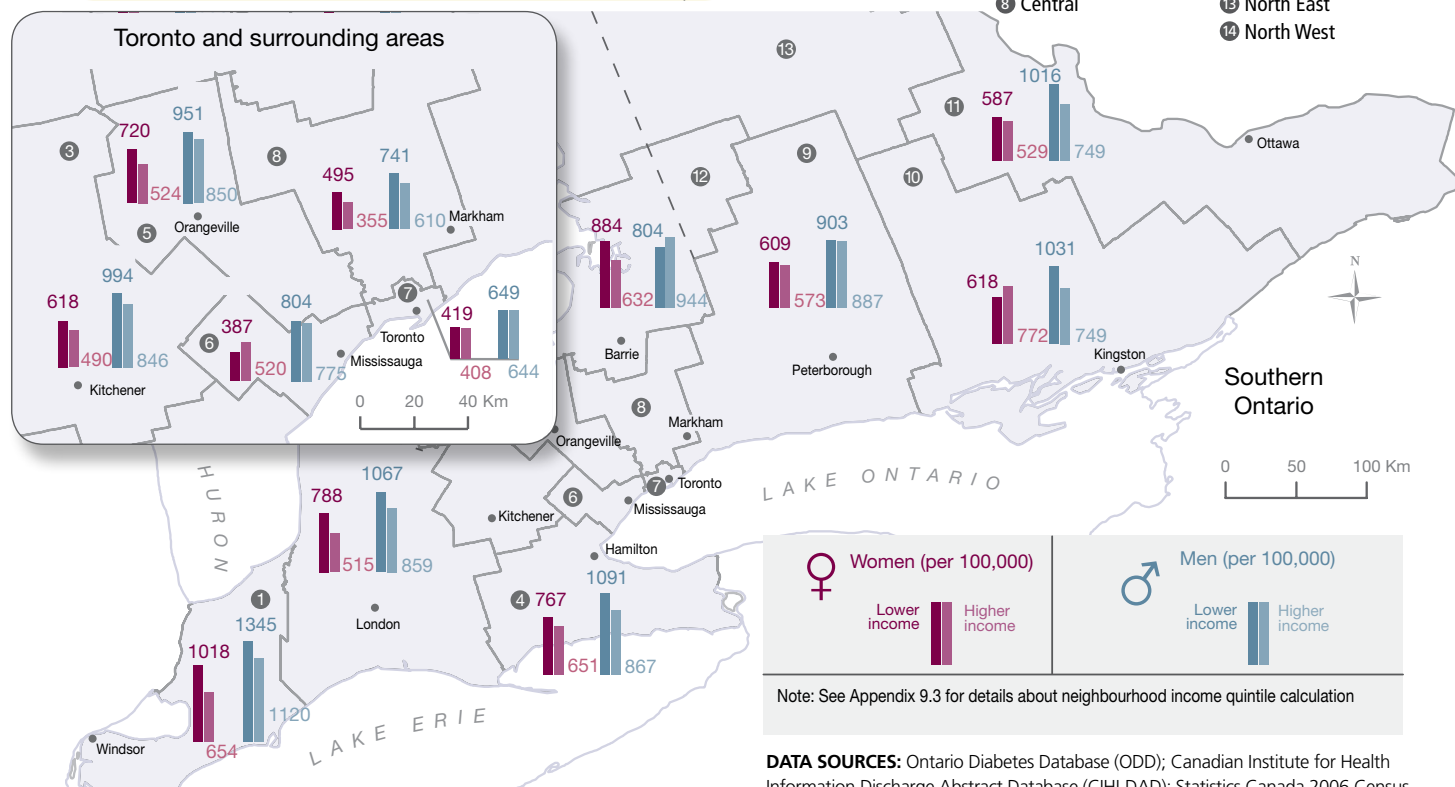
#### Overall Ontario

In Ontario, 660 per 100,000 lower-income women, 552 per 100,000 higher-income women, 951 per 100,000 lower-income men and 822 per 100,000 higher-income men aged 20 and older with diabetes had at least one hospitalization for an AMI during 2006/07.



#### Local Health Integration Networks (LHINs)

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

**Exhibit 9E.10** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had coronary artery bypass graft (CABG) surgery or a percutaneous coronary intervention (PCI), by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07

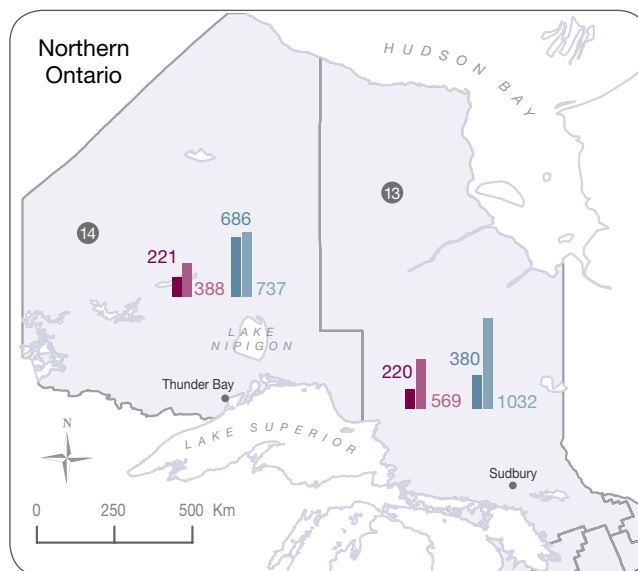
**FINDINGS**

- Among adults with diabetes, rates of CABG surgery and PCI varied significantly across LHINs.
- Rates of CABG surgery from 140 per 100,000 (Toronto Central LHIN) to 275 per 100,000 (Hamilton Niagara Haldimand Brant LHIN) among women and from 366 per 100,000 (Toronto Central LHIN) to 686 per 100,000 (North West LHIN) among men.
- Rates of PCI ranged from 208 per 100,000 (Waterloo Wellington LHIN) to 697 per 100,000 (South East LHIN) among women and from 526 per 100,000 (South West LHIN) to 1109 per 100,000 (South East LHIN) among men.

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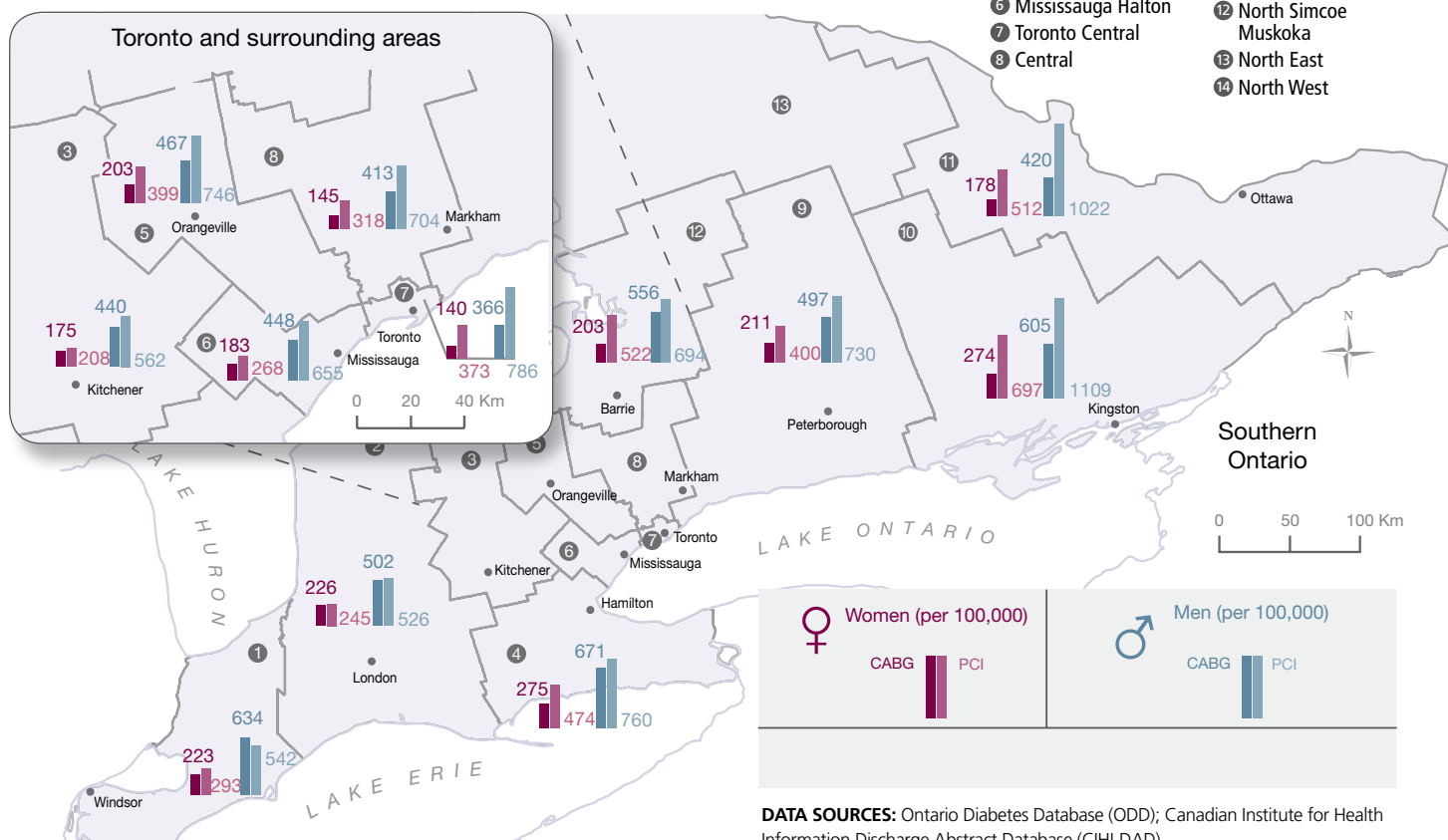
**Overall Ontario**

In Ontario during 2006/07, among women aged 20 and older with diabetes, 200 per 100,000 underwent CABG surgery and 394 per 100,000 underwent PCI. Among men aged 20 and older with diabetes, 491 per 100,000 underwent CABG surgery and 755 per 100,000 underwent PCI.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)



## DIABETES AND STROKE

**Indicator:** The following two indicators measure the number of adults aged 20 and older with diabetes per 100,000 who, over a one-year period, had at least one:

- hospitalization for stroke
- carotid endarterectomy

**Background:** Stroke is a leading cause of death and disability in Canada.<sup>221</sup> Diabetes is associated with a two- to three-fold elevation in the risk of stroke.<sup>187, 189</sup> The control of blood pressure and cholesterol levels can substantially reduce the risk of stroke in individuals with diabetes.<sup>33, 39</sup> Stroke admissions and case fatality rates have fallen considerably over the past decade, likely due to better management of risk factors and improvements in in-hospital stroke care.<sup>187</sup> Patients with symptomatic, moderate or severe carotid stenosis may be candidates for carotid endarterectomy, which is a highly effective treatment for secondary stroke prevention in appropriate patients.<sup>222</sup> Here we assess overall population-based rates of endarterectomy among people with diabetes. However, without clinical data, we cannot assess either the appropriateness of the procedure or underuse among those for whom the procedure is indicated.

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006 (see [Appendix 9.3](#) for details). Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) were used to measure stroke admissions and carotid endarterectomy rates in the 2006/07 fiscal year. Only one admission or procedure was counted for each patient.

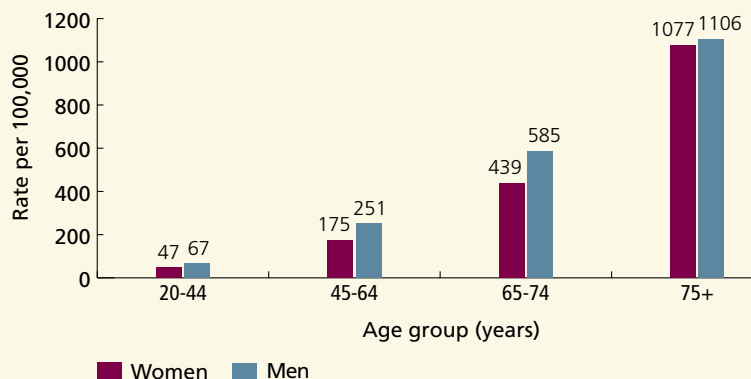
**Findings:** In Ontario in 2006/07, the number of adults aged 20 and older with diabetes hospitalized for a stroke was 457 per 100,000. Women were less likely than men to be hospitalized for stroke (420 per 100,000 versus 494 per 100,000, respectively).

The number of adults with diabetes aged 20 and older who underwent a carotid endarterectomy in 2006/07 was 50 per 100,000. Women were half as likely as men to have a carotid endarterectomy (33 per 100,000 versus 66 per 100,000, respectively).

### Exhibit 9E.11 | Number of adults aged 20 and older with diabetes per 100,000 who had a hospitalization for stroke, by sex and age group, in Ontario, 2006/07

#### FINDINGS

- The risk of being hospitalized for a stroke increased sharply with age among both women and men.
- Among adults aged 20-74 with diabetes, women were less likely to be hospitalized for a stroke than men; however, the sex difference disappeared among people aged 75 and older.
- Adults with diabetes who lived in the lowest-income neighbourhoods had higher hospitalization rates for stroke compared to those living in the highest-income neighbourhoods (507 per 100,000 versus 416 per 100,000, respectively), however, these differences were not significant (data not shown).
- Hospitalization rates for stroke ranged from 356 per 100,000 in the Mississauga Halton Local Health Integration Network (LHIN) to 762 per 100,000 in the North West LHIN (data not shown).



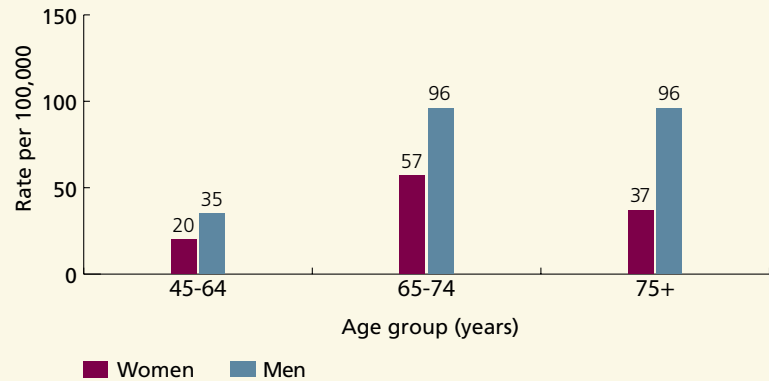
**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

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**Exhibit 9E.12 |** Number of adults aged 20 and older with diabetes per 100,000 who had a carotid endarterectomy, by sex and age group, in Ontario, 2006/07

**FINDINGS**

- Carotid endarterectomy rates were highest among those aged 65 and older. Carotid endarterectomy could not be examined in adults under age 45 due to the small numbers of procedures in that age group.
- Across all age groups, women with diabetes were less likely than men with diabetes to have a carotid endarterectomy.
- Sex differences in carotid endarterectomy rates were greater than the observed sex differences in hospitalization rates for stroke.
- Among adults with diabetes, rates of carotid endarterectomy did not vary by neighbourhood income (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

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## DIABETES AND PERIPHERAL VASCULAR DISEASE

**Indicator:** The following indicators measure the number of adults aged 20 and older with diabetes per 100,000 who, over a one-year period, had at least one:

- major lower extremity amputation (below hip and above ankle)
- minor lower extremity amputation (ankle or lower)
- peripheral revascularization procedure

**Background:** Foot complications are a major cause of morbidity and mortality in people with diabetes.<sup>145, 217</sup> In Ontario, nearly two-thirds of non-traumatic lower extremity amputations occur in people with diabetes.<sup>188</sup> One-third of those undergoing amputation die within the following year. Amputations are potentially preventable through a combination of measures, including regular foot examinations, foot care education, use of proper footwear, good glucose control, smoking cessation, and early detection and treatment of diabetic foot ulcers.<sup>82, 131</sup> Peripheral revascularization may prevent amputation and promote healing in patients with ulcers by restoring the blood supply to the foot.<sup>223</sup>

The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006. Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) were used to measure these indicators in the 2006/07 fiscal year. In order to restrict the analysis to amputations related to diabetes, we excluded amputations that occurred during a hospital admission related to malignancy or to major trauma (see [Appendix 9.3](#) for details).

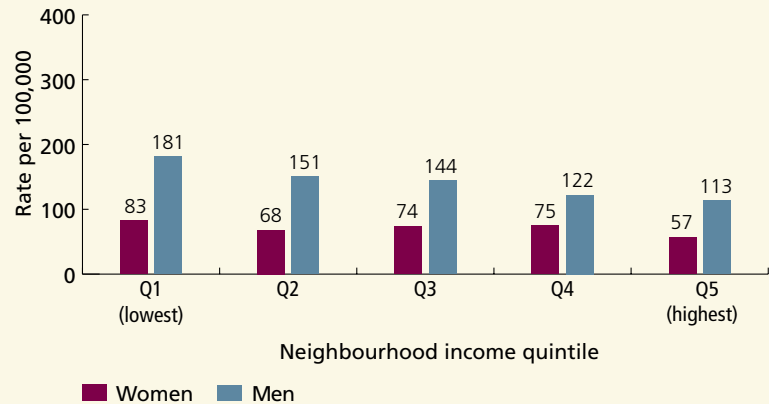
**Findings:** In Ontario, the rate of amputations was 109 major amputations and 78 minor amputations per 100,000 people aged 20 and older with diabetes. Women were less likely than men to have major amputations (72 per 100,000 versus 143 per 100,000, respectively) or minor amputations (44 per 100,000 versus 109 per 100,000, respectively).

The number of adults with diabetes aged 20 and older who underwent a peripheral revascularization procedure in 2006/07 was 111 per 100,000. Women were less likely than men to be revascularized (77 per 100,000 versus 143 per 100,000, respectively).

**Exhibit 9E.13 |** Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had a major amputation, by sex and neighbourhood income quintile, in Ontario, 2006/07

**FINDINGS**

- Among men with diabetes, those living in the lowest-income neighbourhoods were much more likely to have a major amputation than those living in the highest-income neighbourhoods (181 per 100,000 versus 113 per 100,000, respectively). The income gradient was not significant among women with diabetes, possibly due to small numbers and limited power to detect differences.
- Men living in the lowest-income neighbourhoods were more likely than men living in the highest-income neighbourhoods to undergo minor amputations (128 per 100,000 versus 76 per 100,000, respectively) or peripheral revascularization (161 per 100,000 versus 111 per 100,000, respectively). Again, these indicators did not differ by neighbourhood income among women (data not shown).



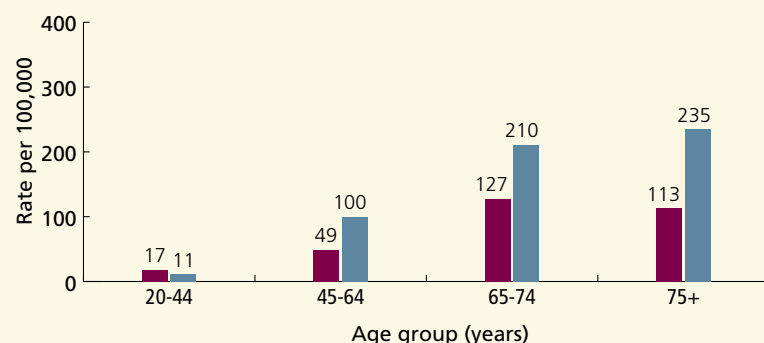
**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

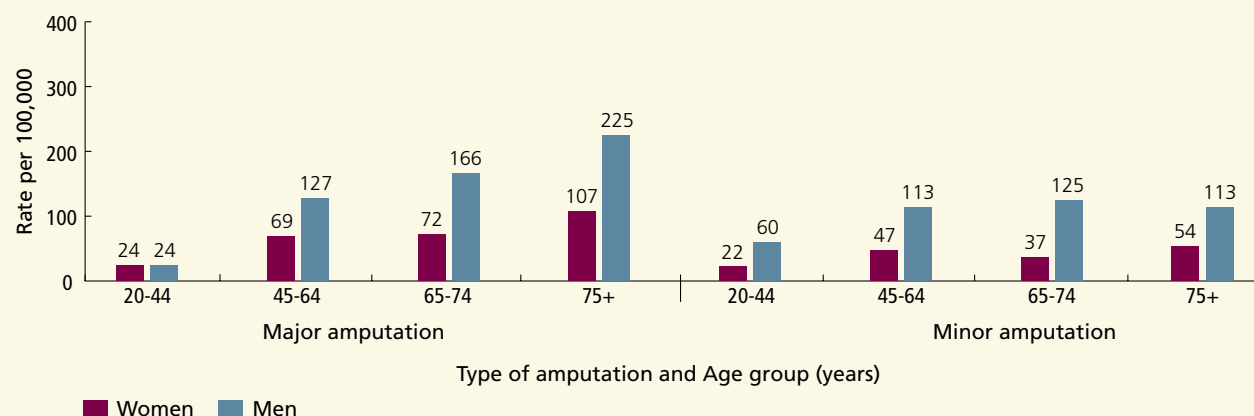
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**Exhibit 9E.14** | Number of adults aged 20 and older with diabetes per 100,000 who had a peripheral revascularization procedure or an amputation, by sex and age group, in Ontario, 2006/07

**Peripheral revascularization procedure**



**Amputation**



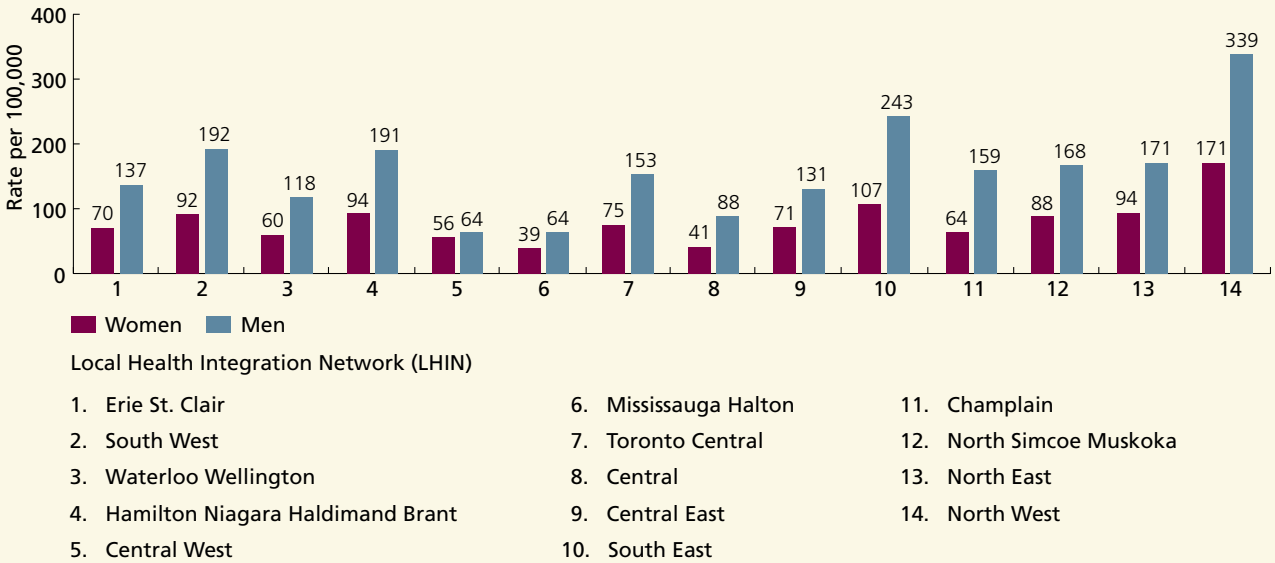
**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**FINDINGS**

- Among adults with diabetes, rates of major amputation and peripheral revascularization were lowest among those aged 20-44 and increased sharply with age for both women and men.
- While the rate of minor amputations was still lowest among women and men aged 20-44, the difference associated with age was substantially smaller. Among adults aged 45 and older the rate of minor amputations did not vary by age for women or for men.
- Young women and men with diabetes (aged 20-44) had similar rates of major amputations and peripheral revascularization; however, in the older age groups, women were about half as likely to undergo one of these procedures as men were.
- Across all age groups, the rates of minor amputations were two to three times higher among men than among women.

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**9E.15 | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had a major amputation, by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07**



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**FINDINGS**

- The rates of major and minor amputations varied across LHINs among women and men with diabetes (data on major amputations shown).
- Among adults with diabetes, the rates of major amputation ranged from 39 per 100,000 (Mississauga Halton LHIN) to 171 per 100,000 (North West LHIN) among women and from 64 per 100,000 (Central West and Mississauga Halton LHINs) to 339 per 100,000 (North West LHIN) among men.
- The rates of minor amputation ranged from 21 per 100,000 (Central LHIN) to 135 per 100,000 (North West LHIN) among women with diabetes and from 46 per 100,000 (Central West LHIN) to 256 per 100,000 (North East LHIN) among men with diabetes (data not shown).
- The rate of peripheral revascularization among adults with diabetes varied significantly across LHINs, ranging from 43 per 100,000 (Waterloo Wellington LHIN) to 151 per 100,000 (North East LHIN) among women and from 69 per 100,000 (North West LHIN) to 248 per 100,000 (North East LHIN) among men (data not shown).

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## CHRONIC DIALYSIS THERAPY

**Indicator:** This indicator measures the number of adults aged 20 and older with diabetes per 100,000 who received chronic dialysis (dialysis duration of 90 days or more) over a one-year period.

**Background:** Chronic kidney disease remains one of the most common and serious complications of diabetes and can lead to chronic kidney failure, known as end-stage renal disease (ESRD). Diabetes is the leading cause of kidney failure in Canada, responsible for half of all new cases.<sup>190</sup> The onset of chronic kidney disease can be prevented or delayed through optimal glucose and blood pressure control, as well as the use of specific therapies (angiotensin converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB) therapy) in individuals who have early signs of kidney disease based on the presence of microalbuminuria (abnormal levels of protein in the urine).<sup>130, 163, 224, 225</sup> Identification and appropriate treatment of early kidney disease is critical for preventing the progression to ESRD. Once a person develops ESRD, survival depends on replacing kidney function by either dialysis or transplantation.

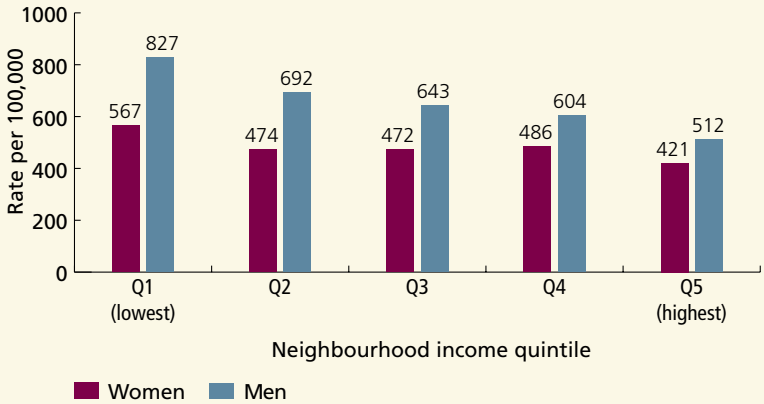
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006 (see [Appendix 9.3](#) for details). Data from the Ontario Health Insurance Plan (OHIP) were used to identify people who were on hemodialysis or peritoneal dialysis for a period of 90 days or more in the 2006/07 fiscal year (see [Appendix 9.3](#) for more details).

**Findings:** In Ontario in 2006/07, the number of people who received chronic dialysis was 580 per 100,000 people aged 20 and older with diabetes. Women were less likely than men to receive chronic dialysis (492 per 100,000 versus 663 per 100,000, respectively).

**Exhibit 9E.16** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who received chronic dialysis, by sex and neighbourhood income quintile, in Ontario, 2006/07

**FINDINGS**

- There was an inverse relationship between neighbourhood income and the rate of chronic dialysis among women and men with diabetes.
- Women living in the lowest-income neighbourhoods were more likely to receive chronic dialysis than women living in the highest-income neighbourhoods (567 per 100,000 versus 421 per 100,000, respectively).
- Men living in the lowest-income neighbourhoods were more likely to receive chronic dialysis than men living in the highest-income neighbourhoods (827 per 100,000 versus 512 per 100,000, respectively).
- Across all income quintiles, men were more likely than women to receive chronic dialysis, but the sex differences were greater in the lower-income neighbourhoods.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census

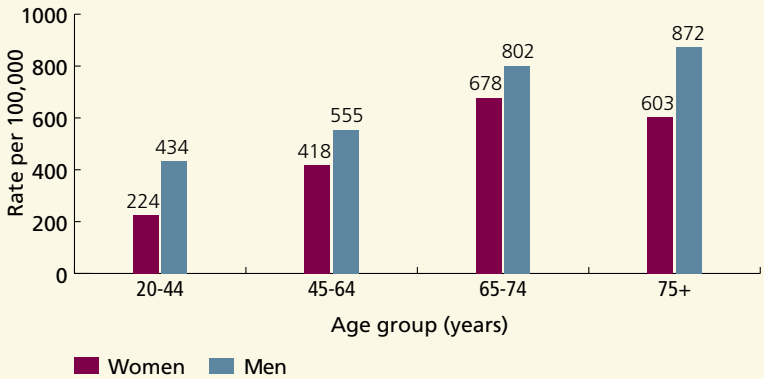
**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

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**Exhibit 9E.17** | Number of adults aged 20 and older with diabetes per 100,000 who received chronic dialysis, by sex and age group, in Ontario, 2006/07

**FINDINGS**

- Among women with diabetes, the proportion who received chronic dialysis increased with age to age 74 and then declined slightly.
- Among men with diabetes, the proportion who received chronic dialysis increased with age across all age groups, however, the increase in the oldest age group was less marked.
- Across all age groups, women were less likely than men to receive chronic dialysis; however, the sex difference was greatest in the youngest and oldest age groups.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

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**Exhibit 9E.18** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who received chronic dialysis, by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07

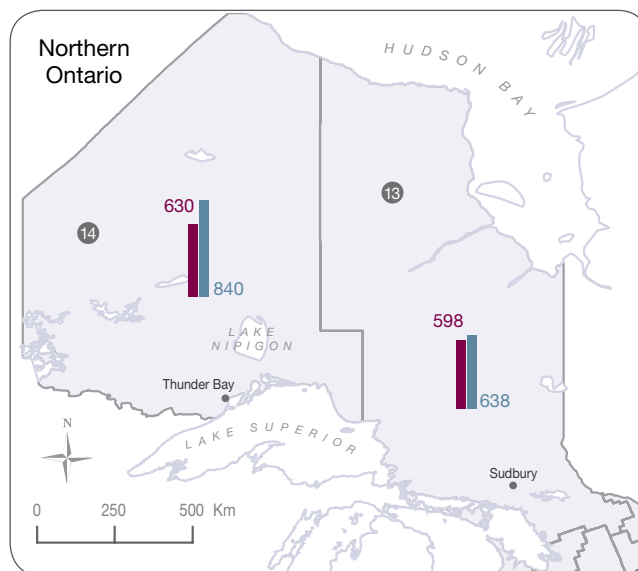
**FINDINGS**

- The rates of chronic dialysis varied across LHINs among women and men with diabetes.
- Among women with diabetes, the proportion who received chronic dialysis ranged from 338 per 100,000 (Erie St. Clair LHIN) to 636 per 100,000 (North Simcoe Muskoka LHIN).
- Among men with diabetes, the proportion who received chronic dialysis ranged from 481 per 100,000 (Erie St. Clair LHIN) to 840 per 100,000 (North West LHIN).

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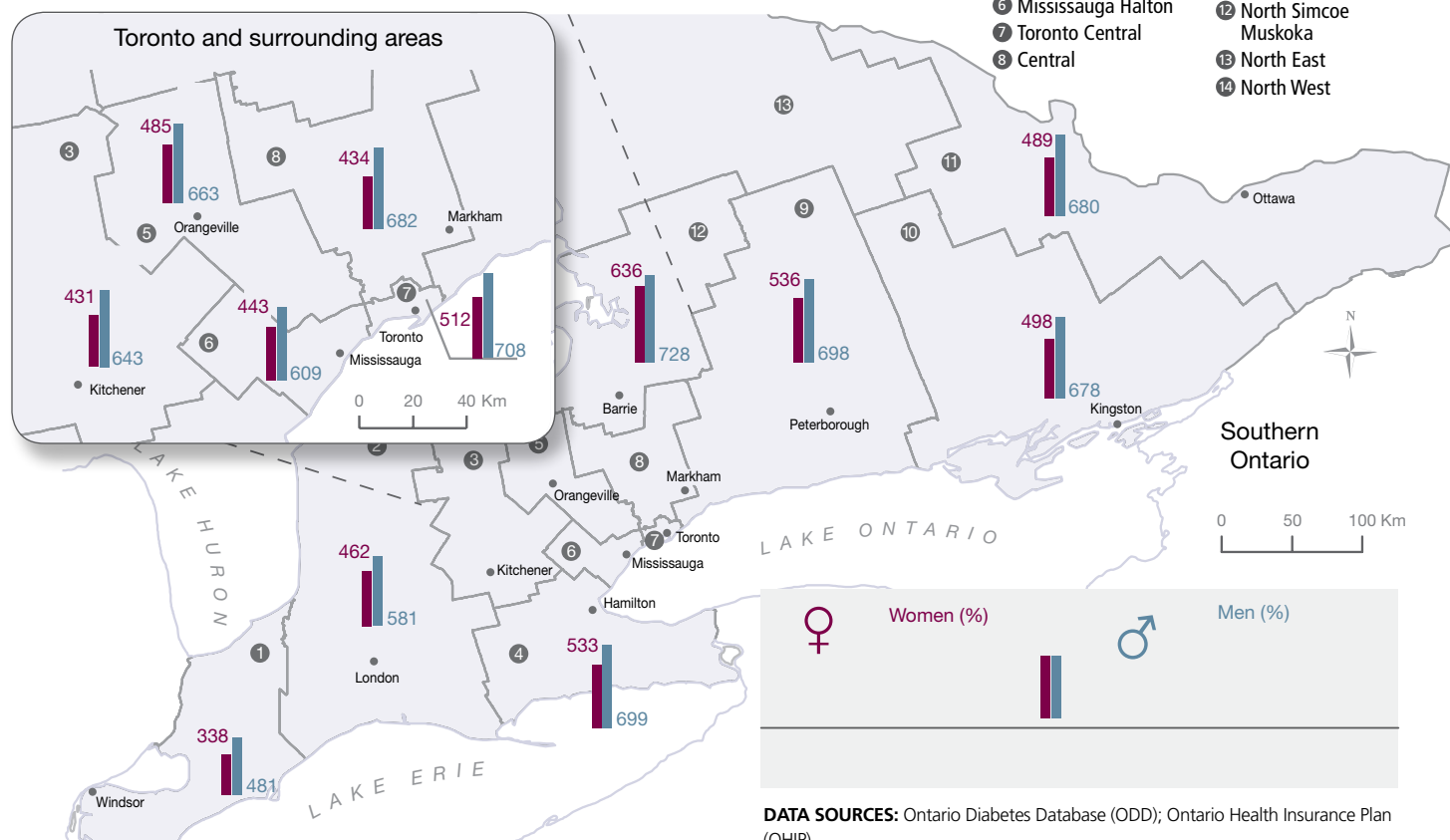
**Overall Ontario**

In Ontario, 492 per 100,000 women and 663 per 100,000 men aged 20 and older with diabetes were on chronic dialysis during 2006/07.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

## DIABETIC RETINOPATHY

**Indicator:** These indicators measure the number of adults aged 20 and older with diabetes per 100,000 who, over a one-year period, had:

- laser photocoagulation
- a vitrectomy

**Background:** Diabetic retinopathy is a common complication of diabetes,<sup>191, 226</sup> and the leading cause of blindness in Canadians between the ages of 30-69.<sup>227</sup> Previous studies have shown the crude prevalence of retinopathy among adults with diabetes in the US to be approximately 40 percent, with higher rates among people with type 1 diabetes compared to those with type 2 diabetes.<sup>226</sup> The prevalence of sight threatening (proliferative) retinopathy is lower, 23 percent and 10 percent in type 1 and type 2 diabetes respectively.<sup>228</sup> The onset and progression of diabetic retinopathy can be reduced substantially through tight control of glucose and blood pressure.<sup>39, 130, 229</sup>

*Retinal Photocoagulation:* If proliferative diabetic retinopathy is detected early, vision loss may be prevented by retinal laser photocoagulation.<sup>230, 231</sup> Left untreated, proliferative diabetic retinopathy leads to blindness in 50 percent of patients within five years.<sup>232</sup>

*Vitrectomy Surgery:* Vitrectomy is a surgical procedure used to treat end-stage complications of diabetic retinopathy and hence may be regarded as a marker of poor outcomes.<sup>233, 234</sup>

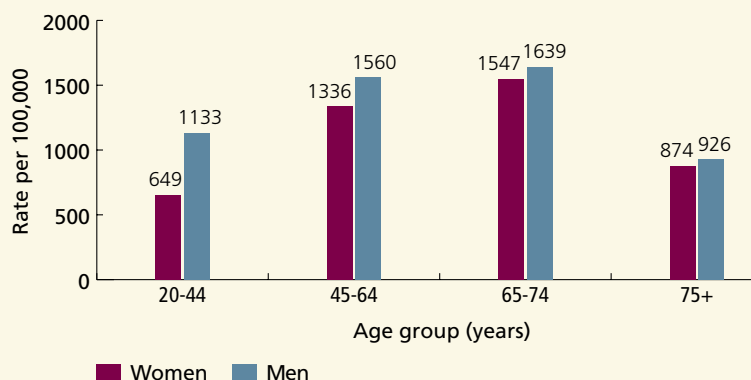
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006. Data from the Ontario Health Insurance Plan (OHIP) were used to identify people who underwent laser photocoagulation and vitrectomy in the 2006/07 fiscal year (see [Appendix 9.3](#) for more detail).

**Findings:** In Ontario in 2006/07, among those aged 20 and older with diabetes, 1293 per 100,000 underwent retinal laser photocoagulation and 253 per 100,000 underwent a vitrectomy. Women were less likely than men to undergo either procedure (1194 per 100,000 women versus 1382 per 100,000 men for laser photocoagulation; 220 per 100,000 women versus 284 per 100,000 men for vitrectomy).

### Exhibit 9E.19 | Number of adults aged 20 and older with diabetes per 100,000 who had laser photocoagulation, by sex and age group, in Ontario, 2006/07

#### FINDINGS

- Rates of laser photocoagulation were highest among women and men with diabetes aged 45-64 and 65-74.
- Among adults with diabetes aged 20-64, men had higher rates of laser photocoagulation than women; with the greatest sex difference among adults aged 20-44. The rates of laser photocoagulation did not vary significantly by sex among adults aged 65 and older.
- Adults with diabetes living in the highest-income neighbourhoods had slightly lower rates of laser photocoagulation than those living in the lowest-income neighbourhoods, however, these differences were small (data not shown).



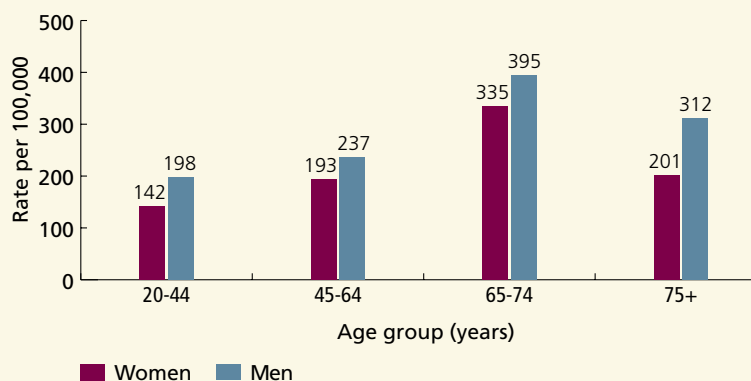
**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

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### Exhibit 9E.20 | Number of adults aged 20 and older with diabetes per 100,000 who had a vitrectomy, by sex and age group, in Ontario, 2006/07

#### FINDINGS

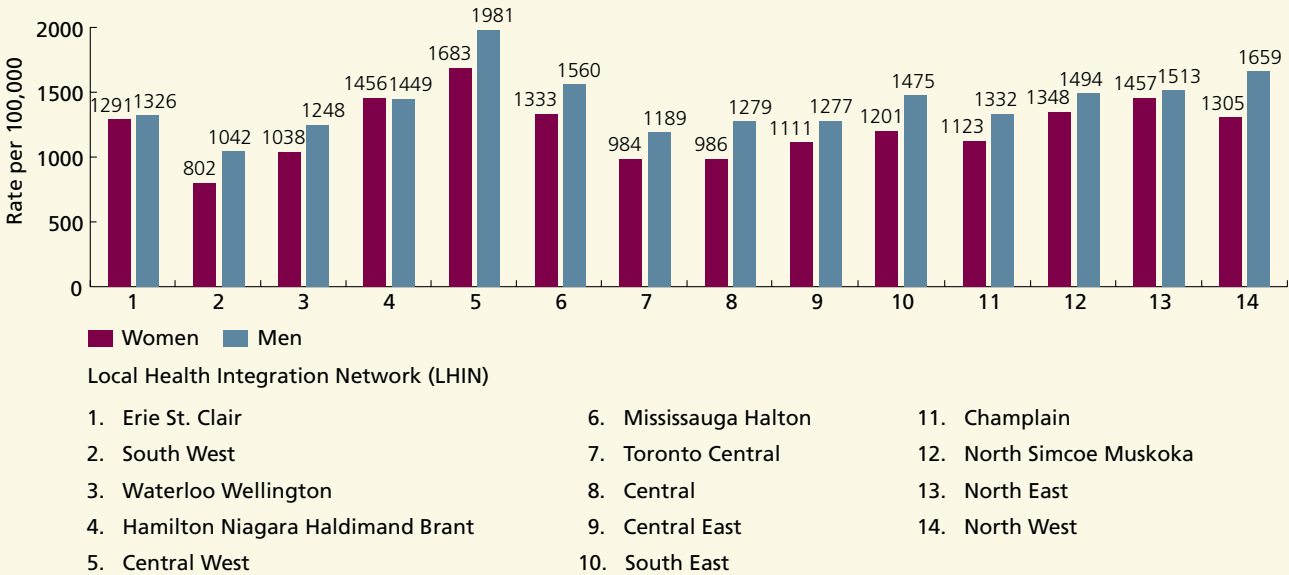
- Rates of vitrectomy among women and men with diabetes increased with age to age 74, and then declined among those aged 75 and older. Men had consistently higher rates than women, across all age groups.
- Vitrectomy rates did not differ by neighbourhood income for women or for men (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

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**Exhibit 9E.21** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had laser photocoagulation, by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07



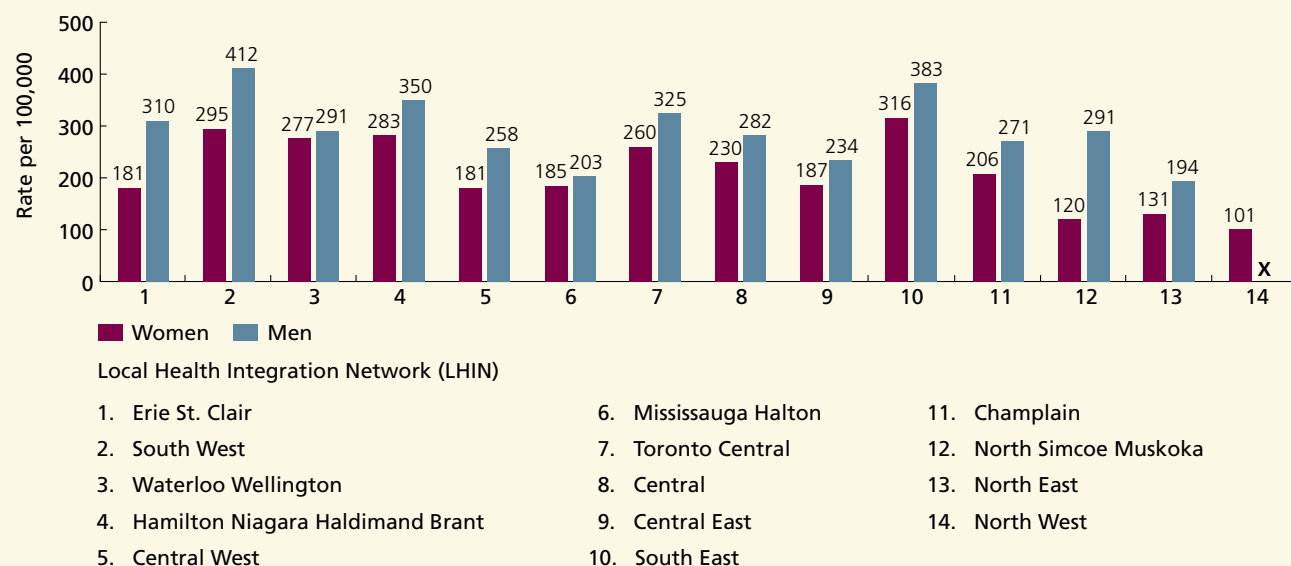
**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

### FINDINGS

- Rates of laser photocoagulation varied across LHINs among women and men with diabetes.
- Among women with diabetes, rates of laser photocoagulation ranged from 802 per 100,000 in the South West LHIN to 1683 per 100,000 in the Central West LHIN.
- Among men with diabetes, rates of laser photocoagulation ranged from 1042 per 100,000 in the South West LHIN to 1981 per 100,000 in the Central West LHIN.

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**Exhibit 9E.22** | Age-standardized number of adults aged 20 and older with diabetes per 100,000 who had a vitrectomy, by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

**X** Suppressed due to small sample size

### FINDINGS

- Vitrectomy rates varied across LHINs among women and men with diabetes.
- Among women with diabetes, vitrectomy rates ranged from 101 per 100,000 in the North West LHIN to 316 per 100,000 in the South East LHIN.
- Among men with diabetes, vitrectomy rates ranged from 194 per 100,000 in the North East LHIN to 412 per 100,000 in the South West, however, some data were suppressed due to small numbers.

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# Section 9E

## SUMMARY OF FINDINGS

This section reports on outcome indicators associated with diabetes including hospital admissions related to glucose control, infections, cardiovascular and cerebrovascular complications, procedures related to circulatory complications of diabetes and chronic dialysis. Consistently, men had higher rates of diabetes complications than women and complication rates varied by age and Local Health Integration Network (LHIN) for most indicators. A number of the health outcome indicators also varied by neighbourhood income; low-income women and men generally had higher rates of hospitalizations and diabetic complications. The findings are summarized below.

### Hospital Visits for Hyperglycemia and Hypoglycemia

In Ontario, 1362 per 100,000 adults with diabetes were either seen in an emergency department or hospitalized in 2006/07 because of hyperglycemia or hypoglycemia. Women were slightly less likely to be hospitalized than men and rates also varied by neighbourhood income, age and LHIN. Women and men living in lower-income neighbourhoods were more likely to have a hospital admission or emergency department visit for one of these two glucose-control related conditions than adults living in higher-income neighbourhoods (1605 per 100,000 versus 1181 per 100,000, respectively). The number of adults with diabetes who had at least one hospital visit for hyper- or hypoglycemia was highest in the youngest and oldest age groups. High rates in those under age 45 are likely related to the higher proportion of type 1 diabetes in this age group.

### Hospitalizations for Skin and Soft Tissue Infections

In Ontario, 534 per 100,000 adults with diabetes were hospitalized for a skin and soft tissue infection in 2006/07. Women were somewhat less likely to be

hospitalized than men (464 per 100,000 women versus 601 per 100,000 men) and the gender differences persisted across all age groups and neighbourhood income quintiles. Hospitalization rates increased with age and varied by LHIN and neighbourhood income. The hospitalization rates for skin and soft tissue infections among adults living in the lowest-income neighbourhoods was over 40 percent higher than the rate among adults living in the highest-income neighbourhoods.

### Diabetes and Cardiac Disease

Among adults with diabetes aged 20 and older, 740 per 100,000 were hospitalized for an acute myocardial infarction (AMI), 863 per 100,000 were hospitalized for congestive heart failure (CHF), 583 per 100,000 underwent percutaneous coronary intervention (PCI) and 353 per 100,000 had coronary artery bypass graft (CABG) surgery in 2006/07. For all four indicators, men had higher rates of both hospital admissions and therapeutic interventions than women. Admission rates and PCI rates were higher among women living in the lowest-income neighbourhoods as compared to women living in the highest-income neighbourhoods, which likely reflects the higher burden of disease in this group; admission rates for AMI or for CHF varied by neighbourhood income among men, however, procedure rates did not. Hospitalizations for CHF and for AMI increased sharply with age and, across most age groups, women with diabetes experienced lower rates than men, however, the sex differences lessened with increasing age. Revascularization rates also increased with age, but declined again after age 75. Sex differences in coronary procedure rates were greater than those observed for AMI and CHF hospitalizations, however, we were unable to assess overuse or underuse of these procedures due to lack of clinical data.

## Diabetes and Stroke

In Ontario in 2006/07, the hospitalization rate for stroke among adults aged 20 and older with diabetes was 457 per 100,000 and 50 per 100,000 underwent a carotid endarterectomy. Men had higher rates of stroke and carotid endarterectomy than women, but rates did not vary significantly by neighbourhood income. Hospitalization rates for stroke varied across LHINs. The risk of being hospitalized for a stroke increased sharply with age in both women and men. Among adults aged 20-74 with diabetes, women were less likely to be hospitalized for a stroke than men; however, the sex difference disappeared among people aged 75 and older. Carotid endarterectomy rates were highest in adults aged 65 and older. Across all age groups, women with diabetes were less likely than men with diabetes to have had a carotid endarterectomy; the sex difference was greatest in those aged 75 and older. Sex differences in carotid endarterectomy rates were greater than those observed in stroke admission rates, however, we were unable to assess overuse or underuse of these procedures due to lack of clinical data.

## Diabetes and Peripheral Vascular Disease

In Ontario, among adults aged 20 and older with diabetes, 109 per 100,000 had a major amputation, 78 per 100,000 had a minor amputation, and 111 per 100,000 underwent a peripheral revascularization procedure in 2006/07. For all three indicators, women had considerably lower rates than men. Among men with diabetes, those living in the lowest-income neighbourhoods were more likely to have an amputation or a peripheral revascularization procedure than men living in the highest-income neighbourhoods; these rates did not differ by neighbourhood income among women. Rates of major amputation and of peripheral revascularization increased sharply with age in both sexes. While the rate of minor amputations also increased with age, the difference was substantially less. Young women and men with diabetes (aged 20-44) had similar rates of major amputations and peripheral revascularization;

however, in the older age groups, women were about half as less likely to undergo one of these procedures as men were. Across all age groups, the rate of minor amputations was two to three times higher among men than among women. Rates of amputation and peripheral revascularization varied across LHINs.

## Chronic Dialysis Therapy

In Ontario in 2006/07, the number of adults with diabetes who received chronic dialysis was 580 per 100,000. Women were less likely than men to receive chronic dialysis. Adults with diabetes living in the lowest-income neighbourhoods were more likely to be on chronic dialysis than women and men living in the highest-income neighbourhoods. Among women with diabetes, the proportion who were on chronic dialysis increased with age to age 74 and then declined slightly; while among men the proportion who were on chronic dialysis increased with age across all age groups. Although men with diabetes were more likely than women with diabetes to be on dialysis across all neighbourhood income quintiles and age groups, the sex differences were greater in the lower-income neighbourhoods, as well as in the youngest and oldest age groups. The rate of chronic dialysis varied across LHINs.

## Diabetic Retinopathy

Among adults aged 20 and older with diabetes, 1293 per 100,000 underwent retinal laser photocoagulation and 253 per 100,000 underwent a vitrectomy in 2006/07. Women were less likely than men to undergo either procedure. Adults with diabetes living in the highest-income neighbourhoods had slightly lower rates of laser photocoagulation than those living in the lowest-income neighbourhoods, however, these differences were minimal. Vitrectomy rates did not differ by neighbourhood income for women or for men. The highest rates of laser photocoagulation were seen among women and men with diabetes aged 45-64 and 65-74. Rates of vitrectomy increased with age to age 74, and then declined. The rates of laser photocoagulation and vitrectomy varied across LHINs.

# Section 9F

## *Diabetes and Pregnancy*

### INTRODUCTION

Recent data suggest that while diabetes rates have risen across all age groups, young women have seen the greatest increase in diabetes over the last decade.<sup>4</sup>

As more women develop type 2 diabetes during their childbearing years, pregnancies complicated by diabetes are becoming increasingly common.<sup>31</sup> This trend has important implications for women, their offspring and the health care system. Women with pregestational diabetes (type 1 or type 2 diabetes that predated the pregnancy) have higher rates of adverse maternal and fetal outcomes than women who do not have diabetes,<sup>25-30</sup> including increased rates of caesarean section, obstructed labour, preeclampsia and hypertension in pregnancy. In addition, their infants have higher rates of perinatal mortality, shoulder dystocia (when the baby gets caught behind the mother's pubic bone, often because the baby is too large), birth injury, congenital anomalies, macrosomia (large size), neonatal hypoglycemia (low blood sugar) and hyperbilirubinemia (jaundice) requiring phototherapy.<sup>25-30</sup> Consistent with these adverse outcomes, more infants of mothers who have diabetes are admitted to the neonatal intensive care unit (NICU).

Studies have shown that both maternal and fetal outcomes can be improved for women with diabetes with appropriate pre-pregnancy and prenatal care provided by a multidisciplinary team. Optimal prenatal care for women with pregestational diabetes should involve access to a high-risk pregnancy team including specialists who are experts in both intensive diabetes management and the special circumstances of diabetes in pregnancy. The Canadian Diabetes Association (CDA) recommends "care by an interdisciplinary diabetes

health care team composed of diabetes nurse educators, dietitians, obstetricians and endocrinologists, both prior to conception and during pregnancy" to "minimize maternal and fetal risks in women with diabetes."<sup>82</sup> The CDA also recommends that pregnant women with pregestational diabetes undergo an ophthalmologic evaluation by an eye care specialist during the first trimester and as needed during the rest of pregnancy.<sup>82</sup>

Congenital anomalies are directly associated with poor glycemic control (control of blood glucose) at the time of conception and in the first trimester. As a result, the deleterious effects of poor glycemic control occur even before many women know they are pregnant. Fortunately, rates of congenital anomalies can be reduced to those seen in the general population with proper pre-pregnancy planning and excellent glycemic control prior to conception.<sup>235, 236</sup> Strategies to improve early pregnancy glucose control must therefore be initiated before attempting to conceive; tight glycemic control prior to pregnancy has also been associated with reduced rates of spontaneous abortion, preeclampsia and progression of retinopathy in the mother.<sup>237-239</sup> Tight control of glucose and blood pressure levels during pregnancy have also been associated with improved maternal and fetal outcomes for women with pregestational diabetes.<sup>240-244</sup> However, studies have shown that rates of pre-pregnancy counselling are suboptimal in women with diabetes,<sup>245-247</sup> especially among visible minority women and those with lower income and less education.<sup>246, 247</sup>

For women with pregestational diabetes, the need for appropriate care can and should be identified prior to pregnancy. However, women with gestational diabetes,

which is diabetes that is diagnosed for the first time during pregnancy, also require specialized prenatal care to lower the risk of maternal and fetal complications. Pregnant women without diabetes are screened for gestational diabetes between 24 and 28 weeks of pregnancy, or earlier if pregestational diabetes is suspected. The identification of gestational diabetes does not exclude the possibility that the condition has preceded the pregnancy but was not identified.<sup>248</sup> Gestational diabetes varies in severity, may or may not resolve with the end of the pregnancy and may or may not require treatment with insulin. Since their hyperglycemia may occur later in pregnancy, women with gestational diabetes may not have increased rates of congenital anomalies. However, they do have many of the other adverse outcomes experienced by women with pregestational diabetes, including increased rates of hypertension, preeclampsia and caesarean section. In addition, their infants have increased rates of macrosomia, shoulder dystocia, neonatal hypoglycemia, hyperbilirubinemia requiring phototherapy, and NICU admissions.<sup>249, 250</sup> Specialized care aimed at excellent glycemic control during pregnancy reduces these risks,<sup>251</sup> therefore access to appropriate prenatal care needs to be assured for all women with gestational diabetes.

The prevalence of diabetes increases with age and varies with socioeconomic status. Similarly, older women and women with low socioeconomic status have an increased risk of developing gestational diabetes<sup>252</sup> and appear to also have worse pregnancy outcomes.<sup>253, 254</sup> However, the effect of age and socioeconomic status on pregnancy outcomes has not been specifically studied among women with diabetes during pregnancy.

In this section, we report indicators of prenatal care, obstetrical complications and fetal complications among women with pregestational diabetes and gestational diabetes compared to women without diabetes. We examine the differences associated with sex, neighbourhood income, age and Local Health Integration Network (LHIN).

### The indicators include:

The percentage of pregnant women who received the following prenatal care:

- At least one visit to an obstetrician during pregnancy
- At least one visit to a endocrinologist or general internist during pregnancy (among women with pregestational diabetes only)
- At least one eye examination in the year before delivery (among women with pregestational diabetes only)

The percentage of pregnant women who had the following obstetrical complications:

- A diagnosis of hypertension (pre-existing or pregnancy induced) in the six months before or at delivery
- Preeclampsia/eclampsia in the six months before or at delivery
- Any obstructed labour (including shoulder dystocia) and specifically shoulder dystocia at delivery
- Caesarean section

The percentage or proportion of infants who had the following fetal complications:

- Stillbirth or in-hospital mortality (per 1,000)
- Congenital anomalies (major or minor)
- Premature delivery (less than 37 weeks)
- Phototherapy for hyperbilirubinemia
- NICU admission

Administrative data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) were used to identify all women aged 20 and older who gave birth between April 1st 2002 and March 31st 2007. Records were linked to the Ontario Health Insurance Plan (OHIP) database and the Ontario Diabetes Database (ODD) to determine whether these women had pregestational diabetes, gestational diabetes or no diabetes. The OHIP database was used to assess prenatal care. The Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB) was used to classify specialists. The CIHI-DAD was used to measure obstetrical complications. The ICES Mother-Baby (MOMBABY) Linked database and CIHI-DAD were used to link women to offspring from their index pregnancy in order to examine complication rates (see [Appendix 9.3](#) for details).

## EXHIBITS AND FINDINGS

### PRENATAL CARE

**Indicator:** These indicators measure the percentage of pregnant women aged 20 and older who received the following prenatal care:

- at least one visit to an obstetrician during pregnancy
- at least one visit to a endocrinologist or general internist during pregnancy (among women with pregestational diabetes only)
- at least one eye examination (from a general practitioner/family physician (GP/FP), optometrist, or ophthalmologist) in the year before delivery (among women with pregestational diabetes only)

**Background:** Optimal prenatal care for women with pregestational diabetes should involve access to a high-risk pregnancy team including specialists who are experts in both intensive diabetes management and the special circumstances of pregnancy.<sup>82, 235</sup> Because diabetic complications can worsen during pregnancy, these women should also be screened for the presence of microvascular disease, including diabetic retinopathy.<sup>82, 239</sup>

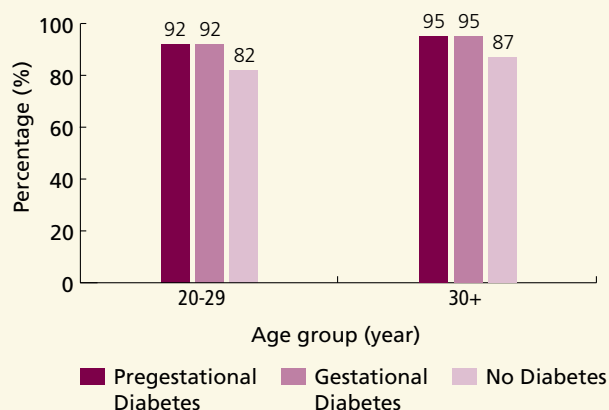
For these indicators, the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify all women aged 20 and older who gave birth between April 1st 2002 and March 31st 2007. If a woman had multiple deliveries in this time period, one delivery was chosen at random. Diabetes status in pregnant women was established by linking births to the Ontario Diabetes Database (ODD) and hospital records. Prenatal care was identified using Ontario Health Insurance Plan (OHIP) data (see [Appendix 9.3](#) for more detail). Services provided by physicians paid through alternate funding plans (AFPs) may not be completely captured using OHIP data. Their concentration in certain specialties or geographic areas could distort an analysis.

**Findings:** In Ontario, most, but not all, women with diabetes (94 percent with pregestational diabetes and 94 percent with gestational diabetes) visited an obstetrician for prenatal care compared to 85 percent of women without diabetes in pregnancy. Among women with pregestational diabetes, only 55 percent were seen by an endocrinologist or general internist during pregnancy and only 31 percent had an eye examination in the year prior to delivery.

## Exhibit 9F.1 | Age-standardized percentage of pregnant women who saw an obstetrician during pregnancy,<sup>^</sup> by diabetes status and age group, in Ontario, 2002/03-2006/07

### FINDINGS

- Women with pregestational or gestational diabetes were more likely to see an obstetrician in the nine months before delivery than women without diabetes.
- The percentage of pregnant women who saw an obstetrician in the nine months before delivery did not vary by age for women with pregestational and gestational diabetes, but did vary for women without diabetes.
- The percentage of pregnant women with diabetes (pregestational or gestational) who saw an obstetrician did not vary by neighbourhood income (data not shown).
- The percentage of pregnant women who saw an obstetrician in the nine months before delivery varied significantly by Local Health Integration Network (LHIN) regardless of diabetes status. In all LHINs women with pregestational and gestational diabetes were more likely to see an obstetrician than women without diabetes (data not shown).

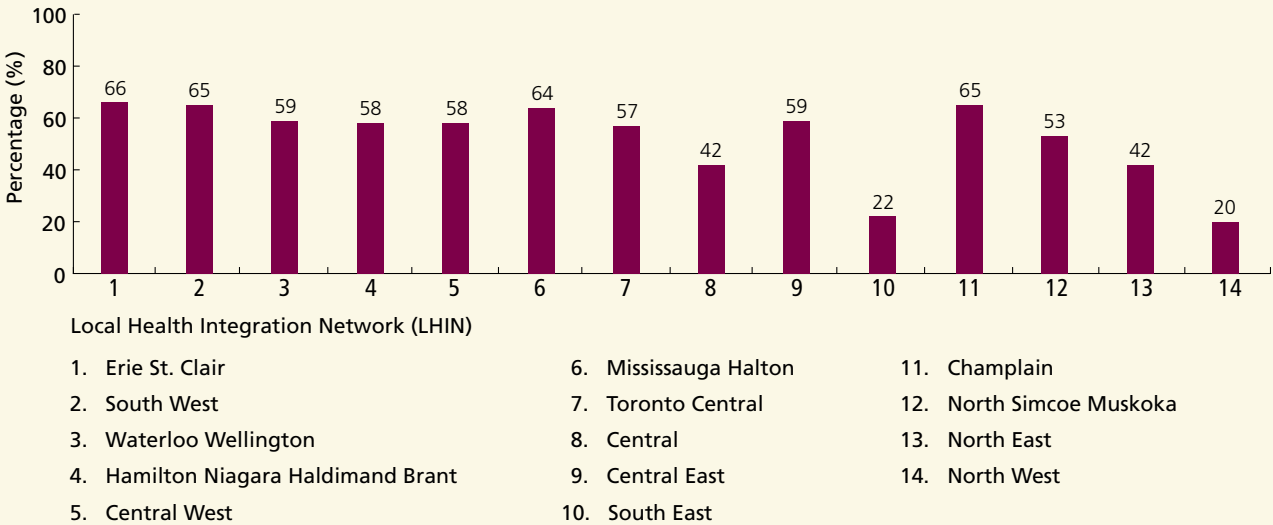


**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Physician Database (IPDB)

<sup>^</sup> Within nine months prior to delivery

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**Exhibit 9F.2 |** Age-standardized percentage of pregnant women with pregestational diabetes who saw an endocrinologist and/or an internist during pregnancy,<sup>^</sup> by Local Health Integration Network (LHIN), in Ontario, 2002/03-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Physician Database (IPDB)

<sup>^</sup> Within nine months prior to delivery

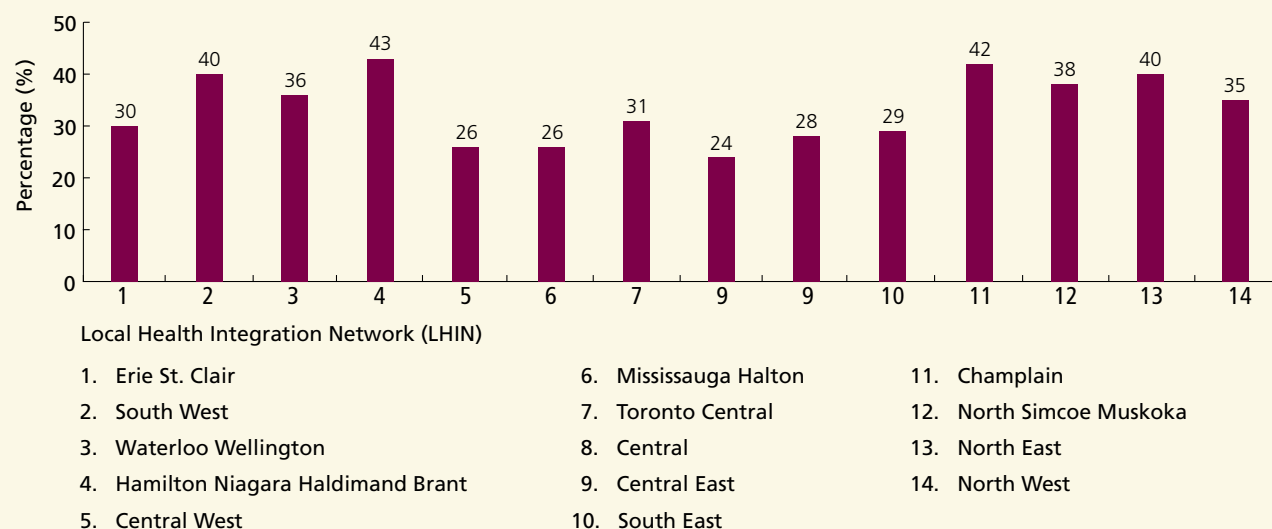
**FINDINGS**

- The percentage of women with pregestational diabetes who saw an endocrinologist or internist in the nine months prior to delivery varied significantly across LHINs.
- Some of the variation may be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete, as occurs in the South East LHIN, or due to out of province use of specialists, as occurs in the North West LHIN.
- Pregnant women with pregestational diabetes who were living in the lowest-income neighbourhoods were somewhat more likely to be seen by an endocrinologist or internist in the nine months prior to delivery than those living in the highest-income neighbourhoods (59 percent versus 52 percent, respectively) (data not shown).
- Women with pregestational diabetes who were aged 30 and older were more likely to be seen by an endocrinologist or internist in the nine months prior to delivery than women aged 20-29 (57 percent versus 50 percent, respectively) (data not shown).

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**Exhibit 9F.3 |** Age-standardized percentage of pregnant women with pregestational diabetes who had at least one eye examination in the year before delivery, by Local Health Integration Network (LHIN), in Ontario, 2002/03-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

### FINDINGS

- The percentage of pregnant women with pregestational diabetes who had an eye examination in the year prior to delivery varied across LHINs from 24 percent (Central LHIN) to 43 percent (Hamilton, Niagara Haldimand Brant LHIN). In all LHINs, less than half of women received recommended eye care.
- Women aged 20-29 were more likely than older women (aged 30 and older) to have had an eye examination, but this difference was small (34 percent versus 30 percent, respectively) (data not shown).
- The percentage of pregnant women with pregestational diabetes who had an eye examination in the year prior to delivery did not vary by neighbourhood income (data not shown).

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## OBSTETRICAL COMPLICATIONS

**Indicator:** The following indicators measure the percentage of pregnant women aged 20 and older with pregestational diabetes, gestational diabetes and no diabetes who delivered over a five-year period who had the following obstetrical complications:

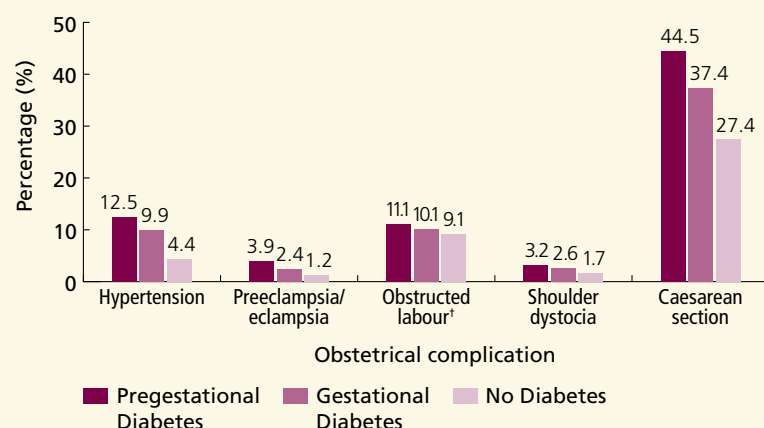
- A diagnosis of hypertension (pre-existing or pregnancy-induced) in the six months before or at delivery
- Preeclampsia/eclampsia in the six months before or at delivery
- Any obstructed labour (including shoulder dystocia)
  - shoulder dystocia at delivery
- Caesarean section

**Background:** Evidence shows that pregnant women with diabetes are more likely than women without diabetes to have obstetrical complications such as hypertension, obstructed labour and caesarean section.<sup>25-27, 29, 30</sup> Obstructed labour, and in particular shoulder dystocia, can lead to birth injury and asphyxia in infants at delivery. In order to avoid complications associated with obstructed labour, infants may be delivered by caesarean section. The risk of complications is further increased by the presence of hypertension. Infants born to women with preexisting or gestational hypertension have an increased risk of serious morbidity or perinatal death. Many adverse outcomes in this population may be preventable through high quality care prior to conception and throughout pregnancy.<sup>237, 240, 241, 243, 244</sup>

For these indicators, the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify all women aged 20 and older who gave birth between April 1st 2002 and March 31st 2007. If a woman had multiple deliveries in this time period, one delivery was chosen at random. Diabetes status in pregnant women was established by linking births to the Ontario Diabetes Database (ODD), OHIP physician claims and hospital records. The CIHI-DAD was used to measure the rates of obstetrical complications (see [Appendix 9.3](#) for more detail), however, the completeness of reporting of some complications will vary.

**Findings:** In Ontario, the percentages of women with pregestational diabetes who had obstetrical complications were: 12.5 percent (hypertension); 3.9 percent (preeclampsia or eclampsia); 11.1 percent (obstructed labour); 3.2 percent (shoulder dystocia). Almost half of all women with pregestational diabetes (45 percent) delivered by caesarean section. For all indicators, women with pregestational diabetes had higher rates of obstetrical complications than women without diabetes. For some indicators, women with gestational diabetes also had higher rates of obstetrical complications than women without diabetes (see [Exhibit 9F.4](#)).

### Exhibit 9F.4 | Age-standardized percentage of pregnant women who had obstetrical complications, by diabetes status, in Ontario, 2002/03-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

† Includes shoulder dystocia

### FINDINGS

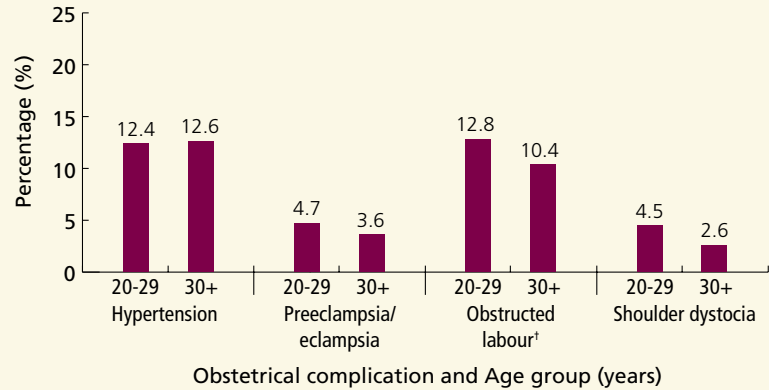
- Compared to women without diabetes, women with pregestational diabetes had rates that were about three times higher for hypertension and preeclampsia/eclampsia and almost twice as high for shoulder dystocia and caesarean section. Rates of obstructed labour were slightly higher among women with pregestational diabetes compared to women without diabetes.
- Compared to women without diabetes, women with gestational diabetes had rates that were about two times higher for hypertension and preeclampsia/eclampsia. Rates of caesarean section, obstructed labour and shoulder dystocia were also higher in this group compared to women without diabetes, however, the differences in rates of obstructed labour and shoulder dystocia were small.
- The rates of hypertension varied somewhat by Local Health Integration Network (LHIN) and ranged from 7.9 percent (Mississauga Halton LHIN) to 21.9 percent (North Simcoe Muskoka LHIN) among women with pregestational diabetes and from 7.4 percent (Central LHIN) to 15.9 percent (North East LHIN) women among with gestational diabetes (data not shown).
- The preeclampsia/eclampsia rates ranged from 2.0 percent (Mississauga Halton LHIN) to 7.4 percent (South West LHIN) among women with pregestational diabetes and from 1.1 percent (Erie St. Clair LHIN) to 4.8 percent (North East LHIN) among women with gestational diabetes (data not shown).
- The rates of obstructed labour and shoulder dystocia also varied by LHIN. Obstructed labour rates ranged from 8.9 percent (Mississauga Halton and Central LHINs) to 16.1 percent (Hamilton Niagara Haldimand LHIN) among women with pregestational diabetes and from 8.0 percent (Central West LHIN) to 12.1 percent (Hamilton Niagara Haldimand LHIN) among women with gestational diabetes. Shoulder dystocia rates ranged from 1.6 percent (Central West LHIN) to 5.3 percent (South West LHIN) among women with pregestational diabetes and from 1.0 percent (Central West LHIN) to 4.6 percent (North West LHIN) among women with gestational diabetes (data not shown).

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**Exhibit 9F.5 | Percentage of pregnant women with pregestational diabetes who had obstetrical complications, by age group, in Ontario, 2002/03-2006/07**

**FINDINGS**

- Among women with pregestational diabetes, younger women (aged 20-29) had higher rates of preeclampsia/eclampsia, obstructed labour and shoulder dystocia than older women. Rates of hypertension among women with pregestational diabetes did not vary with age. Higher rates of preeclampsia/eclampsia among younger women with pregestational diabetes may reflect the fact that this complication is more common in the first pregnancy.
- Among women with gestational diabetes, those aged 20-29 had slightly higher rates of shoulder dystocia than older women (3.0 percent versus 2.3 percent for shoulder dystocia), however, the overall rates of obstructed labour did not vary by age (data not shown).
- Rates of obstetrical complications (hypertension, preeclampsia and eclampsia, obstructed labour and shoulder dystocia) among women with pregestational or gestational diabetes did not vary by neighbourhood income (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

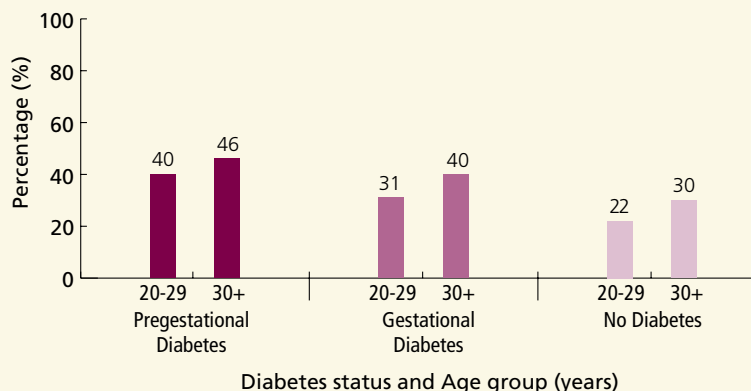
† Includes shoulder dystocia

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## Exhibit 9F.6 | Percentage of pregnant women who had a caesarean section, by age group and diabetes status, in Ontario, 2002/03-2006/07

### FINDINGS

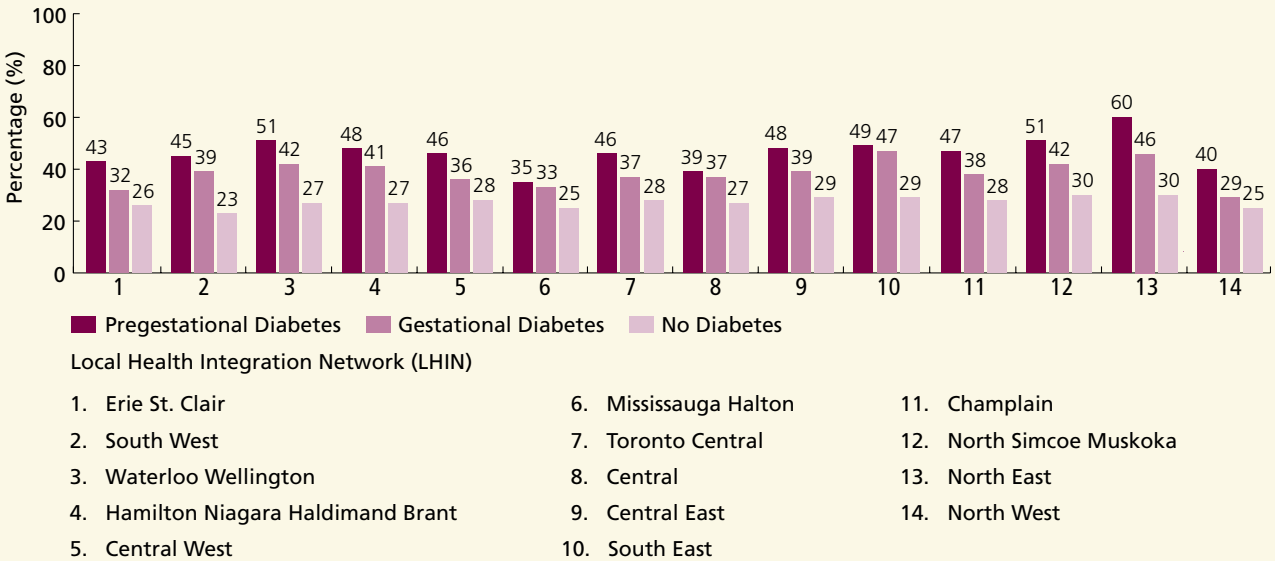
- Women with pregestational or gestational diabetes had higher caesarean section rates than women without diabetes, irrespective of age.
- Women aged 30 and older were more likely to have a caesarean section than younger women, regardless of diabetes status.
- Caesarean section rates did not vary by neighbourhood income (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

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**Exhibit 9F.7 |** Age-standardized percentage of pregnant women who had a caesarean section, by Local Health Integration Network (LHIN) and diabetes status, in Ontario, 2002/03-2006/07



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

### FINDINGS

- Caesarean section rates varied by LHIN among women with pregestational diabetes, with the highest rate found in the North East LHIN (60 percent) and the lowest rate in the Mississauga Halton LHIN (35 percent).
- Among women with gestational diabetes, the percentage who delivered by caesarean section ranged from 29 percent (North West LHIN) to 47 percent (South East LHIN).

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## FETAL COMPLICATIONS

**Indicator:** The following indicators measure the percentage or proportion of pregnant women aged 20 and older with pregestational diabetes, gestational diabetes and without diabetes whose infants had the following fetal complications:

- stillbirth/in-hospital mortality (per 1000)
- congenital anomalies (major and minor)
- premature delivery (delivered before 37 weeks gestation)
- hyperbilirubinemia requiring phototherapy
- neonatal intensive care unit (NICU) admissions (all levels)

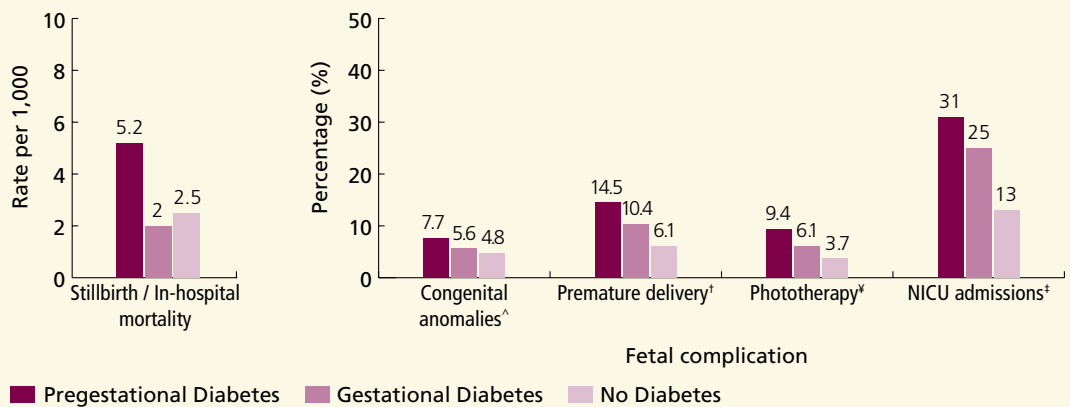
**Background:** Evidence shows that infants of women with diabetes are more likely to have fetal complications such as perinatal mortality, congenital anomalies, premature delivery and hyperbilirubinemia (jaundice) requiring phototherapy compared with infants of women without diabetes.<sup>25-30, 238</sup> Because of these fetal complications, infants of women with diabetes are more often admitted to NICUs. Many adverse outcomes in this population may be preventable through high quality care prior to conception and during the prenatal period.<sup>235, 236, 240-244</sup>

For these indicators, the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify all women aged 20 and older who gave birth between April 1st 2002 and March 31st 2007. If a woman had multiple deliveries in this time period, one delivery was chosen at random. Diabetes status in pregnant women was established by linking births to the Ontario Diabetes Database (ODD) and hospital records. The Institute for Clinical Evaluative Sciences (ICES) Mother-Baby (MOMBABY) linked database and the CIHI-DAD were used to link women to the offspring of their index pregnancy in order to measure fetal outcomes (see [Appendix 9.3](#) for details). Infants may be admitted to a lower-acuity NICU for a limited time for observation of minor concerns. For this reason, this indicator is an imprecise measure of absolute morbidity; however, variation in this measure may reflect true variations in need and care received.

**Findings:** In Ontario, the rate of stillbirth/in-hospital mortality was 5.2 per 1,000 infants born to women with pregestational diabetes, compared to 2.0 per 1,000 infants born to women with gestational diabetes and 2.5 per 1,000 infants born to women without diabetes. The percentages of infants born to women with pregestational diabetes who had other fetal complications were 7.7 percent (congenital anomalies); 14.5 percent (premature delivery); 9.4 percent (phototherapy for hyperbilirubinemia) and 31 percent (NICU admissions). Infants born to women with diabetes had higher rates of fetal complications than those born to women without diabetes (see [Exhibit 9F.8](#)).



**Exhibit 9F.8 | Age-standardized rates of fetal complications, by maternal diabetes status, in Ontario, 2002/03-2006/07**



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

<sup>^</sup> Includes major and minor congenital anomalies

<sup>†</sup> Delivered before 37 weeks gestation

<sup>‡</sup> Hyperbilirubinemia requiring phototherapy

<sup>‡</sup> Includes all admissions to a neonatal intensive care unit (NICU), including low-acuity units and admissions of short duration (e.g., a few hours only)

**FINDINGS**

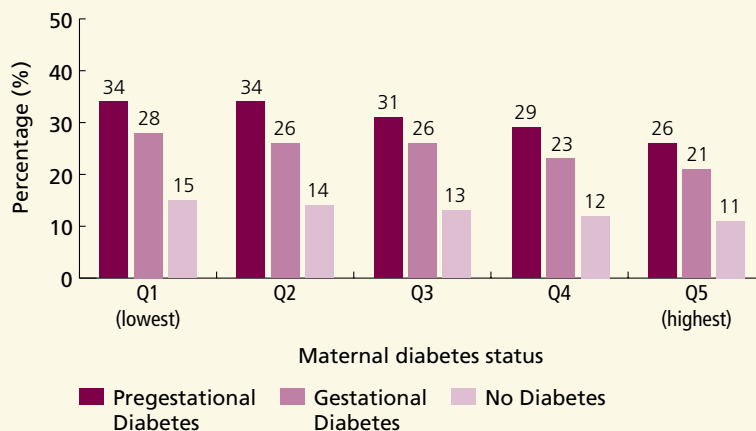
- The rate of stillbirth/in-hospital mortality was twice as high among infants born to women with pregestational diabetes compared to infants born to women with no diabetes (5.2 per 1,000 versus 2.5 per 1,000, respectively). Rates of stillbirth or in-hospital mortality did not differ between infants born to women with gestational diabetes and women without diabetes.
- Rates of premature delivery, phototherapy for hyperbilirubinemia and NICU admissions were two to three times higher among infants born to women with pregestational diabetes compared to infants born to women without diabetes. Rates of congenital anomalies were also higher among infants born to women with pregestational diabetes compared to infants born to women without diabetes (7.7 percent versus 4.8 percent, respectively).
- Compared to infants born to women without diabetes, infants born to women with gestational diabetes had higher rates of congenital anomalies, premature delivery, phototherapy for hyperbilirubinemia and NICU admissions.

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### Exhibit 9F.9 | Age-standardized neonatal intensive care unit (NICU) admission rates,<sup>^</sup> by neighbourhood income quintile and maternal diabetes status, in Ontario, 2002/03-2006/07

#### FINDINGS

- Infants born to women from lower-income neighbourhoods had higher NICU admission rates than infants born to women from higher-income neighbourhoods, regardless of maternal diabetes status.
- Across all income quintiles, NICU admission rates were higher among infants born to women with pregestational or gestational diabetes compared to infants born to women without diabetes.
- Rates of congenital anomalies, premature delivery, and phototherapy for hyperbilirubinemia did not differ by neighbourhood income, regardless of maternal diabetes status (data not shown).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database; Statistics Canada 2006 Census

**NOTE:** See [Appendix 9.3](#) for details about neighbourhood income quintile calculation

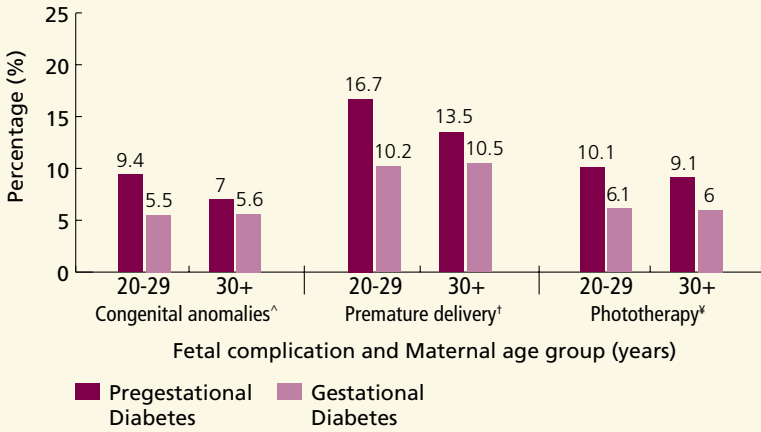
<sup>^</sup> Includes all admissions to NICUs, including low-acuity units and admissions of short duration (e.g., a few hours only)

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**Exhibit 9F.10 | Percentage of infants who had congenital anomalies, premature delivery or who received phototherapy, by maternal age group and maternal diabetes status, in Ontario, 2002/03-2006/07**

**FINDINGS**

- Infants born to younger women (aged 20-29) with pregestational diabetes had higher rates of congenital anomalies and premature delivery than those born to older women. Rates of phototherapy for hyperbilirubinemia did not vary by maternal age.
- Infants born to women aged 20-29 with pregestational diabetes had higher rates of stillbirth or in-hospital mortality than those born to women aged 30 and older (8.3 per 1,000 versus 3.8 per 1,000, respectively) (data not shown).
- Among infants born to women with gestational diabetes, rates of fetal complications did not vary by maternal age.



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

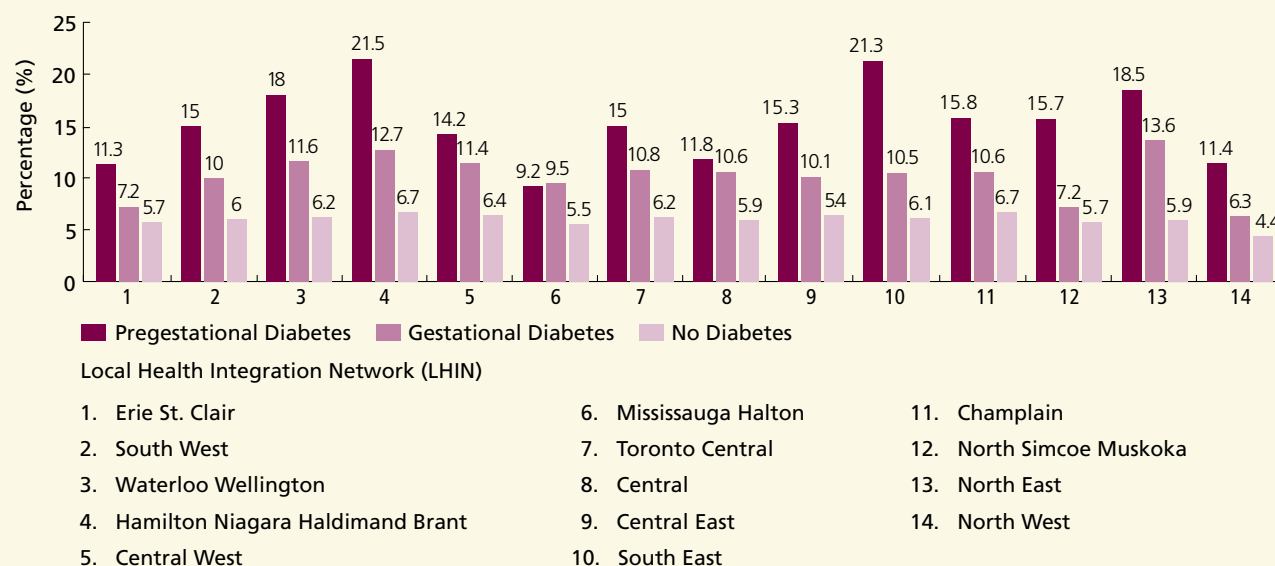
<sup>^</sup> Includes major and minor congenital anomalies

<sup>†</sup> Delivered before 37 weeks gestation

<sup>‡</sup> Hyperbilirubinemia requiring phototherapy

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**Exhibit 9F.11 | Age-standardized percentage of infants who were delivered prematurely,<sup>^</sup> by Local Health Integration Network (LHIN) and maternal diabetes status, in Ontario, 2002/03-2006/07**



**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

<sup>^</sup> Delivered before 37 weeks gestation

## FINDINGS

- The percentage of infants born to women with pregestational or gestational diabetes who were delivered prematurely varied significantly by LHIN.
- In all LHINS, a higher percentage of women with pregestational and gestational diabetes delivered prematurely compared to women without diabetes.
- Among infants born to women with pregestational and gestational diabetes, rates of congenital anomalies and phototherapy for hyperbilirubinemia varied significantly across LHINs. In almost all LHINS, women with pregestational diabetes had higher congenital anomaly rates than women without diabetes (data not shown).

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# Section 9F

## SUMMARY OF FINDINGS

This section reports on indicators of pregnancy care, obstetrical complications and fetal complications among pregnant women with pregestational diabetes, gestational diabetes and women without diabetes. Almost all indicators in this section varied by maternal diabetes status and Local Health Integration Network (LHIN). Consistently, women with pregestational diabetes and their infants experienced more complications and worse outcomes than women without diabetes. Findings for the indicators reported in this section are summarized below.

### Prenatal Care

Among pregnant women with pregestational diabetes, 94 percent had seen an obstetrician; but only 55 percent had seen an endocrinologist or general internist in the nine months prior to delivery; and only 31 percent had an eye examination in the one year prior to delivery. Women with pregestational or gestational diabetes were more likely to receive care from an obstetrician than women without diabetes.

Older pregnant women with pregestational diabetes were more likely to receive care from an endocrinologist or general internist during pregnancy than women aged 20-29, but were less likely to undergo an eye examination. Pregnant women with pregestational diabetes who were living in the lowest-income neighbourhoods were more likely to be seen by an endocrinologist or internist than those living in the highest-income neighbourhoods (59 percent versus 52 percent, respectively). All three measures of prenatal care varied by LHIN.

### Obstetrical Complications

Pregnant women with diabetes had higher rates of obstetrical complications than women without

diabetes; women with pregestational diabetes had particularly high rates (12.5 percent had hypertension, 3.9 percent had preeclampsia/eclampsia, 11.1 percent had obstructed labour, and 3.2 percent had shoulder dystocia). Almost half of all pregnant women with pregestational diabetes (45 percent) delivered by caesarean section compared to 37 percent of women with gestational diabetes and 27 percent of women without diabetes. For women with pregestational or gestational diabetes, the indicators of obstetrical complications did not vary by neighbourhood income, but did vary by LHIN. Among women with pregestational diabetes, women aged 20-29 had higher rates of preeclampsia/eclampsia, obstructed labour, and shoulder dystocia than older women; among women with gestational diabetes, younger women had higher rates of shoulder dystocia, but overall rates of obstructed labour did not vary by age. Women aged 30 and older with pregestational or gestational diabetes had higher rates of caesarean sections compared to younger women.

### Fetal Complications

Infants born to women with diabetes had higher rates of fetal complications than infants born to women without diabetes. The percentage of infants born to women with pregestational diabetes who suffered fetal complications were: 7.7 percent (congenital anomalies); 14.5 percent (premature delivery); 9.4 percent (phototherapy for hyperbilirubinemia); 31 percent (neonatal intensive care unit (NICU) admissions). The rate of stillbirth/in-hospital mortality was twice as high among infants born to women with pregestational diabetes compared to infants born to women without diabetes (5.2 per 1,000 versus 2.5 per 1,000, respectively). Rates of stillbirth/in-hospital mortality did not differ

between offspring of women with gestational diabetes and without diabetes. Compared to infants born to women without diabetes, infants born to women with gestational diabetes had higher rates of congenital anomalies, premature delivery, phototherapy for hyperbilirubinemia, and NICU admissions.

Regardless of diabetes status, rates of congenital anomalies, premature delivery and phototherapy did not differ by neighbourhood income; however, rates of NICU admissions decreased with higher maternal neighbourhood income. Rates of all fetal complications varied across LHINs among women with pregestational

and gestational diabetes. Among women with pregestational diabetes, infants born to younger women (aged 20-29) had higher rates of stillbirth/in-hospital mortality, congenital anomalies and premature delivery than those born to older women; rates of phototherapy for hyperbilirubinemia did not vary by maternal age. This age-related difference may be explained by a higher proportion of type 1 diabetes in younger women, as well as a higher rate of unplanned pregnancies and consequent poor glucose control in that age group. Among women with gestational diabetes, fetal complication rates did not vary by maternal age.



# Chapter Summary of Findings

In this chapter, we present results pertaining to the burden of illness due to diabetes and the performance of Ontario's health care system on indicators of care for diabetes. The chapter includes the following six sections.

**The chapter includes the following six sections:**

- A. Health and Functional Status
- B. Access and Utilization of Care
- C. Screening, Assessment and Monitoring
- D. Pharmacological Treatment
- E. Health Outcomes
- F. Diabetes and Pregnancy

Diabetes prevalence was higher among men than among women; men also suffered more complications related to diabetes and had fewer physician visits. However, women who reported having diabetes were more likely than men to report worse health and more disability. Low-income women and men were more likely to have diabetes and, once they had the disease, they had worse health and functional status, higher rates of hospitalizations, and more diabetic complications. Medication use did not show important variation by sex, with the exception of statins to lower cholesterol, where lower rates were reported in women than in men. While many indicators of health and functional status, access and utilization of care and health outcomes varied by neighbourhood income, few indicators of screening, assessment and monitoring, pharmacological treatment or diabetes and pregnancy did. Most indicators varied by age, with the exception of indicators of screening, assessment and monitoring. There was important variation on almost all indicators by Local Health Integration Network (LHIN). [Table 1](#) provides a summary of differences observed by sex, age, income, education, immigration, ethnicity, rural/urban residency and LHIN.

## Health and Functional Status

According to a validated administrative data algorithm, 9.4 percent of Ontario adults had diabetes; this rate increased to 24 percent among adults aged 65 and older. In general, women had lower rates of diabetes than men, except in the youngest age group where prevalence was similar. Diabetes prevalence varied by LHIN, age and neighbourhood income. Diabetes prevalence increased as neighbourhood income quintile decreased from 7.3 percent among adults living in the highest-income neighbourhoods to 11.5 percent among adults living in the lowest-income neighbourhoods. The percentage of people who reported having diabetes varied by ethnicity, with lower rates reported by White adults compared to adults from visible minority populations. Adults who reported having diabetes were more likely than those without diabetes to have at least two other chronic conditions (56 percent versus 28 percent, respectively), probable depression (7.4 percent versus 5.0 percent, respectively) and hypertension (61 percent versus 21 percent, respectively). Among adults with diabetes, women were more likely than men to have at least two additional chronic conditions (63 percent versus 51 percent, respectively) and probable depression (11.1 percent versus 4.3 percent, respectively), but not hypertension. The relative difference in rates of probable depression by diabetes status was greater among women than among men.

Forty percent of adults who reported having diabetes rated their health as fair or poor compared to 11 percent of adults without diabetes. This did not vary by sex but did increase with declining annual household income; more than one half of lower-income adults reported their health as fair or poor compared to less than one-third of higher-income



adults. The percentage of adults with diabetes who reported limitations in their instrumental activities of daily living (IADL) and/or their activities of daily living (ADL) was twice as high as the rate among those without diabetes (37 percent versus 16 percent, respectively). Women were more likely to report IADL and/or ADL limitations than men (49 percent versus 27 percent, respectively) and rates also increased with age and were higher among women and men with lower annual household incomes.

Among adults who reported having diabetes, 62 percent were physically inactive, 58 percent had inadequate fruit and vegetable intake, 39 percent were overweight, 35 percent were obese and 17 percent were current smokers. Physical inactivity, inadequate fruit and vegetable intake, being overweight or being a current smoker did not vary by diabetes status, however, adults who reported having diabetes were two to three times more likely to be obese than adults without diabetes. High rates of risk behaviours in the population with diabetes has an impact on diabetes control and complication rates, and high rates in the general population contribute to the increasing incidence of diabetes in Ontario.

### **Access and Utilization of Care**

Among adults aged 20 and older with diabetes, 83 percent had continuity of primary care (more than 50 percent of their primary care visits were to the same provider). This did not vary by income, but did vary somewhat by sex, LHIN and age; men aged 20-44 with diabetes were least likely to have continuity of primary care (68 percent). While 17 percent of Ontarians with diabetes did not have continuity of primary care, adults with diabetes still had a mean of 7.3 visits per year to a general practitioner/family physician (GP/FP). Women had consistently higher mean numbers of GP/FP visits per year than men and adults living in lower-income neighbourhoods had a slightly higher mean number of GP/FP visits per year than adults living in higher-income neighbourhoods

(7.7 versus 6.8 visits per year, respectively). The mean number of GP/FP visits per year among people with diabetes varied widely across LHINs from 5.2 visits in the North West LHIN to 8.4 visits in the Toronto Central LHIN. One-quarter of adults with diabetes had seen a specialist (endocrinologist, general internist or geriatrician) during a two-year period, with slightly higher rates among women than among men and among adults living in higher-income neighbourhoods compared to adults living in lower-income neighbourhoods. Younger people with diabetes were more likely to see a specialist than older people, likely due to the higher proportion of type 1 diabetes in young adults.

Given the need for regular screening and monitoring as part of diabetes care, it is concerning that 5.5 percent of Ontarians with diabetes had not seen a GP/FP or a specialist (endocrinologist, general internist or geriatrician) during a two-year period. This varied by sex, income, age and LHIN. Men were more likely to have not received care from any of these types of physicians than women, irrespective of neighbourhood income, age or LHIN. Eight percent of men living in the lowest-income neighbourhoods and 8.5 percent of men aged 20-44 had not seen a GP/FP or specialist during the two-year period. Some LHIN variation may be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete or due to out of province use of specialists.

### **Screening, Assessment and Monitoring**

Clinical practice guidelines recommend self-monitoring of blood glucose on a daily basis for all people with diabetes who are on insulin and on an individualized basis for those on diet or oral medications alone. More recent data have shown that—for the latter group—the benefit of routine self-monitoring of blood glucose is less clear and may not improve glucose control.<sup>139</sup> Among adults who reported having diabetes, 81 percent of those who were taking insulin and 48 percent of those who were on oral glucose-lowering medications reported daily self-monitoring of

blood glucose. Eighty percent of adults who reported having diabetes reported that they had a hemoglobin A1c to assess their blood glucose control and 73 percent reported that they had a microalbumin test to screen for kidney disease in the past 12 months. For these indicators, there was little variation by sex, socio-economic status, demographic characteristics or LHIN, where sample size allowed comparison.

Less than six in ten adults aged 30 and older had an eye examination within two years of being diagnosed with diabetes and this rate declined to slightly more than four in ten among adults aged 30-44. This indicator varied regionally, but in all LHINs, less than two-thirds of adults with diabetes underwent an eye examination within two years of being diagnosed. The percentage of adults who underwent an eye exam did not differ by sex.

Almost 70 percent of adults who reported having diabetes reported having their feet checked for sores or irritation by themselves, a family member or by a friend (self foot examination) at least once per year. This did not vary by sex, annual household income or by age. Among adults who reported having diabetes, 51 percent reported that a health professional had checked their feet for any sores or irritations in the past 12 months. This did not vary by sex, annual household income, educational attainment, age, visible minority status, rural/urban residency or LHIN. Adults with diabetes who had been in Canada for less than 10 years were less likely to have had a foot examination by a health professional than immigrants who had been in Canada for a longer time or adults who were Canadian born (26 percent, versus 52 percent and 53 percent, respectively).

Adults who reported having diabetes were less likely to have seen a dentist in the past 12 months than adults without diabetes, 56 percent versus 65 percent, respectively. Among adults who reported having diabetes, the percentage that had a dental visit in the past year did not vary by sex but did vary by income, age, educational attainment, ethnicity and LHIN.

## Pharmacological Treatment

Most women and men who reported having diabetes were taking some type of medication to control their blood glucose levels, either insulin or oral glucose-lowering medications. This did not vary by annual household income, visible minority status, time since immigration, rural/urban residency or LHIN, but did vary by age and by educational attainment. Adults aged 20-44 were less likely to be on medication to control their diabetes than older adults (71 percent versus 83 percent, respectively). The age difference was not significant for men when stratified by sex; however, this may be due to limited power to detect differences due to small sample size. More than 80 percent of seniors (aged 65 and older) with diabetes had filled a prescription for at least one anti-hypertensive medication, with two-thirds filling prescriptions for an angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB), which are considered the first line of therapy for blood pressure reduction. Sixty percent of seniors with diabetes filled a prescription for at least one statin. There were virtually no variations in medication use by income or LHIN; however, statin use was slightly lower in women than in men and also in adults aged 75 and older compared to younger seniors.

## Health Outcomes

In Ontario in 2006/07 among adults with diabetes: 1362 per 100,000 were either seen in an emergency department or hospitalized for hyperglycemia or hypoglycemia; 534 per 100,000 were hospitalized for a skin and soft tissue infection; 740 per 100,000 were hospitalized for an acute myocardial infarction (AMI); 863 per 100,000 for congestive heart failure (CHF) and 457 per 100,000 were hospitalized for a stroke. A significant proportion of adults with diabetes also underwent interventions to address complications related to diabetes in 2006/07: 583 per 100,000 underwent percutaneous coronary intervention (PCI); 353 per 100,000 had coronary artery bypass

graft (CABG) surgery; 50 per 100,000 underwent a carotid endarterectomy; 109 per 100,000 had a major amputation; 78 per 100,000 had a minor amputation; 111 per 100,000 underwent a peripheral revascularization procedure; 580 per 100,000 received chronic dialysis; 1293 per 100,000 underwent retinal laser photocoagulation and 253 per 100,000 underwent a vitrectomy. Nearly all health outcomes showed variation by LHIN. As well, women consistently experienced lower complication rates than men, but sex differences in cardiac and stroke procedure rates were greater than the observed sex differences in hospitalization rates for AMI, CHF or stroke.

Adults living in lower-income neighbourhoods were more likely than those living in higher-income neighbourhoods to have had a hospital visit for hyper- or hypoglycemia, a hospitalization for a skin and soft tissue infection or to receive chronic dialysis. Men and women with diabetes who were living in lower-income neighbourhoods were more likely than those living in higher-income neighbourhoods to be admitted to hospital for CHF or an AMI, but not for stroke. Procedure rates for cardiac disease (CABG and PCI) did not vary by neighbourhood income, with the exception of CABG surgery rates in women, which decreased as income increased. Men living in the lowest-income neighbourhoods were more likely to undergo major or minor amputations than men living in the highest-income neighbourhoods; these rates did not vary by income among women.

The proportion of adults with diabetes who had at least one hospital visit for hyper- or hypoglycemia was highest in the youngest and oldest age groups. High rates in those under age 45 are likely related to the higher proportion of type 1 diabetes in this age group. For cardiac and stroke hospitalizations and for amputations, peripheral revascularization, CABG, PCI and carotid endarterectomy, rates increased with increasing age. Among women with diabetes, the proportion that received chronic dialysis increased with

age to age 74 and then declined slightly; among men the proportion that received chronic dialysis increased with age across all age groups. The highest rates of laser photocoagulation were seen among women and men with diabetes aged 45-74; while rates of vitrectomy increased with age to age 74, and then declined among those aged 75 and older.

### Diabetes and Pregnancy

Among women with pregestational diabetes, 94 percent had seen an obstetrician. Only 55 percent had seen an endocrinologist or general internist in the nine months prior to delivery and only 31 percent had an eye examination in the one year prior to delivery. Women with pregestational or gestational diabetes were more likely to receive care from an obstetrician than women without diabetes and all three measures of care for pregnant women with diabetes varied by LHIN. Some of the LHIN variation may be due to AFPs where OHIP billing information may be incomplete or due to out of province use of specialists. Pregnant women with pregestational diabetes who were living in the lowest-income neighbourhoods were more likely to be seen by an endocrinologist or internist than those living in the highest-income neighbourhoods (59 percent versus 52 percent, respectively).

Women with pregestational diabetes and gestational diabetes had higher rates of obstetrical complications than women without diabetes. Women with pregestational diabetes had the highest complication rates (hypertension, preeclampsia/eclampsia, obstructed labour, shoulder dystocia) and almost half (45 percent) delivered by caesarean section compared to 37 percent of women with gestational diabetes and 27 percent of women without diabetes. Women with gestational diabetes also had higher rates of hypertension, preeclampsia/eclampsia and caesarean section, but did not have higher rates of obstructed labour or shoulder dystocia than women without diabetes. Indicators of obstetrical complications did not vary by neighbourhood income but did vary by LHIN for

women with pregestational and gestational diabetes. Rates of caesarean section and obstructed labour varied by age for women with pregestational and gestational diabetes; younger women had higher rates of obstructed labour but older women had higher caesarean section rates.

Infants born to women with diabetes had higher rates of fetal complications (minor or major congenital anomalies, premature delivery, phototherapy for hyperbilirubinemia and neonatal intensive care unit (NICU) admissions) compared to infants born to women without diabetes. The rate of stillbirth or in-hospital mortality was twice as high among infants born to women with pregestational diabetes compared to infants born to women without diabetes (5.2 per

1,000 versus 2.5 per 1,000, respectively). Infants born to women with gestational diabetes had higher rates of congenital anomalies, premature delivery, phototherapy for hyperbilirubinemia, and NICU admissions than women without diabetes.

Regardless of diabetes status, rates of congenital anomalies, premature delivery and phototherapy did not differ by neighbourhood income; however, rates of NICU admissions decreased with maternal neighbourhood income. Rates of all fetal complications varied across LHINs. Among women with pregestational diabetes, infants born to younger women (aged 20-29) had higher rates of stillbirth/in-hospital mortality, congenital anomalies and premature delivery than those born to older women.

**Table 1** | Factors associated with differences in diabetes burden of disease, access to care, quality of care and outcomes among people with diabetes

Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>y</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
Health and Functional Status (11 Indicators)										
Diabetes prevalence and comorbidity										
Prevalence of diabetes <sup>a</sup>	9.4%	N/A	Y	Y	Y	Y	Y	N	N	Y
Percentage who had at least two additional chronic conditions†	56%	Y	Y	Y	Y <sup>b</sup>	N	N	N	N	Y
Prevalence of probable depression	7.4%	Y	Y	-	-	-	-	-	-	-
Prevalence of hypertension	61%	Y	N	Y	N	N	N	Y <sup>c</sup>	N	Y <sup>a</sup>
Health and functional status										
Percentage who reported their health to be fair or poor	40%	Y	N	N	Y	Y	N	N	N	Y <sup>b</sup>
Percentage with limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)	37%	Y	Y	Y	Y	N	N	-	N	-
Health behaviours										
Percentage who reported being physically inactive	62%	Y	Y	Y <sup>a</sup>	Y <sup>a</sup>	Y <sup>a</sup>	N	N	N	-

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Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>y</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
Percentage who reported having inadequate daily intake of fruits and vegetables	58%	N	Y	Y <sup>b</sup>	Y <sup>a</sup>	Y	N	N	N	-
Percentage who reported being overweight	39%	N	Y	Y	N	Y <sup>a</sup>	N	-	N	-
Percent who reported being obese	35%	Y	Y	Y	N	Y <sup>b</sup>	Y <sup>b</sup>	-	Y <sup>b</sup>	-
Percent who reported being a current smoker	17%	N	N	Y	N	Y <sup>b</sup>	Y <sup>a</sup>	-	N	-

#### Access and Utilization of Care (4 Indicators)

Percentage who had continuity of primary care	83%	•	Y	Y	Y	•	•	•	•	Y
Mean number of primary care visits per year	7.3 visits	•	Y	Y	Y	•	•	•	•	Y
Percentage who had at least one visit to a specialist (endocrinologist, general internist, or geriatrician) in the past two years	25%	•	Y	Y	Y	•	•	•	•	Y
Percentage who did not have any visits to a general practitioner/family physician or a specialist in the past year	5.5%	•	Y	Y	Y	•	•	•	•	Y

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Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>†</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN

### Screening, Assessment and Monitoring (7 Indicators)

#### Screening, assessment and monitoring for diabetes

The percentage who were currently taking insulin who monitor their blood glucose at least once daily	81%	•	N	N	N	N	-	-	N	Y <sup>c</sup>
Percentage who reported that a health care professional had tested them for hemoglobin A1c within the past 12 months	80%	•	N	N	N	N	N	N	N	-
Percentage who reported that a health care professional had tested them for microalbumin within the past 12 months	73%	•	N	N	N	N	N	N	N	-
Percentage of adults (aged 30 and older) who had an eye examination within two years of being diagnosed with diabetes	58%	•	Y	Y	Y <sup>b</sup>	•	•	•	•	Y
Percentage who reported usually performing a self foot examination at least once per year	68%	•	N	N	N	Y <sup>a</sup>	N	Y	Y <sup>b</sup>	Y
Percentage who reported that a health care professional checked their feet for sores or irritations in the past 12 months	51%	•	N	N	N	N	N	Y <sup>c</sup>	N	-

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Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>y</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
Other preventive screening strategies										
Percentage who reported that they had visited a dentist in the past 12 months	56%	Y	N	Y	Y	Y	Y <sup>c</sup>	-	N	-
Pharmacological Treatment (4 Indicators)										
Percentage who reported being on insulin or at least one glucose-lowering medication	82%	•	N	Y <sup>a</sup>	N	Y <sup>b</sup>	N	N		N
Percentage of adults aged 65 and older who filled a prescription for at least one anti-hypertensive drug	81%	•	Y	Y	N	•	•	•	•	Y
Percentage of adults aged 65 and older who filled a prescription for an ACE Inhibitors and/or an ARB	68%	•	Y	Y	N	•	•	•	•	Y
Percentage of adults aged 65 and older who filled a prescription for a statin	60%	•	Y	Y	N	•	•	•	•	Y
Health Outcomes (14 Indicators)										
Number with at least one hospital visit (emergency department or hospital admission) for hyperglycemia or hypoglycemia	1362 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y
Number with at least one hospitalization for skin and soft tissue infections	534 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y

POWER Study

Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>‡</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
Cardiac disease										
Number with at least one hospitalization for AMI	740 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y
Number with at least one hospitalization for CHF	863 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y
Number who had a coronary artery bypass graft (CABG) surgery	353 <sup>#</sup>	•	Y	Y	Y <sup>a</sup>	•	•	•	•	Y
Number who had a percutaneous coronary intervention (PCI)	583 <sup>#</sup>	•	Y	Y	N	•	•	•	•	Y
Stroke										
Number with at least one hospitalization for stroke	457 <sup>#</sup>	•	Y	Y	Y <sup>b</sup>	•	•	•	•	Y
Number who had a carotid endarterectomy	50 <sup>#</sup>	•	Y	Y	N	•	•	•	•	-
Peripheral vascular disease										
Number who had a minor amputation	78 <sup>#</sup>	•	Y	Y	Y <sup>b</sup>	•	•	•	•	Y
Number who had a major amputation	109 <sup>#</sup>	•	Y	Y	Y <sup>b</sup>	•	•	•	•	Y
Number who had a peripheral revascularization procedure	111 <sup>#</sup>	•	Y	Y	Y <sup>b</sup>	•	•	•	•	Y

POWER Study

Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>y</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
Number who were on chronic dialysis	580 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y
<b>Retinopathy</b>										
Number who had laser photocoagulation	1293 <sup>#</sup>	•	Y	Y	Y	•	•	•	•	Y
Number who had vitrectomy	253 <sup>#</sup>	•	Y	Y	N	•	•	•	•	Y
<b>Diabetes and Pregnancy Indicators (13 Indicators)</b>										
<b>Prenatal Care</b>										
The percentage who had at least one visit to an obstetrician during pregnancy	94% 94% <sup>‡</sup>	Y		N	N	•	•	•	•	Y
The percentage with pregestational diabetes who had at least one visit to a specialist (endocrinologist or general internist) during pregnancy	55%	•		Y	Y	•	•	•	•	Y
The percentage with pregestational diabetes who had at least one eye examination in the year before delivery	31%	•	N/A	Y	N	•	•	•	•	Y
<b>Obstetrical Complications</b>										
The percentage with hypertension in the 6 months before delivery	9.9% 12.5% <sup>‡</sup>	Y	N/A	N	N	•	•	•	•	Y
The percentage with preeclampsia/eclampsia in the 6 months before delivery	2.4% 3.9% <sup>‡</sup>	Y	N/A	Y <sup>d</sup>	N	•	•	•	•	Y
The percentage with obstructed labour	10.1% 11.1% <sup>‡</sup>	Y	N/A	Y <sup>d</sup>	N	•	•	•	•	Y

POWER Study

Indicators	Overall Result Among People with Diabetes	Diabetes Status <sup>¥</sup>	Stratification Factor							
			Sex	Age	Income	Education	Ethnicity	Immigration	Rural/Urban Residence	LHIN
The percentage with shoulder dystocia during labour	2.6% 3.2% <sup>†</sup>	Y	N/A	Y	N	•	•	•	•	Y
The percentage that delivered by caesarean section	37% 45% <sup>†</sup>	Y	N/A	Y	N	•	•	•	•	Y
<b>Fetal complications</b>										
The proportion whose infants were stillborn or suffered in-hospital mortality (per 1,000)	0.20% 0.52% <sup>†</sup>	Y	N/A	Y <sup>d</sup>	-	•	•	•	•	-
The percentage whose infants had a congenital anomaly (major or minor)	5.6% 7.7% <sup>†</sup>	Y	N/A	Y <sup>d</sup>	N	•	•	•	•	Y
The percentage whose infants were delivered prematurely	10.4% 14.5% <sup>†</sup>	Y	N/A	Y <sup>d</sup>	N	•	•	•	•	Y
The percentage whose infants underwent phototherapy for hyperbilirubinemia	6.1% 9.4% <sup>†</sup>	Y	N/A	N	N	•	•	•	•	Y
The percentage whose infants had a NICU admission	25% 31% <sup>†</sup>	Y	N/A	N	Y	•	•	•	•	Y

¥ Comparison between people with and without diabetes, with the exception of the Diabetes and Pregnancy indicators which compare women with pregestational diabetes, gestational diabetes and no diabetes

^ Stratifications by sex, age, income and LHIN were based on ODD; stratifications by education, ethnicity, immigration, time since immigrating, and rural/urban residence were based on self-reported data.

† Among people with diabetes, this refers to at least two chronic conditions in addition to diabetes.

N/A Not applicable

- Data not available

- Limited power to detect differences due to small sample sizes in some subgroups

a Significant in women, but not significant in men

b Significant in men, but not significant in women

c Significant for the overall population, but not significant when stratified by sex

d Significant in women with pregestational diabetes, but not significant in women with gestational diabetes

# Rate per 100,000 population

† The first number reflects the rate in women with gestational diabetes; the second number reflects the rate in women with pregestational diabetes

# Discussion

Globally, the prevalence of diabetes has risen dramatically in concert with soaring rates of obesity.<sup>9, 13, 255</sup>

The rate of obesity in Canada has nearly tripled since 1980 fueled by unfavourable trends, including increased consumption of high-calorie, nutrient poor foods and an increasingly sedentary lifestyle.<sup>256-259</sup> The growing diabetes epidemic has had a profound impact on the health care system and will continue to do so for years to come.<sup>118</sup>

In this chapter, we examined the burden of illness due to diabetes in Ontario, as well as gender differences in the health, functional status and quality of care of individuals with diabetes. We also assessed how socioeconomic status, demographic characteristics and where one lives affected women and men differently. Stratifying data in this way allowed us to identify where care can be improved for different subgroups of the population. We found considerable differences in diabetes prevalence and outcomes by age, sex, income and region across the province (see [Table 1](#)). Low-income women and men were more likely to have diabetes and once they had the disease to have worse health and functional status, higher rates of hospitalizations and diabetic complications. We provide a comprehensive picture of diabetes in Ontario, however, this picture is by no means complete. The data in this chapter came primarily from administrative and survey data, which do not provide detailed clinical information or insights into patient experiences with care or treatment decision-making processes. With the indicators we measured, we identify many opportunities where interventions can reduce adverse outcomes related to diabetes, present objective evidence to inform priority setting and provide a baseline from which to measure progress. The key findings from the chapter are discussed below.

## KEY FINDINGS

### Diabetes is one of the most common conditions in our society.

Nearly one in ten adults in Ontario have been diagnosed with diabetes—however, by age 65, this figure reaches nearly one in four. While rates were generally higher in men than in women, in women of reproductive age (aged 20-44) diabetes rates rival that of young men. Developing diabetes at an early age can have devastating consequences for both sexes, but in women there are additional implications; we found that diabetes prior to pregnancy was associated with a substantially increased risk of adverse pregnancy outcomes and, if poorly controlled, can cause serious harm to an unborn child. According to recent data from national surveys conducted in the US, the fastest rise in body weight and waist size is occurring in young women.<sup>260</sup> Therefore in coming years a new cohort of young women will be facing an even greater burden of diabetes.

### Diabetes rates continue to climb.

This is fueled in large part by the dramatic rise in obesity. The rise in diabetes over the past decade has already surpassed levels the World Health Organization (WHO) had predicted would be reached by 2030.<sup>3, 4</sup> Compared to earlier reports, we found that the prevalence of diabetes among adults in Ontario has doubled in just 12 years.<sup>118</sup> Aging of the population has contributed; as well as the immigration of ethnic groups at high risk for developing diabetes. A recent study showed that immigrants of South Asian, African

Caribbean or Latin American origin, are at high risk for diabetes and develop this condition at an earlier age; women were at particularly high risk.<sup>21</sup> We found that diabetes prevalence rates were extremely high in the Greater Toronto Area, which sees more than 70,000 new immigrants each year. Diabetes prevention strategies are urgently needed, particularly those targeting high-risk groups—including high-risk ethnicities, low-income populations and women with recent gestational diabetes.

### **The ongoing rise in diabetes prevalence creates a significant challenge for those who provide and fund health care.**

Diabetes is one of the most commonly encountered conditions in primary practice,<sup>261</sup> accounting for nearly seven million visits to family physicians each year in Ontario alone.<sup>262</sup> Innovation and improvement of diabetes prevention and management in primary care are critical to addressing this challenge. We found that people with diabetes visited a primary care provider an average of 7.3 times per year. Similar to the overall gender differences reported in [the POWER Study Access to Health Care Services chapter](#), women with diabetes had greater utilization of health services than men.<sup>116</sup> Adults living in lower-income neighbourhoods also had a higher mean number of visits to primary care physicians, yet they suffered more complications from diabetes, suggesting that current models of care are not sufficient to meet their health needs.

### **Men had higher rates of diabetes complications than women.**

This includes more cardiovascular disease (CVD); however, the observed gender gap in revascularization procedures exceeded gender differences in the burden of CVD—suggesting a potential underutilization of these procedures in women with diabetes or gender-related differences in the appropriate use of revascularization. Gender differences in hospitalizations for acute myocardial infarction (AMI), congestive heart failure (CHF) and stroke, and gender differences in

dialysis and laser photocoagulation therapy for diabetic eye disease were greatest in younger age groups and tended to diminish with increasing age—which may reflect differences between men and women in the biology leading to complications; or worse control of risk factors in young men. Studies involving patients in primary care practices in the US and Sweden found that women with diabetes experienced less aggressive management of risk factors than men with diabetes did.<sup>211-215</sup> Health care utilization was higher in women with diabetes overall which could provide women with more opportunities to reach target levels of blood pressure, cholesterol and other risk factors. We found that young men and lower-income men were less likely to have continuity of primary care and more likely to have not received care over a two-year period. Young men and men living in lower-income neighbourhoods were more likely to visit a hospital for emergency management of hyper- or hypoglycemia—complications that could be avoided through good access to outpatient management and improved self-management.<sup>193, 197</sup>

Another important gender difference was in the rates of amputation and peripheral revascularization which were two to three times higher among men than women—across most age groups. Men and women may vary with respect to risk factors for peripheral vascular disease, attention to routine foot care or treatment of foot ulcers/infections, or they may have differential exposures to minor trauma—a common precipitating event that can lead to infection and potentially to gangrene and amputation.<sup>71, 263</sup> From our data, self-reported rates of foot examination by a health professional and performing a self foot examination at least annually did not vary by gender; however, the latter may be an insensitive measure of routine foot care and both measures may be biased due to self-report. Men may be more likely than women to delay seeking care for foot ulcers until they reach a stage where the process is unlikely to be reversed. With fewer primary care visits per year, there are perhaps fewer opportunities for men to receive preventive counselling and management.

### **Diabetes in pregnancy is associated with higher rates of complications.**

Compared to pregnant women without diabetes, pregnant women with pregestational diabetes (diagnosed prior to pregnancy) were at one and a half to three times greater risk for serious obstetrical complications, including hypertension, preeclampsia and obstructed labour (shoulder dystocia); and had high rates of caesarean section. Women with gestational diabetes (diagnosed in pregnancy) were also at higher risk for complications than women without diabetes. Of great concern, infants of women with pregestational diabetes had nearly twice the rate of fetal complications compared to infants of women without diabetes, including major and minor congenital anomalies and stillbirth or in-hospital mortality—outcomes that can be largely prevented through optimal control of glucose and blood pressure at the time of conception and during pregnancy. Infants of younger women with diabetes (aged 20-29) had the highest rates of fetal complications, reflecting a need in this group for more targeted pre-pregnancy counselling and better pregnancy care. We also found that a significant percentage of pregnant women with diabetes were not being seen by specialists who are experienced in intensive diabetes management and the special circumstances of diabetes and pregnancy; the rate of specialist use varied across Local Health Integration Networks (LHINs). LHIN variation may partly be due to alternate funding plans (AFPs) where OHIP billing information may be incomplete or due to out of province use of specialists. The prevalence of gestational and pregestational diabetes in pregnancy is rising in Ontario.<sup>32, 252</sup> Strategies are needed to ensure accessibility of specialized services throughout the province and to promote appropriate referral to care.

### **Income matters when it comes to diabetes prevalence and complications.**

Lower-income groups share a disproportionate burden of diabetes and suffer more diabetes complications. In

fact, socioeconomic status was a strong and inverse risk factor for virtually all diabetes complications that we studied, including CVD and renal disease. Income-related gradients were steeper in men with respect to hyper- or hypoglycemic emergencies, amputations and end-stage renal disease requiring dialysis. Coronary revascularization procedures were largely unaffected by neighbourhood income, despite a higher burden of vascular disease in adults living in lower-income neighbourhoods. This finding suggests a potential underutilization of these procedures in this population, although higher smoking rates in lower-income groups may result in those individuals being less ideal candidates for revascularization.<sup>61, 264</sup> Of note, no significant income-related differences in eye procedures were found.

Socioeconomic gradients in health have been studied in other countries as well and appear to be widespread.<sup>194, 195, 265</sup> A host of factors are thought to drive health inequities related to income, including the propensity for lower-income groups to have risk factors for CVD and other conditions (e.g., smoking, physical inactivity, obesity and poor quality diets), to experience language barriers to accessing care, and to differ with respect to their level of health literacy, their knowledge of diseases, and their health beliefs.<sup>184, 264</sup> Among those without prescription drug insurance, out-of-pocket costs of medications could lead to differences in adherence across income groups. In Ontario, lower-income groups with diabetes have worse outcomes despite greater use of primary care services suggesting missed opportunities for intervention. Evidence suggests that lower-income groups need more frequent and more intensive interactions with a health care team to achieve improvements in diabetes control.<sup>74</sup> Rates of specialist visits were unaffected by socioeconomic status; however, this may reflect problems with accessing these services, given the greater burden of complications among lower-income groups. Moreover, we found that men living in the lowest-income neighbourhoods were more likely to not receive any care



within a two-year period (primary or specialist care) than men living in the highest-income neighbourhoods, suggesting that the former have problems accessing care or a preference for not seeking care as it is currently offered. Changes in services and focused outreach could help to address this problem.

### **Performance on many measures varied across the province.**

We found that where you live in Ontario matters with respect to the risk of diabetes complications. The highest rates of complications were found in northern and rural areas of the province where access to care is more challenging. In addition regional differences in prevalence, population characteristics and risk factors may have contributed to these findings. The proportion of people with no primary care physician or specialist visits within a two-year period may be high in some LHINs due to a shortage of doctors in under-serviced or differently serviced areas or to variations in access to services due to language, socioeconomic or cultural barriers to care. As well, LHIN variation may be due to AFPs where OHIP billing information may be incomplete or due to out of province use of specialists.

### **Age is a strong risk factor for diabetes complications.**

Therefore, the burden of diabetes complications will likely continue to rise with the aging of the population. This has tremendous implications for the planning and provision of health services including the need for in-hospital beds, dialysis and cardiac rehabilitation services, among others. Seniors with diabetes already exhibit high rates of use of primary care services and will continue to do so. We found that age was associated with a reduced likelihood of seeing a specialist. Older individuals may have mild disease with recent onset and doctors may be less likely to refer older patients to specialists either due to patient preference or a more conservative approach to treatment in this group.

### **People with diabetes have worse functional status and poorer self-rated health than those without diabetes.**

Having diabetes was associated with higher rates of comorbidity; over 50 percent of men and women with diabetes report having two or more additional chronic health conditions besides diabetes, they also were more likely to report having probable depression and three times as likely to have hypertension, increasing the complexity of care delivery. Among adults with diabetes, there were important gender differences with women experiencing higher rates of comorbidity, depression and disability than men with diabetes. The differences in rates of probable depression by diabetes status were greater among women than among men. Lower-income groups fared the worst; over 50 percent of those in lower-income groups who had diabetes described their health as fair or poor. Comorbidity can have a considerable impact on quality of life and complicate diabetes management. For practitioners, competing medical and social issues may detract from diabetes care. For patients, disability and comorbid conditions such as depression and osteoarthritis (see [the POWER Study Musculoskeletal Conditions chapter](#))<sup>266</sup> can impede the ability to make changes in diet or activity levels, to lose weight and to self-manage diabetes, and may also affect adherence to medications. These findings have implications for Ontario's chronic disease strategy and underscore the need for patient-centred models of chronic disease management that address multiple medical conditions concurrently.

### **Despite growing evidence on best practices for diabetes, gaps in care persist.**

We found that rates of foot exams and dental care were suboptimal. For dental care, rates were particularly low for older, lower-income and less educated groups, which may reflect a decreased propensity to seek care and/or financial barriers to accessing care due to a lack of insurance coverage for these services. We also noted that rates of eye examination in the

two years following the diagnosis of diabetes were low in women and men provincially and in all regions of Ontario. Based on our findings, the likelihood of receiving an eye examination within two years of diagnosis is no higher today than it was a decade ago.<sup>267</sup> However, our data rely solely on fee-for-service claims and do not include reimbursement from private insurance providers, out-of-pocket payment for retinal photography, or telemedicine and mobile eye programs in Northern Ontario—which may have led to an underestimation of the true level of retinal screening in the province and in specific LHINs. It is also not clear whether wait times for eye care services have influenced these rates, or alternatively, whether people with diabetes are not accessing available services. The delisting of general optometry visits from OHIP may have unwittingly impaired access to eye care particularly in areas that are dependent on these services—despite the fact that individuals with diabetes are exempt from this policy.

### There was good news as well.

A large proportion of seniors with diabetes are receiving therapies proven to reduce the risk of CVD. In fact, we noted a dramatic increase in the use of medications for both glucose-lowering and CVD risk reduction compared to the late 1990s and early 2000s,<sup>50</sup> similar to trends elsewhere.<sup>268</sup> Furthermore, there were virtually no variations in medication use among seniors by sex, age, income or LHIN, except where expected (e.g., glucose-lowering medication use increases with age). This implies that when drug costs are universally reimbursed, income has little influence on access to important therapies. Improvements in survival rates over the past decade have been well documented and show little variation by socioeconomic status among those over age 65.<sup>18</sup> However, the same is not true for groups with diabetes who are under age 65 in whom the gap in mortality between rich and poor is in fact widening. Out-of-pocket costs of

medications are likely to be substantial in the absence of insurance coverage, thus income-related differences in access to therapies may exist for younger groups with diabetes, but could not be examined in our study.

Finally, our report illustrates the **importance of looking at subgroups of individuals** when evaluating quality of care. Stratification by age, sex, income or other factors allows us to identify specific subgroups of individuals who are more vulnerable which in turn can identify areas for further study or facilitate targeted improvement efforts.

## REDUCING THE BURDEN OF DIABETES AND IMPROVING DIABETES CARE: DIFFERENT APPROACHES

### Strategies to Prevent Diabetes

Randomized controlled trials have proven that lifestyle changes that promote weight loss, namely physical activity and healthy food consumption, can delay or prevent diabetes in high-risk populations.<sup>73, 80</sup> Lifestyle interventions delivered by a team of experts in nutrition, exercise training and behaviour modification led to a dramatic reduction in the progression from 'prediabetes' (a condition preceding diabetes where blood sugar levels are mildly elevated) to full blown diabetes. However, the costs and resources required for these interventions were so were considerable, raising the question of how best to deliver such interventions on a wider scale. Recent data suggest that a small shift in the average body weight of the general population may prevent as many cases of diabetes as highly effective interventions targeting only those at highest risk for developing diabetes.<sup>76</sup>

A variety of population-level or community-based interventions have been devised to promote positive lifestyle changes; however, few have been formally evaluated.<sup>269-272</sup> Moreover, the social and physical environment in which we live challenge the sustainability of changes in behaviour outside the setting of a

randomized trial. Such barriers include the ubiquity of high-calorie, low-cost, convenience foods; increasing portion sizes of food sold in stores and restaurants; the relatively higher costs and more time-consuming preparation of healthy foods; and the lack of opportunities for physical activity within one's neighbourhood, school or workplace. Many high-risk groups live in communities that are developed in such a way as to encourage car use and discourage walking or bicycling; and have limited access to public transit, parks and public recreational spaces.

There is a growing body of research which suggests that modifying aspects of our environment could help to curb the rise in obesity-related conditions like diabetes.<sup>270, 271, 273-275</sup> This is a fundamental shift in the paradigm in which we view the etiology of chronic diseases—like diabetes—from purely 'biomedical' to one that incorporates the larger world in which we live. This opens up other avenues for the prevention of obesity-related diseases, such as improving access to safe parks and playgrounds, recreational spaces, public transit and healthy food retailers in underserved areas, as well as more global policies around zoning, urban development and design, and food labelling and preparation (among others).<sup>270, 271, 273, 276</sup>

Obesity prevention needs to start in childhood since obesity is very hard to treat once present. A recent White House Task Force on Childhood Obesity outlined a comprehensive and multifaceted approach to tackle this problem which included strategies to promote healthier food choices and physical education in schools; to encourage active transport between homes, schools and community destinations and to limit marketing of unhealthy food products to children.<sup>276</sup> Drawing on lessons learned from successful anti-smoking campaigns, the simultaneous implementation of different but complementary approaches will be needed to help curb the ongoing rise in obesity over the coming years.

## Coordinated Strategies to Improve Diabetes Care

There is substantial evidence that the long-term complications from diabetes can be reduced or prevented through strategies aimed at lowering glucose, blood pressure and cholesterol levels.<sup>33, 35-37, 277</sup> In fact, targeting each of these simultaneously, in combination with lifestyle measures—a healthy diet, increased physical activity and smoking cessation—may reduce the incidence of CVD by as much as 50 percent.<sup>34</sup>

Clinical practice guidelines recommend that diabetes care be organized around the person with diabetes and involve a multi- or interdisciplinary diabetes health care team centred on self-care management.<sup>82</sup> Because of its complexity, diabetes is difficult to manage in the current 'acute' care model of primary care. There is mounting evidence that suggests that diabetes care is more effective in models of care that support chronic disease management in a systematic and proactive way.<sup>278, 279</sup> Specific health care interventions that have been shown to improve glucose control or other clinical parameters include: the addition of diabetes health care team members from different disciplines; expansion of team members' roles (which may include case management, care coordination, and delegated tasks such as medication adjustment using treatment algorithms); self-management support; and the use of clinical information systems that allow patient outcomes to be tracked over time, provide automatic reminders for patients and clinicians, support quality improvement activities and offer real-time decision support.<sup>280, 281</sup> Telemedicine-based interventions have also been shown to facilitate the delivery of self-management support.<sup>282, 283</sup>

Traditional models of diabetes education that use didactic teaching methods have had variable results<sup>284, 285</sup> and are largely unsuccessful when applied to low-income populations.<sup>270</sup> Socially disadvantaged groups appear to require more frequent and intensive (one-on-one) interaction with the diabetes health care team over a longer duration in order to

see improvements in glucose control.<sup>270</sup> A systematic review on this topic found that the more successful interventions were those that were culturally tailored to the population (often enlisting the help of community educators or lay people in delivering the intervention), and those incorporating individualized assessments and treatment algorithms and focusing on behaviour change.<sup>270</sup> These findings highlight the need for a comprehensive and coordinated, patient-centred chronic disease management strategy to facilitate care and improve outcomes for all patients with diabetes, and specific, tailored interventions for those who are socially disadvantaged. The Ontario Diabetes Strategy is working to reduce variations in diabetes care in part by expanding access to patient-centred, team-based care and self-management information and through targeted initiatives to support the management of diabetes in primary care. By implementing interventions at the policy, population health and practice levels and coordinating these interventions for maximum impact, it will be possible to hasten progress.

## LIMITATIONS

Our study has a number of limitations that merit discussion. For instance, administrative data, while highly sensitive and specific for identifying individuals with diagnosed diabetes,<sup>75</sup> cannot ascertain the true burden of diabetes in the population, since as many as one-third of cases are estimated to be undiagnosed,<sup>261</sup> while others may not be captured by the algorithm we employed.<sup>75</sup> Using administrative data, we were also unable to discriminate between type 1 and type 2 diabetes, which may influence our interpretation of age-related trends in diabetes complications and health service utilization.

Due to lack of clinical detail in administrative data, we were not able to identify 'ideal' patients for specific medications or interventions, or contraindications to

use of medications or procedures. Furthermore, using administrative data we are not able to ascertain when patient preference played a role in treatment decisions. In some cases, procedures conducted for a diabetes complication (such as retinal photocoagulation or vitrectomy) were measured rather than the complication itself (diabetic eye disease) since the latter could not be assessed using our data sources. In the case of retinal photocoagulation, low rates could indicate better disease control (fewer cases of severe diabetic retinopathy) or suboptimal use of this vision-sparing procedure in those who could benefit from it. Lastly, it is challenging to report on quality in real time because some of the administrative data sources need time to receive and verify data. Our primary purpose was to assess whether there were gender or socioeconomic differences on these measures.

Retinopathy screening rates were also likely under-captured in our study because we relied solely on fee-for-service claims to measure eye examinations and were unable to capture reimbursement from private insurance providers, out-of-pocket payment for retinal photography, or provincially run programs involving telemedicine and mobile screening programs. We also could not examine differences in wait times for eye screening or other procedures due to a lack of available data. In addition, health care utilization in areas where physicians receive payment through AFPs may be under reported due to incomplete shadow billing. Thus, caution should be exercised when reviewing regional differences in outcomes that are based solely on physician visits.

Indicators measured using the Canadian Community Health Survey (CCHS) are based on self-report. While these are widely used for reporting the prevalence of health conditions and considered to be well-validated, they are subject to reporting error and bias. Some indicators are more subject to measurement

error than others. For example, the overweight and obesity indicator is subject to measurement error as people may over- or underreport their height and weight. Quality of care indicators may be particularly prone to error in reporting as some participants may be unaware of the relevance of specific tests (e.g., what a hemoglobin A1c measurement is) or may have difficulty recalling whether specific tests (such as microalbumin tests or a foot examination) were done within the specified time frame. In other circumstances important questions may not be asked. The measure of disability we used assesses the prevalence of the population who need the assistance of another person to carry out instrumental activities of daily living (IADL) and/or activities of daily living (ADL). The definition of IADLs included the need for assistance to perform heavy household work, such as gardening and home repairs, and so may overestimate the absolute burden of disability in the population; although relative comparisons of disability between those with and without diabetes and across subgroups of the diabetic population should be unaffected. Lastly, because people with diabetes made up a relatively small proportion of those enrolled in the CCHS, we were unable to report all outcomes within certain subgroups because of insufficient sample size. In particular, we lacked sufficient data to examine indicators of diabetes care and outcomes by ethnicity or immigration status.

### WHAT CAN'T BE MEASURED

There were many important areas where well validated indicators exist that we were unable to measure due to data limitations. We were unable to assess many aspects of diabetes care and management in the

outpatient setting. We measured fairly advanced complications of diabetes including hospitalization for AMI or stroke, dialysis for end-stage renal disease or the need for amputation. Our data sources, however, lack the ability to discern less advanced complications—such as the presence of neuropathy, foot ulcers, high albumin excretion rates or elevated creatinine levels—and whether target levels of glucose, blood pressure or cholesterol are being met. We also could not measure use of non-physician services such as nurses, dieticians and other important members of a diabetes health care team.

Drug data were not available for those under age 65. Therefore we could not determine whether sex and income differences in medication management were present in this age group. Also, while we were able to measure drug use in seniors with diabetes, the Ontario Drug Benefit database only includes claims when a prescription has been filled. Therefore, we could not assess whether a prescription was given but not filled by the patient or whether a prescription was filled but the medication was not taken.

This chapter takes an extensive, but not completely comprehensive, look at diabetes burden and diabetes care in the province. The indicators we used were selected using a rigorous and systematic process, but there were many others we could have used. Most of the indicators we report are from 2006/07. There is a need for real time data on quality to assess performance and to evaluate the effectiveness of improvement interventions. We have provided a baseline from which to monitor progress that can be updated as newer data become available.

## KEY MESSAGES

We took a broad look at the burden of diabetes and quality and outcomes of care for diabetes in the province, focusing on gender, socioeconomic, demographic and regional variations. While much progress has been made in improving quality and outcomes of care for diabetes, much work remains to be done. Our findings point to a number of key areas for intervention and improvement. Health inequities in health and functional status associated with gender and socioeconomic status were much greater than inequities in the provision of diabetes care, underscoring the need to address the social determinants of health to reduce the burden of diabetes. For many indicators, there was sizable LHIN variation. The Ontario Diabetes Strategy is working to reduce regional variations in diabetes care. The results of our analyses are available for the LHINs to use in their priority setting, planning and quality improvement activities. By implementing interventions at the policy, population health and practice levels and coordinating these interventions for maximum impact, it will be possible to hasten progress. To address regional needs, the Ontario Diabetes Strategy has established 14 Diabetes Regional Coordination Centres, within each LHIN, to provide leadership in integration of diabetes best practices across service providers, and to further strengthen coordination within the system and support improved care across the continuum.

The following five actions can help accelerate progress in reducing the burden of diabetes, improve health outcomes among women and men with diabetes and reduce health inequities related to diabetes. For these actions to be truly successful, gender and socioeconomic differences in the burden of diabetes and experiences with care will need to be addressed.

### **Strategies to halt the diabetes epidemic are critically needed in order to minimize future burden on the health care system caused by diabetes and other obesity-related illnesses.**

- Halting the obesity and consequent diabetes epidemics will require a multifaceted approach that promotes positive lifestyle changes at the population level acknowledging the need to address enabling factors such as access to healthy food and safe, walkable neighbourhoods to promote physical activity. Obesity prevention needs to start in childhood since obesity is very hard to treat once present. Using anti-smoking campaigns as a model, a strategy that combines social and public policy changes, public awareness campaigns and clinical interventions aimed at promoting physical activity and healthier eating could help curb the ongoing rise in diabetes.
- More intensive diabetes prevention strategies should be targeted towards high-risk populations, including those from lower-income groups, immigrants, Aboriginal communities, and women with gestational diabetes. Overcoming socioeconomic and demographic barriers to achieving a healthy lifestyle are likely to require innovative and cross-sectoral approaches. Culturally appropriate programs and services are also likely needed to enhance levels of physical activity and promote healthier eating patterns in ethnically diverse groups. For women with recent gestational diabetes, the demands of child-rearing in the postpartum period in combination with the balancing of work, family and other commitments pose additional barriers.

### **Reduce income-related disparities in diabetes outcomes.**

- Focusing efforts upstream through cross-sectoral collaboration can serve to address the root causes of income-related health inequities while reducing the



burden of diabetes in the population. A multifaceted approach would likely be required to tackle the many complex problems which contribute to greater diabetes prevalence and poorer health in these groups.

- Measures to improve the health of low-income groups and other high-risk populations will also have to address barriers to accessing care related to poverty and immigration, such as language barriers and high medication costs, if health promotion and chronic disease prevention and management programs are to be successful.

**Comprehensive patient-centred chronic disease management can improve quality and outcomes of care for diabetes.**

- Diabetes is a complex chronic disease that requires close follow up by a multidisciplinary diabetes health care team for optimal management. Individuals with diabetes often have multiple chronic conditions making diabetes management more challenging. Therefore, implementation of a comprehensive, coordinated, patient-centred chronic disease prevention and management strategy—one that addresses the needs of at-risk populations—is the key to improving quality and outcomes of care for people with diabetes.

**Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.**

- We found sizable regional variations in diabetes outcomes likely due in part to differences in human resources and regional capacity, as well as regional differences in practice patterns and the complexity of the population being served. Interventions such as performance measurement and quality improvement in primary care, the regional coordination of care, use of telemedicine, enhancing the availability of diabetes team members and providing training and support for

local practitioners are approaches that—when coupled with better patient education and support for healthy lifestyle changes—could reduce regional variations in care. Technological approaches such as telemedicine can improve access to effective care in underserved communities. Including performance measurement and quality improvement initiatives when these programs are being implemented will provide timely information on what is working.

**Improve quality, availability and timeliness of data to assess diabetes outcomes and care delivery in the province.**

- While data to assess diabetes care in the province have improved, there is still much to be done to improve the quality, completeness, availability and timeliness of data. Specifically, medication data on people under age 65, laboratory data on screening and monitoring indicators and clinical data such as blood pressure levels or foot examinations to assess the quality of diabetes management in routine care settings are needed. As well, given the importance of eye examinations to detect early changes from retinopathy, data on the frequency of retinopathy screening are also needed.
- Diabetes is primarily managed in the ambulatory care setting through primary care and specialty care. As a result, high quality clinical data are lacking. Better and more comprehensive data collection on management of diabetes in primary care and other ambulatory care settings is needed. Especially needed is more complete data on care that is provided through ACPs.
- Given the known variation in diabetes prevalence in different ethnic communities as well as issues of access to care in recent immigrant populations, data on diabetes care and outcomes that can be stratified by ethnicity and recency of immigration would allow us to assess disease burden, target interventions, as well as to evaluate access, quality, and outcomes of care in Ontario's diverse communities.



# Appendix 9.1

## INDICATORS AND THEIR LINKS TO PROVINCIAL STRATEGIC OBJECTIVES

### APPENDIX 9.1 | Diabetes indicators: links to the Ontario Diabetes Strategy (ODS) Objectives, Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System and the Ministry of Health and Long-Term Care (MOHLTC) Strategic Objectives

Indicator	Link(s) to Ontario Diabetes Strategy (ODS) Objectives	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 9A – Health and Functional Status</b>			
Prevalence of diabetes	<ul style="list-style-type: none"> <li>• Diabetes prevention initiatives</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> <li>• Influence broader determinants of health</li> <li>• Increase sustainability of the health system</li> </ul>
Percentage who had at least two additional chronic conditions	<ul style="list-style-type: none"> <li>• Improving management of disease</li> <li>• Improving coordination of care and leveraging best practices</li> <li>• Expanding existing diabetes programming</li> <li>• Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> </ul>
Prevalence of probable depression	<ul style="list-style-type: none"> <li>• Improving management of disease</li> <li>• Improving coordination of care and leveraging best practices</li> <li>• Expanding existing diabetes programming</li> <li>• Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Influence broader determinants of health</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Prevalence of hypertension	<ul style="list-style-type: none"> <li>• Improving management of disease</li> <li>• Improving coordination of care and leveraging best practices</li> <li>• Expanding existing diabetes programming</li> <li>• Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Influence broader determinants of health</li> <li>• Improve health status of Ontarians</li> <li>• Increase sustainability of the health system</li> </ul>

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Indicator	Link(s) to Ontario Diabetes Strategy (ODS) Objectives	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 9A – Health and Functional Status (Continued)</b>			
Percentage who reported their health to be fair or poor	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Patient-centred</li> <li>Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> </ul>
Percentage with limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Patient-centred</li> <li>Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> </ul>
Health behaviours—percentage who reported: <ul style="list-style-type: none"> <li>physical inactivity</li> <li>inadequate fruit and vegetable intake</li> <li>being overweight</li> <li>being obese</li> <li>smoking</li> </ul>	<ul style="list-style-type: none"> <li>Diabetes prevention initiatives</li> <li>Improving management of disease</li> <li>Expanding medical interventions</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>Improve chronic disease management</li> <li>Improve healthy behaviours, health promotion and disease prevention</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> </ul>
<b>Section 9B – Access and Utilization of Care</b>			
Percentage who had continuity of primary care	<ul style="list-style-type: none"> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> <li>Efficient</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Increase productive use and appropriate distribution of resources across the system</li> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> <li>Increase sustainability of the health system</li> <li>Increase equity of the health system</li> </ul>

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Indicator	Link(s) to Ontario Diabetes Strategy (ODS) Objectives	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 9B – Access and Utilization of Care (Continued)</b>			
Mean number of primary care visits per year	<ul style="list-style-type: none"> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> <li>Efficient</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Increase productive use and appropriate distribution of resources across the system</li> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> <li>Increase sustainability of the health system</li> <li>Increase equity of the health system</li> </ul>
Percentage who had at least one visit to a specialist (endocrinologist, general internist, or geriatrician) in the past two years	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding medical interventions</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Equitable</li> <li>Efficient</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> </ul>
Percentage who did not have any visits to a general practitioner/family physician or a specialist in the past year	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> <li>Expanding medical interventions</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Improve health system capacity and resources</li> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> </ul>
<b>Section 9C – Screening, Assessment and Monitoring</b>			
Percentage who were currently taking insulin who monitored their blood glucose at least daily	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Patient-centred</li> </ul>	<ul style="list-style-type: none"> <li>Improve patient-centeredness</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve healthy behaviours, health promotion and disease prevention</li> <li>Improve clinical &amp; population health outcomes</li> </ul>

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Indicator	Link(s) to Ontario Diabetes Strategy (ODS) Objectives	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 9C – Screening, Assessment and Monitoring (Continued)</b>			
Percentage who reported that a health care professional had tested them for hemoglobin A1c in the past 12 months	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> <li>Improve clinical &amp; population health outcomes</li> </ul>
Percentage who reported that a health care professional had tested them for microalbumin in the past 12 months	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> <li>Improve clinical &amp; population health outcomes</li> </ul>
Percentage of adults (aged 30 and older) who had an eye examination within two years of being diagnosed with diabetes	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Integrated</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve chronic disease management</li> <li>Improve clinical &amp; population health outcomes</li> </ul>
Percentage who reported usually performing a self foot examination at least once per year	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Diabetes prevention initiatives</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Patient-centred</li> </ul>	<ul style="list-style-type: none"> <li>Improve patient-centeredness</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve healthy behaviours, health promotion and disease prevention</li> <li>Improve clinical and population health outcomes</li> </ul>
Percentage who reported that a health care professional checked their feet for sores or irritations in the past 12 months	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding existing diabetes programming</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> </ul>	<ul style="list-style-type: none"> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> </ul>

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Indicator	Link(s) to Ontario Diabetes Strategy (ODS) Objectives	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC Strategic Objectives
<b>Section 9C – Screening, Assessment and Monitoring (Continued)</b>			
Percentage who reported that they had visited a dentist in the past 12 months	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Equitable</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve healthy behaviours, health promotion and disease prevention</li> <li>Improve clinical and population health outcomes</li> <li>Increase equity of the health system</li> </ul>
<b>Section 9D – Pharmacological Treatment</b>			
Percentage who reported being on insulin or at least one glucose-lowering medication	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding medical interventions</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> </ul>	<ul style="list-style-type: none"> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> </ul>
Percentage of adults aged 65 and older who filled a prescription for: <ul style="list-style-type: none"> <li>at least one anti-hypertensive drug</li> <li>an ACE inhibitors and/or an ARB</li> <li>statin</li> </ul>	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Improving coordination of care and leveraging best practices</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> </ul>	<ul style="list-style-type: none"> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> </ul>
<b>Section 9E – Health Outcomes</b>			
Number of adults with diabetes with at least one hospital visit (emergency department or hospital admission) for hyperglycemia or hypoglycemia	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> </ul>	<ul style="list-style-type: none"> <li>Increase productive use and appropriate distribution of resources across the system</li> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve clinical and population health outcomes</li> <li>Increase sustainability of the health system</li> </ul>

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<b>Section 9E – Health Outcomes (Continued)</b>			
Number of adults with diabetes who had at least one hospitalization for skin and soft tissue infections	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> </ul>	<ul style="list-style-type: none"> <li>Improve health system capacity and resources</li> <li>Increase productive use and appropriate distribution of resources across the system</li> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve clinical and population health outcomes</li> <li>Increase sustainability of the health system</li> </ul>
Cardiac disease: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>at least one hospitalization for AMI</li> <li>at least one hospitalization for CHF</li> <li>a coronary artery bypass graft (CABG) surgery</li> <li>a percutaneous coronary intervention (PCI)</li> </ul>	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Increase productive use and appropriate distribution of resources across the system</li> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Increase sustainability of the health system</li> </ul>
Stroke: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>at least one hospitalization for stroke</li> <li>a carotid endarterectomy</li> </ul>	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Increase sustainability of the health system</li> </ul>

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<b>Section 9E – Health Outcomes (Continued)</b>			
Peripheral vascular disease: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>a minor amputation</li> <li>a major amputation</li> <li>a peripheral revascularization procedure</li> </ul>	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Increase sustainability of the health system</li> </ul>
Number of adults with diabetes who were on chronic dialysis	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Expanding medical interventions</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Accessible</li> <li>Effective</li> <li>Equitable</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> </ul>
Retinopathy: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>laser photocoagulation</li> <li>vitrectomy</li> </ul>	<ul style="list-style-type: none"> <li>Improving management of disease</li> <li>Leveraging information to improve health outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Effective</li> <li>Equitable</li> <li>Efficient</li> <li>Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to appropriate health services</li> <li>Improve safety and effectiveness of health services</li> <li>Improve chronic disease management</li> <li>Improve clinical and population health outcomes</li> <li>Improve health status of Ontarians</li> </ul>



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<b>Section 9F – Diabetes and Pregnancy</b>			
Prenatal care: The percentage: <ul style="list-style-type: none"> <li>• who had at least one visit to an obstetrician during pregnancy</li> <li>• with pregestational diabetes who had at least one visit to a specialist (endocrinologist or general internist) during pregnancy</li> <li>• with pregestational diabetes who had at least one eye examination in the year before delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Specific population based programming</li> <li>• Improving management of disease</li> <li>• Expanding existing diabetes programming</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> <li>• Focused on population health</li> <li>• Appropriately resourced</li> <li>• Integrated</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Obstetrical complications: The percentage: <ul style="list-style-type: none"> <li>• with hypertension in the 6 months before delivery</li> <li>• with preeclampsia/ eclampsia in the 6 months before delivery</li> <li>• with obstructed labour</li> <li>• with shoulder dystocia during labour</li> <li>• who delivered by caesarean section</li> </ul>		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Fetal complications: The percentage or proportion of women whose infants: <ul style="list-style-type: none"> <li>• were stillborn or suffered in-hospital mortality (per 1,000)</li> <li>• had a congenital anomaly (major or minor)</li> <li>• were delivered prematurely</li> <li>• underwent phototherapy for hyperbilirubinemia</li> <li>• had a NICU admission</li> </ul>		<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>

# Appendix 9.2

## INDICATORS AND THEIR SOURCES

### APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>^</sup> and data sources

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9A – Health and Functional Status</b>		
Prevalence of diabetes	<ul style="list-style-type: none"> <li>Health Canada. Responding to the challenge of diabetes in Canada: first report of the National Diabetes Surveillance System, 2003<sup>286</sup></li> <li>Health Canada. Diabetes in Canada 2nd edition, 2002<sup>287</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 1: Patterns of prevalence and incidence of diabetes, June 2003<sup>267</sup></li> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>288</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage who had at least two additional chronic conditions	<ul style="list-style-type: none"> <li>Health Council of Canada. Why health care renewal matters: lessons from diabetes, 2007<sup>72</sup></li> <li>Australian Institute of Health and Welfare. Burden of disease and injury in Australia, 1999<sup>289</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Prevalence of probable depression	<ul style="list-style-type: none"> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>288</sup></li> <li>Statistics Canada. Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>290</sup></li> <li>Kessler RC et al. The World Health Organization composite international diagnostic interview short form (CIDI-SF), 1998<sup>291</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 4: Diabetes health status and risk factors, June 2003<sup>55</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)
Prevalence of hypertension	<ul style="list-style-type: none"> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 4: Diabetes health status and risk factors, June 2003<sup>55</sup></li> <li>Health Canada. Diabetes in Canada 2nd edition, 2002<sup>287</sup></li> <li>Healthcare Effectiveness Data and Information Set (HEDIS)<sup>294</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

**APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>^</sup> and data sources**

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9A – Health and Functional Status (Continued)</b>		
Percentage who reported their health to be fair or poor	<ul style="list-style-type: none"> <li>• Association for Public Health Epidemiologist of Ontario (APHEO)<sup>288</sup></li> <li>• Statistics Canada. Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>290</sup></li> <li>• Public Health Research, Education and Development. Report on the Health Status of the Residents of Ontario, 2000<sup>295</sup></li> <li>• Health Canada. Diabetes in Canada 2nd edition, 2002<sup>287</sup></li> <li>• ICES Atlas. Diabetes in Ontario, Chapter 4: Diabetes health status and risk factors, June 2003<sup>55</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage with limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)	<ul style="list-style-type: none"> <li>• Association for Public Health Epidemiologist of Ontario (APHEO)<sup>288</sup></li> <li>• Public Health Research, Education and Development. Report on the Health Status of the Residents of Ontario, 2000<sup>295</sup></li> <li>• ICES Atlas. Diabetes in Ontario, Chapter 4: Diabetes health status and risk factors, June 2003<sup>55</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)
Health behaviours—percentage who reported: <ul style="list-style-type: none"> <li>• physical inactivity</li> <li>• inadequate fruit and vegetable intake</li> <li>• being overweight</li> <li>• being obese</li> <li>• smoking</li> </ul>	<ul style="list-style-type: none"> <li>• Association of Public Health Epidemiologists of Ontario (APHEO)<sup>288</sup></li> <li>• Statistics Canada. Comparable Health Indicators—Canada, Provinces and Territories, 2004<sup>290</sup></li> <li>• ICES Atlas. Diabetes in Ontario, Chapter 4: Diabetes health status and risk factors, June 2003<sup>55</sup></li> <li>• Health Canada. Diabetes in Canada 2nd edition, 2002<sup>287</sup></li> <li>• Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
<b>Section 9B – Access and Utilization of Care</b>		
Percentage who had continuity of primary care	<ul style="list-style-type: none"> <li>• Canadian Diabetes Association. Clinical Practice Guidelines, 2008<sup>82</sup></li> <li>• Association of Public Health Epidemiologists of Ontario (APHEO)<sup>288</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

## APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>a</sup> and data sources

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9B – Access and Utilization of Care (Continued)</b>		
Mean number of primary care visits per year	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 14: Supply and utilization of health care services for diabetes, June 2003<sup>262</sup></li> <li>Institute of Health Economics. Alberta Diabetes Atlas 2007<sup>296</sup></li> <li>A Canadian consensus for the standardized evaluation of quality improvement interventions in type 2 diabetes, 2005<sup>297</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)
Percentage who had at least one visit to a specialist (endocrinologist, general internist, or geriatrician) in the past two years	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 9: Sources of physician care for people with diabetes, June 2003<sup>115</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)
Percentage who did not have any visits to a general practitioner/family physician or a specialist in the past year	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 9: Sources of physician care for people with diabetes, June 2003<sup>115</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)
<b>Section 9C – Screening, Assessment and Monitoring</b>		
Percentage who were currently taking insulin who monitored their blood glucose at least daily	<ul style="list-style-type: none"> <li>U.S. Department of Health and Human Services. Healthy People 2010, 2000<sup>298</sup></li> <li>Canadian Diabetes Association. Clinical Practice Guidelines, 2008<sup>82</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage who reported that a health care professional had tested them for hemoglobin A1c in the past 12 months	<ul style="list-style-type: none"> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> <li>U.S. Department of Health and Human Services. Healthy People 2010, 2000<sup>298</sup></li> <li>Canadian Diabetes Association. Clinical Practice Guidelines, 2008<sup>82</sup></li> <li>Healthcare Effectiveness Data and Information Set (HEDIS)<sup>294</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage who reported that a health care professional had tested them for microalbumin in the past 12 months	<ul style="list-style-type: none"> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> <li>U.S. Department of Health and Human Services. Healthy People 2010, 2000<sup>298</sup></li> <li>Healthcare Effectiveness Data and Information Set (HEDIS)<sup>294</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

**APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>a</sup> and data sources**

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9C – Screening, Assessment and Monitoring (Continued)</b>		
Percentage of adults (aged 30 and older) who had an eye examination within two years of being diagnosed with diabetes	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 10: Diabetes and the eye, June 2003<sup>299</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)
Percentage who reported usually performing a self foot examination at least once per year	<ul style="list-style-type: none"> <li>Canadian Diabetes Association. Clinical Practice Guidelines, 2008<sup>82</sup></li> <li>A Canadian consensus for the standardized evaluation of quality improvement interventions in type 2 diabetes, 2005<sup>297</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage who reported that a health care professional checked their feet for sores or irritations in the past 12 months	<ul style="list-style-type: none"> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> <li>U.S. Department of Health and Human Services. Healthy People 2010, 2000<sup>298</sup></li> <li>Canadian Diabetes Association. Clinical Practice Guidelines, 2008<sup>82</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage who reported that they had visited a dentist in the past 12 months	<ul style="list-style-type: none"> <li>U.S. Department of Health and Human Services. Healthy People 2010, 2000<sup>298</sup></li> <li>Association for Public Health Epidemiologist of Ontario (APHEO)<sup>288</sup></li> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)
<b>Section 9D – Pharmacological Treatment</b>		
Percentage who reported being on insulin or at least one glucose-lowering medication	<ul style="list-style-type: none"> <li>Health Canada. Diabetes in Canada, 2nd ed., 2002<sup>287</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 3: Drug use in older people with diabetes, June 2003<sup>50</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007
Percentage of adults aged 65 and older who filled a prescription for: <ul style="list-style-type: none"> <li>at least one anti-hypertensive drug</li> <li>an ACE inhibitors and/or an ARB</li> <li>statin</li> </ul>	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 3: Drug use in older people with diabetes, June 2003<sup>50</sup></li> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Health Resources and Services Administration. Health Disparities Collaboratives: Diabetes Collaborative, 2006<sup>293</sup></li> <li>Health Quality Council, Saskatchewan. Quality of diabetes management in Saskatchewan, 2006<sup>268</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Drug Benefits (ODB) database

## APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>^</sup> and data sources

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9E – Health Outcomes</b>		
Number of adults with diabetes with at least one hospital visit (emergency department or hospital admission) for hyperglycemia or hypoglycemia	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 2: Acute complications of diabetes, June 2003<sup>300</sup></li> <li>Agency for Healthcare Research and Quality. Prevention Quality Indicators<sup>301</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)
Number of adults with diabetes who had at least one hospitalization for skin and soft tissue infections	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario. Chapter 2: Acute complications of diabetes, June 2003<sup>300</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
Cardiac disease: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>at least one hospitalization for AMI</li> <li>at least one hospitalization for CHF</li> <li>a coronary artery bypass graft (CABG) surgery</li> <li>a percutaneous coronary intervention (PCI)</li> </ul>	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario. Chapter 5: Diabetes and Cardiac Disease, June 2003<sup>302</sup></li> <li>A Canadian consensus for the standardized evaluation of quality improvement interventions in type 2 diabetes, 2005<sup>297</sup></li> <li>Institute of Health Economics. Alberta Diabetes Atlas 2007<sup>296</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)
Stroke: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>at least one hospitalization for stroke</li> <li>a carotid endarterectomy</li> </ul>	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario. Chapter 7: Diabetes and stroke, June 2003<sup>189</sup></li> <li>Institute of Health Economics. Alberta Diabetes Atlas 2007<sup>296</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
Peripheral vascular disease: Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>a minor amputation</li> <li>a major amputation</li> <li>a peripheral revascularization procedure</li> </ul>	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario. Chapter 6: Diabetes and peripheral vascular disease, June 2003<sup>188</sup></li> <li>National Quality Measures Clearinghouse. Diabetes Mellitus<sup>292</sup></li> <li>Agency for Healthcare Research and Quality. Prevention Quality Indicators<sup>301</sup></li> </ul>	Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
Number of adults with diabetes who were on chronic dialysis	<ul style="list-style-type: none"> <li>Health Council of Canada: Why health care renewal matters—lessons from diabetes, 2007<sup>70</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 8: Dialysis therapy for people with diabetes, June 2003<sup>303</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)
Retinopathy—Number of adults with diabetes who had: <ul style="list-style-type: none"> <li>laser photocoagulation</li> <li>vitrectomy</li> </ul>	<ul style="list-style-type: none"> <li>ICES Atlas. Diabetes in Ontario, Chapter 10: Diabetes and the eye, June 2003<sup>299</sup></li> <li>Institute of Health Economics. Alberta Diabetes Atlas 2007<sup>296</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP)

**APPENDIX 9.2 | Diabetes indicators—indicator sources<sup>^</sup> and data sources**

Indicator	Indicator Source(s)	Data Source(s)
<b>Section 9F – Diabetes and Pregnancy</b>		
Prenatal care: The percentage: <ul style="list-style-type: none"> <li>• who had at least one visit to an obstetrician during pregnancy</li> <li>• with pregestational diabetes who had at least one visit to a specialist (endocrinologist or general internist) during pregnancy</li> <li>• with pregestational diabetes who had at least one eye examination in the year before delivery</li> </ul>	<ul style="list-style-type: none"> <li>• ICES Atlas. Diabetes in Ontario, Chapter 11: Diabetes and pregnancy, June 2003<sup>304</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Physician Database (IPDB)
Obstetrical complications: The percentage: <ul style="list-style-type: none"> <li>• with hypertension in the 6 months before delivery</li> <li>• with preeclampsia/ eclampsia in the 6 months before delivery</li> <li>• with obstructed labour</li> <li>• with shoulder dystocia during labour</li> <li>• who delivered by Caesarean section</li> </ul>	<ul style="list-style-type: none"> <li>• ICES Atlas. Diabetes in Ontario, Chapter 11: Diabetes and pregnancy, June 2003<sup>304</sup></li> <li>• Feig DS et al. Trends in deliveries, prenatal care, and obstetrical complications in women with pregestational diabetes: a population-based study in Ontario, Canada, 1996-2001. Diabetes Care 2006;29(2):232-235<sup>32</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
Fetal complications: The percentage of women whose infants: <ul style="list-style-type: none"> <li>• were stillborn or suffered in-hospital mortality (per 1,000)</li> <li>• had a congenital anomaly (major or minor)</li> <li>• were delivered prematurely</li> <li>• underwent phototherapy for hyperbilirubinemia</li> <li>• had a NICU admission</li> </ul>	<ul style="list-style-type: none"> <li>• ICES Atlas. Diabetes in Ontario, Chapter 11: Diabetes and pregnancy, June 2003<sup>304</sup></li> <li>• Evers IM et al. Risk of complications of pregnancy in women with type 1 diabetes: nationwide prospective study in the Netherlands. BMJ 2004;328(7445):915<sup>27</sup></li> <li>• Crowther CA et al. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes. N Engl J Med 2005;352(24):2477-2486<sup>251</sup></li> </ul>	Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

<sup>^</sup> There may be small differences in the indicator reported compared to the indicator source(s) listed here.



# Appendix 9.3

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

The indicators we report are the result of a rigorous selection process, which included an extensive literature review of peer-reviewed and grey literature (see [chapter 1, Introduction to the POWER Study](#)).<sup>305</sup> The review of literature identified a number of indicators that were reviewed by the working group using defined indicator selection criteria (see [the POWER Study Framework, chapter 2](#)).<sup>306</sup> A final list containing potential indicators was prepared for review by a Technical Expert Panel (TEP). Indicators were then selected through a modified Delphi process by the TEP using a two step process—first through an online questionnaire and then at a face-to-face meeting on September 19, 2008. The final list included 53 diabetes indicators (See [Appendix 9.1](#) for a complete indicator list).

All the indicators were reported at the provincial level and at the Local Health Integration Network (LHIN) level when sample size allowed. At the provincial level, these indicators were first stratified by sex, and then further stratified by age, income, education, time since immigration, ethnicity and rural/urban residence as allowed by sample size and data availability. At the LHIN level, indicators were stratified by sex and then by income as allowed by sample size and data availability. When reporting indicators other than by age, age-adjusted rates are reported. Indicators reported by age reflect crude rates. Age-adjustment was done using indirect standardization.

### 2A. Datasets—Survey Data

#### Canadian Community Health Survey (CCHS)

The CCHS is a nationally representative, cross-sectional survey of the Canadian community-dwelling population conducted every two years by Statistics Canada. The

CCHS is offered in English and in French. To remove language as a barrier to conducting interviews, each of the Statistics Canada Regional Offices recruits interviewers with a wide range of language competencies. When necessary, cases are transferred to an interviewer with the language competency needed to complete an interview. In addition, the survey questions are translated into the following languages: Chinese, Punjabi and Inuktitut. Chinese and Punjabi were the most common language barriers identified by the regional offices. The Inuktitut translation was used to facilitate collection in Nunavut. The survey is conducted via face-to-face interviews and covers material that alternates between a general overview of the health of Canadians (the x.1 cycle surveys) and more in-depth issues (the x.2 cycle surveys). In 2007, major changes were made to the CCHS design. Data are now collected on an ongoing basis with annual releases rather than every two years as was the case prior to 2007. As such, as of 2007, the naming convention has also changed to reflect the year of the survey rather than the cycle. Residents living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces and residents of certain remote regions are excluded from the survey. The Ontario share files for the survey were used for all analyses.

For some of the indicators, it was possible to use the combined CCHS, 2005 (Cycle 3.1) and 2007. This was only possible when questions were similarly asked in both cycles and response options were also the same. The cycles were combined using a method developed by Statistics Canada<sup>307</sup> that adjusted the sample weights for each of the cycles by a function of their health region sample sizes. To use the combined cycles, it was necessary to assume the two share files to be independent, i.e., no duplicate respondents, as it would

be difficult to identify these and the probability of duplicate records is very low.

For CCHS-based indicators, we included all respondents aged 20 and older. Data from CCHS, 2000/01 (Cycle 1.1) were used to assess the prevalence of probable depression. Limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL) and dental visits were measured using CCHS, 2005 (Cycle 3.1). Data from CCHS, 2005 (Cycle 3.1) and 2007 were combined to assess: self-reported prevalence of multiple chronic conditions; prevalence of hypertension; self-rated health status; behavioural risk factors; self-monitoring of blood glucose levels; self foot examinations; foot examinations by health care professionals; hemoglobin A1c tests; microalbumin tests; use of anti-hyperglycemic agents and diabetes prevalence by ethnicity.

For the overall population and for women and men we assessed the relationship between the indicators reported in this chapter and income, education, age, ethnicity, immigrant status, and rural/urban residence. When stratifying by education, only people aged 25 and older were included. The variable measuring rural/urban residency is a derived variable by Statistics Canada based on population density and size. In analyses that use the CCHS, income levels were based on information

collected about annual household income, a variable derived by Statistics Canada that accounts for total household income and household size (see [Table 2](#) for more detail regarding variable categories). Income data were missing for 9.4 percent of the sample from CCHS, 2000/01 (Cycle 1.1), 13.4 percent of the sample from CCHS 2005 (Cycle 3.1) and 13.7 percent of the sample from the CCHS, 2005 (Cycle 3.1) and CCHS, 2007 combined sample. The studentized range test was used to assess the significance of differences in the rates. The standard errors and 95 percent confidence intervals were calculated using 500 bootstrap weights provided by Statistics Canada.

Statistics Canada rules were followed in the reporting of estimates using the Ontario share file as follows:

- Estimates should not be reported if the unweighted sample is less than 10 (or less than 30 for data from CCHS 2000/01 (Cycle 1.1))
- Estimates are adequate and can be reported if the coefficient of variation is 16.5 or less
- Estimates should be reported with caution if the coefficient of variation is between 16.6 and 33.3
- Estimates should be suppressed if the coefficient of variation is greater than 33.3

**Table 2 | Stratifying variables for CCHS indicators**
**Sex**

Female  
Male

**Age (years) – 3-level variable**

20–44  
45–64  
65+

**Age (years) – 2-level variable**

20–64  
65+

**Household income – 4-level variable**

Lowest income	<p>&lt; \$15,000 if 1 or 2 people</p> <p>&lt; \$20,000 if 3 or 4 people</p> <p>&lt; \$30,000 if 5+ people</p>
Lower middle income	<p>\$15,000 to \$29,999 if 1 or 2 people</p> <p>\$20,000 to \$39,999 if 3 or 4 people</p> <p>\$30,000 to \$59,999 if 5+ people</p>
Upper middle income	<p>\$30,000 to \$59,999 if 1 or 2 people</p> <p>\$40,000 to \$79,999 if 3 or 4 people</p> <p>\$60,000 to \$79,999 if 5+ people</p>
Highest income	<p>≥ \$60,000 if 1 or 2 people</p> <p>≥ \$80,000 if 3+ people</p>

**Household income – 2-level variable**

Lower income (Lowest / Lower Middle)	<p>&lt; \$30,000 if 1 or 2 people</p> <p>&lt; \$40,000 if 3 or 4 people</p> <p>&lt; \$60,000 if 5+ people</p>
Higher income (Upper Middle / Highest)	<p>≥ \$30,000 if 1 or 2 people</p> <p>≥ \$40,000 if 3 or 4 people</p> <p>≥ \$60,000 if 5+ people</p>

**Education – 4-level variable**

Less than secondary school graduation  
 Secondary school graduation  
 At least some post-secondary school  
 Bachelor's degree or higher

**Immigration – 3-level variable**

0-9 years of residency in Canada  
 10+ years of residency in Canada  
 Born in Canada

**Immigration – 2-level variable**

Immigrant  
 Canadian born

**Ethnicity – 6-level variable**

White	
Black	
East and Southeast Asian	Filipino, Japanese, Korean, Chinese, Southeast Asian
Arab, West and South Asian	South Asian, Arab, and West Asian
Other	Latin American, other racial or cultural origins, multiple racial origins
Aboriginal people	North American Indian, Métis or Inuit

**Ethnicity – 2-level variable**

White	
Visible minority	Black, Filipino, Japanese, Korean, Chinese, Southeast Asian, South Asian, Arab, and West Asian, Latin American, other racial or cultural origins, multiple racial origins, North American Indian, Métis or Inuit

**Rural/urban residence**

Urban	Urban core; Urban fringe; Urban area outside CMAs and CAs Secondary urban core
Rural	Missing; Rural fringe inside CMAs and CAs; Rural fringe outside CMAs and CAs

## 2B. Datasets—Administrative Data

### Ontario Diabetes Database (ODD)

The ODD employs a validated algorithm to identify people with diabetes using data on hospitalizations and physician visits. Hospital discharge abstracts, collected by the Canadian Institute for Health Information (CIHI) from April 1988 onwards were used to identify Ontarians with a valid health card number who had been hospitalized with a new or pre-existing diagnosis of diabetes, based on a specific code (ICD-9 code: 250.x; ICD10 code: any of E10, E11, E13, E14) in any diagnostic field. Physician claim records held by the Ontario Health Insurance Plan (OHIP) from July 1991 onwards were also used to identify individuals with visits to a physician for diabetes (diagnostic code 250). When there was a hospital record with a diagnosis of pregnancy care or delivery (ICD-9 code: 641-676, V27; ICD10 code: O10-O16; O21-O95, O98, O99, Z37) close to a diabetic record (i.e., diabetic record date between 120 days before and 180 days after a gestational admission date), the diabetic record was considered to be for gestational diabetes and was excluded. Individuals were considered to have diabetes if they had at least one hospitalization or two physician service claims over a two-year period. People enter the ODD as incident cases when they are defined as having diabetes (i.e., the first of CIHI admission date or OHIP service date over the two-year period as incident date). The database contains an encrypted patient identifier that can be linked to hospital discharge abstracts from CIHI, physician claims from OHIP and sociodemographic information from the Registered People Database (RPDB). For our analysis, we restricted the sample to adults aged 20 and older with prevalent diabetes as of March 31, 2007. An analysis by Hux and colleagues reported that the current algorithm had a sensitivity of 86 percent and a specificity of 97 percent for identifying diabetes in the population. The positive predictive value of the algorithm was 80 percent.<sup>75</sup>

### Ontario Health Insurance Plan (OHIP)

The OHIP claims database covers all reimbursement claims to the Ontario Ministry of Health and Long-Term Care (MOHLTC) made by fee-for-service physicians, community-based laboratories and radiology facilities. The OHIP database at the Institute for Clinical Evaluative Sciences (ICES) contains encrypted patient and physician identifiers, codes for services provided, date of service, the associated diagnosis and fee paid. Services which are missing from the OHIP data include: some lab services; services received in provincial psychiatric hospitals; services provided by health service organizations and other alternate providers; diagnostic procedures performed on an inpatient basis and lab services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through alternate funding plans (AFPs). Their concentration in certain specialties or geographic areas could distort analyses.

### Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD)

The CIHI-DAD is a database of information abstracted from hospital records. It includes patient-level data for acute- and chronic care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. The main data elements of the CIHI-DAD database are encrypted patient identifier, patient demographics (age, sex, geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay).

### National Ambulatory Care Reporting System (NACRS)

NACRS is a data collection tool used to capture patient and clinical information on patient visits to hospital and community based ambulatory care: same day surgery, outpatient clinics and emergency departments.

### Ontario Drug Benefit Program (ODB)

The ODB database contains information about the use of medications in seniors aged 65 and older as well as individuals on welfare assistance who are covered by the ODB. The ODB tracks all filled prescriptions for medications listed in its Formulary and each record represents a unique drug claim (i.e., a dispensed prescription) paid for by the MOHLTC. The ODB database at ICES contains patient, pharmacy and physician identifiers, drug identifiers (drug identification numbers) quantity supplied, cost and dispensing date.

### Registered People Database (RPDB)

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex, address, date of death (where applicable) and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address are removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data from the RPDB are enhanced with available information through other administrative data sources at ICES; however, even the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality.<sup>308</sup> To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada. The adjusted dataset was used to determine population denominators.

### ICES Physician Database (IPDB)

The IPDB contains information on physician demographics and specialty training. The IPDB incorporates information from the Corporate Provider Database (CPDB), the Ontario Physician Human Resource Data Centre (OPHRDC) database and the OHIP database of physician billings. The CPDB contains information about physician demographics, specialty training and certification and practice location. This information is validated against the OPHRDC database, which verifies this information through periodic telephone interviews with all physicians practicing in Ontario.

### ICES Mother-Baby (MOMBABY) Linked Database

The MOMBABY dataset is a cumulative database created by linking the CIHI-DAD inpatient admission records of delivering mothers to those of their newborns. The linking algorithm makes use of maternal and newborn chart numbers, institutions, postal codes, admission/discharge dates and procedure codes. The database includes information on maternal gestational age at admission and at delivery, newborn gestational weeks at delivery and flags that identify multiple births and still births.

## 3. Analysis and Regional and Socioeconomic Variables

### Analysis

For survey data (CCHS), analyses were conducted at the provincial level, first by sex and then by annual household income, educational attainment, age group, ethnicity, time since immigration, rural/urban residence and LHIN. Where possible, relative rates were calculated for women-to-men, lowest-to-highest income groups, lowest-to-highest education level, and rural-to-urban residence. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. At the LHIN level, indicators were stratified by sex as allowed by sample size and data availability.

For all indicators, with the exception of comparisons across age groups age-adjusted rates were reported. Indirect standardization was used to age adjust rates; this method compares the age specific rates to the standard population average for that age group. For this chapter, the standard population was adults aged 20 and older with diabetes. The standardized rates will differ from the crude rates, in a way that reflects: (i) how the indicator varies by age and (ii) how the strata differ by age. The observed over the expected rate tells us how a particular stratum compares to the overall population and the relative rate tells us how a specific stratum compares to another (i.e., women versus men or low versus high income).

The results based on CCHS data should be interpreted with caution for the following reasons:

- The survey relies on self-reports and voluntary participation of randomly selected participants, and thus the data reflect individuals' interpretation of questions and how they perceive their own health. Hence, results may be an under- or over-estimation of the prevalence of some conditions.
- The CCHS does not survey Aboriginal people living on reserves, institutionalized individuals, individuals unable to be surveyed in English or French, or people in the armed forces. While the findings pertain to a large proportion of Ontarians (those living in households), they may be biased if the group not surveyed have significantly different need or utilization rates.
- The CCHS survey sampling strategy is based on health regions and thus may not be fully representative of the LHINs and in some cases there is inadequate sample size for some measures for some LHINs. This prevents comparative analysis at the LHIN level for some indicators.

For administrative data, analyses were conducted at the provincial level, first by sex and then by neighbourhood income quintile, age group, and LHIN. Analyses at the LHIN level were stratified by sex. For indicators based on administrative data, indirect age-standardization

was applied. For this chapter, administrative data were adjusted to the diabetic population. Pregnancy indicators were adjusted to the pregestational diabetic population. Where numbers were too small, results were either not reported or were aggregated. Where possible, relative rates were calculated for women-to-men and lowest-to-highest income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons.

### Neighbourhood Income Quintile

Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person equivalent (IPPE), which is a household size adjusted measure of household income based on 2006 census summary data at the dissemination area level and using person-equivalents implied by the 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as a proxy for overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilization. Individual geographic information from ICES databases was used to define the best known postal code for each person on July 1st of each year (available from 1991 to 2004). Postal codes were then used to assign people to enumeration areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Two-level income data compare people from the first two income quintiles (Q1, Q2) against people from the remaining three quintiles (Q3, Q4, Q5). Enumeration areas and dissemination areas are small adjacent geographic areas, designated for collection of census data. Dissemination areas replaced enumeration areas in 2001 and have a population of 400–700 people.



### Location of Residence (Urban Versus Rural)

In the administrative data, rural/urban residency was assigned based on a Statistics Canada derived variable. Urban areas are those continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts. Areas are designated as rural, urban core, urban fringe, urban area outside CMAs and CAs, secondary urban code and mix or urban/rural areas. This variable is further dichotomized into rural and urban location by Statistics Canada.

### Patients' Residence

For all analyses presented in the report, the definition of LHIN was based on the residence of the patient rather than where they received care.

## 4. Indicators

### Prevalence of Diabetes

The percentage of adults aged 20 and older who had diabetes as of March 31, 2007 was measured using the ODD. Crude and age-adjusted rates (adjusted to the Ontario population aged 20 and older from Canadian census data on July 1, 2006) were calculated. Currently data from Ontario's administrative health care databases do not allow for analyses by some important sociodemographic variables (i.e., education, ethnicity, etc). Therefore, data from the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset were used to assess self-reported diabetes prevalence by other sociodemographic variables. Respondents to the CCHS are asked whether they have diabetes that has been diagnosed by a health professional.

### Comorbidity

The percentage of adults aged 20 and older who reported having two or more additional chronic conditions (Alzheimer's disease or other dementia; Crohn's disease, ulcerative colitis, Irritable Bowel Syndrome or bowel incontinence; cancer; heart disease; stroke; high blood pressure; urinary

incontinence; arthritis, rheumatism, or back problems, excluding fibromyalgia; asthma, emphysema or chronic obstructive pulmonary disease) diagnosed by a health professional was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We compared the prevalence of comorbidity among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Probable Depression

The prevalence of probable depression among adults aged 20 and older was assessed using the Composite International Diagnostic Interview-Short Form for Major Depression (CIDI-SFMD). This series of questions is used to calculate the predicted probability of major depressive episodes occurring within the year preceding the interview. Respondents who had a CIDI-SFMD predicted probability score of 0.9 or greater were considered to have probable depression. However, since the CIDI-SF was designed to predict the probability that a person would be considered depressed using the full set of CIDI depression questions, it may somewhat overestimate prevalence. We compared the prevalence of probable depression among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Hypertension

The percentage of adults aged 20 and older who reported ever being diagnosed with hypertension by a health professional was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We compared the prevalence of hypertension among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

## Self-Rated Health

The percentage of adults aged 20 and older who reported that their health was fair or poor compared to others their own age was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. We compared self-rated health among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

## Limitations in Instrumental Activities of Daily Living (IADL) and/or Activities of Daily Living (ADL)

The percentage of adults aged 20 and older who reported having IADL and/or ADL limitations was measured using data from the CCHS, 2005 (Cycle 3.1). ADL limitations include washing, dressing, eating and moving about inside the house. IADLs include light and heavy housework, laundry, meal preparation, transportation, grocery shopping, using the telephone and money management. IADL limitations represent difficulties in carrying out routine life activities and are generally interpreted as an indicator of mild to moderate disability. Limitations in ADLs reflect difficulty in carrying out self-care activities, and therefore represent a more severe disability. We compared the prevalence of IADL and/or ADL limitations among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

## Health Behaviours

The following health behaviours were assessed among adults aged 20 and older using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset.

- The percentage who were overweight (defined as a Body Mass Index (BMI)  $\geq 25$  but  $< 30$ ) or obese (BMI  $\geq 30$ ), calculated from self-reported height and weight;

- The percentage who were physically inactive, defined as a Physical Activity Index of  $< 1.5$  kcal/kg/day;
- The percentage who had inadequate daily intake of fruits and vegetables, defined as a daily consumption of less than 5 servings of fruits and vegetables;
- The percentage who were current daily or occasional smokers.

We compared the health behaviours of people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

## Continuity of Primary Care

Continuity of primary care was measured as the percentage of adults with diabetes who had 50 percent or more of their primary care visits over a two year period to the same primary care provider. This indicator was assessed during the period April 1, 2005 to March 31, 2007. Data from the ODD were used to identify adults aged 20 and older who were diagnosed with diabetes as of March 31, 2005. These records were linked to the OHIP database to identify visits to primary care providers based on specialty code '00' (Family Practice and Practice in General). Physician identification numbers in OHIP claims were used to confirm multiple visits to the same physician. Patients were excluded if they had less than three primary care visits over the two-year period. Only one visit per primary care provider per day was counted. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

## Average Number of Primary Care Visits Per Year

Data from the ODD were used to identify adults aged 20 and older who were diagnosed with diabetes as of March 31, 2005. These records were linked to OHIP claims to calculate the mean number of primary care visits per year among adults with diabetes. Means

were calculated per year for two years of OHIP data (April 1, 2005 to March 31, 2007). Primary care visits were defined based on OHIP claims with a specialty code of '00' (Family Practice and Practice in General), excluding inpatient and emergency department visits. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### Specialist Care

Data from the ODD were used to identify adults aged 20 and older who were diagnosed with diabetes as of March 31, 2005. These records were linked to the OHIP database and the IPDB to calculate the percentage of adults with diabetes who had one or more OHIP claims for an 'office' visit with a specialist (endocrinologist, internist or geriatrician) over a two-year period (April 1, 2005 to March 31, 2007). Specialists were defined as having an OHIP specialty code of '13' (Internal Medicine) and an IPDB MAIN-SPECIALTY of 'Endocrinology', 'Internal Medicine', or 'Geriatric Medicine'. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### No Primary or Specialist Care

Using the definitions above, we calculated the percentage of diabetic adults who did not have any primary care or specialist (endocrinologist, general internist, or geriatrician) visits over a two-year period (April 1, 2005 to March 31, 2007). Data from the ODD were used to identify adults aged 20 and older who were diagnosed with diabetes as of March 31, 2005. These records were linked to OHIP claims to identify individuals who did not have any visits to physicians with specialty codes of '00' (Family Practice and Practice in General) or '13' (Internal Medicine). We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### Self-Monitoring of Blood Glucose

The percentage of adults aged 20 and older who reported having diabetes who reported that they self-monitored their blood glucose levels on at least a daily basis was measured using data from the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. The population of people with diabetes was limited to those who reported they were taking glucose-lowering medications and stratified into those who were currently taking insulin ("Are you currently taking insulin for your diabetes?") and those who were not on insulin but who had taken an oral glucose-lowering medication in the past month ("In the past month, did you take pills to control your blood sugar?"). People with diabetes were asked "How often do you usually have your blood checked for glucose or sugar by yourself or by a family member or friend?" The percentage who indicated that they monitored their blood glucose at least daily was reported. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### Hemoglobin A1c Test

The percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional had tested them for hemoglobin A1c within the past year was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Respondents who indicated they had diabetes were asked "In the past 12 months has a health care professional tested you for hemoglobin 'A-one-C'?" (An 'A-one-C' hemoglobin test measures the average level of blood sugar over a 3-month period.)" Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Microalbumin Measurement

The percentage of adults aged 20 or older who reported having diabetes who reported that a health

care professional had tested them for microalbumin (protein in the urine) within the past year was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Respondents who indicated they had diabetes were asked "In the past 12 months has a health care professional tested your urine for protein (i.e., microalbumin)?" Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Eye Examination

The ODD was used to identify incident diabetes cases among people aged 30 and older between April 1, 2003 and March 31, 2006. The sample was restricted to adults aged 30 and older at diagnosis to select people who were more likely to have new onset type 2 diabetes as prompt screening would be recommended for them. These records were linked to the OHIP database to determine the percentage that underwent an eye care visit within two years following the diagnosis date.

There is no specific OHIP fee code for retinopathy screening. Accordingly, OHIP claims were used to identify physician or optometry visits during which a dilated retinal examination would likely have occurred. Visits to optometrists (specialty code '56') were included for billing codes

- V401, V405, V406, V450, V451 (for all diagnostic codes)
- V402, V407 (if the diagnostic code was 250 or 362)
- V408, V409 (if the diagnostic code was 250, 361 or 362)

Visits to primary care physicians (specialty code '00') or ophthalmologists (specialty code '23') were included for billing codes:

- A111, A112 (for all diagnostic codes)
- A114 (if the diagnostic code was 250 or 362)
- A115 (if the diagnostic code was 250, 361 or 362)

Additional ophthalmology billing codes included A233-A236, A238-A240, C233-C236, K065 and K066 for all diagnostic codes. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### Self Foot Examination

The percentage of adults aged 20 and older who reported having diabetes who reported ever having their feet checked for any sores or irritations by themselves, or by a family member or friend was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Respondents who indicated they had diabetes were asked "How often do you usually have your feet checked for any sores or irritations by yourself or by a family member or friend?" We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

### Foot Exam by a Health Care Professional

The percentage of adults aged 20 and older who reported having diabetes who reported that a health care professional checked their feet for sores or irritations within the past 12 months was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Respondents who indicated they had diabetes were asked "In the past 12 months has a health care professional checked your feet for any sores or irritations?" Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Dentist Visit

The percentage of adults aged 20 and older who reported that they had visited a dentist in the past 12 months was measured using the CCHS, 2005 (Cycle 3.1) dataset. We compared the rate of dental care among people who reported having diabetes to those who did not have diabetes. Crude and age-adjusted rates

(adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Insulin or at Least One Oral Glucose-Lowering Medication

The percentage of adults aged 20 and older who reported having diabetes who reported taking pills to control their blood glucose levels in the past month (“In the past month, did you take pills to control your blood sugar?”) or who were currently taking insulin (“Are you currently taking insulin for your diabetes?”) was measured using the CCHS, 2005 (Cycle 3.1) and 2007 combined dataset. Crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals were calculated.

### Anti-Hypertensive Drugs and Statins

Data from the ODD were used to identify adults aged 65 and older who were diagnosed with diabetes as of April 1, 2006. The sample was restricted to patients aged 65 and older because of access to provincially funded drug benefits in this population and additionally restricted to people who were alive as of March 31, 2007. This cohort was linked to the ODB database to calculate the percentage of people aged 65 and older with diabetes who filled at least one prescription between April 1st 2006 and March 31st 2007 for:

- **any antihypertensive agent:**
  - Acebutolol, Amiloride, Amlodipine, Atenolol, Benazepril, Bisoprolol, Candesartan, Captopril, Carvedilol, Chlorthalidone, Cilazapril, Clonidine, Diltiazem, Doxazosin, Enalapril, Eprosartan, Felodipine, Fosinopril, Guanethidine, Hydralazine, Hydrochlorothiazide, Indapamide, Irbesartan, Labetalol, Lisinopril, Losartan, Methyldopa, Metoprolol, Minoxidil, Nadolol, Nicardipine, Nifedipine, Oxprenolol, Perindopril, Pindolol, Prazosin, Propranolol, Quinapril, Ramipril, Reserpine, Spironolactone, Telmisartan, Terazosin, Timolol, Trandolapril, Triamterene, Valsartan, Verapamil
- **an angiotensin converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB):**
  - Benazepril, Captopril, Cilazapril, Enalapril, Fosinopril, Lisinopril, Perindopril, Quinapril, Ramipril, Trandolapril, Telmisartan, Valsartan, Candesartan, Eprosartan, Irbesartan, Losartan
- **Statins:**
  - Atorvastatin, Rosuvastatin, Lovastatin, Pravastatin, Simvastatin, Fluvastatin

We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals.

## HEALTH OUTCOMES

A number of indicators were measured in a cohort of patients aged 20 and older who were identified through the ODD as having been diagnosed with diabetes as of March 31, 2006. This cohort of patients was linked to data from CIHI-DAD, NACRS and OHIP to measure outcomes in the 2006/07 fiscal year including: rates of hospital visits (emergency department and hospitalizations), hospitalizations and procedure rates per 100,000 adults aged 20 and older with diabetes. We calculated the crude and age-adjusted rates (adjusted to the diabetic population) and the associated 95 percent confidence intervals. See the descriptions below for details on the specific health outcome indicators that were measured.

### Hospital Visits for Hyperglycemia or Hypoglycemia

The cohort with diabetes was linked to the CIHI-DAD and NACRS to calculate the number of people who had at least one hospital visit (including emergency department visits and hospitalizations) for hyperglycemia or hypoglycemia (ICD10 codes: E100, E101, E110, E111, E130, E131, E140, E141, E15, E160, E161, E162, E1063, E1163, E1363, E1463 in dxtype M (most responsible diagnosis) or 1 (pre-admit comorbidity; ICD10 codes: R73802, R73812 in dxtype M).



## Hospitalization Rate for Skin and Soft Tissue Infections

The cohort with diabetes was linked to the CIHI-DAD to calculate the number of people who had at least one hospitalization for skin or soft tissue infection (ICD10 codes: L01, L02, L03, L04, L05, L08, A480, E1051, E1151, E1351, E1451, R02, E1071, E1171, E1371, E1471 E1061 E1161 E1361 E1461 in dxtype M (most responsible diagnosis) or 1 (pre-admit comorbidity)).

## Diabetes and Cardiac Disease

The cohort with diabetes was linked to the CIHI-DAD to calculate the number of people who had:

- A hospitalization with a most responsible diagnosis of acute myocardial infarction (AMI) (ICD10 codes: I21, I22);
- A hospitalization with a most responsible diagnosis of congestive heart failure (CHF) (ICD10 code: I50);
- Coronary artery bypass graft (CABG) surgery (CCI code: 1IJ76)

The CIHI-DAD and same day surgery data from NACRS were used to identify the number of people who had:

- A percutaneous coronary intervention (PCI) (CCI code: 1IJ50).

## Diabetes and Stroke

The cohort with diabetes was linked to the CIHI-DAD to calculate the number of people who had:

- At least one hospitalization with a most responsible diagnosis of stroke (ICD10 code: I61, I63, I64);
- At least one carotid endarterectomy (CCI code: 1JE57).

## Diabetes and Peripheral Vascular Disease

The cohort with diabetes was linked to the CIHI-DAD to calculate the number of people who had:

- At least one peripheral revascularization procedure (CCI code: 1KG50, 1KG57, 1KG76, 1KG35HAC1, 1KG35HHC1), excluding patients with a diagnosis

code of aneurysm during same hospitalization (ICD10 code: I67.1, I71, I72, I60, I77.0, I79.0, Q codes);

- At least one major lower extremity amputation (below hip and above ankle) (CCI codes: 1VC93, 1VG93, 1VQ93)
- At least one minor lower extremity amputation (ankle or lower) (CCI codes: 1WL93, 1WA93, 1WE93, 1WJ93, 1WM93)

In order to restrict the analysis to amputations due to diabetes, we excluded amputations that occurred during a hospital admission that included codes related to certain types of malignancies (ICD10 codes: C40.2, C40.3, C46.1, C47.2, C49.2, D16.2, D16.3, D21.2) or major trauma (ICD10 codes: S72-S79, S82-S89, S97, S98, T02.3, T02.5, T02.6, T02.7, T02.8, T02.9, T03.3-T03.9, T04.3-T04.9, T05.3-T05.9, T07, T13.2-T13.9, T14.2-T14.9) anywhere on the same admission.

## Dialysis Therapy

The cohort with diabetes was linked to OHIP data to calculate the number of people who received chronic dialysis in 2006/07. The dialysis fee codes that were included were: fee codes: R849, G323, G326, G860, G862, G333, G863, G865, G866, G330, G331, G332, G864, G861, S435, E769, S434, E771. For each individual, the dialysis billing claims were sorted by date, and the duration of dialysis was calculated as the time between the first and last dialysis records. To account for significant gaps in dialysis treatments between the first and last billing claims, gaps in time between consecutive claims were calculated. Each single gap longer than 21 days was subtracted from the total dialysis duration. After accounting for gaps, if an individual's dialysis treatment period was at least 90 days, they were considered to have received chronic dialysis. Only claims that were billed in the 2006/07 fiscal year were included and so the rate reported may be an underestimate if people started dialysis at the end of the follow up period or completed dialysis

early in the follow up period. As our objective was to assess whether there were gender or socioeconomic difference in dialysis rates, it is unlikely that this would have been affected.

### Diabetic Retinopathy

The cohort with diabetes was linked to OHIP data to calculate the number of people who had:

- Laser photocoagulation (OHIP fee code E154)
- Vitrectomy (OHIP fee code E148)

## DIABETES AND PREGNANCY

A number of indicators were measured in a cohort of women aged 20 and older who gave birth in hospital. Data from the CIHI-DAD were used to identify all women aged 20 and older who gave birth in hospital over a five year period, between April 1, 2002 and March 31, 2007. For women who had multiple deliveries during this period, one delivery was chosen at random for inclusion into the cohort.

The cohort of women was then linked to the ODD, hospital administration data and OHIP data to determine diabetes status. Women were defined as having pregestational diabetes if they met the ODD definition of diabetes 150 days or more before the date of delivery (see previous description of the ODD). Gestational diabetes was defined as not meeting the ODD definition of diabetes before the delivery date, but having a hospital record at delivery with an ICD10 code of either 'E1' or 'O24' within any of the diagnostic fields. Women were defined as being without diabetes if they did not have pregestational or gestational diabetes and did not have any of the following in the nine months before delivery: an OHIP record containing the diagnostic code 250; a CIHI-DAD record containing an ICD9 code of 250.x or an ICD10 code of E10, E11, E13 or E14 in any diagnostic field.

Indicators of obstetrical prenatal care, obstetrical complications and fetal complications were measured

in all three groups of women and other indicators of appropriate prenatal for women with diabetes were measures only in the cohort of women with pregestational diabetes. We calculated the crude and age-adjusted rates (adjusted to the population of women with pregestational diabetes) and the associated 95 percent confidence intervals.

### Prenatal Care

Among each of the three groups of women described above (women with pregestational diabetes, gestational diabetes and no diabetes), we examined the percentage who had at least one OHIP claim for an 'office' visit to an obstetrician within the nine months prior to delivery. An obstetrician was defined as a physician with an IPDB MAINSPECIALTY of 'Obstetrics and Gynecology'.

Among the cohort of women with pregestational diabetes, we examined the following two indicators:

- The percentage who had at least one OHIP claim for an 'office' visit to an endocrinologist or internist within the nine months prior to delivery (defined as a physician with an IPDB MAINSPECIALTY of 'Endocrinology' or 'Internal Medicine')
- The percentage who had at least one OHIP claim for an eye examination in the one year before delivery (see the indicator description for EYE EXAMINATION for more details on codes)

### Obstetrical Complications

Among each of the three groups of women defined above (women with pregestational diabetes, gestational diabetes and no diabetes), we used the CIHI-DAD to examine the percentage who:

- Had hypertension (gestational or pre-existing) in the six months before or at delivery (ICD10 codes: O10, O13, O16; ICD-9 codes: 642.0, 642.1, 642.2, 642.9, 401x, 402x, 403x, 404x, 405x)



- Had preeclampsia or eclampsia in the six months before or at delivery (ICD10 codes: O11, O14, O15; ICD-9 codes: 642.4-642.7)
- Experienced any obstructed labour (including shoulder dystocia) (All obstructions O64.0-O66.99)
- Experienced shoulder dystocia during labour (ICD10 O66.0)
- Underwent a caesarean section (CCI 5.MD.60)
- Congenital anomalies (ICD10 codes: Q00.0-Q99.9)
- Premature delivery defined as less than 37 weeks gestation (ICD10 P07.2, P07.3)
- Phototherapy for hyperbilirubinemia (CCI: 1YZ12JADQ)
- Admission to any level neonatal intensive care unit (NICU) (SCU Special Care Unit=50)

There are many levels of NICU, representing levels of intensity of care. Infants may be admitted to a lower-acuity NICU (i.e., level 2) for a limited time (less than a few hours) for observation of minor concerns (e.g., if they are breathing fast or—in the case of infants of mothers with diabetes—to check their sugar level). There are also financial incentives associated with NICU admissions. For these reasons, this indicator is an imprecise measure of absolute morbidity.

### Fetal Complications

For each of the three groups of women defined above (women with pregestational diabetes, gestational diabetes and no diabetes), records were linked to ICES Mother-Baby (MOMBABY) Linked Database to examine fetal outcomes (if deliveries involved multiple births, one infant was chosen at random). We examined the percentage of infants of women who had the following complications:

- Stillbirth or in-hospital mortality (ICD10 codes: P96.4, P95; or baby's discharge disposition 07 or 09; or stillbirth code under the mother)

## REFERENCE LIST

- (1) Gregg EW, Cadwell BL, Cheng YJ, Cowie CC, Williams DE, Geiss L, et al. Trends in the prevalence and ratio of diagnosed to undiagnosed diabetes according to obesity levels in the U.S. *Diabetes Care* 2004;27(12):2806-2812.
- (2) King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care* 1998;21(9):1414-1431.
- (3) Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-1053.
- (4) Lipscombe LL, Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995-2005: a population-based study. *Lancet* 2007;369(9563):750-756.
- (5) Atkins RC. The epidemiology of chronic kidney disease. *Kidney Int* 2005;67(Suppl 94):S14-S18.
- (6) Congdon NG, Friedman DS, Lietman T. Important causes of visual impairment in the world today. *JAMA* 2003;290(15):2057-2060.
- (7) Barzilay JI, Spiekerman CF, Kuller LH, Burke GL, Bittner V, Gottdiener JS, et al. Prevalence of clinical and isolated subclinical cardiovascular disease in older adults with glucose disorders: the Cardiovascular Health Study. *Diabetes Care* 2001;24(7):1233-1239.
- (8) Tavani A, Bertuzzi M, Gallus S, Negri E, La Vecchia C. Diabetes mellitus as a contributor to the risk of acute myocardial infarction. *J Clin Epidemiol* 2002;55(11):1082-1087.
- (9) World Health Organization. Global strategy on diet, physical activity and health: diabetes. Accessed August 17, 2010 at <http://www.who.int/dietphysicalactivity/publications/facts/diabetes/en/>.
- (10) American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care* 2005;28(Suppl 1):S37-S42.
- (11) Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999-2000. *JAMA* 2002;288(14):1723-1727.
- (12) Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. *N Engl J Med* 2001;345(11):790-797.
- (13) Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, et al. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *JAMA* 2003;289(1):76-79.
- (14) Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. *Nature* 2001;414(6865):782-787.
- (15) Stovring H, Andersen M, Beck-Nielsen H, Green A, Vach W. Rising prevalence of diabetes: evidence from a Danish pharmaco-epidemiological database. *Lancet* 2003;362(9383):537-538.
- (16) Thomas RJ, Palumbo PJ, Melton LJ, 3rd, Roger VL, Ransom J, O'Brien PC, et al. Trends in the mortality burden associated with diabetes mellitus: a population-based study in Rochester, Minn, 1970-1994. *Arch Intern Med* 2003;163(4):445-451.
- (17) Ross NA, Gilmour H, Dasgupta K. 14-year diabetes incidence: the role of socio-economic status. *Health Rep* 2010;21(3).
- (18) Lipscombe LL, Austin PC, Manuel DG, Shah BR, Hux JE, Booth GL. Income-related differences in mortality among people with diabetes mellitus. *CMAJ* 2010;182(1):E1-E17.
- (19) Anand SS, Yusuf S, Vuksan V, Devanese S, Teo KK, Montague PA, et al. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the Study of Health Assessment and Risk in Ethnic groups (SHARE). *Lancet* 2000;356(9226):279-284.
- (20) Borrell LN, Crawford ND, Dailo FJ. Race/ethnicity and self-reported diabetes among adults in the National Health Interview Survey: 2000-2003. *Public Health Rep* 2007;122(5):616-625.
- (21) Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. *CMAJ* 2010;182(8):781-789.

- (22) Health Canada. Diabetes Among Aboriginal (First Nations, Inuit and Métis) People in Canada: The Evidence. Ottawa: Health Canada, Aboriginal Diabetes Initiative, 2000.
- (23) Canadian Institute for Health Information. How healthy are rural Canadians? An assessment of their health status and health determinants. A component of the initiative "Canada's rural communities: understanding rural health and its determinants". Ottawa: Canadian Population Health Initiative, the Canadian Institute for Health Information, the Public Health Agency of Canada, and the Centre for Rural and Northern Health Research, 2006.
- (24) Roumain J, Charles MA, de Courten MP, Hanson RL, Brodie TD, Pettitt DJ, et al. The relationship of menstrual irregularity to type 2 diabetes in Pima Indian women. *Diabetes Care* 1998;21(3):346-359.
- (25) Clausen TD, Mathiesen E, Ekblom P, Hellmuth E, Mandrup-Poulsen T, Damm P. Poor pregnancy outcome in women with type 2 diabetes. *Diabetes Care* 2005;28(2):323-328.
- (26) Diabetes in Pregnancy Group France. French multicentric survey of outcome of pregnancy in women with pregestational diabetes. *Diabetes Care* 2003;26(11):2990-2993.
- (27) Evers IM, de Valk HW, Visser GH. Risk of complications of pregnancy in women with type 1 diabetes: nationwide prospective study in the Netherlands. *BMJ* 2004;328(7445):915.
- (28) Macintosh MC, Fleming KM, Bailey JA, Doyle P, Modder J, Acolet D, et al. Perinatal mortality and congenital anomalies in babies of women with type 1 or type 2 diabetes in England, Wales, and Northern Ireland: population based study. *BMJ* 2006;333(7560):177-180.
- (29) Penney GC, Mair G, Pearson DW. Outcomes of pregnancies in women with type 1 diabetes in Scotland: a national population-based study. *BJOG* 2003;110(3):315-318.
- (30) Shand AW, Bell JC, McElduff A, Morris J, Roberts CL. Outcomes of pregnancies in women with pre-gestational diabetes mellitus and gestational diabetes mellitus; a population-based study in New South Wales, Australia, 1998-2002. *Diabet Med* 2008;25(6):708-715.
- (31) Feig DS, Palda VA. Type 2 diabetes in pregnancy: a growing concern. *Lancet* 2002;359(9318):1690-1692.
- (32) Feig DS, Razzaq A, Sykora K, Hux JE, Anderson GM. Trends in deliveries, prenatal care, and obstetrical complications in women with pregestational diabetes: a population-based study in Ontario, Canada, 1996-2001. *Diabetes Care* 2006;29(2):232-235.
- (33) Colhoun HM, Betteridge DJ, Durrington PN, Hitman GA, Neil HA, Livingstone SJ, et al. Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): multicentre randomised placebo-controlled trial. *Lancet* 2004;364(9435):685-696.
- (34) Gaede P, Lund-Andersen H, Parving HH, Pedersen O. Effect of a multifactorial intervention on mortality in type 2 diabetes. *N Engl J Med* 2008;358(6):580-591.
- (35) Heart Outcomes Prevention Evaluation Study Investigators. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE study and MICRO-HOPE substudy. *Lancet* 2000;355(9200):253-259.
- (36) Holman RR, Paul SK, Bethel MA, Matthews DR, Neil HAW. 10-Year follow-up of intensive glucose control in type 2 diabetes. *N Engl J Med* 2008;359(15):1577-1589.
- (37) Nathan DM, Cleary PA, Backlund JYC, Genuth SM, Lachin JM, Orchard TJ, et al. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *N Engl J Med* 2005;353(25):2643-2653.
- (38) Patel A, MacMahon S, Chalmers J, Neal B, Billot L, Woodward M, et al. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. *N Engl J Med* 2008;358(24):2560-2572.
- (39) UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ* 1998;317(7160):703-713.
- (40) Bierman AS, Clancy CM. Health disparities among older women: identifying opportunities to improve quality of care and functional health outcomes. *J Am Med Womens Assoc* 2001;56(4):155-159, 188.

- (41) Belanger A, Martel L, Berthelot JM, Wilkins R. Gender differences in disability-free life expectancy for selected risk factors and chronic conditions in Canada. *J Women Aging* 2002;14(1-2):61-83.
- (42) Chaturvedi N, Jarrett J, Shipley MJ, Fuller JH. Socioeconomic gradient in morbidity and mortality in people with diabetes: Cohort study findings from the Whitehall study and the WHO multinational study of vascular disease in diabetes. *BMJ* 1998;316(7125):100-105.
- (43) Jimenez-Garcia R, Jimenez-Trujillo I, Hernandez-Barrera V, Carrasco-Garrido P, Lopez A, Angel G. Ten-year trends in self-rated health among Spanish adults with diabetes, 1993-2003. *Diabetes Care* 2008;31(1):90-92.
- (44) Saydah S, Lochner K. Socioeconomic status and risk of diabetes-related mortality in the U.S. *Public Health Reports* 2010;125(3):377-388.
- (45) Bierman AS, Ko B, Mawani F. Equity and women's health. Measuring health inequalities among Canadian women: developing a basket of indicators. Ottawa: Report to Health Canada, 2007.
- (46) Bellary S, O'Hare JP, Raymond NT, Mughal S, Hanif WM, Jones A, et al. Premature cardiovascular events and mortality in south Asians with type 2 diabetes in the United Kingdom Asian Diabetes Study - effect of ethnicity on risk. *Curr Med Res Opin* 2010;26(8):1873-1879.
- (47) Jiang HJ, Andrews R, Stryer D, Friedman B. Racial/ethnic disparities in potentially preventable readmissions: the case of diabetes. *Am J Public Health* 2005;95(9):1561-1567.
- (48) Karter AJ, Ferrara A, Liu JY, Moffet HH, Ackerson LM, Selby JV. Ethnic disparities in diabetic complications in an insured population. *JAMA* 2002;287(19):2519-2527.
- (49) Martens PJ, Martin BD, O'Neil JD, MacKinnon M. Diabetes and adverse outcomes in a first nations population: associations with healthcare access, and socioeconomic and geographical factors. *Can J Diabetes* 2007;31(3):223-232.
- (50) Shah BR, Mamdani M, Kopp A. Chapter 3: Drug use in older people with diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (51) Wong TY, Klein R, Islam FM, Cotch MF, Folsom AR, Klein BE, et al. Diabetic retinopathy in a multi-ethnic cohort in the United States. *Am J Ophthalmol* 2006;141(3):446-455.
- (52) Grant RW, Pirraglia PA, Meigs JB, Singer DE. Trends in complexity of diabetes care in the United States from 1991 to 2000. *Arch Intern Med* 2004;164(10):1134-1139.
- (53) Pomerleau J, Pederson LL, Ostbye T, Speechley M, Speechley KN. Health behaviours and socio-economic status in Ontario, Canada. *Eur J Epidemiol* 1997;13(6):613-622.
- (54) Aikens JE, Piette JD. Diabetic patients medication underuse, illness outcomes, and beliefs about Antihyperglycemic and Antihypertensive treatments. *Diabetes Care* 2009;32(1):19-24.
- (55) Manuel DG, Schultz SE. Chapter 4: Diabetes health status and risk factors. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (56) Mo F, Pogany LM, Li FCK, Morrison H. Prevalence of diabetes and cardiovascular comorbidity in the Canadian Community Health Survey 2002-2003. *ScientificWorldJournal* 2006;6:96-105.
- (57) Manuel DG, Schultz SE. Health-related quality of life and health-adjusted life expectancy of people with diabetes in Ontario, Canada, 1996-1997. *Diabetes Care* 2004;27(2):407-414.
- (58) Wray LA, Ofstedal MB, Langa KM, Blaum CS. The effect of diabetes on disability in middle-aged and older adults. *J Gerontol A Biol Sci Med Sci* 2005;60(9):1206-1211.
- (59) Wu JH, Haan MN, Liang J, Ghosh D, Gonzalez HM, Herman WH. Diabetes as a predictor of change in functional status among older Mexican Americans: a population-based cohort study. *Diabetes Care* 2003;26(2):314-319.
- (60) Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes - a meta-analysis. *Diabetes Care* 2001;24(6):1069-1078.

- (61) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of Illness In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report. Toronto, 2009.
- (62) Fortin M, Bravo G, Hudon C, Vanasse A, Lapointe L. Prevalence of multimorbidity among adults seen in family practice. *Ann Fam Med* 2005;3(3):223-228.
- (63) Marengoni A, Winblad B, Karp A, Fratiglioni L. Prevalence of chronic diseases and multimorbidity among the elderly population in Sweden. *Am J Public Health* 2008;98(7):1198-1200.
- (64) van den Akker M, Buntinx F, Metsemakers JFM, Roos S, Knottnerus JA. Multimorbidity in general practice: prevalence, incidence, and determinants of co-occurring chronic and recurrent diseases. *J Clin Epidemiol* 1998;51(5):367-375.
- (65) Kessler RC. Epidemiology of women and depression. *J Affect Disord* 2003;74(1):5-13.
- (66) Kessler RC, McGonagle KA, Nelson CB, Hughes M, Swartz M, Blazer DG. Sex and depression in the National Comorbidity Survey II: Cohort effects. *J Affect Disord* 1994;30(1):15-26.
- (67) Nolen-Hoeksema S. Sex-differences in unipolar depression: evidence and theory. *Psychol Bull* 1987;101(2):259-282.
- (68) Wolk SI, Weissman MM. Women and depression: an update. *American Psychiatric Press Review of Psychiatry* 1995;14:227-259.
- (69) Wilkins K, Park E. Chronic conditions, physical limitations and dependency among seniors living in the community. *Health Rep* 1996;8(3):7-15.
- (70) Zunzunegui MV, Nunez O, Durban M, de Yebenes MJG, Otero A. Decreasing prevalence of disability in activities of daily living, functional limitations and poor self-rated health: a 6-year follow-up study in Spain. *Aging Clin Exp Res* 2006;18(5):352-358.
- (71) Chen HF, Ho CA, Li CY. Age and sex may significantly interact with diabetes on the risks of lower-extremity amputation and peripheral revascularization procedures: evidence from a cohort of a half-million diabetic patients. *Diabetes Care* 2006;29(11):2409-2414.
- (72) Health Council of Canada. Why health care renewal matters: lessons from diabetes. Toronto: Health Council of Canada, 2007.
- (73) Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346(6):393-403.
- (74) Glazier RH, Bajcar J, Kennie NR, Willson K. A systematic review of interventions to improve diabetes care in socially disadvantaged populations. *Diabetes Care* 2006;29(7):1675-1688.
- (75) Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. *Diabetes Care* 2002;25(3):512-516.
- (76) Manuel DG, Rosella LCA, Tuna M, Bennett C. How many Canadians will be diagnosed with diabetes between 2007 and 2017? Assessing population risk. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences, 2010.
- (77) Congdon P. Estimating diabetes prevalence by small area in England. *J Public Health* 2006;28(1):71-81.
- (78) Lindstrom J, Ilanne-Parikka P, Peltonen M, Aunola S, Eriksson JG, Hemio K, et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet* 2006;368(9548):1673-1679.
- (79) Tonstad S. Cigarette smoking, smoking cessation, and diabetes. *Diabetes Res Clin Pract* 2009;85(1):4-13.
- (80) Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001;344(18):1343-1350.
- (81) Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J. Active smoking and the risk of type 2 diabetes: a systematic review and meta-analysis. *JAMA* 2007;298(22):2654-2664.
- (82) Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2008 clinical practice guidelines for the prevention and management of diabetes in Canada. *Can J Diabetes* 2008;32(Suppl 1):S1-S201.
- (83) Shields M, Tremblay MS. Sedentary behaviour and obesity. *Health Rep* 2008;19(2):19-30.

- (84) Shields M. Smoking—prevalence, bans and exposure to second-hand smoke. *Health Rep* 2007;18(3):67-85.
- (85) Mamdani M, Hux JE. The increasing burden of diabetes in Canada. *Can J Diabetes* 2004;28(2):112-113.
- (86) Young TK, Mustard CA. Undiagnosed diabetes: does it matter? *CMAJ* 2001;164(1):24-28.
- (87) de Groot M, Kushnick M, Doyle T, Merrill J, McGlynn M, Shubrook J, et al. Depression among adults with diabetes: prevalence, impact, and treatment options. *Diabetes Spectr* 2010;23(1):15-18.
- (88) Durso SC. Using clinical guidelines designed for older adults with diabetes mellitus and complex health status. *JAMA* 2006;295(16):1935-1940.
- (89) Williams J. Diabetes and the older adult: what care do they need and what do they receive? *Journal of Diabetes Nursing* 2009;13(8):308-310.
- (90) Lin E, Diaz-Granados N, Stewart D, Rhodes A, Yeritsyan N, Johns A, et al. Depression In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report Toronto, 2009
- (91) Adler AI, Stratton IM, Neil HAW, Yudkin JS, Matthews DR, Cull CA, et al. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *BMJ* 2000;321(7258):412-419.
- (92) Czupryniak L, Saryusz-Wolska M, Pawlowski M, Loba J. Elevated systolic blood pressure is present in almost all individuals with newly diagnosed diabetes. *J Hum Hypertens* 2006;20(3):231-233.
- (93) Turner R, Holman R, Stratton I, Cull C, Frighi V, Manley S, et al. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ* 1998;317(7160):703-713.
- (94) Bierman AS, Bubolz TA, Fisher ES, Wasson JH. How well does a single question about health predict the financial health of Medicare managed care plans? *Eff Clin Pract* 1999;2(2):56-62.
- (95) DeSalvo KB, Bloser N, Reynolds K, He J, Muntner P. Mortality prediction with a single general self-rated health question: a meta-analysis. *J Gen Intern Med* 2006;21(3):267-275.
- (96) Shields M, Shooshtari S. Determinants of self-perceived health. *Health Rep* 2001;13(1):35-52.
- (97) Bourdel-Marchasson I, Dubroca B, Manciet G, Decamps A, Emeriau JP, Dartigues JF. Prevalence of diabetes and effect on quality of life in older French living in the community: the PAQUID Epidemiological Survey. *J Am Geriatr Soc* 1997;45(3):295-301.
- (98) Tsai J, Ford ES, Li C, Zhao G, Balluz LS. Physical activity and optimal self-rated health of adults with and without diabetes. *BMC Public Health* 2010;10(365)
- (99) Dasbach EJ, Klein R, Klein BEK, Moss SE. Self-rated health and mortality in people with diabetes. *Am J Public Health* 1994;84(11):1775-1779.
- (100) Hayes AJ, Clarke PM, Glasziou PG, Simes RJ, Drury PL, Keech AC. Can self-rated health scores be used for risk prediction in patients with type 2 diabetes? *Diabetes Care* 2008;31(4):795-797.
- (101) McEwen LN, Kim C, Haan MN, Ghosh D, Lantz PM, Thompson TJ, et al. Are health-related quality-of-life and self-rated health associated with mortality? Insights from Translating Research Into Action for Diabetes (TRIAD). *Prim Care Diabetes* 2009;3(1):37-42.
- (102) Ahroni JH, Boyko EJ, Davignon DR, Pecoraro RE. The health and functional status of veterans with diabetes. *Diabetes Care* 1994;17(4):318-321.
- (103) Gregg EW, Beckles GLA, Williamson DF, Leveille SG, Langlois JA, Engelgau MM, et al. Diabetes and physical disability among older U.S. adults. *Diabetes Care* 2000;23(9):1272-1277.
- (104) Bruce DG, Davis WA, Davis TME. Longitudinal predictors of reduced mobility and physical disability in patients with type 2 diabetes: the Fremantle Diabetes Study. *Diabetes Care* 2005;28(10):2441-2447.
- (105) Li C-L, Chang H-Y, Wang H-H, Bai Y-B. Diabetes, functional ability, and self-rated health independently predict hospital admission within one year among older adults: a population based cohort study. *Arch Gerontol Geriatr* in press. Available online 24 March 2010.
- (106) Wilhide C, Hayes JR, Farah JR. Impact of behavioral adherence on clinical improvement and functional status in a diabetes disease management program. *Dis Manag* 2008;11(3):169-175.



- (107) American Diabetes Association. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. *Diabetes Care* 2008;31(Suppl 1):S61-S78.
- (108) Sigal RJ, Kenny GP, Wasserman DH, Castaneda-Sceppa C, White RD. Physical activity/exercise and type 2 diabetes: a consensus statement from the American Diabetes Association. *Diabetes Care* 2006;29(6):1433-1438.
- (109) Wing RR, Goldstein MG, Acton KJ, Birch LL, Jakicic JM, Sallis Jr JF, et al. Behavioral science research in diabetes: lifestyle changes related to obesity, eating behavior, and physical activity. *Diabetes Care* 2001;24(1):117-123.
- (110) Gaede P, Vedel P, Larsen N, Jensen GVH, Parving H, Pedersen O. Multifactorial intervention and cardiovascular disease in patients with type 2 diabetes. *N Engl J Med* 2003;348(5):383-393.
- (111) Fagard RH, Nilsson PM. Smoking and diabetes—the double health hazard! *Prim Care Diabetes* 2009;3(4):205-209.
- (112) Hueston WJ. Does having a personal physician improve quality of care in diabetes? *J Am Board Fam Med* 2010;23(1):82-87.
- (113) O'Connor PJ, Desai J, Rush WA, Cherney LM, Solberg LI, Bishop DB. Is having a regular provider of diabetes care related to intensity of care and glycemic control? *J Fam Pract* 1998;47(4):290-297.
- (114) Cabana MD, Jee SH. Does continuity of care improve patient outcomes? *J Fam Pract* 2004;53(12):974-980.
- (115) Jaakkimainen L, Shah BR, Kopp A. Chapter 9: Sources of physician care for people with diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (116) Bierman AS, Angus J, Ahmad F, Degani N, Vahabi M, Glazier RH, et al. Access to Health Care Services. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report*. Toronto, 2010.
- (117) Fiscella K, Franks P, Gold MR, Clancy CM. Inequality in quality: addressing socioeconomic, racial and ethnic disparities in health care. *JAMA* 2000;283(19):2579-2584.
- (118) Hux JE, Booth GL, Slaughter PM, Laupacis A. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (119) Jencks SF, Cuerdon T, Burwen DR, Fleming B, Houck PM, Kussmaul AE, et al. Quality of medical care delivered to medicare beneficiaries: a profile at state and national levels. *JAMA* 2000;284(13):1670-1676.
- (120) Kosiak B, Sangl J, Correa-de-Araujo R. Quality of health care for older women: what do we know? *Womens Health Iss* 2006;16(2):89-99.
- (121) Shah BR. Utilization of physician services for diabetic patients from ethnic minorities. *J Public Health* 2008;30(3):327-331.
- (122) Bird CE, Fremont AM, Bierman AS, Wickstrom S, Shah M, Rector T, et al. Does quality of care for cardiovascular disease and diabetes differ by gender for enrollees in managed care plans? *Womens Health Iss* 2007;17(3):131-138.
- (123) Brown AF, Gregg EW, Stevens MR, Karter AJ, Weinberger M, Safford MM, et al. Race, ethnicity, socioeconomic position, and quality of care for adults with diabetes enrolled in managed care: the Translating Research Into Action for Diabetes (TRIAD) study. *Diabetes Care* 2005;28(12):2864-2870.
- (124) Ontario Health Quality Council. *Quality Monitor: 2010 Report on Ontario's Health System*. Toronto: Ontario Health Quality Council, 2010.
- (125) Statistics Canada. *Access to Health Care Services in Canada: January to December 2005*. Accessed August 9, 2010 at <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=82-575-XIE2006002&lang=eng&issnote=1>
- (126) Davis K, Schoen C, Stremikis K. *Mirror, Mirror on the Wall: How the Performance of the U.S. Health Care System Compares Internationally, 2010 Update*. New York: The Commonwealth Fund, 2010.
- (127) Shah BR, Hux JE, Laupacis A, Zinman B, Austin PC, Van Walraven C. Diabetic patients with prior specialist care have better glycaemic control than those with prior primary care. *J Evaluation Clin Prac* 2005;11(6):568-575.
- (128) Zgibor JC, Songer TJ, Kelsey SF, Drash AL, Orchard TJ. Influence of health care providers on the development of diabetes complications: Long-term follow-up from



- the Pittsburgh Epidemiology of Diabetes Complications Study. *Diabetes Care* 2002;25(9):1584-1590.
- (129) The Diabetes Control and Complications Trial/ Epidemiology of Diabetes Interventions and Complications Research Group. Retinopathy and nephropathy in patients with type 1 diabetes four years after a trial of intensive therapy. *N Engl J Med* 2000;342(6):381-389.
- (130) UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998;352(9131):837-853.
- (131) McCabe CJ, Stevenson RC, Dolan AM. Evaluation of a diabetic foot screening and protection programme. *Diabet Med* 1998;15(1):80-84.
- (132) Litzelman DK, Slemenda CW, Langefeld CD, Hays LM, Welch MA, Bild DE, et al. Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus: a randomized, controlled trial. *Ann Intern Med* 1993;119(1):36-41.
- (133) Karter AJ, Ackerson LM, Darbinian JA, D'Agostino Jr RB, Ferrara A, Liu J, et al. Self-monitoring of blood glucose levels and glycemic control: the Northern California Kaiser Permanente Diabetes Registry. *Am J Med* 2001;111(1):1-9.
- (134) Heller SR. Self monitoring of blood glucose in type 2 diabetes. *BMJ* 2007;335(7611):105-106.
- (135) Leatherman S, Sutherland K. Quality of health care in Canada: a chartbook. Ottawa: Canadian Health Services Research Foundation, 2010.
- (136) Jha AK, Perlin JB, Kizer KW, Dudley RA. Effect of the transformation of the veterans affairs health care system on the quality of care. *N Engl J Med* 2003;348(22):2218-2227.
- (137) Khunti K, Gadsby R, Millett C, Majeed A, Davies M. Quality of diabetes care in the UK: comparison of published quality-of-care reports with results of the Quality and Outcomes Framework for Diabetes. *Diabet Med* 2007;24(12):1436-1441.
- (138) Krein SL, Hayward RA, Pogach L, Bootsmiller BJ. Department of Veterans Affairs' Quality Enhancement Research Initiative for Diabetes Mellitus. *Med Care* 2000;38(6 Suppl 1):I38-I48.
- (139) Clar C, Barnard K, Cummins E, Royle P, Waugh N. Self-monitoring of blood glucose in type 2 diabetes: systematic review. *Health Technol Assess* 2010;14(12):1-140.
- (140) Centers for Disease Control and Prevention. National diabetes fact sheet: general information and national estimates on diabetes in the United States, 2007. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2008.
- (141) Bäcklund LB, Algvare PV, Rosenqvist U. New blindness in diabetes reduced by more than one-third in Stockholm County. *Diabet Med* 1997;14(9):732-740.
- (142) Jones S, Edwards RT. Diabetic retinopathy screening: a systematic review of the economic evidence. *Diabet Med* 2010;27(3):249-256.
- (143) Winkley K, Stahl D, Chalder T, Edmonds ME, Ismail K. Quality of life in people with their first diabetic foot ulcer: a prospective cohort study. *J Am Podiatr Med Assoc* 2009;99(5):406-414.
- (144) White JC, Bell RA, Langefeld CD, Jackson SA. Preventive foot-care practices among adults with diabetes in North Carolina, 1997 to 2001. *J Am Podiatr Med Assoc* 2004;94(5):483-491.
- (145) Bild DE, Selby JV, Sincock P, Browner WS, Braveman P, Showstack JA. Lower-extremity amputation in people with diabetes. Epidemiology and prevention. *Diabetes Care* 1989;12(1):24-31.
- (146) Chávarry NG, Vettore MV, Sansone C, Sheiham A. The relationship between diabetes mellitus and destructive periodontal disease: a meta-analysis. *Oral Health Prev Dent* 2009;7(2):107-127.
- (147) Nagasawa T, Noda M, Katagiri S, Takaichi M, Takahashi Y, Wara-Aswapati N, et al. Relationship between periodontitis and diabetes - importance of a clinical study to prove the vicious cycle. *Intern Med* 2010;49(10):881-885.
- (148) Saremi A, Nelson RG, Tulloch-Reid M, Hanson RL, Sievers ML, Taylor GW, et al. Periodontal disease and mortality in type 2 diabetes. *Diabetes Care* 2005;28(1):27-32.

- (149) Shultis WA, Weil EJ, Looker HC, Curtis JM, Shlossman M, Genco RJ, et al. Effect of periodontitis on overt nephropathy and end-stage renal disease in type 2 diabetes. *Diabetes Care* 2007;30(2):306-311.
- (150) Taylor GW, Burt BA, Becker MP, Genco RJ, Shlossman M, Knowler WC, et al. Severe periodontitis and risk for poor glycemic control in patients with non-insulin-dependent diabetes mellitus. *J Periodontol* 1996;67(Suppl 10):1085-1093.
- (151) Thorstensson H, Kuylensstierna J, Hugoson A. Medical status and complications in relation to periodontal disease experience in insulin-dependent diabetics. *J Clin Periodontol* 1996;23(3 Pt 1):194-202.
- (152) Ryan ME. Diagnostic & therapeutic strategies for the management of the diabetic patient. *Compend Contin Educ Dent* 2008;29(1):32-38, 40-44.
- (153) Schwartz B. Access to dental care: a social justice discussion. *Alpha Omegan* 2007;100(3):143-147.
- (154) Main P, Leake J, Burman D. Oral health care in Canada—a view from the trenches. *J Can Dent Assoc* 2006;72(4):319.
- (155) Shamoon H, Duffy H, Fleischer N, Engel S, Saenger P, Strelzyn M, et al. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993;329(14):977-986.
- (156) UK Prospective Diabetes Study (UKPDS) Group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). *Lancet* 1998;352(9131):854-865.
- (157) Gerstein HC, Miller ME, Byington RP, Goff DC, Jr., Bigger JT, Buse JB, et al. Effects of intensive glucose lowering in type 2 diabetes. *N Engl J Med* 2008;358(24):2545-2559.
- (158) Booth GL, Kapral MK, Fung K, Tu JV. Relation between age and cardiovascular disease in men and women with diabetes compared with non-diabetic people: a population-based retrospective cohort study. *Lancet* 2006;368(9529):29-36.
- (159) Brenner BM, Cooper ME, De Zeeuw D, Keane WF, Mitch WE, Parving HH, et al. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *N Engl J Med* 2001;345(12):861-869.
- (160) de Galan BE, Perkovic V, Ninomiya T, Pillai A, Patel A, Cass A, et al. Lowering blood pressure reduces renal events in type 2 diabetes. *J Am Soc Nephrol* 2009;20(4):883-892.
- (161) Gerstein HC, Yusuf S, Mann JFE, Hoogwerf B, Zinman B, Held C, et al. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE study and MICRO-HOPE substudy. *Lancet* 2000;355(9200):253-259.
- (162) Lindholm LH, Ibsen H, Dahlöf B, Devereux RB, Beevers G, De Faire U, et al. Cardiovascular morbidity and mortality in patients with diabetes in the Losartan Intervention For Endpoint reduction in hypertension study (LIFE): a randomised trial against atenolol. *Lancet* 2002;359(9311):1004-1010.
- (163) Parving HH, Lehnert H, Brochner-Mortensen J, Gomis R, Andersen S, Arner P. The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. *N Engl J Med* 2001;345(12):870-878.
- (164) The TRANSCEND Investigators. Effects of the angiotensin-receptor blocker telmisartan on cardiovascular events in high-risk patients intolerant to angiotensin-converting enzyme inhibitors: a randomised controlled trial. *Lancet* 2008;372(9644):1174-1183.
- (165) MacLean DR, Petrasovits A, Connelly PW, Joffres M, O'Connor B, Little JA. Plasma lipids and lipoprotein reference values, and the prevalence of dyslipoproteinemia in Canadian adults. *Can J Cardiol* 1999;15(4):434-444.
- (166) Heart Protection Study Collaborative Group. MRC/BHF Heart Protection Study of cholesterol-lowering with simvastatin in 5963 people with diabetes: a randomised placebo-controlled trial. *Lancet* 2003;361(9374):2005-2016.
- (167) Bierman AS, Jaakkimainen RL, Abramson BL, Kapral MK, Azad N, Hall R, et al. Cardiovascular Disease. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report. Toronto, 2009.
- (168) Gouni-Berthold I, Berthold HK, Mantzoros CS, Bähr H, Krone W. Sex disparities in the treatment and control of cardiovascular risk factors in type 2 diabetes. *Diabetes Care* 2008;31(7):1389-1391.

- (169) Safford M, Eaton L, Hawley G, Mangala Rajan MB, Li H, Pogach L. Disparities in use of lipid-lowering medications among people with type 2 diabetes mellitus. *Arch Intern Med* 2003;163(8):922-928.
- (170) Sequist TD, Adams A, Zhang F, Ross-Degnan D, Ayanian JZ. Effect of quality improvement on racial disparities in diabetes care. *Arch Intern Med* 2006;166(6):675-681.
- (171) Tseng CW, Tierney EF, Gerzoff RB, Dudley RA, Waitzfelder B, Ackermann RT, et al. Race/ethnicity and economic differences in cost-related medication underuse among insured adults with diabetes: The translating research into action for diabetes study. *Diabetes Care* 2008;31(2):261-266.
- (172) Weinstock RS, Izquierdo R, Goland R, Palmas W, Teresi JA, Eimicke JP, et al. Lipid treatment in ethnically diverse underserved older adults with diabetes mellitus: statin use, goal attainment, and health disparities in the informatics for diabetes education and telemedicine project. *J Am Geriatr Soc* 2010;58(2):401-402.
- (173) De Berardis G, Sacco M, Strippoli GF, Pellegrini F, Graziano G, Tognoni G, et al. Aspirin for primary prevention of cardiovascular events in people with diabetes: meta-analysis of randomised controlled trials. *BMJ* 2009;339:b4531.
- (174) Calvin AD, Aggarwal NR, Murad MH, Shi Q, Elamin MB, Geske JB, et al. Aspirin for the primary prevention of cardiovascular events: a systematic review and meta-analysis comparing patients with and without diabetes. *Diabetes Care* 2009;32(12):2300-2306.
- (175) Pignone M, Alberts MJ, Colwell JA, Cushman M, Inzucchi SE, Mukherjee D, et al. Aspirin for primary prevention of cardiovascular events in people with diabetes: a position statement of the American Diabetes Association, a scientific statement of the American Heart Association, and an expert consensus document of the American College of Cardiology Foundation. *Diabetes Care* 2010;33(6):1395-1402.
- (176) Zhang C, Sun A, Zhang P, Wu C, Zhang S, Fu M, et al. Aspirin for primary prevention of cardiovascular events in patients with diabetes: a meta-analysis. *Diabetes Res Clin Pract* 2010;87(2):211-218.
- (177) Alexander GC, Sehgal NL, Moloney RM, Stafford RS. National trends in treatment of type 2 diabetes mellitus, 1994-2007. *Arch Intern Med* 2008;168(19):2088-2094.
- (178) Grant RW, McCarthy EP, Singer DE, Meigs JB. Frequent outpatient contact and decreasing medication affordability in patients with diabetes from 1997 to 2004. *Diabetes Care* 2006;29(6):1386-1388.
- (179) Kwan J, Razzaq A, Leiter LA, Lillie D, Hux JE. Low socioeconomic status and absence of supplemental health insurance as barriers to diabetes care access and utilization. *Canadian Journal of Diabetes* 2008;32(3):174-181.
- (180) Piette JD, Heisler M, Wagner TH. Problems paying out-of-pocket medication costs among older adults with diabetes. *Diabetes Care* 2004;27(2):384-391.
- (181) Tamblyn R, Laprise R, Hanley JA, Abrahamowicz M, Scott S, Mayo N, et al. Adverse events associated with prescription drug cost-sharing among poor and elderly people. *JAMA* 2001;285(4):421-429.
- (182) Gazmararian JA, Kripalani S, Miller MJ, Echt KV, Ren J, Rask K. Factors associated with medication refill adherence in cardiovascular-related diseases: A focus on health literacy. *J Gen Intern Med* 2006;21(12):1215-1221.
- (183) Kripalani S, Gatti ME, Jacobson TA. Association of age, health literacy, and medication management strategies with cardiovascular medication adherence. *Patient Educ Couns*, in press.
- (184) Schillinger D, Grumbach K, Piette J, Wang F, Osmond D, Daher C, et al. Association of health literacy with diabetes outcomes. *JAMA* 2002;288(4):475-482.
- (185) Boyd CM, Darer JD, Boulton C, Fried LP, Boulton L, Wu AW. Clinical practice guidelines for older patients with comorbid diseases [4]. *JAMA* 2006;295(1):34-35.
- (186) The ONTARGET Investigators. Telmisartan, ramipril, or both in patients at high risk for vascular events. *N Engl J Med* 2008;358(15):1547-1559.
- (187) Booth GL, Kapral MK, Fung K, Tu JV. Recent trends in cardiovascular complications among men and women with and without diabetes. *Diabetes Care* 2006;29(1):32-37.
- (188) Hux JE, Jacka R, Fung K, Rothwell DM. Chapter 6: Diabetes and peripheral vascular disease. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.

- (189) Kapral MK, Rothwell DM, Fung K, Tang M, Booth GL, Laupacis A. Chapter 7: Diabetes and stroke. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (190) Lok CE, Oliver MJ, Rothwell DM, Hux JE. The growing volume of diabetes-related dialysis: a population based study. *Nephrol Dial Transplant* 2004;19(12):3098-3103.
- (191) Klein R, Klein BEK. Vision disorders in diabetes. In: National Diabetes Data Group, editor. *Diabetes in America*. 2nd ed. Washington: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, 1995:293-338.
- (192) Duckworth W, Abaira C, Moritz T, Reda D, Emanuele N, Reaven PD, et al. Glucose control and vascular complications in veterans with type 2 diabetes. *N Engl J Med* 2009;360(2):129-139.
- (193) Booth GL, Hux JE, Fang J, Chan BT. Time trends and geographic disparities in acute complications of diabetes in Ontario, Canada. *Diabetes Care* 2005;28(5):1045-1050.
- (194) Thomas B, Dorling D, Smith GD. Inequalities in premature mortality in Britain: observational study from 1921 to 2007. *BMJ* 2010;341:c3639.
- (195) Rognerud MA, Zahl PH. Social inequalities in mortality: changes in the relative importance of income, education and household size over a 27-year period. *Eur J Public Health* 2006;16(1):62-68.
- (196) Bachmann MO, Eachus J, Hopper CD, Smith GD, Proppert C, Pearson NJ, et al. Socio-economic inequalities in diabetes complications, control, attitudes and health service use: a cross-sectional study. *Diabet Med* 2003;20(11):921-929.
- (197) Booth GL, Hux JE. Relationship between avoidable hospitalizations for diabetes mellitus and income level. *Arch Intern Med* 2003;163(1):101-106.
- (198) Dray-Spira R, Gary TL, Brancati FL. Socioeconomic position and cardiovascular disease in adults with and without diabetes: United States trends, 1997-2005. *J Gen Intern Med* 2008;23(10):1634-1641.
- (199) Chaturvedi N, Stephenson JM, Fuller JH. The relationship between socioeconomic status and diabetes control and complications in the EURODIAB IDDM Complications Study. *Diabetes Care* 1996;19(5):423-430.
- (200) Larranaga I, Arteagoitia JM, Rodriguez JL, Gonzalez F, Esnaola S, Piniés JA. Socio-economic inequalities in the prevalence of Type 2 diabetes, cardiovascular risk factors and chronic diabetic complications in the Basque Country, Spain. *Diabet Med* 2005;22(8):1047-1053.
- (201) Drewnowski A, Darmon N, Briand A. Replacing fats and sweets with vegetables and fruits—a question of cost. *Am J Public Health* 2004;94(9):1555-1559.
- (202) Glazier RH, Creatore MI, Gozdyra P, Weyman J, Booth GL. Access to healthy resources. In: Glazier RH, Booth GL, editors. *Neighbourhood environments and resources for healthy living: A focus on diabetes in Toronto*. Toronto: Institute for Clinical Evaluative Sciences, 2007.
- (203) Hemphill E, Raine K, Spence JC, Smoyer-Tomic KE. Exploring obesogenic food environments in Edmonton, Canada: the association between socioeconomic factors and fast-food outlet access. *Am J Health Promot* 2008;22(6):426-432.
- (204) Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med* 2002;22(1):23-29.
- (205) Jotkowitz AB, Rabinowitz G, Segal AR, Weitzman R, Epstein L, Porath A. Do patients with diabetes and low socioeconomic status receive less care and have worse outcomes? A National study. *Am J Med* 2006;119(8):665-669.
- (206) Wild S, MacLeod F, McKnight J, Watt G, MacKenzie C, Ford I, et al. Impact of deprivation on cardiovascular risk factors in people with diabetes: an observational study. *Diabet Med* 2008;25(2):194-199.
- (207) Shah BR, Anand S, Zinman B, Duong-Hua M. Chapter 13: Diabetes and First Nations People. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (208) Janghorbani M, Jones RB, Allison SP. Incidence of and risk factors for proliferative retinopathy and its association with blindness among diabetes clinic attenders. *Ophthalmic Epidemiol* 2000;7(4):225-241.

- (209) Klein R, Klein BEK, Moss SE, Cruickshanks KJ. The wisconsin epidemiologic study of diabetic retinopathy: XVII. The 14- year incidence and progression of diabetic retinopathy and associated risk factors in type 1 diabetes. *Ophthalmology* 1998;105(10):1801-1815.
- (210) Orchard TJ, Dorman JS, Maser RE, Becker DJ, Drash AL, Ellis D, et al. Prevalence of complications in IDDM by sex and duration. Pittsburgh Epidemiology of Diabetes Complications Study II. *Diabetes* 1990;39(9):1116-1124.
- (211) Ferrara A, Williamson DF, Karter AJ, Thompson TJ, Kim C. Sex differences in quality of health care related to ischemic heart disease prevention in patients with diabetes: the translating research into action for Diabetes (TRIAD) study, 2000-2001. *Diabetes Care* 2004;27(12):2974-2976.
- (212) McFarlane SI, Castro J, Kaur J, Shin JJ, Kelling D, Jr., Farag A, et al. Control of blood pressure and other cardiovascular risk factors at different practice settings: outcomes of care provided to diabetic women compared to men. *J Clin Hypertens (Greenwich)* 2005;7(2):73-80.
- (213) Nilsson PM, Theobald H, Journath G, Fritz T. Gender differences in risk factor control and treatment profile in diabetes: a study in 229 swedish primary health care centres. *Scand J Prim Health Care* 2004;22(1):27-31.
- (214) Sarafidis PA, McFarlane SI, Bakris GL. Gender disparity in outcomes of care and management for diabetes and the metabolic syndrome. *Curr Diab Rep* 2006;6(3):219-224.
- (215) Wexler DJ, Grant RW, Meigs JB, Nathan DM, Cagliero E. Sex disparities in treatment of cardiac risk factors in patients with type 2 diabetes. *Diabetes Care* 2005;28(3):514-520.
- (216) Mühlhauser I, Bruckner I, Berger M, Cheta D, Jorgens V, Ionescu-Tirgoviste C, et al. Evaluation of an intensified insulin treatment and teaching programme as routine management of type 1 (insulin-dependent) diabetes. The Bucharest-Dusseldorf Study. *Diabetologia* 1987;30(9):681-690.
- (217) Frykberg RG, Veves A. Diabetic foot infections. *Diabetes Metab Rev* 1996;12(3):255-270.
- (218) Reiber GE, Pecoraro RE, Koepsell TD. Risk factors for amputation in patients with diabetes mellitus. A case-control study. *Ann Intern Med* 1992;117(2):97-105.
- (219) Lee WL, Cheung AM, Cape D, Zinman B. Impact of diabetes on coronary artery disease in women and men: a meta-analysis of prospective studies. *Diabetes Care* 2000;23(7):962-968.
- (220) Morgan CD, Sykora K, Naylor CD, the Steering Committee of the Cardiac Care Network of Ontario. Analysis of deaths while waiting for cardiac surgery among 29,293 consecutive patients in Ontario, Canada. *Heart* 1998;79(4):345-349.
- (221) Statistics Canada. Leading Causes of Death in Canada, 2006. Accessed August 17, 2010 at <http://www.statcan.gc.ca/pub/84-215-x/84-215-x2010000-eng.htm>.
- (222) Cina CS, Clase CM, Haynes BR. Refining the indications for carotid endarterectomy in patients with symptomatic carotid stenosis: a systematic review. *J Vasc Surg* 1999;30(4):606-617.
- (223) Pomposelli FB, Kansal N, Hamdan AD, Belfield A, Sheahan M, Campbell DR, et al. A decade of experience with dorsalis pedis artery bypass: analysis of outcome in more than 1000 cases. *J Vasc Surg* 2003;37(2):307-315.
- (224) Lewis EJ, Hunsicker LG, Bain RP, Rohde RD. The effect of angiotensin-converting-enzyme inhibition on diabetic nephropathy. The Collaborative Study Group. *N Engl J Med* 1993;329(20):1456-1462.
- (225) The Diabetes Control and Complications (DCCT) Research Group. Effect of intensive therapy on the development and progression of diabetic nephropathy in the Diabetes Control and Complications Trial. *Kidney Int* 1995;47:1703-1720.
- (226) Kempner JH, O'Colmain BJ, Leske MC, Haffner SM, Klein R, Moss SE, et al. The prevalence of diabetic retinopathy among adults in the United States. *Arch Ophthalmol* 2004;122(4):552-563.
- (227) CNIB National Office. Canadian National Institute of Blindness Client Database. Toronto, 2002.
- (228) Klein R, Klein BE, Moss SE. Epidemiology of proliferative diabetic retinopathy. *Diabetes Care* 1992;15(12):1875-1891.
- (229) The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993;329(14):977-986.



- (230) Early Treatment Diabetic Retinopathy Study Research Group. Photocoagulation for diabetic macular edema. Early Treatment Diabetic Retinopathy Study report number 1. *Arch Ophthalmol* 1985;103(12):1796-1806.
- (231) The Diabetic Retinopathy Study Research Group. Photocoagulation treatment of proliferative diabetic retinopathy: the second report of diabetic retinopathy study findings. *Ophthalmology* 1978;85(1):82-106.
- (232) Caird FI, Burditt AF, Draper GJ. Diabetic retinopathy. A further study of prognosis for vision. *Diabetes* 1968;17(3):121-123.
- (233) The Diabetic Retinopathy Vitrectomy Study Research Group. Early vitrectomy for severe proliferative diabetic retinopathy in eyes with useful vision. Results of a randomized trial—Diabetic Retinopathy Vitrectomy Study Report 3. *Ophthalmology* 1988;95(10):1307-1320.
- (234) The Diabetic Retinopathy Vitrectomy Study Research Group. Early vitrectomy for severe vitreous hemorrhage in diabetic retinopathy. Four-year results of a randomized trial: Diabetic Retinopathy Vitrectomy Study Report 5. *Arch Ophthalmol* 1990;108(7):958-964.
- (235) Ray JG, O'Brien TE, Chan WS. Preconception care and the risk of congenital anomalies in the offspring of women with diabetes mellitus: a meta-analysis. *Q J Med* 2001;94(8):435-444.
- (236) McElvy SS, Miodovnik M, Rosenn B, Khoury JC, Siddiqi T, Dignan PS, et al. A focused preconceptional and early pregnancy program in women with type 1 diabetes reduces perinatal mortality and malformation rates to general population levels. *J Matern Fetal Med* 2000;9(1):14-20.
- (237) Hiilesmaa V, Suhonen L, Teramo K. Glycaemic control is associated with pre-eclampsia but not with pregnancy-induced hypertension in women with type I diabetes mellitus. *Diabetologia* 2000;43(12):1534-1539.
- (238) Jovanovic L, Knopp RH, Kim H, Cefalu WT, Zhu XD, Lee YJ, et al. Elevated pregnancy losses at high and low extremes of maternal glucose in early normal and diabetic pregnancy: evidence for a protective adaptation in diabetes. *Diabetes Care* 2005;28(5):1113-1117.
- (239) The Diabetes Control and Complications Trial Research Group. Effect of pregnancy on microvascular complications in the diabetes control and complications trial. *Diabetes Care* 2000;23(8):1084-1091.
- (240) Jovanovic L, Druzin M, Peterson CM. Effect of euglycemia on the outcome of pregnancy in insulin-dependent diabetic women as compared with normal control subjects. *Am J Med* 1981;71(6):921-927.
- (241) Jovanovic L, Nakai Y. Successful pregnancy in women with type 1 diabetes: from preconception through postpartum care. *Endocrinol Metab Clin North Am* 2006;35(1):79-97, vi.
- (242) Mello G, Parretti E, Mecacci F, La Torre P, Cioni R, Cianciulli D, et al. What degree of maternal metabolic control in women with type 1 diabetes is associated with normal body size and proportions in full-term infants? *Diabetes Care* 2000;23(10):1494-1498.
- (243) Nielsen GL, Moller M, Sorensen HT. HbA1c in early diabetic pregnancy and pregnancy outcomes: a Danish population-based cohort study of 573 pregnancies in women with type 1 diabetes. *Diabetes Care* 2006;29(12):2612-2616.
- (244) Temple R, Aldridge V, Greenwood R, Heyburn P, Sampson M, Stanley K. Association between outcome of pregnancy and glycaemic control in early pregnancy in type 1 diabetes: population based study. *BMJ* 2002;325(7375):1275-1276.
- (245) Casele HL, Laifer SA. Factors influencing preconception control of glycemia in diabetic women. *Arch Intern Med* 1998;158(12):1321-4.
- (246) Holing EV, Beyer CS, Brown ZA, Connell FA. Why don't women with diabetes plan their pregnancies? *Diabetes Care* 1998;21(6):889-95.
- (247) Janz NK, Herman WH, Becker MP, Charron-Prochownik D, Shayna VL, Lesnick TG, et al. Diabetes and pregnancy. Factors associated with seeking pre-conception care. *Diabetes Care* 1995;18(2):157-65.
- (248) Berger H, Crane J, Farine D, Armson A, De La Ronde S, Keenan-Lindsay L, et al. Screening for gestational diabetes mellitus. *J Obstet Gynaecol Can* 2002;24(11):894-912.
- (249) Reece EA, Leguizamón G, Wiznitzer A. Gestational diabetes: the need for a common ground. *Lancet* 2009;373(9677):1789-1797.

- (250) The HAPO Study Cooperative Research Group. Hyperglycemia and adverse pregnancy outcomes. *N Engl J Med* 2008;358(19):1991-2002.
- (251) Crowther CA, Hiller JE, Moss JR, McPhee AJ, Jeffries WS, Robinson JS. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes. *N Engl J Med* 2005;352(24):2477-2486.
- (252) Feig DS, Zinman B, Wang X, Hux JE. Risk of development of diabetes mellitus after diagnosis of gestational diabetes. *CMAJ* 2008;179(3):229-234.
- (253) Montan S. Increased risk in the elderly parturient. *Curr Opin Obstet Gynecol* 2007;19(2):110-112.
- (254) Kramer MS, Seguin L, Lydon J, Goulet L. Socio-economic disparities in pregnancy outcome: why do the poor fare so poorly? *Paediatr Perinat Epidemiol* 2000;14(3):194-210.
- (255) Centers for Disease Control and Prevention (CDC). Vital signs: state-specific obesity prevalence among adults—United States, 2009. *MMWR Morb Mortal Wkly Rep*. 2010;59(30):951-955.
- (256) Brownson RC, Boehmer TK, Luke DA. Declining rates of physical activity in the United States: what are the contributors? *Annu Rev Public Health* 2005;26:421-443.
- (257) Shields M. Measured Obesity. Overweight Canadian children and adolescents. In: *Nutrition: Findings from the Canadian Community Health Survey; Issue no. 1*. Ottawa: Statistics Canada, 2005.
- (258) Statistics Canada. Food Statistics, 2006. Ottawa: Statistics Canada, 2007.
- (259) Tjepkema M. Measured Obesity. Adult obesity in Canada: Measured height and weight. In: *Nutrition: Findings from the Canadian Community Health Survey; Issue no. 1*. Ottawa: Statistics Canada 2005.
- (260) Wang Y, Beydoun MA. The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiol Rev* 2007;29:6-28.
- (261) Leiter LA, Barr A, Bélanger A, Lubin S, Ross SA, Tildesley HD, et al. Diabetes screening in Canada (DIASCAN) study: prevalence of undiagnosed diabetes and glucose intolerance in family physician offices. *Diabetes Care* 2001;24(6):1038-1043.
- (262) Chan B, Harju M. Chapter 14: Supply and utilization of health care services for diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (263) Davis WA, Norman PE, Bruce DG, Davis TM. Predictors, consequences and costs of diabetes-related lower extremity amputation complicating type 2 diabetes: the Fremantle Diabetes Study. *Diabetologia* 2006;49(11):2634-2641.
- (264) Health Canada. Smoking. A National Strategy. Accessed August 13, 2010 at <http://www.hc-sc.gc.ca/hc-ps/pubs/tobac-tabac/ns-sn/preface-eng.php>.
- (265) Diez Roux AV, Merkin SS, Arnett D, Chambless L, Massing M, Nieto FJ, et al. Neighborhood of residence and incidence of coronary heart disease. *N Engl J Med* 2001;345(2):99-106.
- (266) Hawker GA, Badley EM, Jaglal S, Dunn S, Croxford R, Ko B, et al. Musculoskeletal Conditions. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report*, 2010.
- (267) Hux JE, Tang M. Chapter 1: Patterns of prevalence and incidence of diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. *Diabetes in Ontario: Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (268) Chan BTB, Klomp H, Cascagnette P. Quality of diabetes management in Saskatchewan. Saskatoon: Health Quality Council, 2006.
- (269) Kahn EB, Ramsey LT, Brownson RC, Heath GW, Howze EH, Powell KE, et al. The effectiveness of interventions to increase physical activity. A systematic review. *Am J Prev Med* 2002;22(4 Suppl):73-107.
- (270) Sallis JF, Bauman A, Pratt M. Environmental and policy interventions to promote physical activity. *Am J Prev Med* 1998;15(4):379-397.
- (271) Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. *Annu Rev Public Health* 2008;29:253-272.
- (272) Yancey AK, Kumanyika SK, Ponce NA, McCarthy WJ, Fielding JE, Leslie JP, et al. Population-based interventions engaging communities of color in healthy eating and active living: a review. *Prev Chronic Dis* 2004;1(1):A09.



- (273) Glazier RH, Booth GL, Gozdyra P, Creatore MI, Tynan A-M. Neighbourhood environments and resources for healthy living: a focus on diabetes in Toronto. Toronto: Institute for Clinical Evaluative Sciences, 2008.
- (274) Papas MA, Alberg AJ, Ewing R, Helzlsouer KJ, Gary TL, Klassen AC. The built environment and obesity. *Epidemiol Rev* 2007;29(1):129-143.
- (275) Raine K, Spence JC, Church J, Boulé N, Slater L, Marko J, et al. State of the evidence review on urban health and healthy weights. Ottawa: The Canadian Institute for Health Information, 2008.
- (276) White House Task Force on Childhood Obesity. Report to the President. Solving the problem of childhood obesity within a generation. Available at <http://www.letsmove.gov/obesitytaskforce.php>, May 2010.
- (277) UK Prospective Diabetes Study Group. Efficacy of atenolol and captopril in reducing risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 39. UK Prospective Diabetes Study Group. *BMJ* 1998;317(7160):713-720.
- (278) Battersby MW. Health reform through coordinated care: SA HealthPlus. *BMJ* 2005;330(7492):662-665.
- (279) Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q* 1996;74(4):511-544.
- (280) Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care* 2002;25(7):1159-1171.
- (281) Shojania KG, Ranji SR, McDonald KM, Grimshaw JM, Sundaram V, Rushakoff RJ, et al. Effects of quality improvement strategies for type 2 diabetes on glycemic control: a meta-regression analysis. *JAMA* 2006;296(4):427-440.
- (282) Meigs JB, Cagliero E, Dubey A, Murphy-Sheehy P, Gildesgame C, Chueh H, et al. A controlled trial of web-based diabetes disease management: the MGH diabetes primary care improvement project. *Diabetes Care* 2003;26(3):750-757.
- (283) Shea S, Weinstock RS, Teresi JA, Palmas W, Starren J, Cimino JJ, et al. A randomized trial comparing telemedicine case management with usual care in older, ethnically diverse, medically underserved patients with diabetes mellitus: 5 year results of the IDEATel study. *J Am Med Inform Assoc* 2009;16(4):446-456.
- (284) Duke SA, Colagiuri S, Colagiuri R. Individual patient education for people with type 2 diabetes mellitus. *Cochrane Database Syst Rev* 2009(1):CD005268.
- (285) Hawthorne K, Robles Y, Cannings-John R, Edwards AG. Culturally appropriate health education for Type 2 diabetes in ethnic minority groups: a systematic and narrative review of randomized controlled trials. *Diabet Med*;27(6):613-623.
- (286) Health Canada. Responding to the challenge of diabetes in Canada: first report of the National Diabetes Surveillance System (NDSS) 2003. Ottawa: Health Canada, 2003.
- (287) Center for Chronic Disease Prevention and Control, Population and Public Health Branch, Health Canada. Diabetes in Canada. 2nd ed. Ottawa: Health Canada, 2002.
- (288) Association of Public Health Epidemiologists in Ontario (APHEO). Core indicators for public health in Ontario. Last accessed August 26, 2010 at <http://www.apheo.ca/index.php?pid=55>.
- (289) Mathers C, Vos T, Stevenson C. The burden of disease and injury in Australia. Canberra: Australian Institute of Health and Welfare, 1999.
- (290) Statistics Canada. Comparable health indicators—Canada, provinces and territories, November 2004. Last accessed May 18, 2010 at <http://www.statcan.gc.ca/pub/82-401-x/2002000/index-eng.htm>.
- (291) Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen HU. The World Health Organization Composite International Diagnostic Interview Short-Form (CIDI-SF). *Int J Methods Psychiatr Res* 1998;7(4):171-185.
- (292) The National Quality Measures Clearinghouse. Diabetes Mellitus. Last accessed May 18, 2010 at <http://www.qualitymeasures.ahrq.gov/>.
- (293) Health Resources and Services Administration, U.S. Department of Health and Human Services. Health Disparities Collaboratives: Diabetes Collaborative. Last Accessed August 31, 2010 at <http://www.healthdisparities.net/hdc/html/collaboratives.topics.diabetes.aspx>.

- (294) National Committee for Quality Assurance (NCQA). HEDIS and quality measurement. Last accessed August 31, 2010 at <http://www.ncqa.org/tabid/59/Default.aspx>.
- (295) Johnson I, Goettler F, Goral A, Leffley A, Lueske B, Lee-Han H, et al. Report on the health status of the residents of Ontario. Ontario: Public Health Research, Education & Development Program, February 2000.
- (296) Institute of Health Economics. Alberta Diabetes Atlas 2007. Alberta: Institute of Health Economics, 2007.
- (297) Majumdar SR, Johnson JA, Bowker SL, Booth GL, Dolovich L, Ghali W, et al. A Canadian consensus for the standardized evaluation of quality improvement interventions in type 2 diabetes. *Can J Diabetes* 2005;29(3):220-229.
- (298) U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With understanding and improving health and objectives for improving health. 2 vols. Washington, D.C.: U.S. Government Printing Office, November 2000.
- (299) Buhrmann R, Assaad D, Hux JE, Tang M, Sykora K. Chapter 10: Diabetes and the eye. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. Diabetes in Ontario: Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (300) Booth G, Fang J. Chapter 2: Acute complications of diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. Diabetes in Ontario: Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (301) Agency for Healthcare Research and Quality. Prevention Quality Indicators. Last accessed August 31, 2010 at [http://www.qualityindicators.ahrq.gov/pqi\\_overview.htm](http://www.qualityindicators.ahrq.gov/pqi_overview.htm).
- (302) Booth GL, Rothwell DM, Fung K, Tu JV. Chapter 5: Diabetes and cardiac disease. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. Diabetes in Ontario: Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (303) Oliver MJ, Lok CE, Shi J, Rothwell DM. Chapter 8: Dialysis therapy for people with diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. Diabetes in Ontario: Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (304) Feig DS, Kopp A, Anderson GM. Chapter 11: Pregnancy in women with diabetes. In: Hux JE, Booth GL, Slaughter PM, Laupacis A, editors. Diabetes in Ontario: Practice Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (305) Shiller SK, Bierman AS. Introduction to the POWER Study. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St.Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (306) Clark JP, Bierman AS. The POWER Study Framework. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St.Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (307) Thomas S. Combining cycles of the Canadian Community Health Survey. Proceedings of Statistics Canada Symposium 2006: Methodological Issues in Measuring Population Health. Ottawa, 2006.
- (308) Iron K, Zagorski BM, Sykora K, Manuel DG. Living and dying in Ontario: an opportunity for improved health information. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences, 2008.

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### Echo: Improving Women's Health in Ontario

Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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resources. ICES knowledge is highly regarded in Canada and abroad, and is widely used by government, hospitals, planners, and practitioners to make decisions about care delivery and to develop policy.

# Reproductive and Gynaecological Health

## *Chapter 10*

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### INSIDE

- Prenatal Care
- Childbirth
- Postpartum Care
- Abortion
- Hysterectomy
- Sexually Transmitted Infections



Project for an Ontario Women's Health Evidence-Based Report

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# Executive Summary

## ISSUE

This chapter on reproductive and gynaecological health focuses on the health of women as it specifically relates to their reproductive systems.

Therefore, unlike other POWER Study chapters that examine the complex interplay between sex and health in the context of conditions that affect both men and women, this chapter focuses on how the characteristics of women—how old they are, how well educated, how wealthy, where they live—affects health and health care issues that are unique to women. The issues covered in this chapter span the life course from teenage pregnancy to hysterectomy in older women.

Care provided for reproductive and gynaecological health issues is deeply embedded in social and cultural norms. Care provided for conditions that are unique to women and that in many instances are essential elements of family life, may vary over time, socioeconomic status and across cultures and countries. Although evidence and information about the risks and benefits of care options are important, values and preferences also play a central role in informed shared decision making for reproductive health and health care.

In the first section, the **prenatal care** received by Ontario women who delivered in hospitals is described including the types of health professionals providing prenatal care, maternal multiple marker screening rates (for Down syndrome, trisomy 18 and open neural tube defects) and rates of screening for group B streptococcus among women who delivered at full-term (beyond 37 weeks gestation). The second section includes indicators of **childbirth**: the rate of live births to teenage mothers, the types of health professionals attending deliveries, intervention rates (induction of labour, episiotomy, assisted (vacuum and/or forceps) vaginal deliveries,

caesarean sections) and maternal and neonatal outcomes. The final section related to childbirth is the **postpartum section** which includes measures of early hospital discharge for mothers, readmission rates (within 14 days and within 90 days) for women and 28-day readmission rates for infants. In the **abortion section** we report the abortion rate and ratio of abortions to live births, the proportion of Ontario hospitals performing abortions (excluding hospitals with religious affiliations and those designated for specific patient groups such as children) and the characteristics of hospital abortions as well as the short-term complication rates. The fifth section is on **hysterectomy** and includes the hysterectomy rates for benign gynaecological conditions, the proportion of hysterectomies that are

### ABOUT THIS CHAPTER

The chapter has six sections:

- A. Prenatal Care
- B. Childbirth
- C. Postpartum Care
- D. Abortion
- E. Hysterectomy
- F. Sexually Transmitted Infections



performed using minimally invasive methods and the in-hospital complication rates. In the final section on **sexually transmitted infections** we report the rates of chlamydia, gonorrhea, syphilis and hepatitis B virus. This section of the chapter includes data on men as well as women.

## STUDY

The indicators we report were selected after a thorough literature review and rigorous selection process including expert panel input ([see Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through many sources, including for example: the Society of Obstetricians and Gynaecologists of Canada (SOGC), the Canadian Institute for Health Information (CIHI), the Public Health Agency of Canada (PHAC), the Hospital Report, Statistics Canada and the World Health Organization. We build on indicators used by these sources by incorporating an equity analysis into this chapter ([see the POWER Study Framework, chapter 2](#)). This is important because subgroups of women may have different patterns of health and disease, varying social contexts and experiences and also vary in their health care utilization. These differences will contribute to the differences we observe by income, education, age and region.

This chapter draws on existing data sources. Although this limits the indicators that we can include in this chapter, Ontario has some very useful data sources. Much of the health care utilization data used in this chapter are similar to the data used in other reports and as often as possible, similar methodologies were used to

ensure comparability of measures across reports and over time. These data can provide rich and comprehensive insights into the care provided to women in Ontario. One database used in this chapter is the Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal database. This detailed clinical database provides information on health care and health outcomes for childbirth that have not been available in the past. The indicators drawn from this database provide a new and exciting way to better understand a key aspect of women's reproductive health. Other data sources that were used include: the Ontario Maternal Multiple Marker Screening (OMMMS) database; the CIHI Discharge Abstract Database (CIHI-DAD); the Ontario Health Insurance Plan (OHIP) data; the National Ambulatory Care Reporting System (NACRS); the Registered Persons Database (RPDB) and Statistics Canada's 2006 Census.

Data from the Niday Perinatal database were stratified by age, neighbourhood income, neighbourhood educational attainment and Local Health Integration Network (LHIN) of residence. Indicators were additionally stratified or limited (where possible and where indicated) by parity, presentation, delivery type and whether the delivery was full-term. OMMMS data were reported stratified by age. Data from the CIHI-DAD, NACRS and from OHIP were stratified by neighbourhood income, neighbourhood educational attainment, age, rural/urban residency and LHIN. Analyses were conducted as allowed by sample size. Age-adjustment, where appropriate, was done using indirect age adjustment. [Appendix 10.3](#) provides a more detailed description of the research methods.

## KEY FINDINGS

With few exceptions, performance on most indicators did not vary by neighbourhood income or average neighbourhood educational attainment. We found important regional variation on most indicators examined, with wide variation observed across LHINs for some indicators.

### Prenatal Care

- Most women who gave birth in Ontario hospitals—80 percent—received prenatal care from an obstetrician, 27 percent received care from a general practitioner/family physician (GP/FP) and six percent received prenatal care from a midwife ([Exhibit 10A.1](#)). Since women may get prenatal care from more than one type of professional, the percentages will add up to more than 100 percent.
- Women who live in the northern part of the province were more likely to receive prenatal care from a GP/FP or a midwife than those who live in southern Ontario. ([Exhibit 10A.2](#)).
- About two-thirds of pregnant women underwent maternal multiple marker screening for chromosomal anomalies (Down syndrome, trisomy 18) and/or open neural tube defects as part of their prenatal care ([Exhibit 10A.3](#)) and over 90 percent of women who delivered after 37 weeks gestation were screened for group B streptococcus (GBS) colonization ([Exhibit 10A.4](#)).

### Childbirth

- The overall rates of adverse outcomes (severe maternal morbidity ([Exhibit 10B.18](#)), birth trauma to newborns ([Exhibit 10B.19](#)) and low five-minute Apgar score ([Exhibit 10B.20](#))) were low and provide evidence that Ontario is a very safe place for women to give birth and for babies to be born.

- Overall, the rate of live births to teenage mothers (aged 15-19) was 10 per 1,000. Teenagers who lived in the lowest-income neighbourhoods had live birth rates that were over five times higher than teenagers who lived in the highest-income neighbourhoods (20.6 versus 3.6 per 1,000 women aged 15-19, respectively) ([Exhibit 10B.1](#)). A similar pattern was observed for average neighbourhood educational attainment.
- Twenty-eight percent of all hospital deliveries were done by caesarean section. Among women who had full-term, singleton, vertex presentations, 23 percent of deliveries were done by caesarean section ([Exhibit 10B.12](#)). Among women who had a history of caesarean section, 84 percent of deliveries were done by caesarean section ([Exhibit 10B.13](#)).
- Provincial caesarean section rates varied by LHIN from 24 percent of deliveries in the South West LHIN to 31 percent of deliveries in the North Simcoe Muskoka LHIN ([Exhibit 10B.11](#)). Episiotomy ([Exhibit 10B.7](#)) and assisted delivery rates ([Exhibit 10B.9](#)) also varied by LHIN.

### Postpartum Care

- Nearly three-quarters of women who had a vaginal delivery were discharged home early (i.e., within 48 hours of delivery) and almost 90 percent of women who had a caesarean section were discharged home early (i.e., within 96 hours of delivery) ([Exhibit 10C.1](#)). Early discharge rates varied across LHINs from 53 percent (North West LHIN) to 83 percent (Waterloo Wellington LHIN) for women who had vaginal deliveries and from 68 percent (North West LHIN) to 94 percent (Erie St. Clair LHIN) for women who had caesarean deliveries ([Exhibit 10C.3](#)). Rural women were somewhat less likely than urban women to be discharged early from hospital, irrespective of the type of delivery ([Exhibit 10C.2](#)).

- All-cause or postpartum-related maternal readmission rates within 14 days ([Exhibit 10C.4](#)) or readmission rates within 90 days of discharge ([Exhibit 10C.7](#)) were consistently higher for women who delivered by caesarean section than for women who delivered vaginally.
- About one in 30 infants was readmitted to hospital within 28 days of birth and jaundice accounted for almost half of all of these neonatal readmissions. Neonatal readmission rates varied by LHIN and were higher among those living in urban areas as compared to rural areas ([Exhibit 10C.10](#)).

### Abortion

- Women residing in the lowest-income neighbourhoods were more than twice as likely to have an abortion as women residing in the highest-income neighbourhoods, 2.1 abortions per 100 women versus 1.0 abortion per 100 women, respectively. Urban women were more likely to have an abortion than their rural counterparts ([Exhibit 10D.1](#)). Regional variation in abortion rates ranged from 0.9 per 100 women (Erie St. Clair LHIN) to 2.5 per 100 women (Central West LHIN).
- Short-term complication rates, defined as any emergency department/same day surgery visit or hospitalization within 14 days after an abortion, regardless of the reason for the visit, were low; 4.1 percent of abortions were associated with a subsequent emergency department/same day surgery visit for any reason and 0.4 percent were associated with a subsequent hospital admission.

### Hysterectomy

- Hysterectomy rates in the province have declined over time. Overall, 258 out of every 100,000 women had a hysterectomy for a benign gynaecological condition; rates varied by average neighbourhood educational attainment ([Exhibit 10E.1](#)). Regional variation in hysterectomy rates ranged from 133 per 100,000 women (Toronto Central LHIN) to 440 per 100,000 women (North East LHIN) ([Exhibit 10E.4](#)).
- Hysterectomy done by the vaginal or laparoscopic route is associated with lower complication rates and better outcomes for women than abdominal hysterectomy, and is preferred when clinical factors allow. The percentage of women who had a vaginal or laparoscopic hysterectomy varied substantially by LHIN ranging from 30 percent in the Central East LHIN to 63 percent in the South West LHIN ([Exhibit 10E.6](#)).

## KEY MESSAGES

There is much good news in our examination of reproductive and gynaecological health in the province of Ontario. The overall rates of adverse outcomes related to childbirth were low and provide evidence that Ontario is a very safe place for women to give birth and for babies to be born. Hysterectomy rates have declined and the proportion that is done through the less invasive vaginal or laparoscopic routes has increased. Socioeconomic factors, such as neighbourhood income or average neighbourhood educational attainment, were not associated with performance on many indicators of gynaecological and reproductive health care.

Despite our progress, more work needs to be done and there are opportunities to improve care. There was substantial variation in the type of obstetrical and gynaecological care provided related to where women lived in the province. Women who lived in different LHINs had different rates for a range of common procedures including hysterectomy and interventions related to childbirth. There were large differences in teenage pregnancy and abortion rates between rich and poor women. Caesarean section rates are high and vary by region. Hysterectomy rates vary by region and more women who have hysterectomies could have the surgery done using less invasive techniques. Important data gaps need to be closed. For example, we were unable to assess whether performance on these indicators varied by ethnicity.

There are ways to improve care for women and their families around important aspects of reproductive health and at the centre of many of the key strategies is a commitment not only to rely on the best evidence but to ensure that women are actively involved in the decision making process and that their knowledge, perspectives, beliefs and values are respected. The following actions can accelerate progress, improve quality and outcomes of care for reproductive and gynaecological health and can help eliminate remaining inequities.

### **Shared decision making is essential to optimizing reproductive and gynaecological care.**

- Many decisions around reproductive care are embedded in social norms and individual and family preferences and values. In this context, a model of shared decision making—where providers and women communicate and use both best clinical evidence and a respect for individual preferences and autonomy to determine the appropriate course of action—is essential.
- There is clear evidence that interventions such as induction of labour and delivery by caesarean section are effective in specific clinical situations. However, in many cases the use of these interventions involves complex trade-offs between risks and benefits and women and their families should be encouraged to make an informed choice that takes into account preferences, values and patient autonomy.

### **There is opportunity to reduce substantial geographic variation in the clinical management, services provided, and outcomes of reproductive health and gynaecological care.**

- Large regional variations in rates of interventions in childbirth, hysterectomy rates and type of procedure used raise concerns that access to services or provider practice styles may limit choices available to women and their families.
- Interventions to optimize and standardize care across the province, including the use of learning networks and telemedicine, should be considered.

**There is a need to better understand the reasons for regional variation in caesarean section rates and the overall increase in these rates over the last decade and there is an opportunity to reduce the observed regional variation.**

- Better understanding and communication of the risks and benefits of caesarean section in different clinical situations would support women in making shared and informed decisions about their treatment choices.
- Efforts to reduce variation could focus on first time caesarean sections in low-risk women and on offering a trial of labour, when appropriate, as an alternative to repeat caesarean section in women with a previous caesarean section.

**There is opportunity to reduce substantial geographic variation in the use of hysterectomy for benign conditions as well as to increase the proportion of hysterectomies done by the less invasive vaginal or laparoscopic routes.**

- A woman's decision to have a hysterectomy for benign conditions should be based on informed decision making after consideration of alternatives.
- Once the decision is made, the procedure should be performed by the least invasive procedure allowed by clinical circumstances.

**There is opportunity to reduce rates of teen pregnancy and abortion among low-income women.**

- There were higher rates of teen pregnancy and abortion among low-income women compared to higher-income women. Reproductive health programs that reach out to low-income women, particularly low-income teens are needed. There is evidence that school and community-based interventions can reduce teenage pregnancy rates.

**Improve quality, availability and timeliness of data to assess reproductive health and gynaecological care in the province.**

- While data quality and availability to assess reproductive health and gynaecological care in the province has improved, there is still much to be done to improve the quality, availability and timeliness of data.
- Data on ethnicity would allow us to assess performance on these indicators and outcomes of care to Ontario's diverse communities.

# Introduction

This chapter on reproductive and gynaecological health focuses on the health of women as it specifically relates to their reproductive system.

Therefore, unlike other POWER Study chapters that examine the complex interplay between sex and health in the context of conditions that affect both men and women, this chapter focuses, for the most part, on how the characteristics of women—how old they are, how well educated, how wealthy, where they live—affects health and health care issues that are unique to women. The issues covered in this chapter span the life course from teenage pregnancy to hysterectomy.

## The chapter has six sections:

- Prenatal Care
- Childbirth
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- Abortion
- Hysterectomy
- Sexually Transmitted Infections

Care provided for reproductive and gynaecological health issues is deeply embedded in social and cultural norms. Care provided for conditions that are unique to women and that in many instances are important elements of a women's life, may vary over time, socioeconomic status and across cultures and countries. Evidence and information about the risks and benefits of care options are important to inform choice of treatment options. Values and preferences also play a central role in informed, shared decision making for reproductive health and health care.

A substantial proportion of this chapter looks at issues related to pregnancy, prenatal care, childbirth and postpartum care. This reflects the fundamental role pregnancy, childbirth and child rearing play in the lives of many women. Along with its importance in many women's lives, the care and services provided during pregnancy and childbirth are major elements in health care delivery in Ontario. Childbirth is the single most common reason for hospital admission in Ontario and care during pregnancy, childbirth and in the postpartum period is provided by a large and highly trained workforce. Any comprehensive assessment of a health care delivery system must include an examination of care related to pregnancy and childbirth.

For women with low-risk pregnancies, the types of health care professionals providing care during pregnancy and childbirth depend predominantly on personal choice and availability. However, research has found differences in types of care received associated with socioeconomic position and where one lives. In Canada, there is substantial provincial variation in the types of providers attending births.<sup>1</sup> An Ontario study provided evidence for regional variation and also found that the types of providers attending births varied by maternal age and income; women residing in higher-income neighbourhoods were more likely to receive prenatal and delivery care from midwives than women living in lower-income neighbourhoods.<sup>2</sup> Other studies have also found regional and socioeconomic variation in intervention rates during childbirth. Caesarean

section and episiotomy rates varied widely by region and by rural/urban residency<sup>3-6</sup> and Canadian caesarean section rates were slightly higher among women living in lower-income neighbourhoods compared to women living in higher-income neighbourhoods.<sup>6</sup> A U.S. study on caesarean section rates concluded that the regional variation in rates could not solely be attributed to clinical factors.<sup>7</sup>

Unintended pregnancy and abortion are health issues that affect many women of reproductive age, with one abortion occurring for every three to four live births in Canada.<sup>8</sup> Most abortions are performed in the first trimester of pregnancy through surgical dilation and curettage (D&C). Access to abortion is uneven across Canada.<sup>9,10</sup> An Ontario study reported that counties with low age-standardized rates (below the 25<sup>th</sup> percentile) also had the highest proportions of women who obtained their abortion outside their county of residence (in some of these counties no abortions were performed in local facilities). This study confirmed interregional variations in the utilization of Ontario abortion procedures and indicated that observed differences in rates and in the proportion of women who travelled outside of their county of residence for these services raised questions about the accessibility of abortions in some regions.<sup>11</sup> Although abortions in Ontario are increasingly provided in non-hospital abortion clinics, these are situated only in urban centres, making hospitals an important provider for many Ontario women as these institutions are dispersed throughout the province. Socioeconomic status has been found to be associated with a woman's likelihood of having an abortion. U.S. studies have found that poor and low-income women have higher rates of abortion and more difficulty accessing contraception.<sup>12,13</sup>

Reproductive health involves more than obstetrical and abortion care. A range of gynaecological conditions have major impacts on women's health and health status. This chapter also includes a section on hysterectomy. Hysterectomy is a major surgical procedure used to treat both malignant and benign conditions and is one of the most common abdominal, surgical procedures in older women.<sup>14</sup> The section on hysterectomy focuses on the use of hysterectomy to treat benign conditions. Care for gynaecological cancers is examined within the [POWER Study Cancer chapter](#).<sup>15</sup>

As was the case for obstetrical care, hysterectomy rates and choice of procedure type vary significantly by geography<sup>16,17</sup> and socioeconomic status. Research has found that hysterectomy rates for benign indications were higher among women from lower socioeconomic strata compared to women with higher income or more education.<sup>18,19</sup> An American study also showed that, among women having hysterectomies, lower-income women were more likely to have abdominal hysterectomies compared to higher-income women, despite the fact that the preferred methods are laparoscopic or vaginal hysterectomy.<sup>20</sup> While some of this variation may be based on patient preference or clinical considerations, surgeon preference and hospital type (teaching versus community) also affect hysterectomy rates and surgical approaches.<sup>21,22</sup>

The indicators we report were selected after a thorough literature review and rigorous selection process including expert panel input ([see Introduction to the POWER Study, chapter 1](#)). The indicators that have been included have been identified through many sources, including: the Society of Obstetricians and Gynaecologists of Canada (SOGC), the Canadian Institute for Health Information (CIHI), the Public Health Agency of Canada



(PHAC), the Hospital Report 2006, Statistics Canada and the World Health Organization. We build on indicators used by these sources by incorporating an equity analysis (see the [POWER Study Framework, chapter 2](#)). This is important because subgroups of women may have different patterns of health and disease, varying social contexts and experiences and may also vary in their health care utilization. These differences will contribute to the differences we observe by income, education, age and region.

This chapter draws on existing data sources. Although this limits the scope of the chapter, available data allow us to examine important patterns of care for reproductive and gynaecological care received by women in the province. Much of the health care utilization data used in this report are similar to the data used in other reports and, as often as possible, similar methodologies were used to ensure comparability of measures across reports and over time. These data can provide rich and comprehensive insights. One database used in this chapter is the Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database. This detailed clinical database provides information on health care and health outcomes for childbirth that has not been available in the past. The indicators that use data from this database provide a new and exciting way to better understand a key aspect of women's reproductive health. Other data sources that were used include: the Ontario Maternal Multiple Marker Screening (OMMMS) database; the CIHI Discharge Abstract Database (CIHI-DAD), Ontario Health Insurance Plan (OHIP) data; the National Ambulatory Care Reporting System (NACRS); the Registered Persons Database (RPDB) and Statistics Canada 2006 Census.

Data from the Niday Perinatal Database were stratified by age, neighbourhood income, neighbourhood educational attainment and Local Health Integration Network (LHIN) of residence whenever possible. Indicators were additionally stratified or limited (where possible and where indicated) by parity, presentation, delivery type and whether the delivery was full-term. OMMMS data were reported stratified by age. Data from the CIHI-DAD, NACRS and from OHIP were stratified by neighbourhood income, neighbourhood educational attainment, age and LHIN. Analyses were reported as allowed by sample size. Age-adjustment, where appropriate, was done using indirect age adjustment. [Appendix 10.3](#) provides a more detailed description of the research methods.

The purpose of this chapter is to provide province-wide data on some key aspects of the reproductive and gynaecological health and health care of women. The indicators provide data on access to care, quality of care and important health outcomes. The analyses examine whether there are variations in these indicators across income, education, age and place of residence. This information should be useful to policy makers and key stakeholders who strive for high quality and equitable care for women.

A complete list of the indicators in this chapter and their data sources can be found in [Appendix 10.2](#). [Appendix 10.1](#) indicates which attribute of the Ontario Health Quality Council's (OHQC) nine attributes of a high performing health system each indicator assesses. It also identifies which of the strategic objectives included in the Ontario Ministry of Health and Long-Term Care (MOHLTC) strategy map would be met through improvement on each indicator.

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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

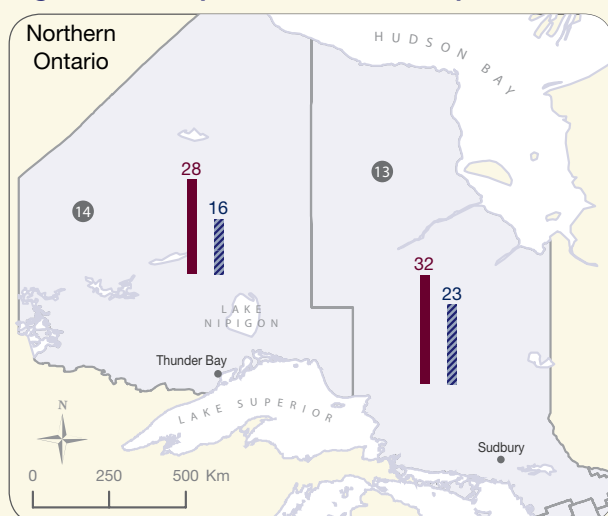
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

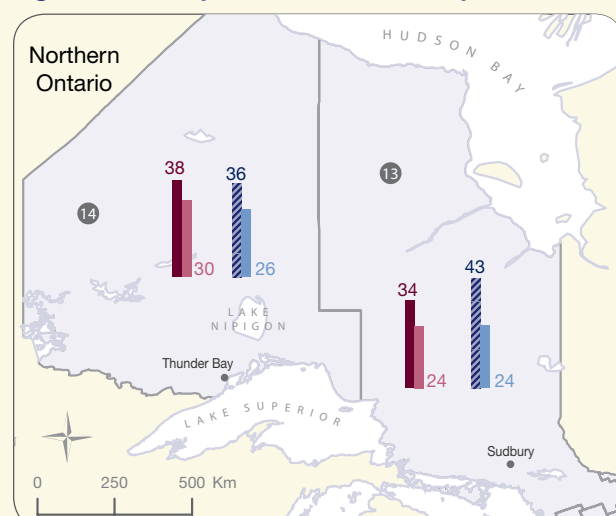
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

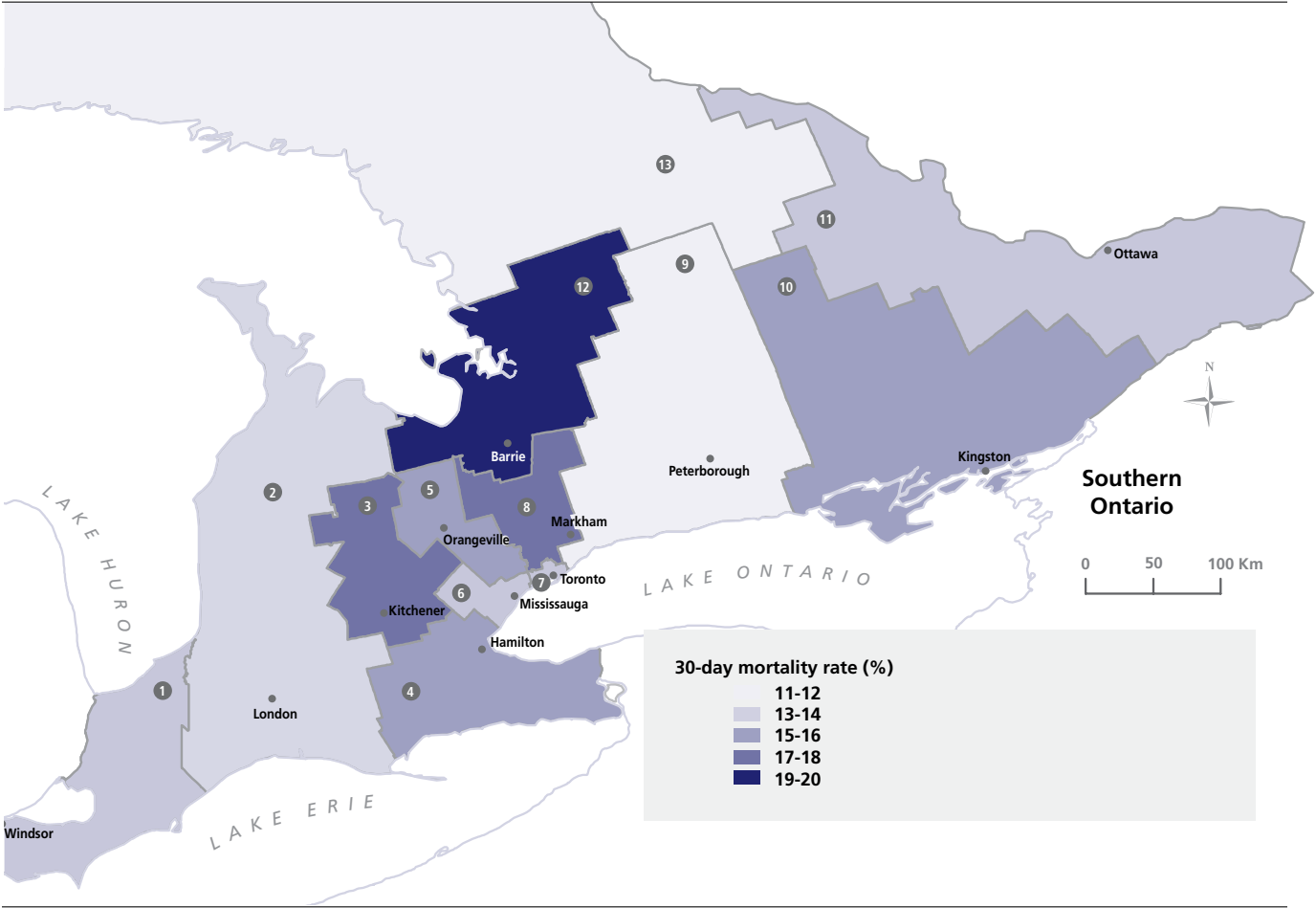


### CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**







# Section 10A

## *Prenatal Care*

### INTRODUCTION

The period from conception to delivery is referred to as the prenatal period. Care provided in the prenatal period is focused on monitoring the progress of the pregnancy, screening and treatment for conditions that develop during pregnancy and providing advice, education and support to the mother and family. Ideally, prenatal care should begin early in the pregnancy and continue at regular intervals throughout pregnancy.

High quality prenatal care can be provided by a range of different health care professionals including obstetricians, family physicians and midwives. In some cases, care will be provided by more than one type of professional. In Ontario, over the last decade, there has been a marked shift in the types of providers from whom women are receiving prenatal care. The proportion of women receiving prenatal care from family doctors is decreasing, while that by obstetricians is increasing. There has been an increase in the number of women receiving prenatal care from midwives, although the proportion remains low.<sup>2</sup> The choice of prenatal health care professional is sometimes guided by clinical factors related to risk and the need for specialty care. However, in normal pregnancies, the choice may depend on the preferences of the women or availability of different providers.

Having regular contact with a health care professional during the prenatal period is important. The Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends that pregnant women have prenatal visits every 4-6 weeks in early pregnancy, every 2-3 weeks after 30 weeks' gestation, and every 1-2 weeks after 36

weeks.<sup>23</sup> Prenatal care providers can assess the risks due to clinical or social factors of developing problems or complications with the mother, delivery or the fetus and offer a plan of management to reduce those risks.<sup>24,25</sup> Providers can also promote healthy lifestyle choices during the pregnancy which may continue to impact risk behaviours after the pregnancy.<sup>24</sup>

While there are no clear recommendations on when to start prenatal care, the SOGC recommends that pregnant women who are seeking prenatal care should be seen within four weeks of a positive pregnancy test to be able to arrange for appropriate prenatal care and testing.<sup>26</sup> At the least, most providers agree with the importance of at least one prenatal visit in the first trimester with regular visits throughout the pregnancy. One Canadian study reviewed access to adequate prenatal care for women who gave birth to live singleton babies over a ten year period from 1991-2000. They defined 'inadequate care' based on gestational age, number of visits and initiation of prenatal care. They found that the percentage of women who received inadequate prenatal care was

higher among women who lived in neighbourhoods with a higher proportion of the population reporting Aboriginal status or the highest percentage of recent immigrants, those living in lower socioeconomic status neighbourhoods and younger women.<sup>27</sup>

Screening tests comprise a significant part of prenatal care. Population-based screening is undertaken for conditions serious enough to warrant intervention and for which intervention is available. Screening for serious fetal problems through the Ontario Maternal Multiple Marker Screening (OMMMS) program is offered to all families in Ontario.<sup>28</sup> The OMMMS program screens for Down syndrome, trisomy 18 and open neural tube defects. Families may decline this type of screening if they do not wish to know or act on the results of the screening tests.

Screening for group B streptococcus colonization (GBS) is offered late in pregnancy (between 35 and 37 weeks gestation) and universal screening of all pregnant women is recommended by the SOGC and the Canadian Task Force on Preventive Health.<sup>29,30</sup> This screening test identifies women who are carrying this bacteria; treatment and precautions can be used to decrease the risk of transmission of GBS to the newborn.

This section of the chapter includes findings on three indicators of prenatal care:

- The types of health care professionals (obstetricians, general practitioners/family physicians and/or midwives) who provided prenatal care after the first trimester to women who gave birth in an Ontario hospital
- Rates of screening for Down syndrome, trisomy 18 and open neural tube defects through the OMMMS program among pregnant women
- Rates of screening for GBS colonization between 35 and 37 weeks gestation for women who gave birth at full-term (37 or more weeks gestation) in an Ontario hospital

The Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database was used to measure the types of professionals who provided prenatal care and GBS screening rates. These indicators were measured among women who gave birth in an Ontario hospital in 2007 and were stratified by age, neighbourhood income, neighbourhood educational attainment and Local Health Integration Network (LHIN) of residence. The OMMMS database was used to identify women who underwent prenatal screening for Down syndrome, trisomy 18 and open neural tube defects as part of the provincial prenatal screening program. Rates were reported stratified by age. Due to a large number of records with missing postal code information in the OMMMS dataset, this indicator could not be reported by neighbourhood income or LHIN.



## EXHIBITS AND FINDINGS

### TYPES OF PROVIDERS OF PRENATAL CARE

**Indicator:** This indicator measures the types of health care professionals (obstetricians, general practitioners/family physicians (GP/FP) and/or midwives) who provided prenatal care after the first trimester to women who gave birth in Ontario hospitals.

**Background:** The profile of providers of prenatal care has changed over time in Ontario. Ontario GP/FPs are decreasing their involvement in obstetrical care and as such, fewer women are receiving care from GP/FPs and more women are receiving care from obstetricians. Some women receive shared care between GP/FPs and obstetricians.<sup>2,31</sup> There is also a small but increasing proportion of prenatal care provided by midwives since the introduction of the Midwifery programme in Ontario in 1994. The choice of prenatal provider should be guided by clinical factors that can be used to identify increased risk and the need for specialty care. For women with normal pregnancies, the choice is often based on availability and patient preference. Some communities have a wide choice of prenatal care providers, others do not. This depends on community size, resources and geography. The fundamental principle is to provide family-centred, maternity and newborn care, based on informed choice, continuity of care, evidence-based care and respect for individuality.<sup>32</sup>

Data for this indicator are from the Niday Perinatal Database. Since women may get prenatal care from more than one type of professional, the percentages add up to more than 100 percent. The Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends that pregnant women who are seeking prenatal care should be seen within four weeks of a positive pregnancy test to be able to arrange for appropriate prenatal care and tests.<sup>26</sup> However, because of issues of data quality and a large proportion of records with missing information, we only report on the type of health care professional providing prenatal care after the first trimester. Even with this restriction, a number of records were missing information on the prenatal care provider. As well, the results could not be stratified by the risk status of the pregnancy and so cannot distinguish between high- and low-risk pregnancies.

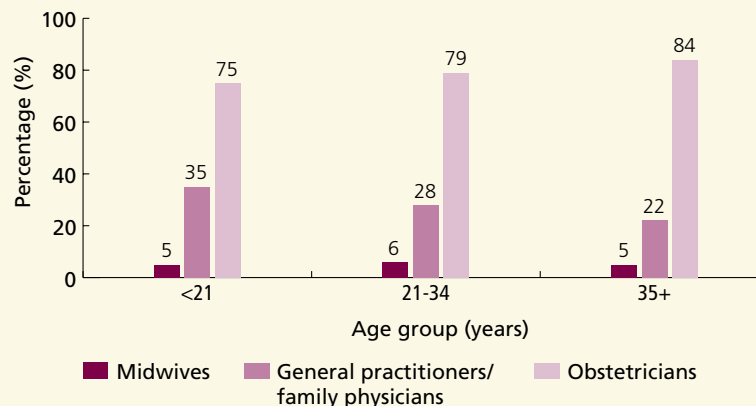
**Findings:** Among women who gave birth in an Ontario hospital, 80 percent received prenatal care from obstetricians, 27 percent from GP/FPs and six percent from midwives.



## Exhibit 10A.1 | Types of health care professionals providing prenatal care<sup>^</sup> to women who gave birth in Ontario hospitals and received prenatal care, by type of professional and age group, in Ontario, 2007

### FINDINGS

- The type of health care professional providing prenatal care to women varied by age.
- Women under age 21 were less likely to get prenatal care from an obstetrician than women aged 21-34 or women aged 35 and older (75 percent versus 79 percent and 84 percent, respectively).
- The relationship was reversed for prenatal care from a GP/FP and decreased from 35 percent among women under age 21 to 28 percent among women aged 21-34 and to 22 percent among women aged 35 and older.
- Across all age groups, 5-6 percent of women received some prenatal care from a midwife.
- The type of health care professional caring for pregnant women did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN)  
Ontario's Niday Perinatal Database

<sup>^</sup> Limited to prenatal care received after the first trimester

**NOTE:** Women may receive prenatal care from multiple providers and so values will not sum to 100 percent.

POWER Study

**Exhibit 10A.2** | Types of health care professionals providing prenatal care<sup>^</sup> to women who gave birth in Ontario hospitals and received prenatal care, by type of professional and Local Health Integration Network (LHIN), in Ontario, 2007

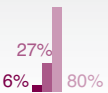
**FINDINGS**

- There was significant regional variation in the percentages of women who received prenatal care after the first trimester from obstetricians, GP/FPs and midwives.
- The percentage of women who received prenatal care from obstetricians ranged from 43 percent in the North West LHIN to 91 percent in the Erie St. Clair LHIN.
- The percentage of women who received prenatal care from GP/FPs ranged from 10 percent in the Central LHIN to 70 percent in the North Simcoe Muskoka LHIN.
- The percentage of women who received prenatal care from midwives ranged from two percent in the Central and Central West LHINs to 20 percent in the North West LHIN.

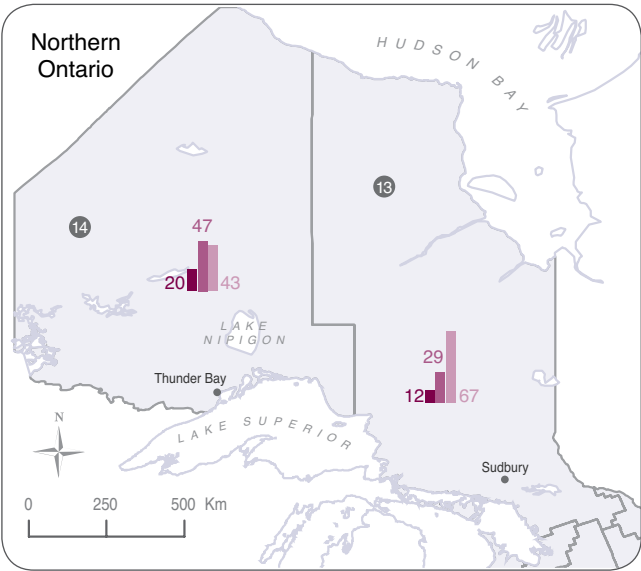
POWER Study

**Overall Ontario**

In Ontario, among women who gave birth in an Ontario hospital, 6 percent received prenatal care from midwives, 27 percent from GP/FPs and 80 percent from obstetricians.

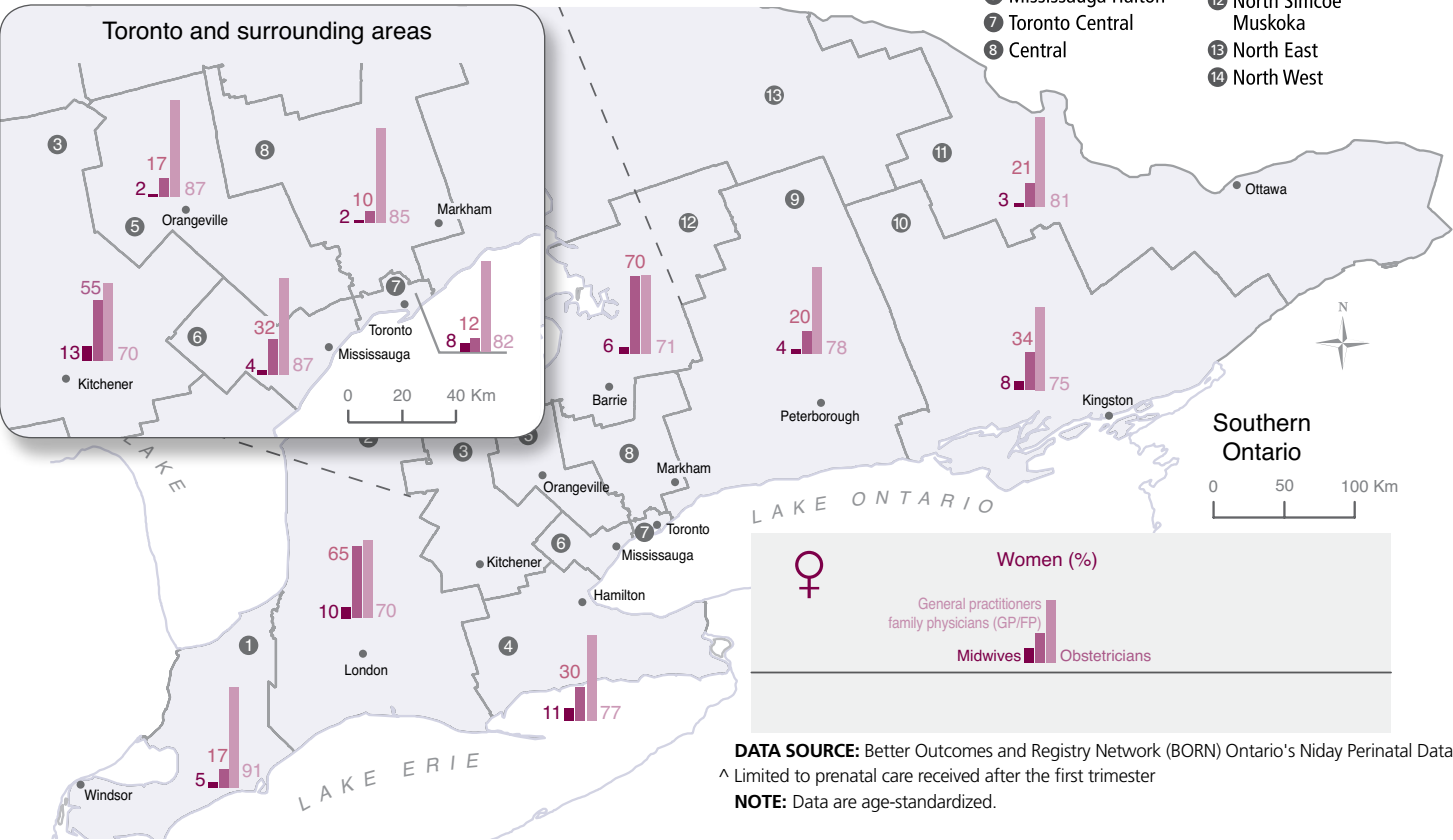


Note: bars will not add to 100 percent as women may have multiple providers of prenatal care



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database  
<sup>^</sup> Limited to prenatal care received after the first trimester  
**NOTE:** Data are age-standardized.

## MATERNAL MULTIPLE MARKER SCREENING RATE

**Indicator:** This indicator measures the percentage of women who underwent maternal multiple marker screening for chromosomal anomalies (Down syndrome, trisomy 18) and/or open neural tube defects as part of their prenatal care.

**Background:** Multiple marker screening for Down syndrome, trisomy 18 and open neural tube defects is based on a combination of maternal age, blood work for biochemical indicators, with or without an ultrasound. A positive result indicates an increased risk of one of these conditions, and should be followed by discussions of options for additional tests and clinical management. In the Ontario Maternal Multiple Marker Screening (OMMMS) program, women are offered non-invasive screening between 11 and 20 weeks of gestation at one of 18 screening centres or clinics in the province. OMMMS screening has markedly decreased the number of invasive procedures, such as amniocentesis or chorionic villus sampling that are performed.<sup>32</sup> The Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends offering all pregnant women, regardless of age, a prenatal screening test for the most common clinically significant fetal chromosomal abnormalities, in addition to a second trimester ultrasound for dating, growth, and screening for anomalies.<sup>33-36</sup> Families may choose not to participate in this screening program.

The data on pregnant women who underwent any type of screening for chromosomal anomalies (Down syndrome and trisomy 18) and/or open neural tube defects as part of their prenatal care were from the OMMMS database. This would include women who had miscarriages, abortions or who delivered at home, however, due to data limitations, the denominator is restricted to women who delivered in hospital. This results in somewhat of an overestimation of the true rate of screening among women who delivered in hospital, however given the low rates of miscarriage and abortion later in pregnancy, the difference is not likely to be large. Due to data limitations, we report crude screening rates only and we are unable to report regional variation on this measure due to a large number of records with missing postal codes in the OMMMS database. We report screening rates and are unable to assess the proportion of women who were offered screening and declined. We also cannot assess the extent of information provided to allow a woman to make an informed decision about screening.

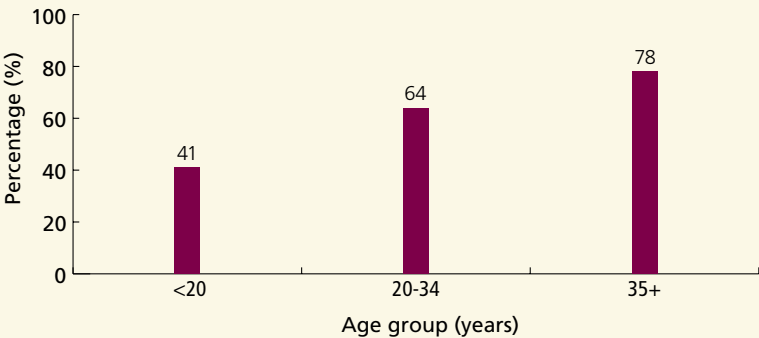
**Findings:** Overall in Ontario, 66 percent of pregnant women underwent maternal multiple marker screening for chromosomal anomalies and/or open neural tube defects.



**Exhibit 10A.3 | Maternal multiple marker screening rate<sup>^</sup> (percentage of hospital deliveries) during the prenatal period, by age group, in Ontario, 2007**

**FINDINGS**

- The percentage of women who had maternal multiple marker screening increased with age.
- The rates ranged from 41 percent among women under age 20 to 64 percent among women aged 20-34 and 78 percent among women aged 35 and older.



**DATA SOURCES:** Ontario Maternal Multiple Marker Screening (OMMMS); Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

<sup>^</sup> Prenatal screening for Down syndrome, trisomy 18 and/or open neural tube defects

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## SCREENING RATE FOR GROUP B STREPTOCOCCUS COLONIZATION

**Indicator:** This indicator measures the rate of prenatal screening (percentage of hospital deliveries) for group B streptococcus (GBS) colonization (between 35 and 37 weeks gestation) among women who gave birth after 37 weeks of gestation in an Ontario hospital.

**Background:** GBS colonization is part of normal vaginal flora and it is estimated that between 10 and 30 percent of women are colonized and for many women, this will not lead to clinical disease and so will remain undetected.<sup>37</sup>

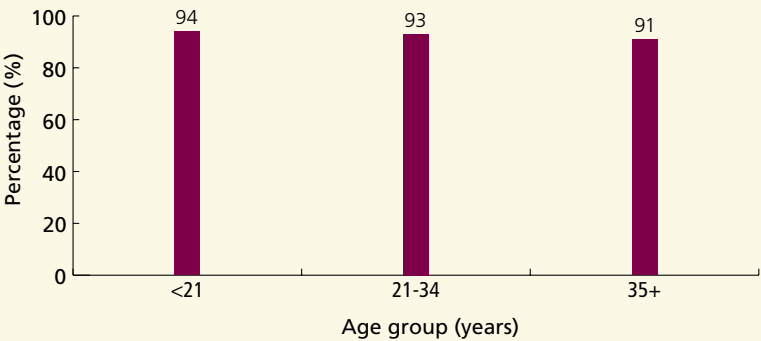
For women who are pregnant, maternal to infant transmission of GBS is possible during delivery and the risk is increased for women who start labour before 37 weeks, have premature rupture of membranes or have clinical signs of GBS infection.<sup>37</sup> GBS infection in infants represents a significant cause of neonatal morbidity and mortality. Intrapartum (during labour) chemoprophylaxis is an effective strategy to prevent neonatal GBS disease, and the wide implementation of this screening program has reduced the incidence of neonatal GBS disease from 2-3 cases per 1,000 births to 0.5 cases per 1,000 births in Canada and the U.S.<sup>38,39</sup> The Society of Obstetricians and Gynaecologists of Canada (SOGC) and the Canadian Task Force on Preventive Health Care<sup>30</sup> recommend offering all pregnant women screening for GBS colonization between 35 and 37 weeks gestation,<sup>40,41</sup> even if the woman is scheduled for a planned caesarean delivery. Data for this indicator are from the Niday Perinatal Database.

**Findings:** Overall in Ontario, 93 percent of women who gave birth in hospital after 37 weeks of gestation had prenatal screening for GBS colonization between 35 and 37 weeks gestation.

**Exhibit 10A.4 | Prenatal screening rate (percentage of hospital deliveries) between 35 and 37 weeks gestation for group B streptococcus (GBS) colonization among women who gave birth after 37 weeks of gestation, by age group, in Ontario, 2007**

**FINDINGS**

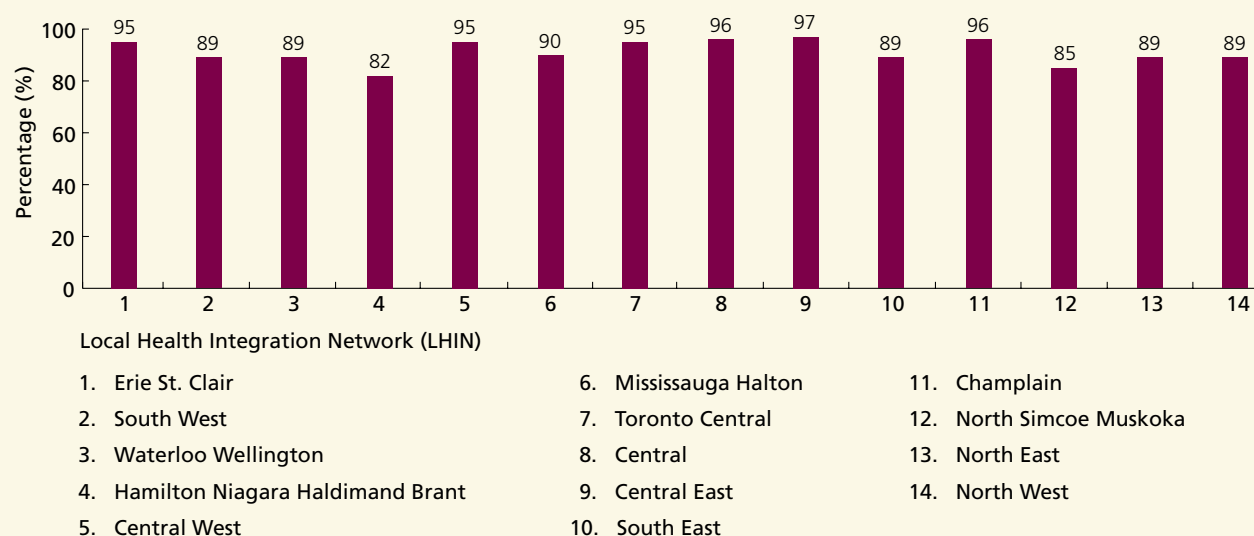
- Irrespective of age, over 90 percent of women who gave birth after 37 weeks of gestation were screened for GBS between 35 and 37 weeks gestation.
- The percentage of women who were screened for GBS was slightly lower among women aged 35 and older as compared to younger women, however, the differences were small.
- The percentage of women who delivered after 37 weeks gestation who were screened for GBS did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN)  
Ontario's Niday Perinatal Database

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**Exhibit 10A.5** | Age-standardized prenatal screening rate (percentage of hospital deliveries) between 35 and 37 weeks gestation for group B streptococcus (GBS) colonization among women who gave birth after 37 weeks of gestation, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

### FINDINGS

- The percentage of women who delivered after 37 weeks gestation who were screened for GBS between 35 and 37 weeks gestation varied across LHINs.
- The rates of screening ranged from 82 percent (Hamilton Niagara Haldimand Brant LHIN) to 97 percent (Central East LHIN).

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# Section 10A

## SUMMARY OF FINDINGS

The type of health professional providing prenatal care and screening rates for group B streptococcus (GBS) varied across Local Health Integration Networks (LHIN). Older women were more likely to receive care from obstetricians and to undergo maternal multiple marker screening than younger women, which reflects their increased risk. Prenatal care indicators did not vary by neighbourhood income or average neighbourhood educational attainment. The results are summarized below.

### **The Types of Health Care Professionals Who Provided Prenatal Care to Women After the First Trimester**

The vast majority of women who delivered in hospital in Ontario—80 percent—received prenatal care from an obstetrician, 27 percent received prenatal care from a general practitioner/family physician (GP/FP) and six percent received prenatal care from a midwife. Since women may receive prenatal care from more than one type of professional, the percentages sum to more than 100 percent. There were variations in the types of health care professionals who provided prenatal care by maternal age and by LHIN of residence. However, the types of providers did not vary by neighbourhood income or by average neighbourhood educational attainment. Older women were more likely than younger women to receive prenatal care from an obstetrician and younger women were more likely to receive care from a GP/FP. Women were far more likely to receive care from a GP/FP or a midwife if they lived in the northern part of the province than if they lived in southern Ontario.

### **Maternal Multiple Marker Screening**

The rates of maternal multiple marker screening increased with age and this is consistent with the notion that the rates of the genetic and congenital problems that the screening tests detect increase with maternal age. Women who are at higher risk, based on age, may be more willing to undergo screening. Rates of maternal multiple marker were not reported by LHIN, because of a large number of records with missing postal code information. Nevertheless, it is likely that there is regional variation and that regional differences in rates may be attributable to differences in access to the Ontario Maternal Multiple Marker Screening program, local decisions to offer screening to women or in women's acceptance of this type of screening. Improvements in data quality in the future will allow better estimation of regional rates of screening.

### **Screening for Group B Streptococcus (GBS) Colonization**

GBS screening rates in women who delivered in hospital after 37 weeks gestation were quite high (93 percent) and did not vary by neighbourhood income or average neighbourhood educational attainment. There were only very small differences associated with maternal age. However, rates of screening varied across LHINs. This suggests that the screening program is better implemented in some LHINs than in others.

# Section 10B

## *Childbirth*

### INTRODUCTION

Statistics Canada estimates that there were almost 400,000 births in Canada in 2009/10.<sup>42</sup> Although childbirth is a natural process, modern childbirth practices involve care provided by highly trained professionals—obstetricians, family physicians, midwives and nurses—and in Ontario, 98 percent of births occur in hospitals.

In fact, among women, childbirth and pregnancy were the most common reasons for hospitalization in Canada and childbirth accounted for 14 percent of all hospitalizations in 2001-2002.<sup>43</sup>

The role of health professionals in childbirth is to provide support and guidance and also to monitor the health of the mother and the baby prior to and during childbirth. One of the purposes of this monitoring is to identify situations where interventions may be needed to prevent adverse outcomes in the mother and/or the infant. Many factors may influence the decision to use specific interventions such as induction of labour or caesarean section including clinical considerations, considerations of trade offs between benefits and risks, access to services, the preferences of women and their families and provider practice styles and norms. There is wide variation in the use of these interventions across countries, within countries and over time.

Childbirth is a complex process that may involve risks for both mother and child. High quality care that is focused on providing the right services at the right time can minimize, but not eliminate, these risks. Assessment of the rates of complications and adverse events in childbirth can help to identify areas for quality of care

improvement. This section of the report focuses on complications and adverse events that are apparent at the time of delivery. Postpartum outcomes are examined in the next section.

This section of the chapter draws heavily on a new and important data source—the Better Outcomes Registry and Network (BORN) Ontario's Niday Perinatal Database. The database has evolved over the last several years to provide detailed data on virtually all deliveries that occur in Ontario hospitals. The Niday Perinatal Database has an advantage over other administrative data sources as it includes more clinical detail on hospital deliveries. Along with data from Niday, this section includes data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) on hospital utilization and outcomes for mothers and infants. We report indicators in different subgroups of women because decisions regarding the use of interventions in childbirth are driven in large part by the clinical situation. A number of indicators are reported in the overall population and then reported among women who had full-term (37 or more weeks gestation), singleton, vertex (head down) deliveries. Most women fall into this category and they are, in general, at

lower risk of interventions and complications than other women. Based on data availability and sample size, all the indicators were analysed by maternal age, neighbourhood income, average neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN). Given the higher rate of complications in teenage mothers and the social challenges that they can face, we present data on rates of birth in teenage mothers.

The indicators presented are:

- Live births to teenage mothers

#### **Provider type**

- Types of providers attending childbirth

#### **Interventions**

- Rate of induction of labour
- Rate of episiotomy
- Rate of forceps- and/or vacuum-assisted vaginal deliveries
- Rate of caesarean section

#### **Maternal and neonatal outcomes**

- Rate of third or fourth degree perineal lacerations
- Severe maternal morbidity rate
- Birth trauma or injury to newborns
- Low five-minute Apgar score in full-term newborns





## EXHIBITS AND FINDINGS

### LIVE BIRTHS TO TEENAGE WOMEN

**Indicator:** This indicator measures the rate of live births to teenage women (per 1,000 women aged 15-19).

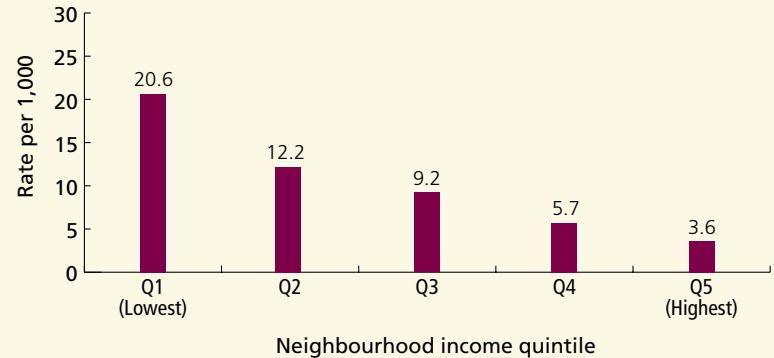
**Background:** In Ontario, the rate of live births to teenage women (aged 15-19) declined from 21.5 per 1,000 teenage women in 1990 to 10.6 per 1,000 teenage women in 2005.<sup>44</sup> Live births to teenage women accounted for 3.3 percent of all live births in 2007 (down from 5.0 percent in 1991).<sup>42</sup> Despite these declines, there are still substantial numbers of teenage women who give birth each year in Ontario. Early pregnancy and childbirth have health and social consequences for both infants and their mothers.<sup>45</sup> In a U.S. population-based study, teenage mothers were found to be at increased risk for preterm birth, low birth weight and neonatal mortality compared to mothers aged 20-24. In addition, infants born to mothers aged 17 or younger had lower five-minute Apgar scores.<sup>46</sup> Teenage mothers are more likely than other women to limit their education and often face underemployment and its associated economic challenges.<sup>47,48</sup> Studies from the U.S. and United Kingdom have shown that rates of teenage pregnancy are higher for teenagers who are socially disadvantaged, have lower educational achievement and who are members of certain ethnic groups.<sup>44,48-50</sup> Data for this indicator are from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) using maternal and newborn records that were linked by the Institute for Clinical Evaluative Sciences (ICES) to create the Mother-Baby (MOMBABY) linked database.

**Findings:** Overall in Ontario, the rate of live births to teenage women (aged 15-19) was 10 per 1,000 women aged 15-19.

**Exhibit 10B.1** | Age-standardized rate of live births to teenage women (per 1,000 women aged 15-19), by neighbourhood income quintile, in Ontario, 2007

**FINDINGS**

- The rate of live births to teenage women (aged 15-19) varied substantially by neighbourhood income.
- Women aged 15-19 living in the lowest-income neighbourhoods had rates of live birth that were almost six times higher than the rates seen among similarly aged women living in the highest-income neighbourhoods (20.6 versus 3.6 per 1,000 women aged 15-19, respectively).
- A similar pattern was seen for educational attainment. Women aged 15-19 living in neighbourhoods with the lowest average educational attainment had rates of live births that were six times higher than the rates seen among similarly aged women living in neighbourhoods with the highest average educational attainment (18.5 versus 3.1 per 1,000 women aged 15-19, respectively) (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database); Statistics Canada 2006 Census

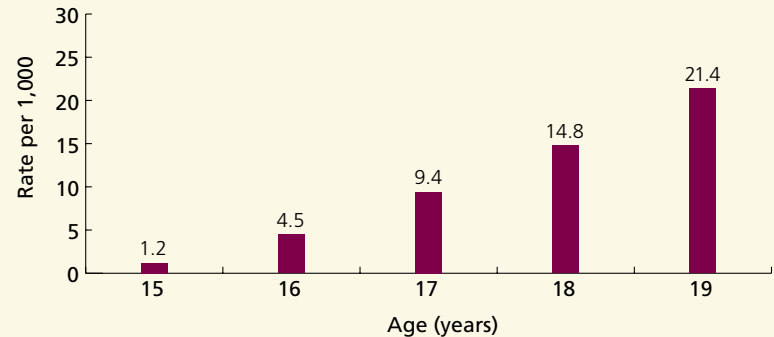
**NOTE:** See [Appendix 10.3](#) for details on neighbourhood income quintile calculation

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**Exhibit 10B.2** | Rate of live births to teenage women (per 1,000 women aged 15-19), by age, in Ontario, 2007

**FINDINGS**

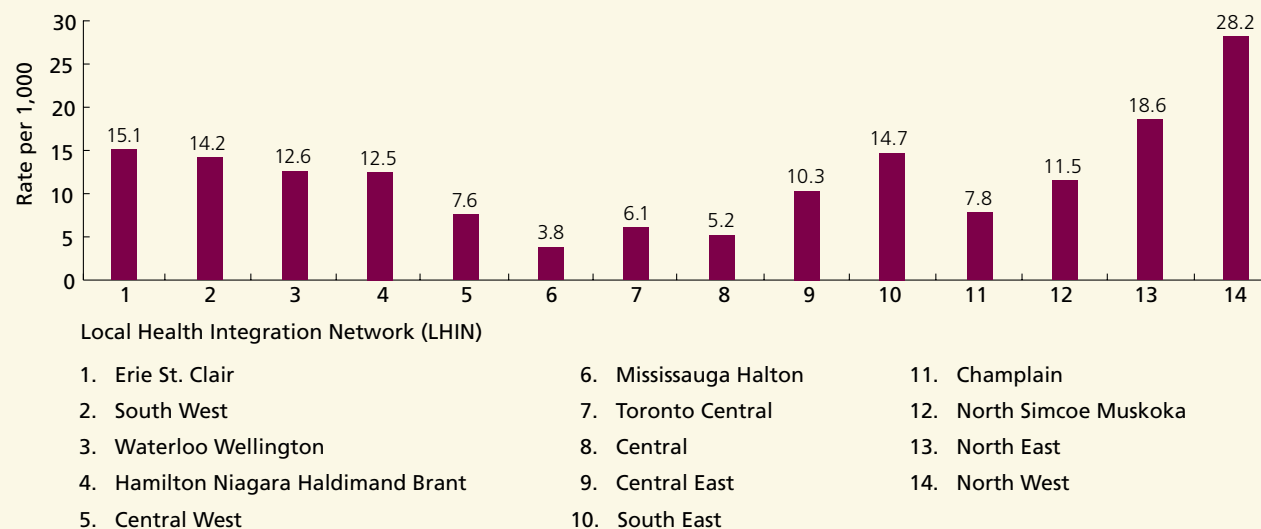
- The rate of live births to women aged 15-19 increased with age, from 1.2 per 1,000 among women age 15 to 21.4 per 1,000 women age 19.



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database)

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### Exhibit 10B.3 | Age-standardized rate of live births to teenage women (per 1,000 women aged 15-19), by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database)

#### FINDINGS

- The rates of live births to teenage women aged 15-19 showed substantial variation across LHINs.
- The rate of live births to teenage women ranged from 3.8 per 1,000 women aged 15-19 (Mississauga Halton LHIN) to 28.2 per 1,000 women aged 15-19 (North West LHIN).
- The rate of live births to teenage women aged 15-19 was higher among women living in rural areas than in urban areas (15.1 versus 9.5 per 1,000 women aged 15-19, respectively) (data not shown).

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## PROVIDER TYPE

### TYPES OF PROVIDERS ATTENDING CHILDBIRTH

**Indicator:** This indicator identifies the type of provider (midwife, general practitioner/family physician (GP/FP) or obstetrician) most responsible for care during childbirth for deliveries occurring in hospital.

**Background:** In Ontario, 98 percent of births occur in hospital. Births can be attended by a midwife, a GP/FP, an obstetrician or other practitioners. Previous research has shown that the proportion of births attended by obstetricians has been relatively stable over time, while the proportion attended by midwives is increasing and the proportion attended by GP/FPs is decreasing. Nurse practitioners and other health providers attended less than two percent of births in Ontario in 2006/07.<sup>51</sup> Sometimes during delivery care may need to be transferred to an obstetrician from a GP/FP or a midwife because of the need for more specialized care; these deliveries will then be assigned to the obstetrician. Thus, our results may somewhat under represent the involvement of GP/FPs and midwives during childbirth.

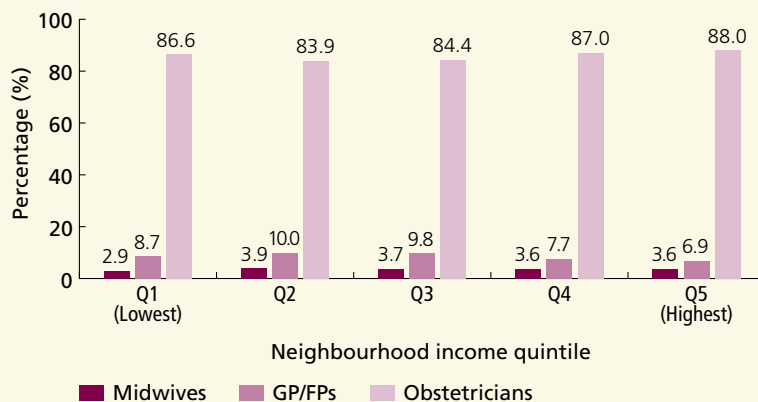
In 2001, the proportion of births attended by GP/FPs varied across provinces in Canada, from eight percent to 69 percent.<sup>1</sup> The type of provider attending births also varied by maternal age. In Ontario in 2003/04, out of 7,362 births attended by midwives, 28 percent were women aged 35 and older and less than 0.5 percent were among women under age 19.<sup>2</sup> The same study showed that women residing in the highest-income neighbourhoods were more likely to receive some prenatal and delivery care from midwives, ranging from 15 percent in the lowest-income group to 21 percent in the highest-income group and use of midwives varied across Local Health Integration Networks (LHINs).<sup>2</sup> Data for this indicator are from the Niday Perinatal Database.

**Findings:** Overall in Ontario, 3.5 percent of hospital deliveries were attended by midwives, 8.6 percent by GP/FPs and 86.0 percent by obstetricians. The remaining two percent of hospital deliveries were attended by other types of health care providers including nurse practitioners.

### Exhibit 10B.4 | Age-standardized percentage of hospital deliveries that were attended by midwives, general practitioners/family physicians (GP/FP) or obstetricians, by neighbourhood income quintile, in Ontario, 2007

#### FINDINGS

- The types of providers attending hospital births did not vary by neighbourhood income.
- The percentage of hospital deliveries that were attended by an obstetrician increased with maternal age; from 82.1 percent among women aged 20 and younger to 89.4 percent among women aged 35 and older (data not shown).
- The percentage of hospital deliveries that were attended by GP/FPs decreased with maternal age, from 13.3 percent in women aged 20 and younger, to 6.1 percent in women aged 35 and older (data not shown).
- The types of providers attending hospital deliveries did not vary by average neighbourhood educational attainment (data not shown).



**DATA SOURCES:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database; Statistics Canada 2006 Census

**NOTE:** See [Appendix 10.3](#) for details on neighbourhood income quintile calculation

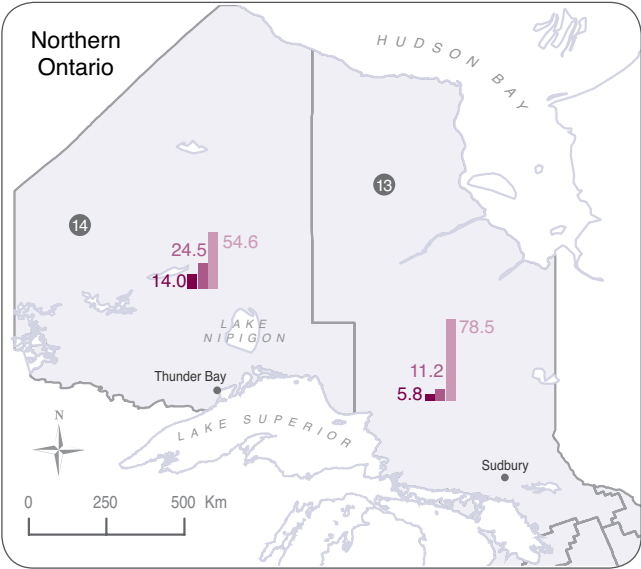
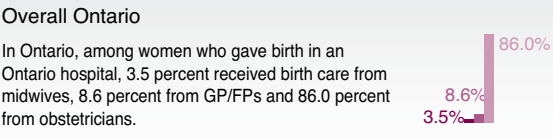
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**Exhibit 10B.5** | Age-standardized percentage of hospital deliveries that were attended by midwives, general practitioners/family physicians (GP/FP) or obstetricians, by Local Health Integration Network (LHIN), in Ontario, 2007

**FINDINGS**

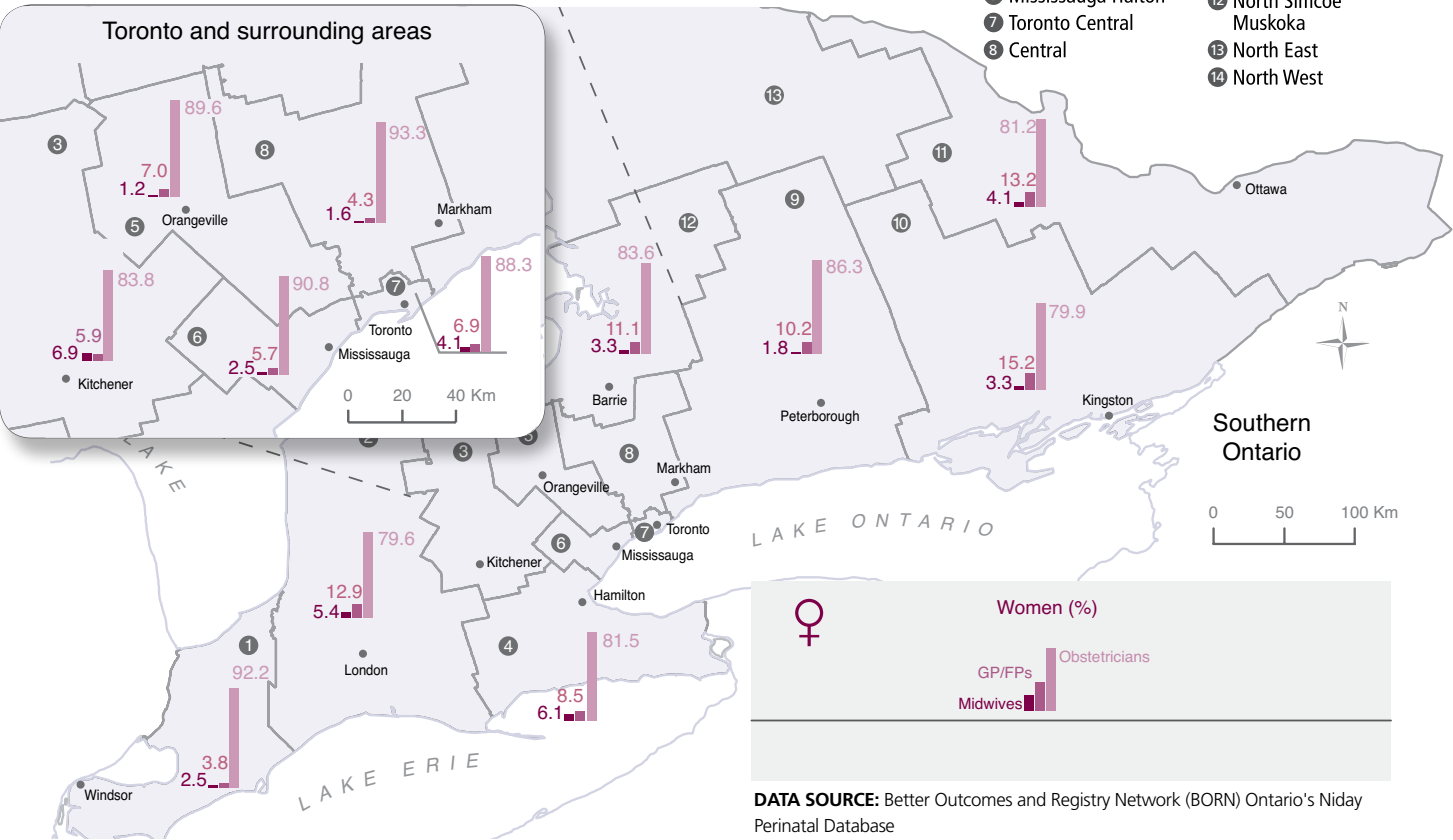
- There were large regional differences in the types of providers who attended hospital deliveries.
- The percentage of hospital deliveries that were attended by midwives varied from 1.2 percent in the Central West LHIN to 14.0 percent in the North West LHIN.
- The percentage of hospital deliveries that were attended by GP/FPs varied from 3.8 percent in the Erie St. Clair LHIN to 24.5 percent in the North West LHIN.
- The percentage of hospital deliveries that were attended by obstetricians varied from 54.6 percent in the North West LHIN to 93.3 percent in the Central LHIN.

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**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

## INTERVENTIONS

### INDUCTION OF LABOUR

**Indicator:** This indicator measures the percentage of hospital deliveries in which labour was induced.

**Background:** Induction of labour is the artificial initiation of labour before its spontaneous onset. Common indications for induction are maternal diabetes or high blood pressure, pregnancy that has gone past the due date, and a baby that is growth restricted. The Society of Obstetricians and Gynaecologists of Canada (SOGC) guidelines on induction state that as elective induction is associated with potential complications, it should be discouraged, and only undertaken after fully informing the woman of these risks and only when it is felt that the benefits outweigh the risks.<sup>52</sup> Induction rates are lower in multiparous than nulliparous women.<sup>53</sup>

In addition to reporting the induction rate among all hospital deliveries in Ontario, we also reported the rate of induction among women who had full-term (37 or more weeks gestation), singleton, vertex presentations. The rates in this subgroup were stratified by parity into two groups of women—nulliparous (women with no prior deliveries) and multiparous (women with at least one prior delivery). Data for this indicator are from the Niday Perinatal Database. There may be differences in coding of induction of labour across providers. Augmentation of labour may be coded similarly to induction. As such, these rates may somewhat over estimate the true rates of induction. A review by BORN Ontario, suggested coding practices vary across regions. Therefore, these data are not reported by Local Health Integration Network.<sup>54</sup>

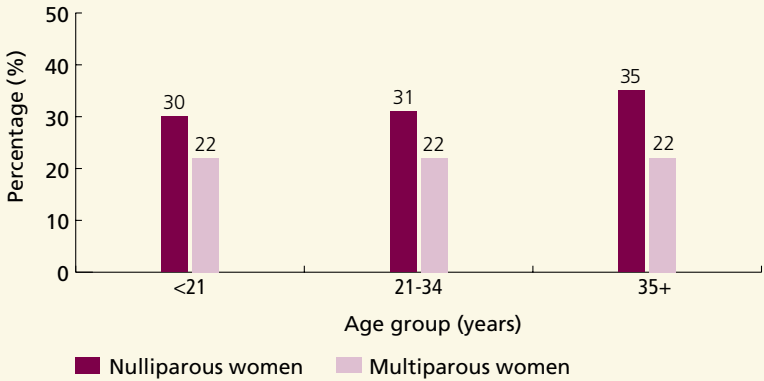
**Finding:** In Ontario, labour was induced in 25 percent of all hospital deliveries. Among women who had full-term, singleton, vertex presentations, the percentage of deliveries that were preceded by labour induction was higher among nulliparous women compared to multiparous women (32 percent versus 22 percent, respectively).



**Exhibit 10B.6 | Rate of labour induction (percentage of hospital deliveries) among women who had full-term, singleton, vertex presentations, by parity and age group, in Ontario, 2007**

**FINDINGS**

- Among women who had full-term, singleton, vertex presentations the percentage of hospital deliveries that were preceded by labour induction was higher among nulliparous women compared to multiparous women, irrespective of maternal age.
- Among nulliparous women who had full-term, singleton, vertex presentations, the rate of labour induction increased with age from 30 percent of deliveries among women under age 21 to 35 percent of deliveries among nulliparous women aged 35 and older. Among multiparous women, the rate of labour induction did not vary by age.
- The percentage of hospital deliveries that were preceded by labour induction did not vary by neighbourhood income or average neighbourhood educational attainment among women who had full-term, singleton, vertex presentations, irrespective of parity (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

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## EPISIOTOMY RATE

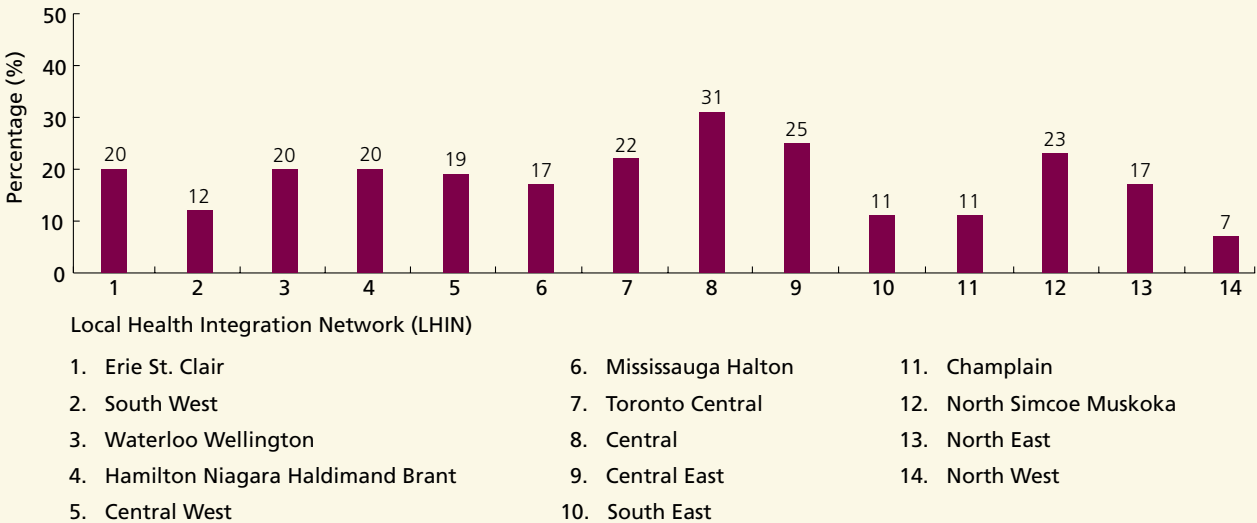
**Indicator:** This indicator measures the episiotomy rate (percentage of deliveries) among women who had vaginal deliveries in hospital.

**Background:** Episiotomy is the incision of the perineum performed to enlarge the vaginal perineal tissues as the baby is being born. Episiotomy is a common surgical procedure performed during vaginal delivery and may result in short- and long-term complications such as bleeding, infection and injury to the pelvic floor.<sup>55, 56</sup> The Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends that instead of performing episiotomy routinely, that it be done in specific situations, for example if there are concerns about the well-being of the mother or baby.<sup>3,23</sup> Episiotomy has not been shown to shorten the length of labour or to be necessary with assisted vaginal births.<sup>57</sup> Previous research has shown that there remains wide variation in rates of episiotomy across countries, hospitals and even among care providers within the same hospital.<sup>3,4</sup> In Canada in 2004/05, the episiotomy rate was 20 per 100 in-hospital vaginal deliveries (down from 31 per 100 vaginal deliveries in 1994/95), with considerable variation by province; the rate in Ontario was one of the highest (21.6 per 100 vaginal deliveries in hospital).<sup>58</sup> Similar rates were seen in 2006/07 as reported in the Maternal Experiences Survey.<sup>59</sup> Some studies suggest that the rate should be as low as 10 per 100 deliveries.<sup>60</sup>

Data for this indicator are from the Niday Perinatal Database. This indicator is reported among women who had full-term (37 or more weeks gestation), singleton, vertex, vaginal deliveries. We also looked at rates among all women who had vaginal deliveries stratified by whether the delivery was spontaneous or assisted (either by forceps and/or vacuum extraction).

**Findings:** In Ontario, among women who had full-term, singleton, vertex, vaginal deliveries in hospital, an episiotomy was performed on women in 20 percent of deliveries. Among all women who had vaginal deliveries, the episiotomy rate was higher among women who had assisted vaginal deliveries versus women with spontaneous vaginal deliveries (53 percent of deliveries versus 14 percent of deliveries, respectively).

**Exhibit 10B.7** | Age-standardized episiotomy rate (percentage of hospital deliveries) among women who had full-term, singleton, vertex, vaginal deliveries, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

**FINDINGS**

- Among women who had full-term, singleton, vertex, vaginal deliveries, the episiotomy rate varied by LHIN and ranged from seven percent in the North West LHIN to 31 percent in the Central LHIN.
- Among women who had vaginal deliveries, the episiotomy rate did not vary by neighbourhood income or by average neighbourhood educational attainment, irrespective of type of delivery (data not shown).
- Rates of episiotomy, as would be expected, were higher among women who had assisted deliveries. Irrespective of maternal age, the episiotomy rate was almost four times higher among women who had assisted vaginal deliveries than among women who had spontaneous births (data not shown).

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## RATE OF FORCEPS- OR VACUUM-ASSISTED VAGINAL DELIVERIES

**Indicator:** This indicator measures the percentage of hospital, vaginal deliveries that were forceps-and/or vacuum-assisted.

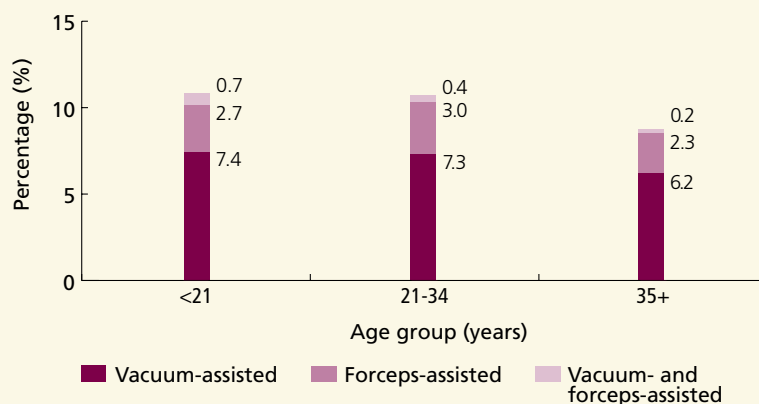
**Background:** An assisted vaginal delivery refers to a forceps- and/or vacuum-assisted vaginal birth.<sup>57</sup> Maternal health providers have to make a decision in the second stage of labour whether assistance is required and if so, if it is safe;<sup>57</sup> caesarean section is the surgical alternative. In Canada, the rate of forceps-assisted delivery declined significantly from 7.4 percent in 1995/1996 to 4.6 percent in 2004/2005, while the rate of vacuum-assisted delivery increased from 9.4 percent to 10.3 percent.<sup>58</sup> Data for this indicator are from the Niday Perinatal Database.

**Findings:** Among women who delivered in hospital, 2.8 percent of vaginal deliveries were forceps-assisted, 7.1 percent were vacuum-assisted, and 0.4 percent were assisted by both vacuum and forceps.

### Exhibit 10B.8 | Percentage of hospital, vaginal deliveries that were forceps- and/or vacuum-assisted, by maternal age, in Ontario, 2007

#### FINDINGS

- The percentage of vaginal deliveries that were forceps- and/or vacuum-assisted decreased somewhat with maternal age, ranging from a total rate of 10.8 percent among women under age 21 to 8.7 percent among women aged 35 and older.
- Across all age groups, more than two-thirds of assisted vaginal deliveries were vacuum-assisted.
- The percentage of hospital deliveries that were forceps- and/or vacuum-assisted did not vary meaningfully by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

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**Exhibit 10B.9 | Age-standardized percentage of hospital, vaginal deliveries that were forceps- and/or vacuum-assisted by Local Health Integration Network (LHIN) and type of assistance, in Ontario, 2007**

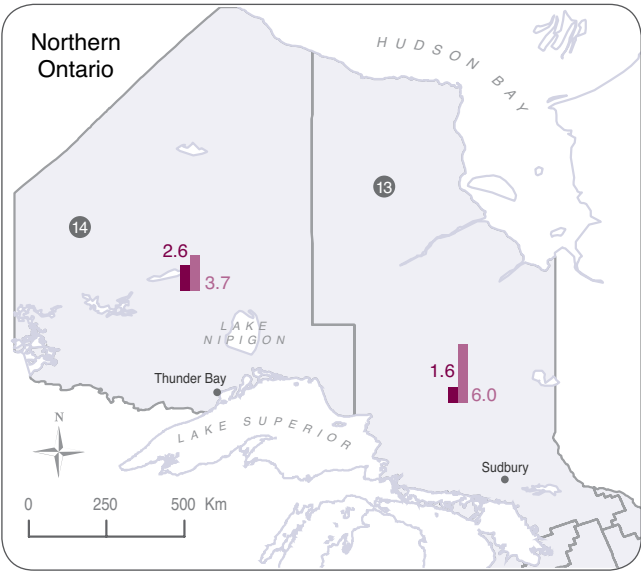
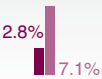
**FINDINGS**

- The percentage of vaginal deliveries that were forceps-assisted varied by LHIN, from 0.7 percent in the North Simcoe Muskoka LHIN to 6.2 percent in the Erie St. Clair LHIN.
- The percentage of vaginal deliveries that were vacuum-assisted varied by LHIN, from 2.0 percent in the South West LHIN to 10.0 percent in the Toronto Central LHIN.
- The percentage of vaginal deliveries that were assisted by both forceps and vacuum varied by LHIN from 0.1 percent in the South West LHIN to 0.7 percent in the North East and South East LHINs (data not shown).
- In most LHINs, it was more common for women who had assisted deliveries to have vacuum-assisted rather than forceps-assisted deliveries, but in three LHINs (Erie St. Clair, South West and Waterloo Wellington LHINs) forceps-assisted deliveries were more common.

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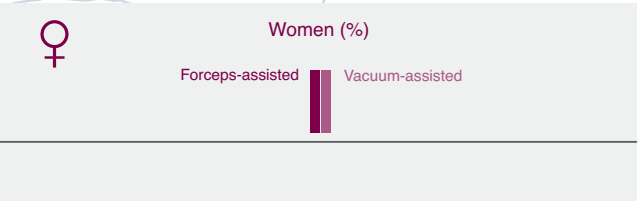
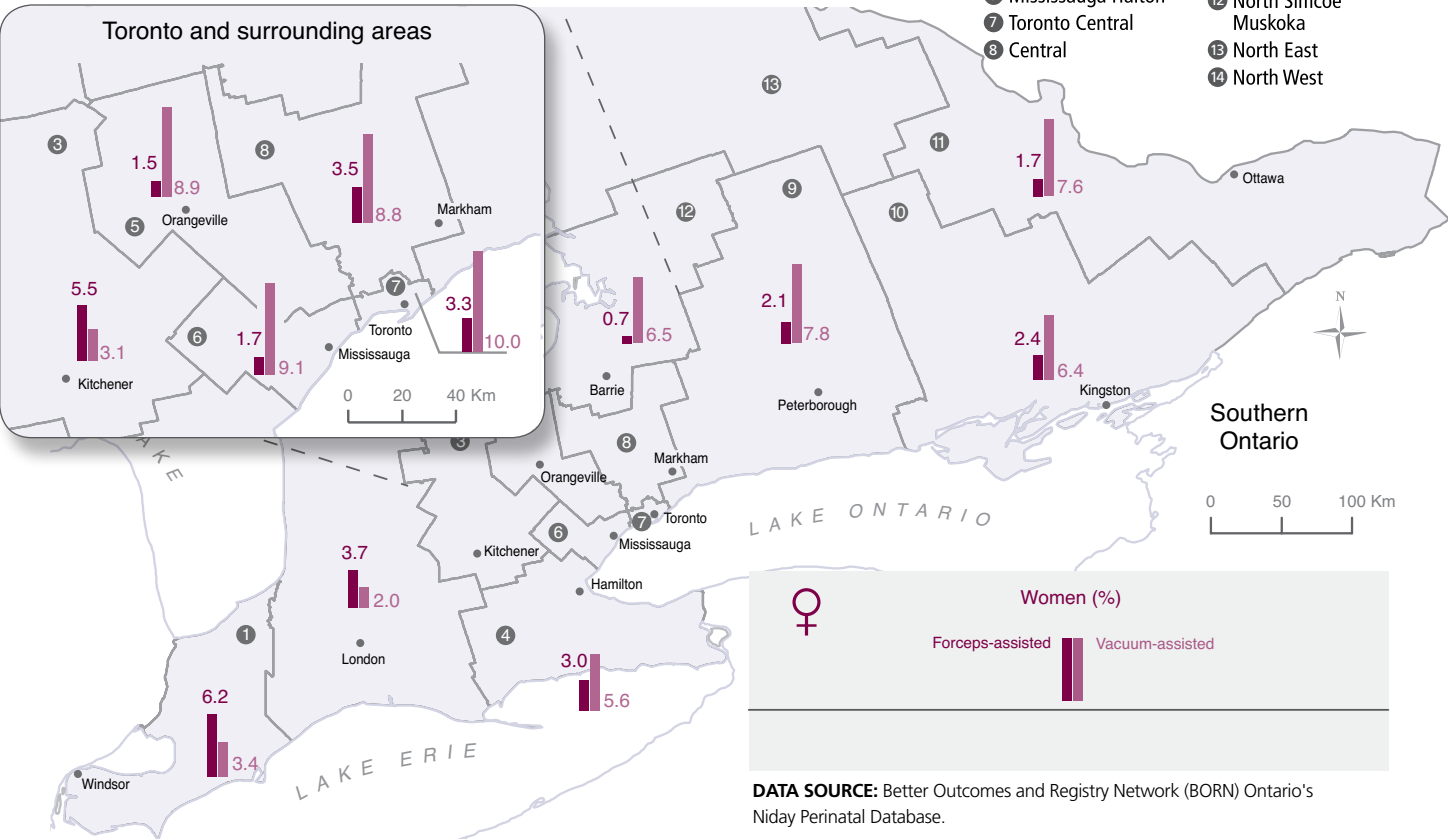
**Overall Ontario**

In Ontario, of women who gave birth and had a vaginal delivery, 2.8 percent were forceps-assisted and 7.1 percent were vacuum-assisted.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database.

## CAESAREAN SECTION RATE

**Indicator:** This indicator measures the percentage of hospital deliveries that were done by caesarean section.

**Background:** The caesarean section rate in Canada has increased steadily since the mid-1980s.<sup>58</sup> According to the Canadian Institute for Health Information (CIHI), the caesarean section rate in Canada was 26.9 percent in 2008/09 and the rate in Ontario was slightly higher than the national rate.<sup>14</sup> In addition, the variation in primary (first) caesarean section rates was more than double across the provinces.<sup>61</sup> The rate of primary caesarean section increases with maternal age,<sup>6,62,63</sup> as does the rate of repeat caesarean section in women with a history of previous caesarean section.<sup>64</sup> Research has also shown variation in caesarean section rates by income. A study of caesarean section rates among women who gave birth in Canadian hospitals in 2002/03 showed that, after adjusting for age, women living in the lowest-income, urban neighbourhoods were slightly more likely to have a caesarean section (25 percent) than those living in higher-income, urban neighbourhoods (23 percent).<sup>6</sup> A U.S. study based on data from the late 1990s, found that variation in caesarean section rates could not be entirely attributed to clinical factors.<sup>7</sup> According to CIHI, if all provinces achieved the primary caesarean section rate of Manitoba—the province with the lowest rate—about 30 percent fewer procedures would be performed nationally.<sup>61</sup>

The optimal rate of delivery by caesarean section is unknown.<sup>61</sup> However, research suggests that caesarean sections may pose a higher risk than vaginal delivery and result in higher rates of morbidity for mothers and babies, higher rates of postpartum readmission and an increased risk of complications in subsequent deliveries.<sup>65-68</sup> For women with full-term, singleton, vertex presentation, caesarean section may be required if problems develop during labour, such as fetal distress, shoulder dystocia or failure to progress. For women who have a history of previous caesarean delivery, there is ongoing debate about the role of elective repeat caesarean section. For women who have a baby that is in breech presentation at full-term, recommendations for caesarean section have changed over time.<sup>69</sup> Previously, planned caesarean section was routinely recommended in many countries including Canada, based on an international clinical trial.<sup>70</sup> However, newer evidence and updated guidelines suggest that planned vaginal delivery by a skilled provider is reasonable in selected women with breech presentations.<sup>69,71-73</sup>

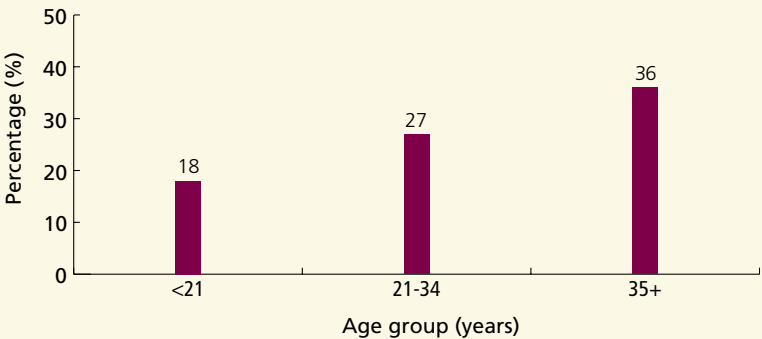
We report the percentage of caesarean sections among all women who gave birth in hospital. In addition, we report the percentage of deliveries that were done by caesarean section among the following subgroups of women: women who had full-term (37 or more weeks gestation), singleton, vertex presentations; women who had a history of previous caesarean section (i.e., repeat caesarean sections); and women who had singleton, full-term, breech presentations. Data for this indicator are from the Niday Perinatal Database, with the exception of the caesarean section rates among women who had full-term (37 or more weeks gestation), singleton, vertex presentations. These rates were calculated using data from the CIHI Discharge Abstract Database (CIHI-DAD).

**Findings:** In Ontario in 2007, caesarean sections were performed in 28 percent of all hospital deliveries. Among women who had full-term, singleton, vertex presentations, 23 percent of deliveries were caesarean sections; among women who had a history of previous caesarean section, 84 percent of deliveries were caesarean sections; and among women who had singleton, full-term, breech presentation, 98 percent of deliveries were done by caesarean section.

**Exhibit 10B.10** | Caesarean section rate (percentage of hospital deliveries), by age group, in Ontario, 2007

**FINDINGS**

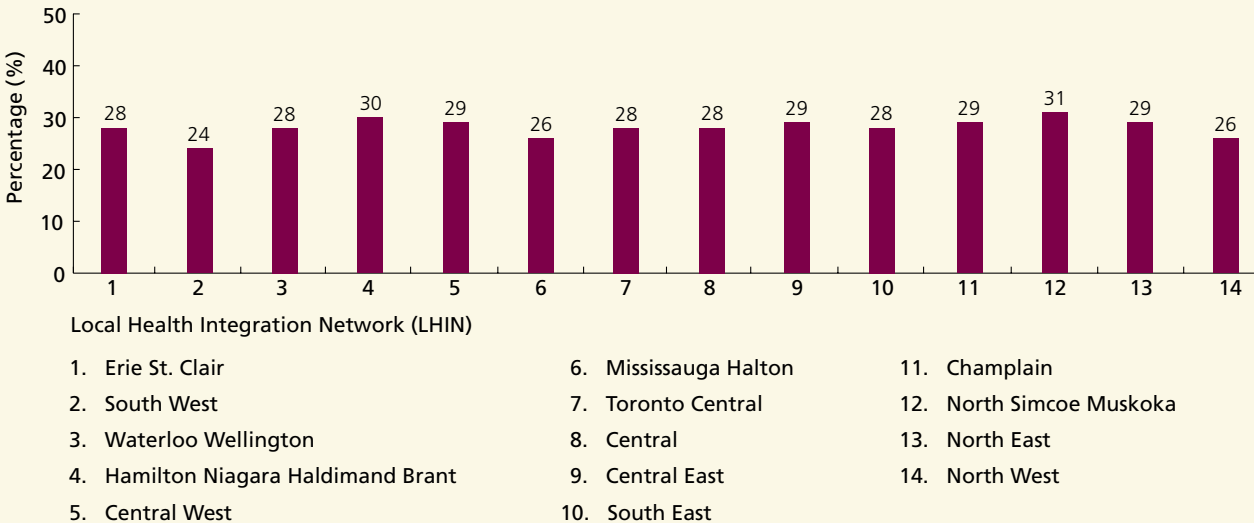
- Among women who gave birth in Ontario hospitals, the caesarean section rate increased with maternal age from 18 percent of deliveries among women under age 21 to 36 percent of deliveries among women aged 35 and older.
- Among women who gave birth in Ontario hospitals, the caesarean section rate did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

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**Exhibit 10B.11** | Age-standardized caesarean section rate (percentage of hospital deliveries), by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

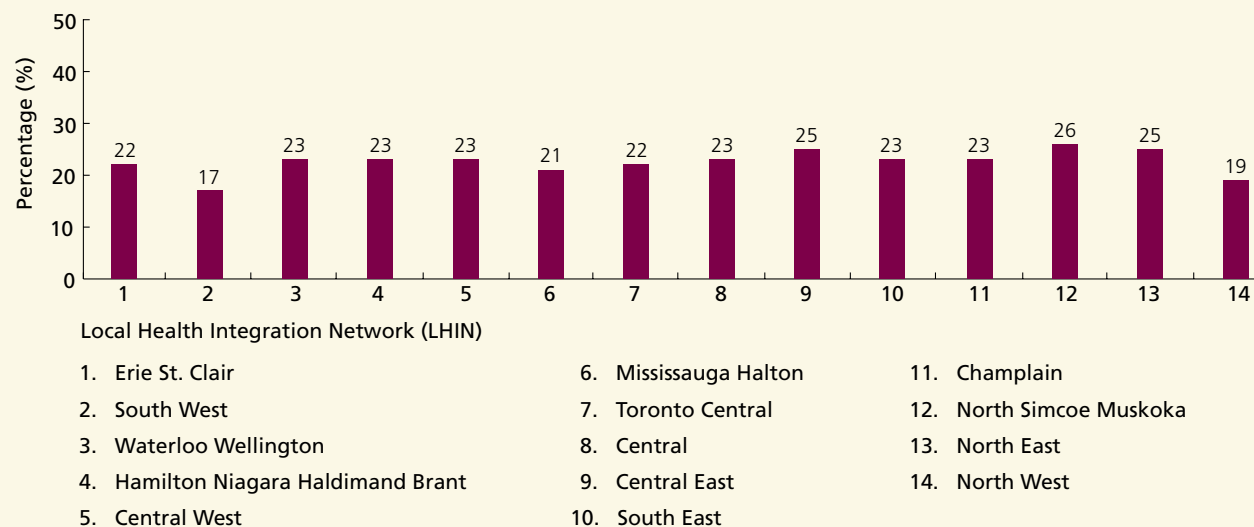
**FINDINGS**

- Among women who gave birth in Ontario hospitals, the caesarean section rate varied by LHIN from 24 percent of deliveries in the South West LHIN to 31 percent of deliveries in the North Simcoe Muskoka LHIN.

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**Exhibit 10B.12** | Age-standardized caesarean section rate (percentage of hospital deliveries) among women who had full-term, singleton, vertex presentations, by Local Health Integration Network (LHIN), in Ontario, 2007



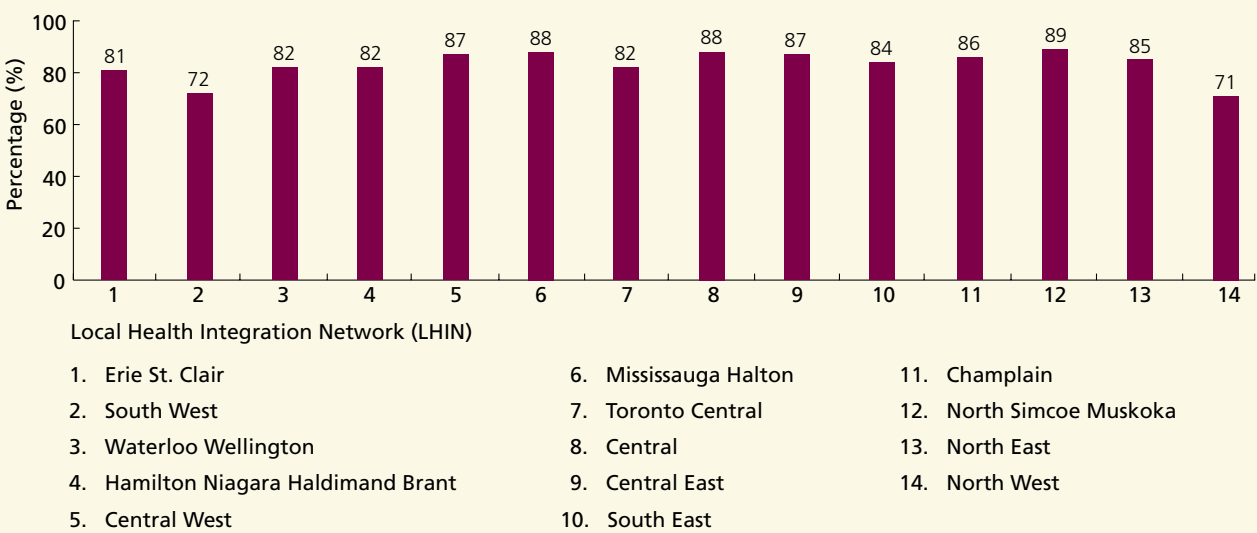
**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database)

### FINDINGS

- Among women who had full-term (37 or more weeks gestation), singleton, vertex presentations, the caesarean section rate varied by LHIN, ranging from 17 percent of deliveries in the South West LHIN to 26 percent of deliveries in the North Simcoe Muskoka LHIN.
- Across all LHINs, nearly all women (96 percent or more) who had singleton, full-term, breech presentations delivered by caesarean section (data not shown).

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**Exhibit 10B.13** | Age-standardized caesarean section rate (percentage of hospital deliveries) among women with a history of previous caesarean section, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

**FINDINGS**

- Among women with a history of one or more previous caesarean sections, the repeat caesarean section rate varied by LHIN, ranging from 71 percent in the North West LHIN to 89 percent in the North Simcoe Muskoka LHIN.

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## MATERNAL AND NEONATAL HEALTH OUTCOMES

### RATE OF THIRD OR FOURTH DEGREE PERINEAL LACERATIONS

**Indicator:** This indicator measures the rate (percentage of hospital deliveries) of third or fourth degree perineal lacerations among women who had full-term (37 or more weeks gestation), singleton, vertex, vaginal deliveries.

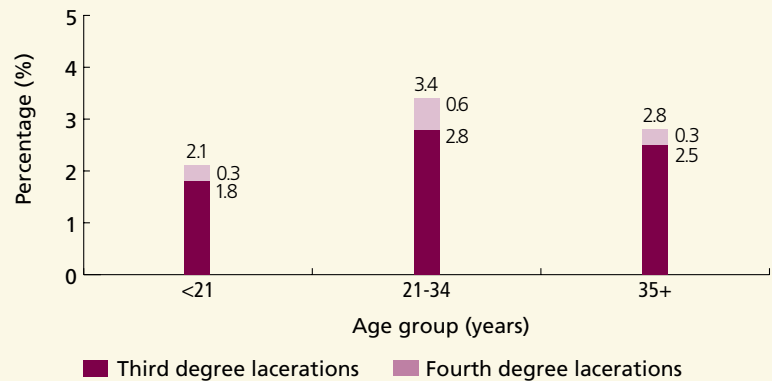
**Background:** A third degree perineal laceration is one that extends through the skin, mucosal membrane and perineal body and involves the anal sphincter; a fourth-degree laceration additionally extends through the rectal mucosa to expose the lumen of the rectum. These will sometimes occur during childbirth. Women with third and fourth degree lacerations are more likely than women with lesser degree lacerations to experience fecal incontinence and urgency due to damage to the anal sphincter; to suffer from perineal pain, dyspareunia (painful sexual intercourse) and pain with bowel motions; and to develop rectovaginal fistulae.<sup>74</sup> In Canada, in the 2005/06 fiscal year, the rate of third degree lacerations was 3.3 per 100 vaginal deliveries, and the rate of fourth degree lacerations was 0.6 per 100 vaginal deliveries. These rates varied considerably by province and territory.<sup>58</sup>

**Finding:** Among women who had full-term, singleton, vertex, vaginal deliveries in hospital, 3.2 percent of hospital deliveries resulted in third or fourth degree perineal lacerations (2.7 percent third degree and 0.5 percent fourth degree).

**Exhibit 10B.14** | Third or fourth degree perineal laceration rate (percentage of hospital deliveries) among women with full-term, singleton, vertex, vaginal deliveries, by maternal age, in Ontario, 2007

**FINDINGS**

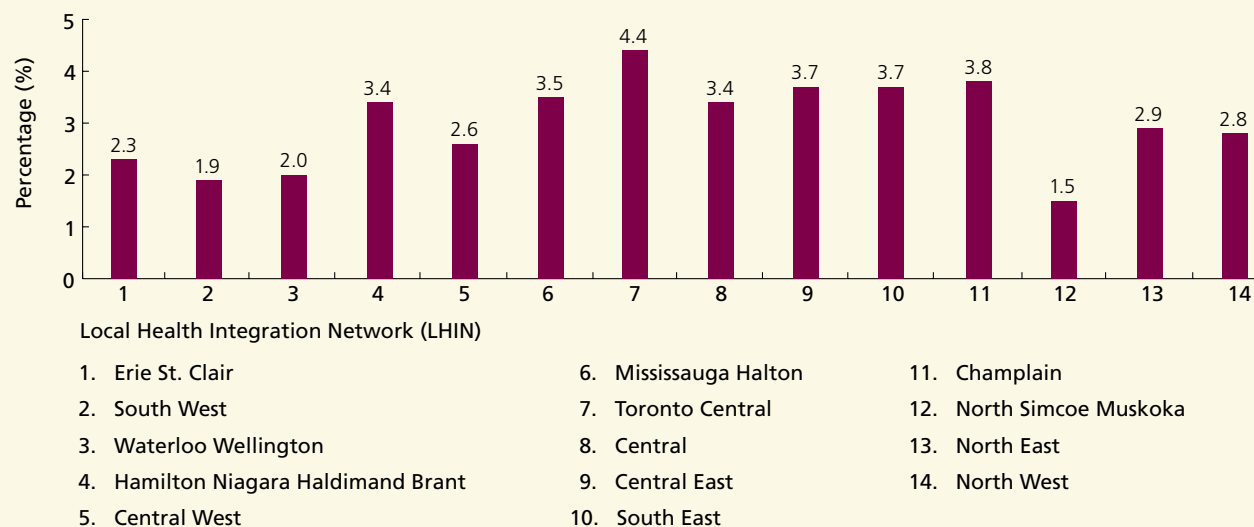
- Among women who had full-term, singleton, vertex, vaginal deliveries, the third or fourth degree perineal laceration rate varied by maternal age.
- The percentage of vaginal deliveries that resulted in third degree lacerations ranged from 2.8 percent among women aged 21-34 to 2.5 percent among women aged 35 and older and 1.8 percent among women under age 21.
- A similar age pattern was seen for fourth degree lacerations; 0.6 percent of hospital deliveries among women aged 21-34 resulted in fourth degree perineal lacerations compared to 0.3 percent of deliveries among older and younger women.
- Among women who had full-term, singleton, vertex, vaginal deliveries, the third or fourth degree perineal laceration rate did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

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**Exhibit 10B.15** | Age-standardized third or fourth degree perineal laceration rate (percentage of hospital deliveries) among women with full-term, singleton, vertex, vaginal deliveries, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database

### FINDINGS

- Among women who had full-term, singleton, vertex, vaginal deliveries, the third or fourth degree perineal laceration rate varied by LHIN from 1.5 percent of deliveries in the North Simcoe Muskoka LHIN to 4.4 percent of deliveries in the Toronto Central LHIN.

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## SEVERE MATERNAL MORBIDITY RATE

**Indicator:** This indicator measures the severe maternal morbidity rate (per 1,000 hospital deliveries) within 30 days of delivery. The list of conditions included for severe maternal morbidity was taken from the Health Canada report on maternal mortality and severe morbidity<sup>58</sup> and includes postpartum hemorrhage, eclampsia, amniotic fluid embolism, pulmonary and circulatory disorders and other conditions.

**Background:** The rate of severe maternal morbidity is an important index of childbirth complications.<sup>58</sup> Most of the conditions that are included are rare. As such, we present the rate of overall severe maternal morbidity which includes all the conditions. We also present the rate of postpartum hemorrhage, the most commonly occurring cause of maternal morbidity. Postpartum hemorrhage is the leading cause of maternal death worldwide; it is estimated that every year 140,000 women die of postpartum hemorrhage in the world.<sup>75-77</sup> Though maternal death from postpartum hemorrhage is no longer common in industrialized countries (such as Canada), postpartum hemorrhage is still a leading cause of maternal morbidity in Canada and remains an important clinical concern.<sup>58</sup> The most common cause of postpartum hemorrhage is uterine atony,<sup>76</sup> accounting for more than three-quarters of all postpartum hemorrhages in Canada.<sup>58</sup> Atonic postpartum hemorrhage is due to failure of the uterus to contract and generally occurs within the first 24 hours after birth. The International Federation of Gynaecologists and Obstetricians and the International Confederation of Midwives recommend that active management of the third stage of labour be routinely offered to women since it reduces the incidence of postpartum hemorrhage due to uterine atony by half.<sup>78</sup> In 2004/05, in Canada, the overall rate of postpartum hemorrhage was 50 per 1,000 hospital deliveries, with substantial regional variation in rates.<sup>58</sup> Data for this indicator are from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) using maternal and newborn inpatient admission records that were linked by the Institute for Clinical Evaluative Sciences (ICES) to create the Mother-Baby (MOMBABY) linked Database.

**Findings:** In Ontario the rate of overall severe maternal morbidity within 30 days of delivery was 39.4 per 1,000 hospital deliveries. The most common condition—associated with almost 95 percent of all severe maternal morbidity—was postpartum hemorrhage (36.6 per 1,000 deliveries). Atonic postpartum hemorrhage accounted for 74 percent (27.2 per 1,000 deliveries) of all postpartum hemorrhage ([see Exhibit 10B.16](#)).

**Exhibit 10B.16 | Rate of severe maternal morbidity (per 1,000 hospital deliveries) within 30 days after delivery, by condition, in Ontario, 2007**

Condition	<b>Severe maternal morbidity within 30 days after delivery (all diagnosis types)^</b>	
	Number of cases	Rate per 1,000 deliveries
<b>Overall severe maternal morbidity</b>	<b>5,288</b>	<b>39.4</b>
Postpartum hemorrhage (PPH)	4,917	36.6
• Atonic postpartum hemorrhage	3,647	27.2
Eclampsia	110	0.8
Uterine dehiscence or rupture	93	0.7
Obstetrical Pulmonary Embolism	57	0.4
Cardiac arrest/failure or cerebral anoxia following obstetrical surgery	55	0.4
Pulmonary oedema	30	0.2
Shock (obstetrical, septic, pulmonary)	27	0.2
Cerebrovascular disorders	26	0.2
Anaesthesia complications	20	0.1
Acute renal failure following labour and delivery	16	0.1
Adult respiratory distress syndrome	15	0.1
Amniotic fluid embolism	11	0.1
Myocardial Infarction	9	0.1

**DATA SOURCE:** Data source: Canadian Institute for Health Information Discharge Abstract Database (ICES Mother-Baby (MOMBABY) linked database)

^ Diagnosis-specific rates do not sum to total rate as women can have multiple diagnoses

## FINDINGS

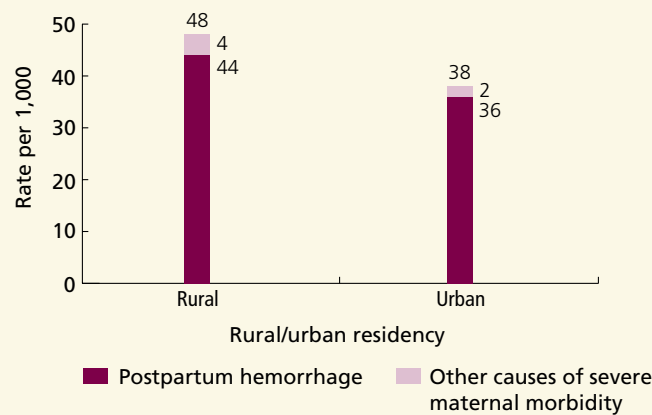
- The rate of severe maternal morbidity was 39.4 per 1,000 hospital deliveries; postpartum hemorrhage accounted for 36.6 cases per 1,000 or 93 percent of all severe maternal morbidity.
- The most common cause of postpartum hemorrhage was atonic postpartum hemorrhage which resulted in 27.2 cases of severe maternal morbidity per 1,000 hospital deliveries, or 74 percent of all postpartum hemorrhage.
- Less than two percent of all cases of postpartum hemorrhage required hysterectomy (data not shown).
- The next most common conditions associated with severe maternal morbidity were eclampsia and uterine dehiscence or rupture, but these conditions were rare (fewer than one in 1,000 hospital deliveries).



**Exhibit 10B.17 |** Age-standardized rate of severe maternal morbidity and postpartum hemorrhage (per 1,000 hospital deliveries) within 30 days after delivery, by rural/urban residency, in Ontario, 2007

**FINDINGS**

- Women residing in rural areas had higher rates of severe maternal morbidity compared to women living in urban areas (48 per 1,000 hospital deliveries versus 38 per 1,000 hospital deliveries, respectively).
- Women residing in rural areas were more likely to have a postpartum hemorrhage compared to women living in urban areas (44 per 1,000 deliveries versus 36 per 1,000 deliveries, respectively).
- The rate of severe maternal morbidity did not vary by neighbourhood income (data not shown).

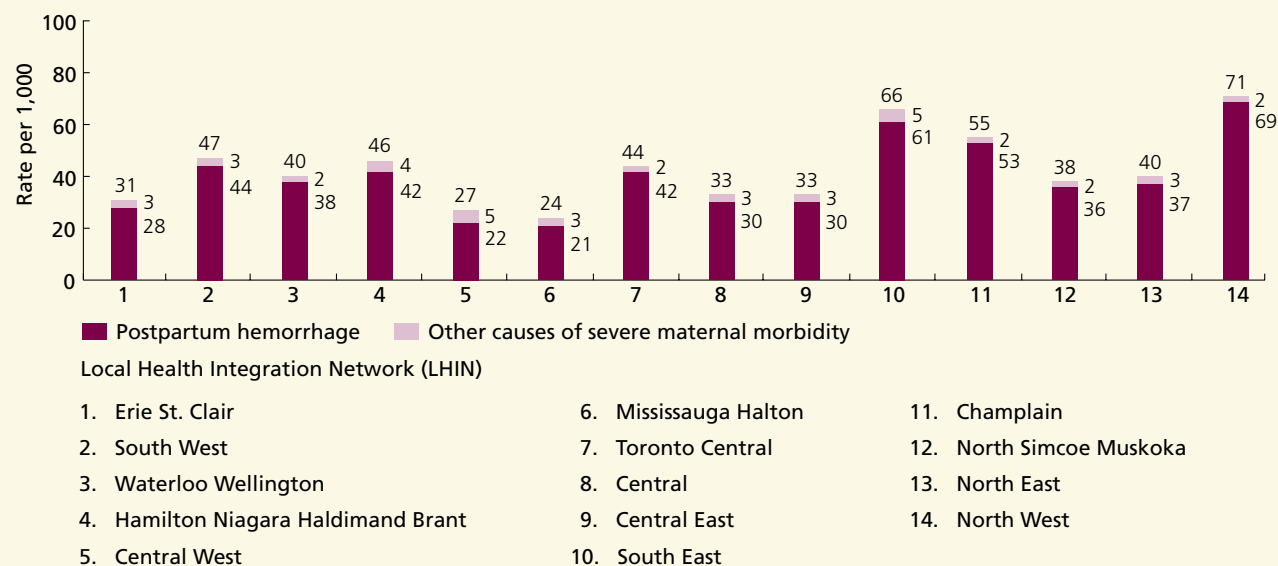


**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database)

**NOTE:** See [Appendix 10.3](#) for definitions of rural/urban residency

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**Exhibit 10B.18** | Age-standardized rate of severe maternal morbidity and postpartum hemorrhage (per 1,000 hospital deliveries) within 30 days after delivery, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database)

### FINDINGS

- The rates of severe maternal morbidity and postpartum hemorrhage varied by LHIN.
- The rate of severe maternal morbidity ranged from 24 per 1,000 deliveries in the Mississauga Halton LHIN to 71 per 1,000 deliveries in the North West LHIN.
- The rate of postpartum hemorrhage ranged from 21 per 1,000 deliveries in the Mississauga Halton LHIN to 69 per 1,000 deliveries in the North West LHIN.

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## BIRTH TRAUMA OR INJURY TO NEWBORNS

**Indicator:** This indicator measures the rate (per 1,000 live births) of birth trauma or injury to newborns.

**Background:** Birth trauma is defined as injuries sustained during the process of labour and delivery.<sup>79</sup> Although not all incidents of birth trauma are preventable, understanding and monitoring risk factors may help to prevent birth trauma in a number of instances. Studies have found that maternal risk factors for birth trauma include diabetes, obesity and small pelvis. Delivery or pregnancy related risk factors include prolonged pregnancy, abnormal presentation of the fetus, induced labour and assisted deliveries.<sup>79</sup> Experts suggest that risk to the newborn can be reduced by ensuring early diagnosis, identifying potential risks, as well as careful consideration of using alternative methods of operative delivery or caesarean section.<sup>67-69</sup> The rate of birth trauma or injury was 7 per 1,000 live births in Canada from 2003 to 2006.<sup>80</sup> Measurement of this indicator and associated maternal and pregnancy related risk factors will help to understand the condition, improve the quality of health care, reduce associated costs and address patient safety.

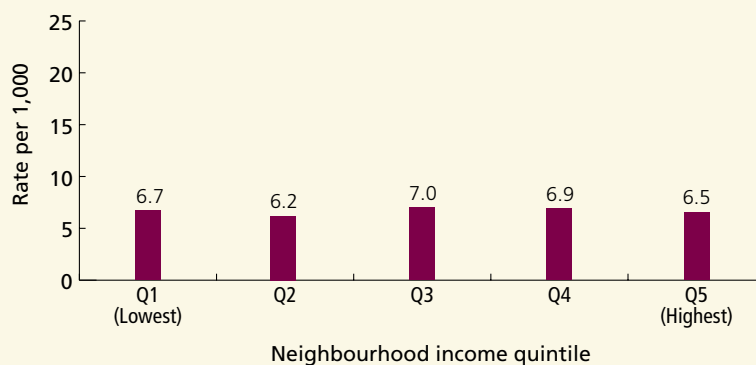
Data for this indicator are from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) using maternal and newborn records that were linked by the Institute for Clinical Evaluative Sciences (ICES) to create the Mother-Baby (MOMBABY) linked database. The CIHI-DAD was used to identify newborns (live births only) with a diagnosis of birth trauma or injury including intracranial laceration and hemorrhage due to birth injury, birth injuries to central nervous system, scalp, skeleton, peripheral nervous system or other birth injuries (ICD10 codes P10-15). In order to include only traumas and injuries that were related to the birth process, preterm and low-birth weight infants were excluded from the analysis if they had subdural and/or cerebral hemorrhage. Newborns with congenital malformations and deformations of the musculoskeletal system and the central nervous system were also excluded from the analysis.

**Finding:** In Ontario, the rate of birth trauma or injury to newborns was 6.6 per 1,000 live births.

### Exhibit 10B.19 | Rate (per 1,000 live births) of birth trauma or injury<sup>^</sup> in newborns, by neighbourhood income quintile, in Ontario 2007

#### FINDINGS

- The rates of birth trauma or injury to newborns did not vary by neighbourhood income.
- The rate of birth trauma or injury to newborns did not vary by rural/urban residency (data not shown).
- The rate of birth trauma or injury to newborns varied by Local Health Integration Network (LHIN) (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database); Statistics Canada 2006 Census

**NOTE:** See [Appendix 10.3](#) for details about neighbourhood income quintile calculation.

<sup>^</sup> Excluding preterm and low birth weight infants if they had subdural and/or cerebral hemorrhage and newborns with congenital malformations and deformations of the musculoskeletal system and central nervous system

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# LOW FIVE-MINUTE APGAR SCORE IN FULL-TERM NEWBORNS

**Indicator:** This indicator measures the percentage of full-term (37 or more weeks gestation) newborns that had a low (three or less) five-minute Apgar score.

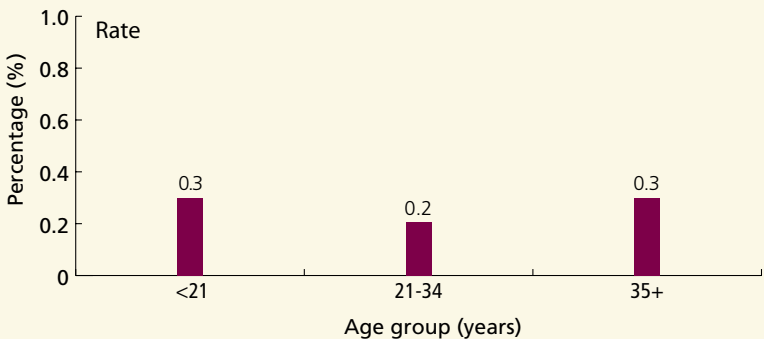
**Background:** The Apgar score is a measure of infant health and is measured at one minute and five minutes after birth. The score is based on heart rate, respiratory effort, muscle tone, reflex irritability and skin color. The Apgar score ranges from 0-10. Apgar scores are almost universally assigned to newborns at birth in most developed countries and this method of assessment is consistently used in Ontario. The five-minute score helps to determine how well the baby is adapting to the new environment. A score of three or less means the newborn is in severe distress.<sup>81</sup> Newborns who have five-minute Apgar scores of three or less have an increased risk of neonatal death and cerebral palsy.<sup>82</sup> This indicator was restricted to newborns who were full-term (37 or more weeks gestation) because preterm newborns may have a lower Apgar score related to their prematurity and not to the birth process or to newborn care immediately after birth. Data for this indicator are from the Niday Perinatal Database.

**Finding:** Overall in Ontario, 0.3 percent of full-term newborns had a 5-minute Apgar score of three or less.

**Exhibit 10B.20** | Percentage of full-term newborns who had a low^ five-minute Apgar score, by age group, in Ontario, 2007

**FINDINGS**

- The percentage of full-term newborns who scored three or less on the five-minute Apgar test did not vary by maternal age.
- The percentage of full-term newborns who scored three or less on the five-minute Apgar test did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).
- The percentage of full-term newborns who scored three or less on the five-minute Apgar test varied by Local Health Integration Network (LHIN), ranging from 0.2 percent in eight of fourteen LHINs to 0.9 percent in the North West LHIN (data not shown).



**DATA SOURCE:** Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database.  
^ Apgar score of three or less

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# Section 10B

## SUMMARY OF FINDINGS

The indicators in this section (where data could reliably be reported) varied by Local Health Integration Network (LHIN) and some varied by age. There was little or no variation by neighbourhood income or by average neighbourhood educational attainment, with the exception of live births to teenage mothers. The indicators are summarized below.

### Live Births to Teenage Mothers

The rate of live births to teenage mothers (aged 15-19) was 10 per 1,000. The rates increased with age from 1.2 per 1,000 among women aged 15 to 21.4 per 1,000 women aged 19. Rates also varied by LHIN. Importantly, teenagers who lived in the lowest-income neighbourhoods had live birth rates that were over five times higher than teenagers who lived in the highest-income neighbourhoods. Higher rates of live births to teenage women were also observed for those living in neighbourhoods with lower average educational attainment.

### Types of Providers Attending Childbirth

The majority of women (86 percent) who gave birth in hospital had an obstetrician in attendance. Our results may somewhat under represent the involvement of general practitioners/family physicians (GP/FP) and midwives during childbirth as data capture the provider who delivered the baby, and not those who may have been involved during labour. Older women (aged 35 and older) were more likely to have an obstetrician in attendance than women aged 20 and younger (89.4 percent versus 82.1 percent, respectively); this may reflect the increased likelihood of complications among older women. Conversely, younger women (aged 20 and younger) were more likely than women aged 35 and older to be attended in childbirth by a GP/FP (13.3

percent versus 6.1 percent, respectively). The types of provider attending in-hospital births did not vary by neighbourhood income or average neighbourhood educational attainment. However, there was wide variation in the types of provider attending childbirths by LHIN. Women living in northern Ontario were more likely to have care provided by a midwife and less likely to have care provided by an obstetrician than women living in southern Ontario.

### Interventions

The chapter looks at four interventions in childbirth—induction of labour, episiotomy, assisted delivery and caesarean section. Among women who delivered in Ontario hospitals, one in four deliveries were preceded by labour induction; one in five women with full-term, singleton, vertex, vaginal deliveries had an episiotomy; one in ten vaginal deliveries were forceps- and/or vacuum-assisted and almost three in ten (28 percent) deliveries in Ontario were done by caesarean section.

Although there are findings that are unique to each intervention, there are some important commonalities. The rates for all of these interventions did not vary by neighbourhood income or average neighbourhood educational attainment. All the interventions varied somewhat by maternal age and all intervention rates varied by LHIN (where data could reliably be reported). The use of these interventions was driven in part by clinical factors. For every intervention there were large differences in rates of use depending on the clinical circumstance. For example, caesarean section rates were higher among women with a history of previous caesarean section or with breech presentation, compared to women with full-term, singleton, vertex presentation.

## Induction

Among women who had full-term, singleton, vertex presentations, induction rates were higher among nulliparous women (no prior deliveries) compared to multiparous women (at least one prior delivery) (32 percent versus 22 percent, respectively). Induction rates increased with age among nulliparous women, but not among multiparous women. Some of these deliveries may actually reflect augmentation of labour to assist with slow progression, rather than actual induction of labour.

## Episiotomy rate

Among all women who delivered in Ontario hospitals, episiotomy rates were almost four times higher in assisted deliveries compared to spontaneous deliveries—53 percent versus 14 percent respectively. In all LHINs, women with assisted vaginal deliveries had significantly higher episiotomy rates than women with spontaneous vaginal deliveries. Episiotomy rates varied by LHIN in all subgroups of women (women with full-term, singleton, vertex, vaginal deliveries; women who had spontaneous vaginal deliveries and women who had assisted vaginal deliveries). Episiotomy rates also varied somewhat by age but only among women with assisted vaginal deliveries.

## Rates of assisted deliveries

Rates of forceps- and/or vacuum-assisted vaginal deliveries varied by LHIN. In most LHINs, it was more common for women to have vacuum-assisted rather than forceps-assisted deliveries. However in three LHINs, forceps-assisted deliveries were more common. The rate of assisted deliveries decreased as age increased, for both vacuum-assisted and forceps-assisted deliveries.

## Caesarean section

Twenty-eight percent of all hospital deliveries were done by caesarean section; among women with a history of previous caesarean section, 84 percent of deliveries were done by caesarean section; among women with full-term, singleton, breech presentations, 98 percent of deliveries were done by caesarean section. Among women with full-term, singleton, vertex presentations, 23 percent of deliveries were done by caesarean section. Among all women who delivered in Ontario, caesarean section rates increased with age, from 18 percent among women aged 20 and younger to 36 percent among women aged 35 and older. Provincial caesarean section rates—as with all other interventions—varied by LHIN, ranging from 24 percent of deliveries in the South West LHIN to 31 percent of deliveries in the North Simcoe Muskoka LHIN. Caesarean section rates also varied by LHIN among women who had a history of previous caesarean section and among women who had full-term, singleton, vertex presentation, but not among women with singleton, full-term, breech presentation.

## Maternal and Neonatal Health Outcomes

The overall rates of severe maternal morbidity, birth trauma to newborns and low five-minute Apgar score were low, suggesting that Ontario is a very safe place for women to give birth and for babies to be born. However, as with other indicators in this section, outcomes varied across regions, which suggests the need for further scrutiny.



### Third and fourth degree laceration rates

Among women with full-term, singleton, vertex, vaginal deliveries 3.2 percent of deliveries resulted in third or fourth degree perineal lacerations. The rates varied by age and were highest among women aged 21-34. Rates did not vary by neighbourhood income or average neighbourhood educational attainment, but did vary by LHIN, ranging from 1.5 percent of deliveries in the North Simcoe Muskoka LHIN to 4.4 percent of deliveries in the Toronto Central LHIN.

### Severe maternal morbidity rate

Among women who delivered in Ontario hospitals, the severe maternal morbidity rate within 30 days of delivery was 39.4 per 1,000 deliveries. The most common cause of severe maternal morbidity—accounting for 95 percent of cases—was postpartum hemorrhage (36.6 per 1,000 deliveries). Atonic postpartum hemorrhage was the most common type of postpartum hemorrhage. The rates of severe maternal morbidity and postpartum hemorrhage did not vary by neighbourhood income but did vary by LHIN. The rates of both severe maternal morbidity and postpartum hemorrhage were higher among women residing in rural areas compared to women residing in urban areas.

### Birth trauma or injury to newborns and low five-minute Apgar score

Overall in Ontario, the rate of birth trauma or injury to newborns was 6.6 per 1,000 live births and the rate of low (3 or less) five-minute Apgar score was 0.25 percent or 2.5 per 1,000 full-term newborns. These indicators did not vary by neighbourhood income or by maternal age, but did vary by LHIN.



# Section 10C

## *Postpartum Care*

### INTRODUCTION

For the mother, the period immediately after childbirth is referred to as the postpartum period and for the infant it is referred to as the postnatal period.

Childbirth can be a strenuous process for both mother and baby. Both vaginal birth and delivery by caesarean section can have impacts on health that become apparent days, weeks or even months after delivery. As well, caring for a newborn can be complex and stressful. Both mother and baby can develop problems during this period and timely and comprehensive care after delivery can help both.

Appropriate postpartum and postnatal care should involve monitoring the mother and baby and providing the education and support to the mother and family that is needed. About 98 percent of Ontario women give birth in hospital and for these women and their families; postpartum care begins in the hospital. The length of time that women remain in hospital after giving birth should take both clinical and psychosocial factors into account. It is important that mother and child do not leave the hospital until they are stable and until the family is prepared to provide care at home. However, once these goals have been achieved, home is the best place for the family. Many hospitals have established early postpartum discharge programs that are aimed at getting women with vaginal deliveries home within 48 hours and women with caesarean deliveries home within 96 hours.

After hospital discharge, or after the professional attending a home birth has left, postpartum care is provided in the community. This can involve visits

to providers' offices or home visits. Follow up visits should provide further support and education and are important opportunities to monitor progress and identify and treat any problems that might develop for the mother or the child. Although problems cannot always be prevented, the more prepared women and families are, the less likely it will be that the mother or baby will suffer serious complications after the birth. The Ontario Healthy Babies Healthy Children program offers all Ontario families with new babies screening and assessment of new mothers and infants and a range of community and home-based services.<sup>83</sup> An Ontario study found that socioeconomically disadvantaged women were more likely than advantaged women to be discharged from hospital within 24 hours postpartum and were less likely to receive a call from a public health nurse within 48 hours. However if contacted, socioeconomically disadvantaged women were more likely to have more home visits from a public health nurse or community provider, suggesting a potentially higher need.

An important measure of postpartum or postnatal morbidity is readmission to hospital.<sup>65,84,85</sup> Readmission rates can be measured in terms of all readmissions, irrespective of cause, or for a set of specific causes that are felt to be more directly related to the birth. Readmission rates can be measured at different intervals after birth. Readmissions within shorter time periods

after discharge (e.g., within 14 or 28 days) are felt to be more related to the in-hospital care and less related to community-based care than readmissions measured at longer time periods after discharge (e.g., within 90 days).<sup>58,86</sup>

This section of the chapter includes indicators of postpartum and postnatal care for mothers and babies after childbirth and includes:

- Early postpartum discharge rate
- All-cause and postpartum-related readmission rates for women within 14 days of discharge after delivery
- All-cause readmission rates for women within 90 days of discharge after delivery
- All-cause readmission rates for newborns within 28 days of birth

The denominator for estimating the maternal readmission rates was the number of women who gave birth in hospital in 2007 and was identified from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) using maternal and newborn inpatient admission records that were linked by the Institute for Clinical Evaluative Sciences (ICES) to create the Mother-Baby (MOMBABY) linked

Database. Neonatal readmissions were defined as any readmission to hospital within 28 days of birth. Infants with extremely low birth weight (less than 1,000 g) were excluded from the analysis. Maternal readmissions were measured within 14 days and within 90 days of discharge after childbirth. All-cause readmissions were defined as any admissions to hospital. The maternal 14-day postpartum-related readmissions were determined by using the list of conditions taken from the 2006 Hospital Report.<sup>87</sup> The conditions include for example; hypertension, eclampsia, diabetes, surgical site and other infections, hemorrhage, anesthesia complications and obstetric embolism. The reason for the admission was identified based on the most responsible diagnosis code in the CIHI-DAD. All maternal readmission rates (within 14 days and within 90 days) were stratified by delivery type (vaginal versus caesarean delivery). Maternal readmission indicators were additionally stratified by age, neighbourhood income, neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN). The neonatal readmission indicator was stratified by neighbourhood income, rural/urban residency and LHIN.



## EXHIBITS AND FINDINGS

### EARLY POSTPARTUM MATERNAL DISCHARGE RATE

**Indicator:** This indicator measures the early postpartum maternal discharge rate among women who delivered in hospital. Early discharge is defined as less than 48 hours after a vaginal delivery or less than 96 hours after a caesarean section.

**Background:** The 'appropriate' postpartum hospital length of stay is a controversial issue. Length of postpartum hospital stay in Canada has decreased over time between 1995/96 and 2004/2005 from 2.6 to 2.2 days for vaginal delivery and from 5.0 to 3.9 days for caesarean delivery.<sup>58</sup> Studies have shown that this decrease has not had a detrimental effect on maternal morbidity, breastfeeding rates or postpartum depression, but may be associated with increased neonatal morbidity and mortality.<sup>88</sup> The Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends that providers assess maternal and neonatal well-being, and ensure appropriate follow up, prior to discharging women and infants home.<sup>88</sup> In 1999, as part of the Ontario Healthy Babies Healthy Children program, women who delivered in hospital were offered up to a 60 hour postpartum stay in hospital if needed. An evaluation of this program found that whether the 60 hour hospital stay was offered depended on the hospital site, whether the woman had a family physician and maternal ethnicity.<sup>89</sup>

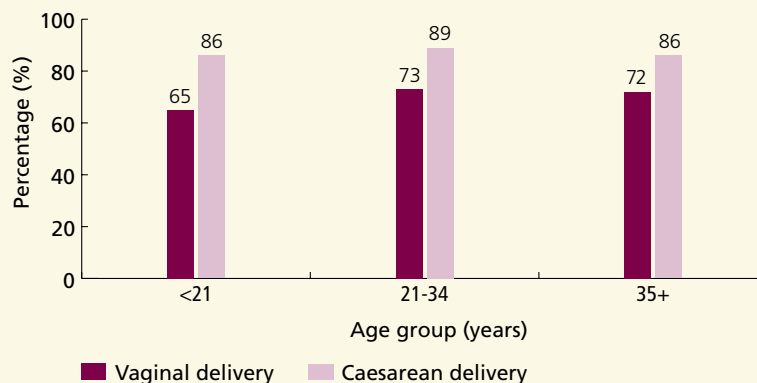
In 2004/05, in Canada, the rate of early maternal discharge was 25.5 per 100 vaginal deliveries and 52.5 per 100 caesarean deliveries; these rates varied significantly by province and territory.<sup>58</sup> Women in Ontario had the shortest mean length of stay after vaginal delivery (2.1 days) and after caesarean delivery (3.7 days).<sup>58</sup> The definition of length of stay used for the Canadian Perinatal Health Report encompasses the time from admission to discharge, including time spent during labour and birth,<sup>58</sup> whereas the length of stay presented in this indicator measures the time from birth to discharge, which more accurately measures the postpartum length of stay. As such, our rates will be higher than those reported in the Canadian Perinatal Health Report.

**Finding:** Overall, in Ontario the early postpartum maternal discharge rate was 73 percent among women who had vaginal deliveries (discharged home in less than 48 hours); 8.4 percent were discharged in less than 24 hours. Among women who had caesarean deliveries, the early postpartum maternal discharge rate was 88 percent (discharged home in less than 96 hours); 5.9 percent were discharged in less than 48 hours.

### Exhibit 10C.1 | Early postpartum maternal discharge rate (percentage of hospital deliveries)<sup>^</sup> among women who delivered in hospital, by method of delivery and age group, in Ontario, 2007

#### FINDINGS

- The early postpartum maternal discharge rate after a vaginal delivery (within 48 hours) varied by age. Women under age 21 had lower rates of early discharge after a vaginal delivery than older women.
- The early postpartum maternal discharge rate after a caesarean delivery (within 96 hours) did not vary by age.
- The early postpartum maternal discharge rate after a vaginal or caesarean delivery did not vary by neighbourhood income or average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

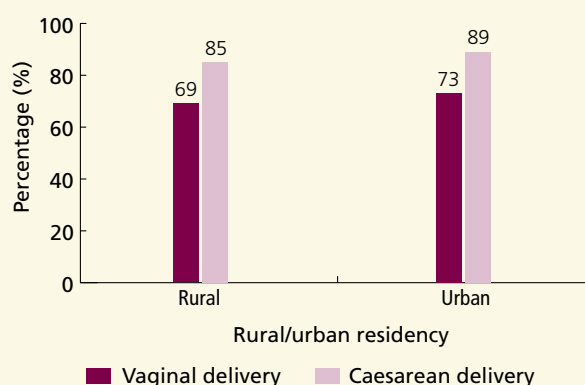
<sup>^</sup> Early discharge is defined as less than 48 hours after a vaginal delivery or less than 96 hours after a caesarean delivery

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### Exhibit 10C.2 | Age-standardized early postpartum maternal discharge rate (percentage of hospital deliveries)<sup>^</sup> among women who delivered in hospital, by method of delivery and rural/urban residency, in Ontario, 2007

#### FINDINGS

- Women from rural areas were somewhat less likely to be discharged early from hospital after childbirth than those living in urban areas, for both vaginal and caesarean deliveries.
- For women who had vaginal deliveries, the early postpartum maternal discharge rate was 69 percent of deliveries among women living in rural areas and 73 percent of deliveries among women living in urban areas.
- For women who had caesarean sections, the early postpartum maternal discharge rate was 85 percent of deliveries among women living in rural areas and 89 percent of deliveries among women living in urban areas.



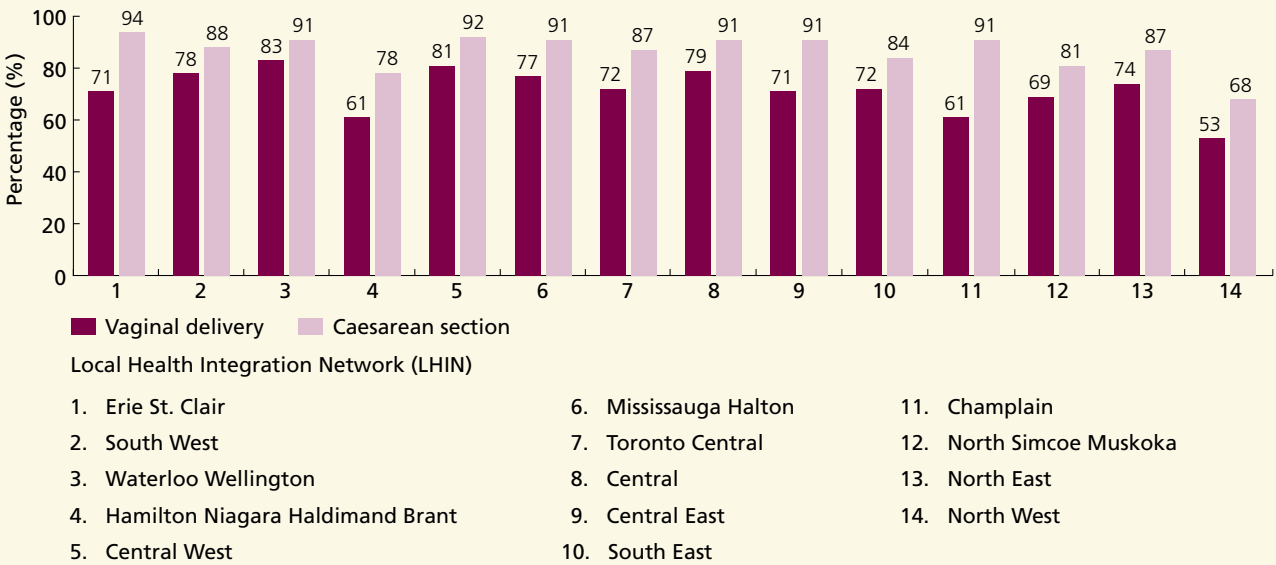
**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

**NOTE:** See [Appendix 10.3](#) for definitions of rural/urban residency

<sup>^</sup> Early discharge is defined as less than 48 hours after a vaginal delivery or less than 96 hours after a caesarean delivery

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**Exhibit 10C.3** | Age-standardized early postpartum maternal discharge rate (percentage of hospital deliveries)^ among women who delivered in hospital, by method of delivery and Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

^ Early discharge is defined as less than 48 hours after a vaginal delivery or less than 96 hours after a caesarean delivery

**FINDINGS**

- The early postpartum maternal discharge rate varied by LHIN.
- Among women who had vaginal deliveries, the early postpartum maternal discharge rate ranged from 53 percent of deliveries (North West LHIN) to 83 percent of deliveries (Waterloo Wellington LHIN).
- Among women who had caesarean deliveries, the early postpartum maternal discharge rate ranged from 68 percent of deliveries (North West LHIN) to 94 percent of deliveries (Erie St. Clair LHIN).

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## FOURTEEN-DAY, ALL-CAUSE AND POSTPARTUM-RELATED MATERNAL READMISSION RATES

**Indicator:** This indicator measures the 14-day maternal readmission rate among women who gave birth in an Ontario hospital and were discharged. We report readmission rates for any reason and for a set of specific diagnoses that are markers of postpartum morbidity including for example; hypertension, eclampsia, diabetes, infections, hemorrhage, anesthesia complications and obstetric embolism.

**Background:** Maternal readmission is an indicator of postpartum maternal morbidity and can help to assess the quality of care after birth. Maternal readmission rates have been shown to be associated with a number of factors including: severity of illness/obstetric condition, availability of hospital resources, distance to hospital, hospital admission policies and accessibility of outpatient services.<sup>58</sup> Compared to spontaneous vaginal deliveries, caesarean sections and operative vaginal deliveries (forceps- and/or vacuum-assisted) are associated with an increased risk of maternal readmission due to pelvic injury/wounds, obstetrical complications, venous disorders and thromboembolism and major puerperal infection.<sup>58</sup> A Canadian study using administrative data from 1997/98-2000/01 found the overall rate of 60-day maternal readmission was 1.8 percent; caesarean delivery was associated with a significantly increased risk of postpartum readmission compared to vaginal birth (2.7 percent versus 1.5 percent).<sup>65</sup> According to the Canadian Perinatal Health Report, maternal readmission rates varied significantly across provinces and territories, both for women with caesarean deliveries and for those with vaginal deliveries.<sup>58</sup>

Expert panels have defined a set of conditions that represent causes of serious postpartum morbidity. Monitoring readmissions related to these conditions may provide a more specific way to look at postpartum outcomes rather than examining all readmissions. Rates of readmission for these defined conditions have been used in previous studies of postpartum care in Canada.<sup>87</sup> This indicator uses data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) to identify readmissions and the most responsible diagnosis. We report postpartum readmissions for any reason and postpartum-related readmissions as defined by expert panels and used in the 2006 Hospital Report.<sup>87</sup>

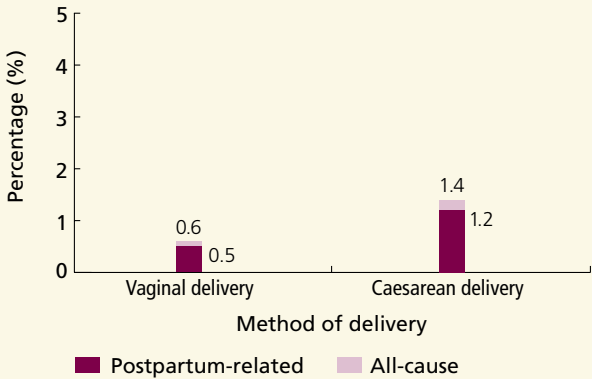
**Findings:** The 14-day maternal readmission rate among women who gave birth in hospital was 0.8 percent for any reason and 0.7 percent for postpartum-related diagnoses. Postpartum-related diagnoses accounted for 85 percent of all maternal readmissions that occurred within 14 days.



**Exhibit 10C.4 | Fourteen-day all-cause and postpartum-related readmission rates (percentage of hospital deliveries) among women discharged after delivery in hospital, by method of delivery, in Ontario, 2007**

**FINDINGS**

- Women who had caesarean sections were more than twice as likely to be readmitted to hospital within 14 days of discharge as women who delivered vaginally (1.4 percent of deliveries versus 0.6 percent of deliveries, respectively).
- Women who had caesarean sections were also more than twice as likely to be readmitted for postpartum-related diagnoses as women who delivered vaginally (1.2 percent of deliveries versus 0.5 percent of deliveries, respectively).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

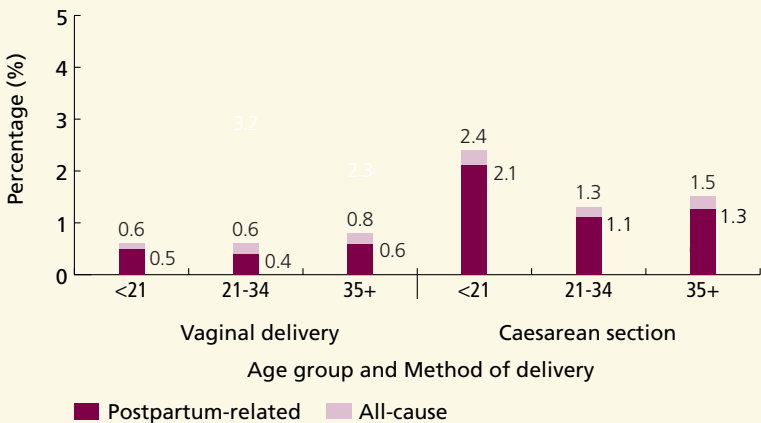
**NOTE:** See [Appendix 10.3](#) for details of diagnoses used to define postpartum-related readmissions

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**Exhibit 10C.5 | Fourteen-day all-cause and postpartum-related readmission rates (percentage of hospital deliveries) among women discharged after delivery in hospital, by method of delivery and age group, in Ontario, 2007**

**FINDINGS**

- Fourteen-day readmission rates were 2-4 times higher among women who had caesarean sections compared to women who delivered vaginally, irrespective of age group.
- Among women who had caesarean sections, 14-day readmission rates were higher among those under age 21 compared to older women.
- Among women who delivered vaginally, readmission rates did not vary by age.
- Readmission rates did not vary by neighbourhood income or average neighbourhood educational attainment, irrespective of delivery type (data not shown).

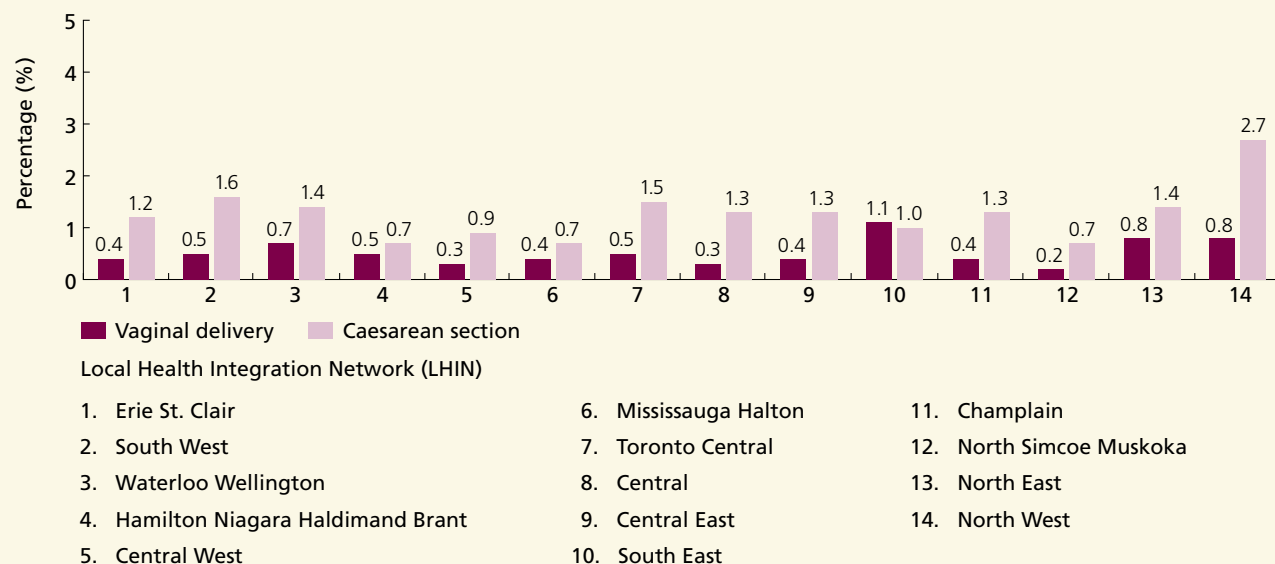


**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

**NOTE:** See [Appendix 10.3](#) for details of diagnoses used to define postpartum-related readmissions

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**Exhibit 10C.6** | Age-standardized 14-day postpartum-related readmission rates (percentage of hospital deliveries) among women discharged after delivery in hospital, by method of delivery and Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

**NOTE:** See [Appendix 10.3](#) for details of diagnoses used to define postpartum-related readmissions

### FINDINGS

- Among women who delivered vaginally, the 14-day postpartum-related readmission rates ranged from 0.2 percent of deliveries in the North Simcoe Muskoka LHIN to 1.1 percent of deliveries in the South East LHIN.
- Among women who delivered by caesarean section, the 14-day postpartum-related readmission rates ranged from 0.7 percent of deliveries in the Hamilton Niagara Haldimand Brant, Mississauga Halton and North Simcoe Muskoka LHINs to 2.7 percent of deliveries in the North West LHIN.
- Fourteen day, all-cause readmission rates for women who delivered vaginally ranged from 0.4 percent (Central West LHIN) to 1.1 percent (South East LHIN) and from 0.8 percent (North Simcoe Muskoka LHIN) to 2.9 percent (North West LHIN) among women who delivered by caesarean section (data not shown).
- Fourteen day, all-cause and postpartum-related readmission rates did not vary by rural/urban residency (data not shown).

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## NINETY-DAY, ALL-CAUSE MATERNAL READMISSION RATE

**Indicator:** This indicator measures the 90-day, all-cause, maternal readmission rate among women who gave birth in an Ontario hospital.

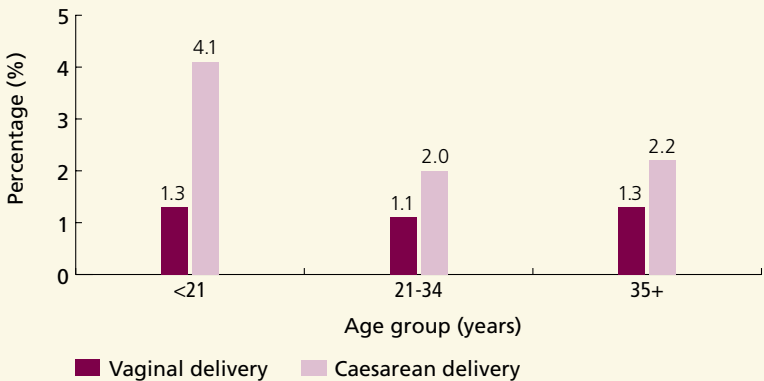
**Background:** Readmission rates within 90 days of discharge provide a broad overview of postpartum morbidity in the three months after delivery.<sup>58,65</sup> A number of factors have been associated with maternal readmission including mode of delivery, severity of illness, availability of hospital resources, distance to hospital, hospital admission policies and access to outpatient resources.<sup>58,65</sup> Ninety day readmission rates should capture most of the morbidity that develops after childbirth.<sup>58</sup> While the shorter time period of 14 days focuses primarily on factors that may be related to the initial hospitalization (e.g., discharge before the women was stabilized; failure to adequately educate the women about what to expect or how to manage problems), the 90 day time frame may reflect the adequacy of care provided in the community in terms of education and follow up.<sup>58</sup>

**Findings:** The 90-day, all-cause maternal readmission rate among women who gave birth in hospital was 1.4 percent. The rate was higher among women who delivered by caesarean section than among women who delivered vaginally, 2.1 percent versus 1.2 percent, respectively.

### Exhibit 10C.7 | Ninety-day, all-cause maternal readmission rate (percentage of hospital deliveries) among women discharged after delivery in hospital, by method of delivery and age group, in Ontario, 2007

#### FINDINGS

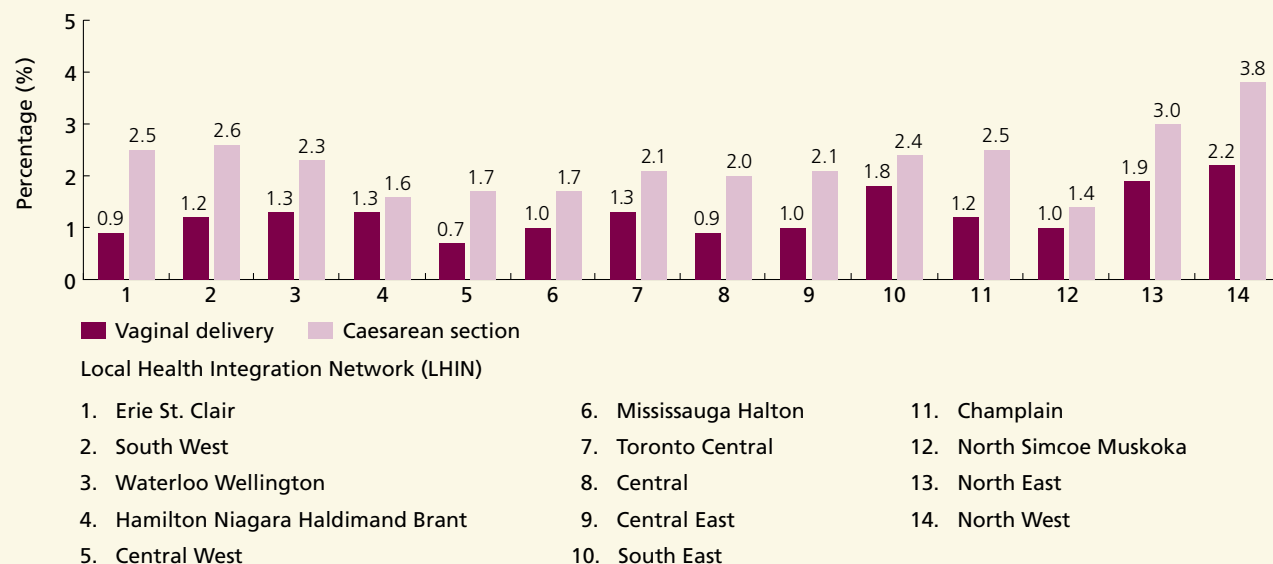
- Among women who delivered by caesarean section, 90-day readmission rates for women under age 21 were approximately twice as high as for women aged 21-34 and for women aged 35 and older (4.1 percent, 2.0 percent and 2.2 percent, respectively).
- Among women who delivered vaginally, 90-day readmission rates did not vary by age.
- Ninety-day readmission rates did not vary by neighbourhood income or average neighbourhood educational attainment, irrespective of delivery type (data not shown).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

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**Exhibit 10C.8** | Age-standardized 90-day, all-cause maternal readmission rate (percentage of hospital deliveries) among women discharged after delivery in hospital, by method of delivery and Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked Database)

### FINDINGS

- The 90-day readmission rates in women who delivered vaginally ranged from 0.7 percent of deliveries in the Central West LHIN to 2.2 percent of deliveries in the North West LHIN.
- Among women who had caesarean sections, the 90-day readmission rates ranged from 1.4 percent of deliveries in the North Simcoe Muskoka LHIN to 3.8 percent of deliveries in the North West LHIN.
- Ninety-day readmission rates for women who delivered in hospital were higher among women who lived in rural areas as compared to women who lived in urban areas (1.8 percent of deliveries versus 1.4 percent of deliveries, respectively). This was driven primarily by variation in the 90-day readmission rate for women who delivered vaginally; 1.6 percent of deliveries among women living in rural areas versus 1.1 percent of deliveries among women living in urban areas (data not shown).

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## NEONATAL READMISSION RATE (WITHIN 28 DAYS FOLLOWING BIRTH)

**Indicator:** This indicator measures the neonatal readmission rate (percentage of newborns) within 28 days of birth for all infants born in Ontario hospitals.

**Background:** Several studies and reports have shown an increase in neonatal readmission rates associated with shorter lengths of hospital stay following childbirth,<sup>88,90,91</sup> including one study from Ontario.<sup>92</sup> Neonatal readmission rates are associated with maternal age, parity, method of delivery, low birth weight and prematurity.<sup>93</sup> Neonatal readmission rates may additionally be associated with hospital, provider and community approaches to monitoring and treatment of fetal complications and the availability of programs to support the initiation and continuation of breastfeeding.<sup>58,88</sup> A study conducted in Sweden showed that the main reasons for neonatal readmissions were infections, feeding problems, jaundice and heart disease.<sup>94</sup> The same study showed that infants who underwent routine neonatal examination within 48 hours of delivery and who received some care through a home care program had lower readmission rates than other infants.<sup>94</sup> Problems in feeding can result in dehydration, weight loss and can often exacerbate hyperbilirubinemia. Now a number of Canadian agencies recommend universal predischarge bilirubin screening that may reduce the number of jaundice-related readmissions.<sup>95</sup>

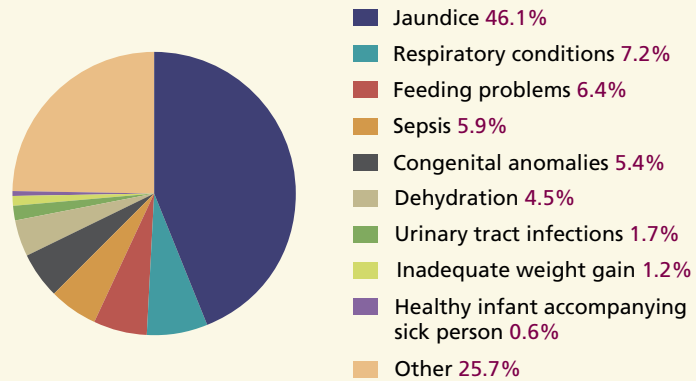
According to the 2008 Canadian Perinatal Health Report, neonatal hospital readmission rates declined from 3.7 readmissions per 100 hospital live births in 1995-1996 to 3.5 readmissions per 100 hospital live births in 1999-2000 and then stabilized after that.<sup>58</sup> Additionally, the report identified wide regional variations in rates between 2002-2003 and 2004-2005 with the highest neonatal readmission rates reported in Nunavut and the lowest rates reported in Nova Scotia and Newfoundland and Labrador.<sup>58</sup> Data for this indicator were from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD). Infants who were extremely low birth weight (less than 1,000 g) were excluded.

**Finding:** Overall in Ontario, 3.5 percent of newborns or about one in 30 were readmitted to hospital within 28 days of birth after being delivered in hospital.

### Exhibit 10C.9 | The ten primary diagnoses (percentage of readmissions) responsible for neonatal readmissions within 28 days after birth, in Ontario, 2007

#### FINDINGS

- The major identified causes for neonatal readmissions were jaundice (46.1 percent), urinary tract infections or sepsis (7.6 percent) and respiratory conditions (7.2 percent).
- Twelve percent of neonatal readmissions were for diagnoses of feeding problems (6.4 percent), dehydration (4.5 percent) or inadequate weight gain (1.2 percent). All three diagnoses are potentially related to problems with feeding.
- Over one-quarter of infants who were readmitted to hospital were admitted for other reasons including unspecified fevers, viral infections and gastroesophageal reflux.
- Neonatal readmission rates (within 28 days of birth) were slightly higher in urban areas than in rural areas (3.5 percent versus 3.1 percent, respectively) (data not shown).
- Neonatal readmission rates did not vary by neighbourhood income (data not shown).

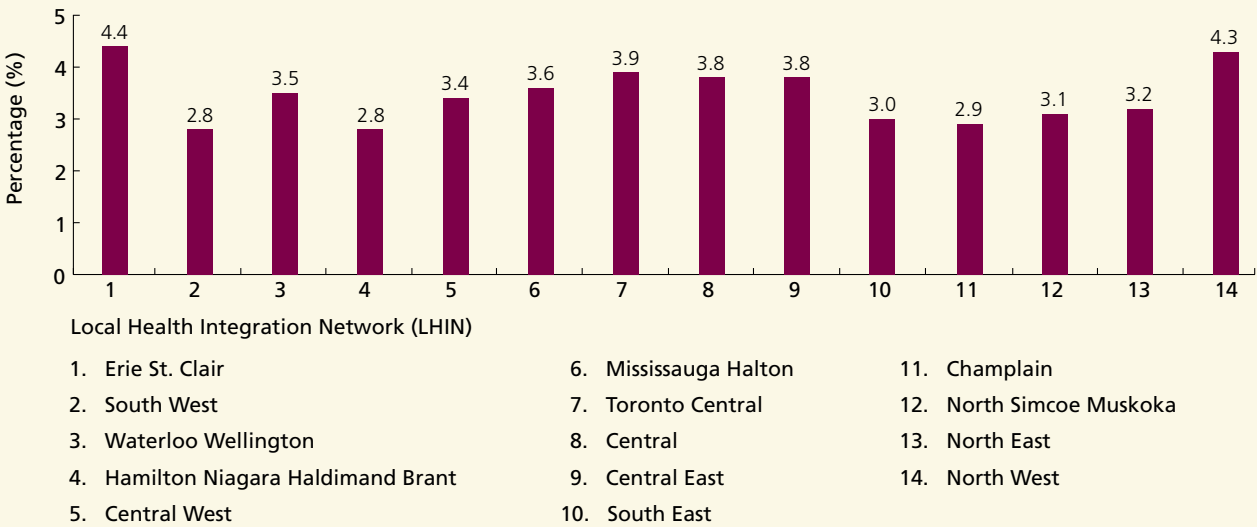


**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** Infants who were extremely low birth weight (less than 1,000 g) were excluded.

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**Exhibit 10C.10** | Neonatal readmission rate (percentage of infants) within 28 days after birth, by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract database (CIHI-DAD)

**NOTE:** Infants who were extremely low birth weight (less than 1,000 g) were excluded.

**FINDINGS**

- Neonatal readmission rates (within 28 days of birth) varied across LHINs from 2.8 percent in the South West and Hamilton Niagara Haldimand Brant LHINs to 4.4 percent in the Erie St. Clair LHIN.

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# Section 10C

## SUMMARY OF FINDINGS

There was significant variation across Local Health Integration Networks (LHIN) for all postpartum care indicators. Maternal readmission rates were higher among women who had caesarean sections compared to women who had vaginal deliveries. Rural women were less likely to be discharged early from hospital after a caesarean or vaginal delivery, but were more likely to be readmitted to hospital within 90 days of discharge.

### Early Postpartum Discharge Rate

Nearly three-quarters of women who had a vaginal delivery were discharged home early (i.e., within 48 hours of delivery) and almost 90 percent of women who had a caesarean section were discharged home early (i.e., within 96 hours of delivery). Early discharge rates varied across LHINs and rural women were somewhat less likely than urban women to be discharged early from hospital, irrespective of the type of delivery.

### Postpartum Maternal Readmission Rates (14-day and 90-day)

Maternal readmission rates within 14 days or 90 days of hospital discharge were consistently higher for women who delivered by caesarean section than for women who delivered vaginally. Among women who delivered in Ontario hospitals, the 14-day, all-cause maternal readmission rate was 0.8 percent of deliveries; 85 percent of these readmissions were for diagnoses specifically associated with postpartum morbidity including for example; hypertension, eclampsia, diabetes, surgical site and other infections, hemorrhage, anesthesia complications or obstetric embolism. Fourteen-day readmission rates (all-cause and postpartum-related) for women who delivered by caesarean section were more than double the rates

seen for women who delivered vaginally; about one in 160 women were readmitted within two weeks after a vaginal delivery and about one in 70 were readmitted within two weeks after a caesarean section. Fourteen-day readmission rates varied by LHIN for women with vaginal or caesarean deliveries. They varied by age for caesarean deliveries only. Readmission rates were highest among women aged 20 and younger who delivered by caesarean section. Readmission rates were not related to neighbourhood income or average neighbourhood educational attainment.

Ninety-day readmission rates are more reflective of care received in the community after hospital discharge. For women who delivered in Ontario hospitals, the 90-day maternal readmission rate was 1.4 percent of deliveries. As was the case for 14-day readmission rates, women who delivered by caesarean section were almost twice as likely to be readmitted as women who delivered vaginally (2.1 percent of deliveries versus 1.2 percent of deliveries, respectively). As well, 90-day readmission rates were highest among women aged 20 and younger who had caesarean sections. Ninety-day readmission rates varied by LHIN and by rural/urban residency (for women who delivered vaginally), but not by neighbourhood income or average neighbourhood educational attainment.

### Neonatal Readmissions

About one in 30 infants were readmitted to hospital within 28 days of birth and jaundice accounted for almost half of all readmissions. Neonatal readmission rates did not vary by neighbourhood income. However, neonatal readmission rates varied by LHIN and were higher among those living in urban areas as compared to those living in rural areas.

# Section 10D

## *Abortion*

### INTRODUCTION

Induced abortion is a common procedure in Canada and worldwide. Studies of U.S. and Australian populations indicate that about one-third of women will have an abortion during their lifetime.<sup>96,97</sup>

In 2006, the most recent year for which federal statistics are available, 91,310 induced abortions were performed in Canada or about one abortion for every 3-4 live births.<sup>8,98</sup>

Between 1995 and 2003 the vast majority—between 80 and 90 percent—of induced abortions in Canada were performed at 12 weeks gestation age or less.<sup>99</sup> Since 2002, induced abortion rates have been highest among women aged 20-24, followed by those aged 25-29, whereas the live birth rate in Canada is highest among women aged 30-34 followed by women aged 25-29.<sup>99</sup> As in most developed countries where abortion is legal, induced abortion procedures in Canada are very safe with few complications. Procedures are safer when performed at an earlier gestational age.<sup>100-102</sup>

The estimated global rate of induced abortions has been declining, as access to and use of effective contraceptives have increased.<sup>103</sup> Similarly, Statistics Canada data show that Canadian abortion rates declined during the period from 2002 to 2005 from 14.9 to 13.7 per 1,000 women aged 14-44. The largest decline was seen in women under age 20.<sup>104</sup> The ratio of induced abortions per 100 live births in Canada also declined from 32.1/100 live births in 2002 to 28.3/100

live births in 2005.<sup>104</sup> This decline is not the result of a decrease in pregnancies, which remained stable over the same period.<sup>10,105</sup> However, we do not know if the decrease is due to changes in the reporting of abortions, or to other factors such as school-based sex education programs, more effective use of contraception, more intended pregnancies, changes in attitude towards contraception or abortion or a combination of these factors. Research does show that, where fertility is constant, increased use of contraception reduces the number of induced abortions.<sup>106</sup>

Statistics Canada data on abortion have some limitations and the most recent 2006 data should be interpreted with caution because of underreporting by clinics in some provinces. As well, the data likely underestimate the number of Ontario abortions because procedures performed in Ontario clinics which are not directly funded by the Ministry of Health and Long Term Care (MOHLTC) or in private doctors' offices, and procedures that are paid for by women themselves are not reported to Statistics Canada.<sup>107</sup>

Most women seeking induced abortions do so because of an unintended pregnancy. A U.S. study of women undergoing an induced abortion in 2000/01 reported that 54 percent of the women had been using a

contraceptive method at the time of conception.<sup>13</sup> A smaller proportion of women have an induced abortion because of fetal abnormalities or maternal health indications. Unlike most abortions, those undertaken for fetal abnormality are usually performed after 12 weeks gestation once diagnostic test results are available. It is unclear how many of the induced abortions beyond 12 weeks are for fetal abnormalities in Canada, however, most abortions in Canada occur before 12 weeks.

Since 1988, when the Supreme Court of Canada ruled that the abortion provision in the Criminal Code was unconstitutional,<sup>108</sup> induced abortion has been considered to be like other medical procedures, including being regulated by provincial and territorial governments. Induced abortions may be performed in hospitals (as a same day or inpatient procedure), non-hospital abortion clinics/surgical centres or doctors' offices. In Ontario there are non-hospital abortion clinics, five of which are independent health facilities which are funded directly by the Ontario MOHLTC. Since 1996, a decreasing proportion of induced abortions have been performed in hospitals while the proportion performed in clinics has increased.<sup>104</sup> However, abortion clinics in Ontario are located only in major urban centres and therefore it is expected that hospitals, which are geographically dispersed throughout the province, will continue to be important abortion providers.

Induced abortions may be performed using a surgical procedure or medications. Most induced abortions in Canada are performed surgically. Most first trimester procedures use suction (either manual or electric) curettage to aspirate the products of conception after dilation of the cervix (D&C). Those in the second trimester most commonly use dilation of the cervix followed by evacuation of the uterine contents (D&E).<sup>109</sup> A recent Cochrane Collaboration Review examining surgical methods used in first trimester induced abortions noted that surgical complications

are rare.<sup>102</sup> A large study using administrative data showed that the rate of immediate complications following induced abortions performed in Ontario was less than one percent.<sup>110</sup> Non-surgical options for abortions performed very early in pregnancy (typically up to seven weeks gestation in Canada) are referred to as medical abortions (i.e., abortions done using medications) and include the use of drugs to empty the uterus. In Canada, medical abortions usually involve the use of methotrexate with the prostaglandin analogue misoprostol. Although not available in Canada, mifepristone (RU 486) with misoprostol is the preferred regimen in jurisdictions with access to it; it can be used up to nine weeks gestation. Medical abortions using these methods are clinically safe for terminating pregnancies.<sup>111-113</sup> Terminations in advanced gestation (over 16 weeks) are performed surgically by D&E or using medication such as misoprostol to induce the abortion. Drug induced abortions over 16 weeks are called induction abortions to differentiate them from medical abortions and are done as inpatient procedures.

Access to abortion services varies across Canada.<sup>10,9</sup> A 2006 report by the non-profit organization Canadians for Choice,<sup>114</sup> reported that "only 15.9 percent of Canadian hospitals provide accessible abortion services" and that most of these hospitals are in urban areas and within 150km of a U.S. border. Fewer hospitals perform the procedure for pregnancies that are beyond 12 weeks gestation.<sup>114</sup> A Canadian pilot study that tracked the distance women travelled to a Canadian abortion clinic based on questionnaire replies reported that approximately 15 percent of women travelled more than 100km and that some women travelled more than 1,000km.<sup>115</sup> An earlier Ontario study reported that counties with low age-standardized abortion rates (below the 25<sup>th</sup> percentile) had the highest proportions of women who obtained their abortion outside their county of residence (in some of these counties no abortions were performed in local facilities). This Ontario study confirmed interregional variations

in the utilization of Ontario abortion procedures and indicated that the observed differences in rates and in the proportion of women who travelled outside of their county of residence for these services raised questions about the regional accessibility of abortions.<sup>11</sup>

For women who have access to induced abortions, studies suggest that demographic factors, such as the woman's age, socioeconomic status, and ethnicity are important determinants of whether she will have the procedure. In Canada and the U.S., induced abortion rates are highest among women aged 20-24.<sup>116</sup> U.S. data suggest that Black women (compared to White women, including Hispanic and non-Hispanic White women) and Hispanic women (compared to non-Hispanic women) have the highest abortions rates.<sup>117</sup> In 2008, women with family incomes below the poverty line accounted for 42 percent of those obtaining abortions in a nationally representative U.S. survey of abortion patients.<sup>118</sup> In an earlier study, poor and low-income women were also much more likely to report difficulty accessing contraception.<sup>13</sup>

In this section of the chapter, we examine indicators of induced abortion procedures including:

- Abortion rate
- Ratio of abortions to live births
- Proportion of Ontario hospitals performing inpatient or outpatient abortions (excluding hospitals with religious affiliations and those designated for specific patient groups such as children)
- Characteristics of hospital abortions
- Rate of short-term, post-abortion complications

Data from the Ontario Health Insurance Plan (OHIP) database, the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS) were used to identify the number of induced abortions performed in women aged 15-49, based on diagnosis, fee and procedure codes. OHIP fee codes were used to identify abortions performed out of hospital. Abortion is coded in the physician billing data as being performed at either less than 16 weeks gestation (early) or 16 weeks or later gestation. The details of abortion characteristics performed in hospitals were obtained from the CIHI-DAD and NACRS. Data from the Ontario MOHLTC Master Numbering System database were used to identify hospitals that performed elective abortions. Hospitals with a religious affiliation and specialty (e.g., children's) hospitals were excluded from the analysis. Short-term (within 14 days after index procedure), post-abortion complications were identified using data from CIHI-DAD and NACRS and were defined as any visit to an emergency department/same day surgery or any hospitalization within 14 days following the abortion, regardless of the reason.

## EXHIBITS AND FINDINGS

### ABORTION RATE

**Indicator:** This indicator measures overall and early stage (less than 16 weeks gestation) induced abortion rates per 100 women aged 15-49.

**Background:** The abortion rate is a widely reported global and regional statistic. It reflects the annual number of induced abortions per 100 or 1,000 women of childbearing age. Since 1995, the global abortion rate has declined, more so in developed countries (former Soviet block countries contribute greatly to the decline) than in developing countries,<sup>119</sup> where most unsafe abortions occur.<sup>120</sup>

Abortions are “a compelling indicator of the incidence of unintended pregnancies.”<sup>121</sup> According to 2003 statistics (the most recent year of global data), 40 percent of the 23 million pregnancies in developed countries were unintended and 28 percent were terminated.<sup>122</sup> Globally, the 2003 induced abortion rate was 29 per 1,000 women aged 15-44.<sup>121</sup> According to Statistics Canada, the abortion rate in Canada in 2003 was 14.7 per 1,000 women aged 15-44.<sup>123</sup> Worldwide, the majority of induced abortions are performed at less than 12 weeks gestation.<sup>99,120</sup> An Ontario administrative data study reported that in 1992-1993, 39 percent of induced abortions were performed before nine weeks gestation, 47 percent between 9-12 weeks gestation and 13 percent of induced abortions were performed beyond 12 weeks gestation.<sup>101</sup>

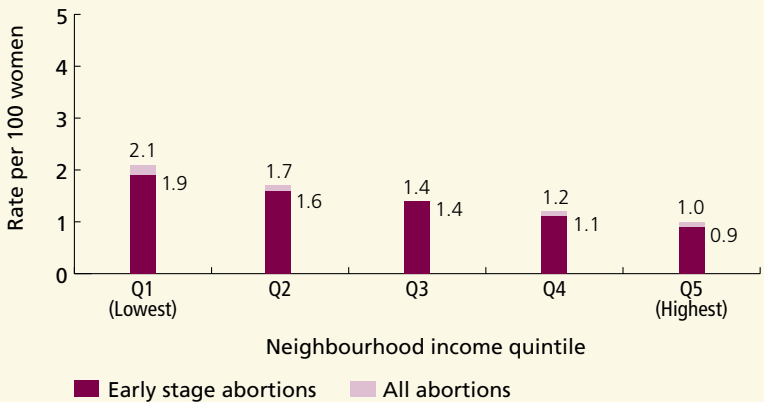
The induced abortion rates presented in this chapter differ from the rates reported by Statistics Canada for the following reasons. We include women up to age 49 (versus up to age 44) and present data for 2007. The most recent year of available Statistics Canada data is 2006 and there are significant limitations in this data due to underreporting of abortions in some provinces. Unlike Statistics Canada, which receives Ontario data only on abortions performed by hospitals and clinics funded directly by the Ontario Ministry of Health and Long Term Care, our data used province-wide billing data and therefore also captured abortions billed to the provincial insurance plan, including those performed in other clinics or private offices. Our data also include abortions billed to the Ontario Health Insurance Plan (OHIP) that were provided out of province, although we estimate this number to be less than one percent of all abortions. Procedures performed outside a hospital were identified using OHIP physician billing data, which only differentiates between procedures performed at less than 16 weeks gestation (early) or 16 weeks or later gestation. We know that the vast majority of abortions in Ontario are provided prior to 12 weeks gestation. These data do not capture early medical abortions. However, we believe that number is low and unlikely to affect the rates we report.

**Finding:** In Ontario, the overall induced abortion rate was 1.5 per 100 women aged 15-49, of which 93 percent (1.4 per 100 women) were early stage (less than 16 weeks gestation) abortions.

**Exhibit 10D.1 | Age-standardized overall and early stage (less than 16 weeks gestation) induced abortion rate (per 100 women aged 15-49), by neighbourhood income quintile, in Ontario, 2007**

**FINDINGS**

- Induced abortion rates (overall and early stage) varied by neighbourhood income.
- The induced abortion rate was twice as high among women living in the lowest-income neighbourhoods compared to women living in the highest-income neighbourhoods (2.1 per 100 women versus 1.0 per 100 women, respectively).
- Early stage induced abortion rates showed a similar pattern. The rates ranged from 1.9 per 100 women living in the lowest-income neighbourhoods to 0.9 per 100 women living in the highest-income neighbourhoods.



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

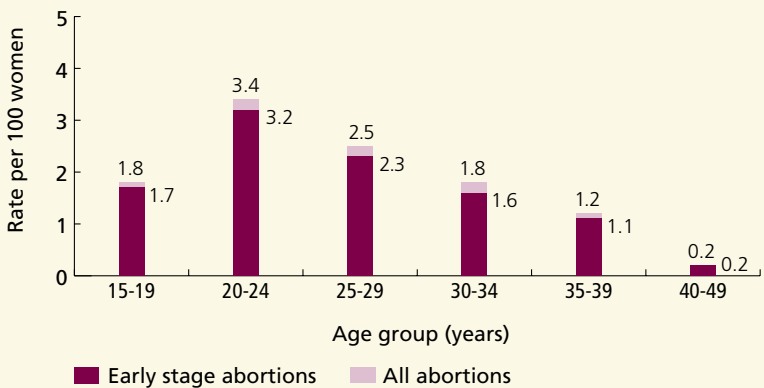
**NOTE:** See [Appendix 10.3](#) for details about neighbourhood income quintile calculation

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**Exhibit 10D.2 | Overall and early stage (less than 16 weeks gestation) induced abortion rate (per 100 women aged 15-49), by age group, in Ontario, 2007**

**FINDINGS**

- The highest rate of induced abortion was among women aged 20-24.
- Induced abortion rates varied by age from 3.4 per 100 women aged 20-24 to 0.2 per 100 women aged 40-49.
- Across all age groups, almost all abortions were early stage abortions. Early stage abortion rates varied from 3.2 per 100 women aged 20-24 to 0.2 per 100 women aged 40-49.



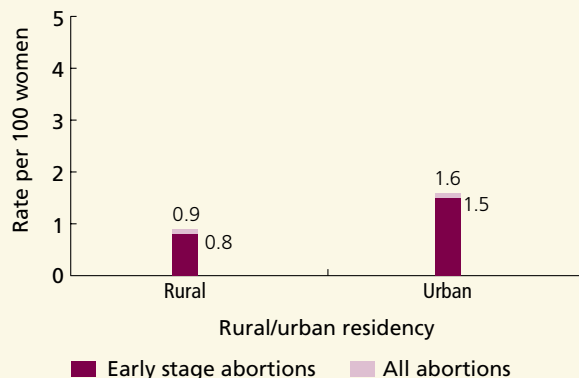
**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

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### Exhibit 10D.3 | Age-standardized overall and early stage (less than 16 weeks gestation) induced abortion rate (per 100 women aged 15-49), by rural/urban residency, in Ontario, 2007

#### FINDINGS

- Women living in urban areas were more likely to have induced abortions compared to women living in rural areas—the rate was 1.6 per 100 women living in urban areas compared to 0.9 per 100 women living in rural areas.
- The rates for early stage abortions varied similarly—1.5 per 100 women living in urban areas compared to 0.8 per 100 women living in rural areas.



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

**NOTE:** See [Appendix 10.3](#) for definitions of rural/urban residency

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**Exhibit 10D.4** | Age-standardized induced abortion rate (per 100 women aged 15-49), by Local Health Integration Network (LHIN), in Ontario, 2007

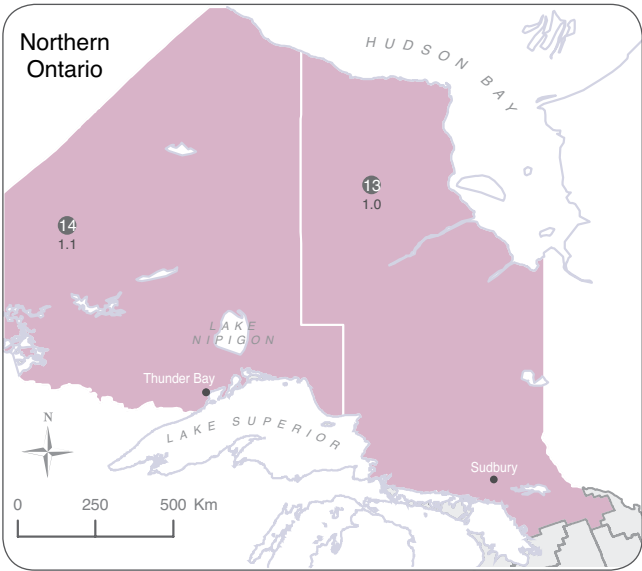
**FINDINGS**

- The abortion rate varied across LHINs from 0.9 per 100 women in the Erie St. Clair LHIN to 2.5 per 100 women in the Central West LHIN.

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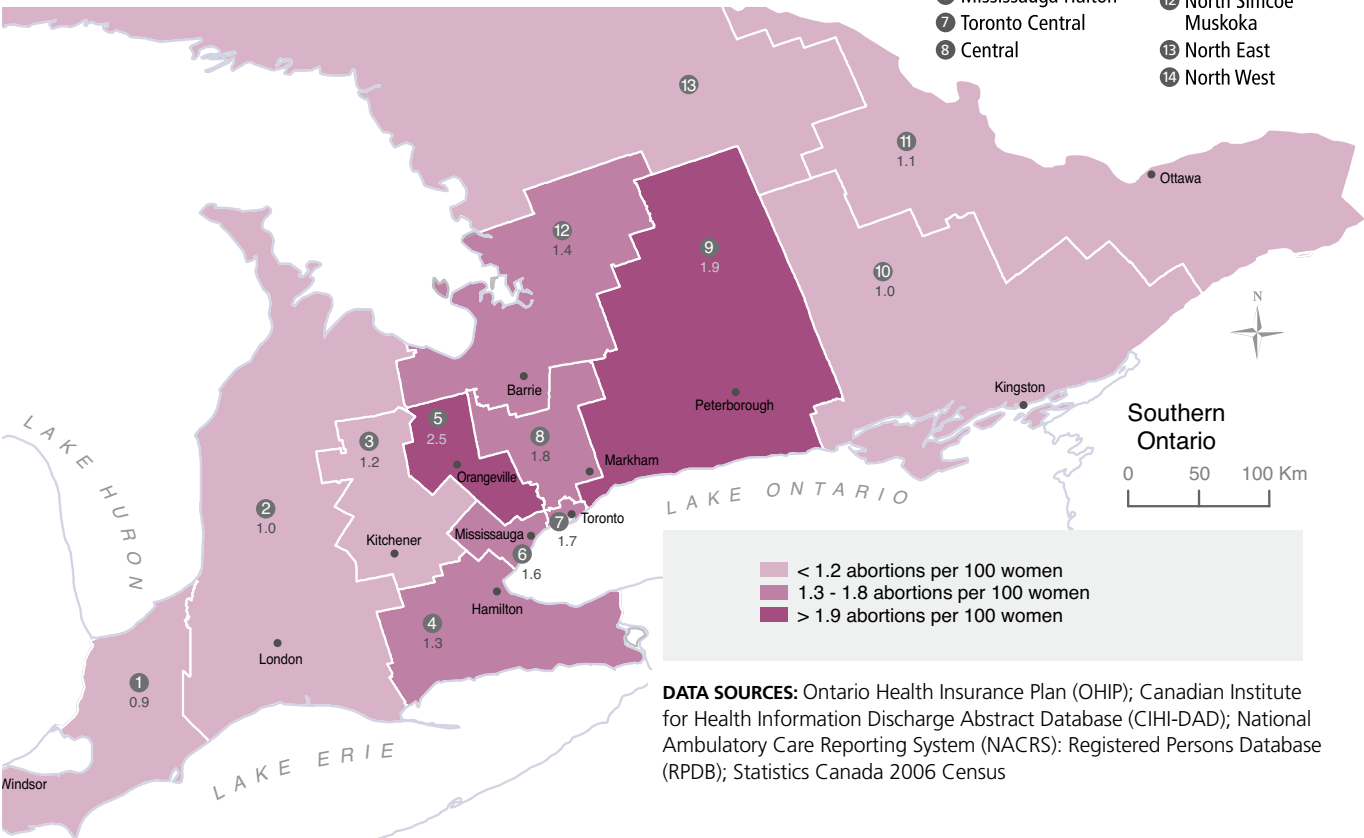
**Overall Ontario**

In Ontario, the rate of induced abortions was 1.5 per 100 women aged 15-49.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

## RATIO OF ABORTIONS TO LIVE BIRTHS (ABORTION RATIO)

**Indicator:** This indicator measures the number of induced abortions in women aged 15-49 per 100 live births. We report this indicator for all abortions and for early stage abortions (less than 16 weeks gestation).

**Background:** The abortion ratio is a widely reported global and regional statistic. It reflects the annual ratio of the number of induced abortions compared to the number of live births. In countries with legalized, induced abortion, it is used to estimate the proportion of pregnancies that were unintended. In 2003, the worldwide abortion ratio (including estimates of abortions in countries where abortion is not legal or is highly restricted) was about 31 per 100 live births.<sup>121</sup> This estimated ratio was highest in Eastern Europe (105 per 100 live births); the ratio in Northern America (U.S and Canada) was estimated to be 33 per 100 live births. According to more recent Statistics Canada data, the national abortion ratio in 2005 was 28.3 per 100 live births among women aged 15-44; the rate in Ontario was 25.1 per 100 live births.<sup>8,104</sup> The abortion ratio is influenced by factors such as access to and use of reliable contraception, and fertility rates.

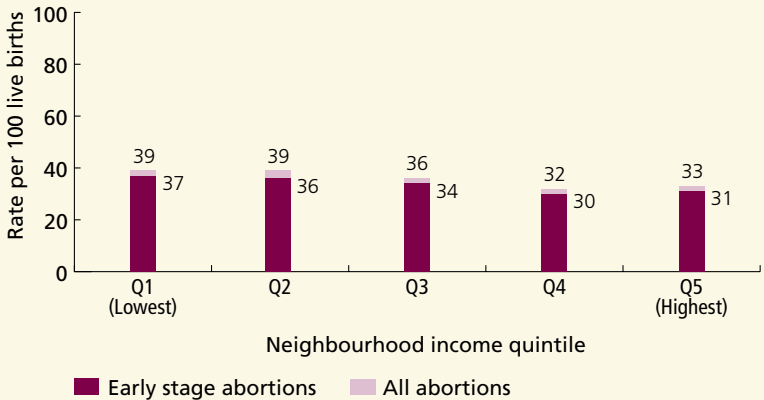
The induced abortion ratio presented in this chapter is different from the ratio reported by Statistics Canada for the following reasons. We include women up to age 49 (versus up to age 44) and present data for 2007. The most recent year of available Statistics Canada data is 2006 and there are significant limitations in this data due to underreporting of abortions in some provinces. Unlike Statistics Canada, which receives Ontario data only on abortions performed by hospitals and clinics funded directly by the Ontario Ministry of Health and Long Term Care, our data used province-wide billing data and therefore also captured abortions billed to the provincial insurance plan, including those performed in other clinics or private offices. Our data also include abortions billed to the Ontario Health Insurance Plan (OHIP) that were provided out of province, although we estimate this number to be less than one percent of all abortions. These data do not capture early medical abortions; however, we believe that number is low and unlikely to affect the rates we report.

**Finding:** Overall in Ontario, the ratio was 37 induced abortions per 100 live births and the number of early stage induced abortions was 34 per 100 live births.

**Exhibit 10D.5** | Age-standardized overall and early stage (less than 16 weeks gestation) induced abortion ratio (per 100 live births among women aged 15-49), by neighbourhood income quintile, in Ontario, 2007

**FINDINGS**

- The induced abortion ratios varied by neighbourhood income, with the highest ratios in women residing in lower-income neighbourhoods.
- The overall ratio ranged from 33 per 100 live births among women living in the highest-income neighbourhoods to 39 per 100 live births among women living in the lowest-income neighbourhoods.
- The early stage abortion ratio ranged from 31 per 100 live births among women living in the highest-income neighbourhoods to 37 per 100 live births among women living in the lowest-income neighbourhoods.



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

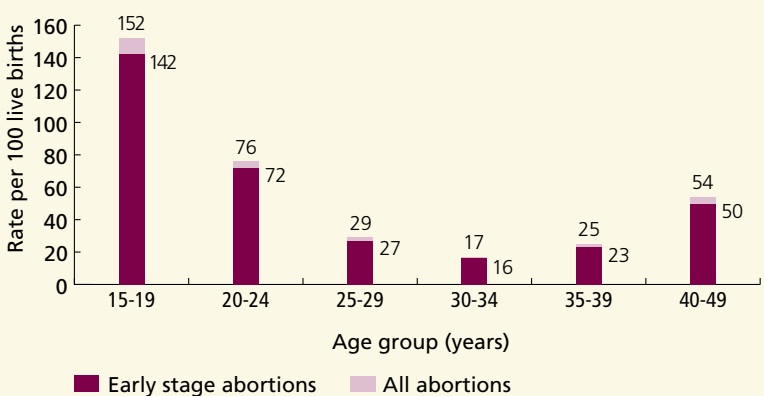
**NOTE:** See [Appendix 10.3](#) for details about neighbourhood income quintile calculation

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**Exhibit 10D.6** | Overall and early stage (less than 16 than weeks gestation) induced abortion ratio (per 100 live births among women aged 15-49), by age group, in Ontario, 2007

**FINDINGS**

- The overall induced abortion ratio varied by age and ranged from 152 per 100 live births among women aged 15-19 to 17 per 100 live births among women aged 30-34.
- The early stage abortion ratio varied from 142 per 100 live births among women aged 15-19 to 16 per 100 live births among women aged 30-34.



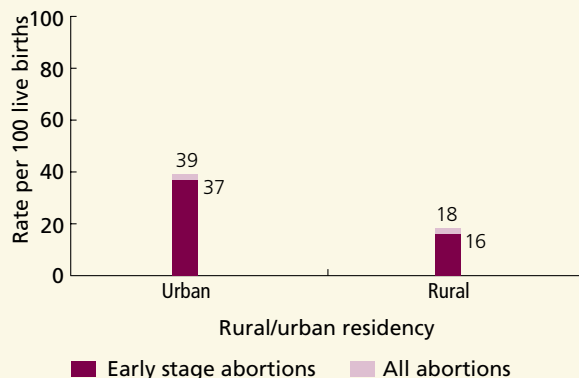
**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB)

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**Exhibit 10D.7** | Age-standardized overall and early stage (less than 16 weeks gestation) induced abortion ratio (per 100 live births among women aged 15-49), by rural/urban residency, in Ontario, 2007

**FINDINGS**

- The overall and early stage abortion ratios were twice as high among women living in urban areas as compared to women living in rural areas.



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

**NOTE:** See [Appendix 10.3](#) for definitions of rural/urban residency

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**Exhibit 10D.8 |** Age-standardized induced abortion ratio per 100 live births, by Local health Integration Network (LHIN), in Ontario, 2007

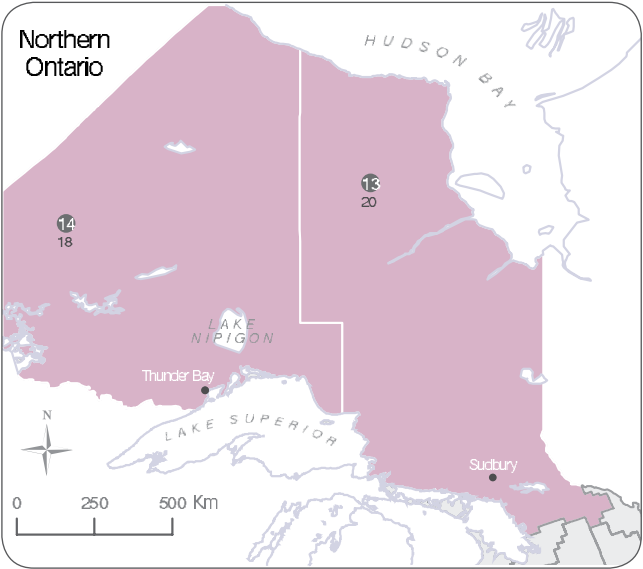
**FINDINGS**

- The overall abortion ratio varied across LHINs, ranging from 18 induced abortions per 100 live births in the Erie St. Clair and North West LHINs to 55 induced abortions per 100 live births in the Central West LHIN.

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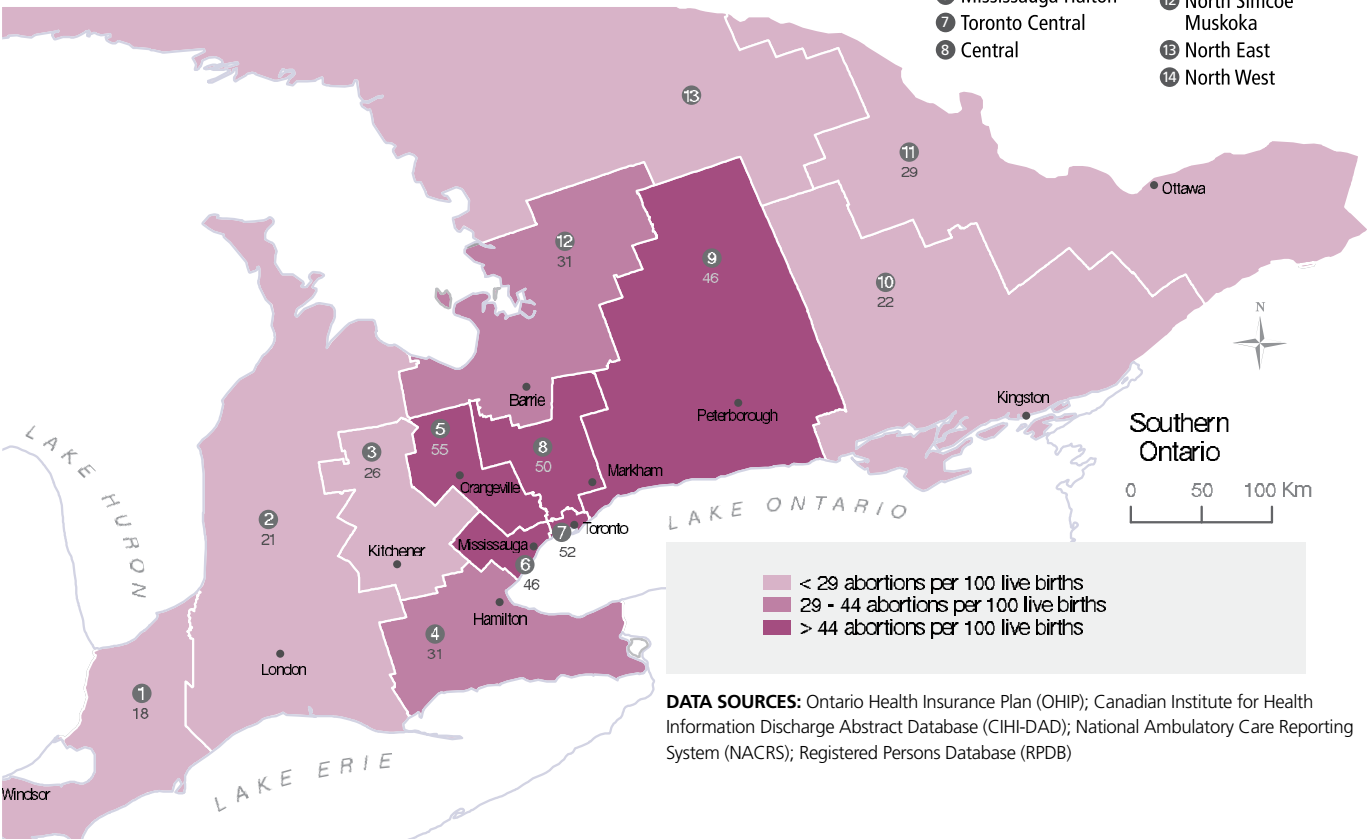
**Overall Ontario**

In Ontario, for every 100 live births the number of induced abortions was 37.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



Legend for Southern Ontario map:  
Light pink: < 29 abortions per 100 live births  
Medium pink: 29 - 44 abortions per 100 live births  
Dark pink: > 44 abortions per 100 live births

**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB)

## INPATIENT AND OUTPATIENT ABORTIONS IN ACUTE CARE HOSPITALS

**Indicator:** This indicator measures the percentage of acute care hospitals in Ontario that provide inpatient or outpatient abortion procedures.

**Background:** Induced abortions may be performed in hospitals (as a same day or inpatient procedure), non-hospital abortion clinics/surgical centres or doctors' offices. Since 1996, a decreasing proportion of induced abortions have been performed in hospitals while the proportion performed in clinics has increased.<sup>104</sup> A 2006 study found that "only 15.9 percent [of Canadian hospitals] provide abortion services" (that is one of every six hospitals) and that most of these facilities are in urban areas, within 150km of a U.S. border and are likely to provide abortions only up to 12 weeks gestational age.<sup>114</sup>

In Ontario, there are 114 acute care hospitals without religious affiliations or designation for a specific patient group, such as children, that could potentially provide abortion services. Provision of induced abortion procedures varies greatly by region. Women in large cities like Toronto have access to several options while women in rural or remote areas may need to travel considerable distances for the procedure. From 1985 to 1992, those counties with the lowest abortion rates had the largest proportion of women who travelled to another county for the procedure (in some of these counties no abortions were performed in local facilities).<sup>11</sup>

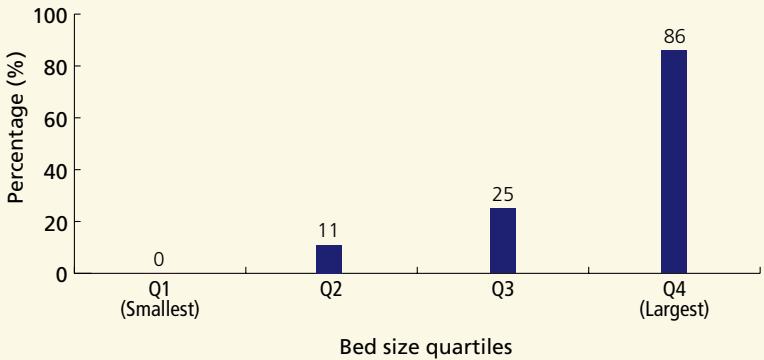
This indicator provides information on the proportion of Ontario hospitals performing abortions, excluding hospitals with religious affiliations and those designated for specific patient groups such as children. We report this indicator by hospital type (teaching versus non-teaching), hospital bed size and Local Health Integration Network (LHIN). We also describe the types of procedure (surgical versus medical/induced) performed and the proportion of procedures that were early stage abortions (less than 16 weeks gestation).

**Finding:** Abortions were provided in 35 (31 percent) of the 114 Ontario acute care hospitals (excluding hospitals with religious affiliations and those designated for specific patient groups, such as children) in 2007. Overall, 99 percent of hospital induced abortions were surgical procedures and the vast majority (94 percent) were performed before 16 weeks gestation.

**Exhibit 10D.9 | Percentage of hospitals<sup>^</sup> providing abortions<sup>¥</sup>, by quartile of hospital bed size, in Ontario, 2007**

**FINDINGS**

- Abortions were provided in all Ontario teaching hospitals (excluding hospitals with religious affiliations or designation for a specific patient group such as children) compared to 26 percent of non-teaching hospitals (data not shown).
- Hospital bed size was strongly associated with the provision of induced abortions. Abortions were performed in 86 percent of the hospitals in the largest bed size quartile whereas no abortions were performed in hospitals in the smallest bed size quartile.
- All Local Health Integration Networks (LHINs) have at least one hospital providing abortions (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Ontario Ministry of Health and Long-Term Care Master Numbering System (MNS) Database; Hospital Statistics (number of beds staffed and in operation)

<sup>^</sup> The list of acute care and ambulatory hospitals does not include specialty and religious hospitals. Hospitals that were part of a corporation or that were part of a hospital alliance with a single board of directors were counted as a single entity.

<sup>¥</sup> A hospital is considered to provide abortions if at least 6 procedures were performed in 2007. A hospital corporation, hospital alliance, or multi-site hospital is considered to provide abortions if at least 6 procedures were performed in 2007 across all of the hospitals making up the corporation/alliance.

**NOTE:** See [Appendix 10.3](#) for details of hospital bed size quartiles

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## PRIOR INDUCED ABORTIONS AMONG WOMEN HAVING A HOSPITAL ABORTION

**Indicator:** This indicator measures the percentage of induced abortions performed in hospitals that were provided to women with a history of previous induced abortions.

**Background:** According to 2008 data, approximately half of U.S. women seeking an abortion had had a previous abortion.<sup>118</sup> In an earlier study, women having repeat abortions (as compared to those seeking their first abortion) tended to be older, to already have children, and to be slightly more likely to be using a highly effective birth control method.<sup>124</sup> An Ontario study found that 32 percent of women in Southwestern Ontario seeking an abortion between August 1998 to May 1999 reported that they had a previous induced abortion.<sup>125</sup> In the same study, those seeking repeat abortions were older, more likely to be users of oral contraception, considerably more likely to have experienced physical abuse by a male partner and to have had a history of sexual abuse or sexual violence.

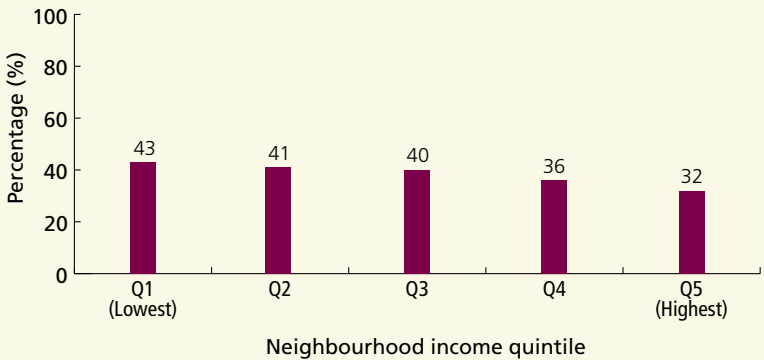
This indicator is calculated based on a woman's self-report of whether she had previous abortions as recorded in the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) or in the National Ambulatory Care Reporting System (NACRS). Research suggests that women underreport a history of previous abortion, so these data may underestimate the true percentage.<sup>126</sup>

**Finding:** Overall in Ontario, 40 percent of women having a hospital induced abortion reported having had a previous induced abortion.

**Exhibit 10D.10** | Age-standardized percentage of women who had hospital abortions who had at least one previous induced abortion, by neighbourhood income quintile, in Ontario, 2007

**FINDINGS**

- The percentage of women having hospital abortions who had previous induced abortions varied by neighbourhood income.
- Those living in the lowest-income neighbourhoods were more likely to have had a previous induced abortion (43 percent) than those living in the highest-income neighbourhoods (32 percent).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Statistics Canada 2006 Census

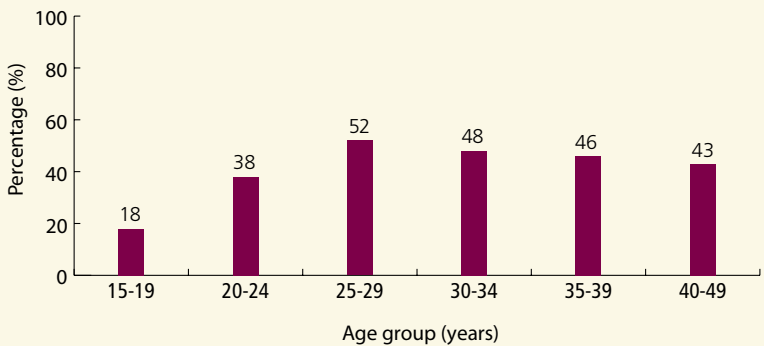
**NOTE:** See [Appendix 10.3](#) for details about neighbourhood income quintile calculation

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**Exhibit 10D.11** | Percentage of women who had hospital abortions who had at least one previous induced abortion, by age group, in Ontario, 2007

**FINDINGS**

- The percentage of women having hospital abortions who had previous induced abortions varied by age. The highest rate (52 percent) was among women aged 25-29 and the lowest rate (18 percent) was among women aged 15-19.



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB)

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## RATE OF SHORT-TERM POST-ABORTION COMPLICATIONS

**Indicator:** This indicator measures the percentage of abortions that were followed by a short-term (within 14 days) complication that resulted in emergency department/same day surgery visits or hospitalization.

**Background:** Two systematic Cochrane Collaboration reviews confirm the safety and effectiveness of medical and surgical abortions performed in countries where the procedure is legal, safe, and widely available.<sup>102,113</sup> In the U.S., complications requiring hospitalization occur in fewer than 0.3 percent of abortions.<sup>127</sup> A Danish study of abortion complications from 1980-1994 found short-term complications—mainly bleeding, infection or re-evacuation—occurred in about five percent of abortions. Complications were more frequent in teens, women living in rural areas and women with more advanced pregnancies.<sup>100</sup> An Ontario study based on administrative data from 1992-1993 found an immediate complication rate of 0.7 percent, with greater gestational age being a risk factor for complications.<sup>110</sup>

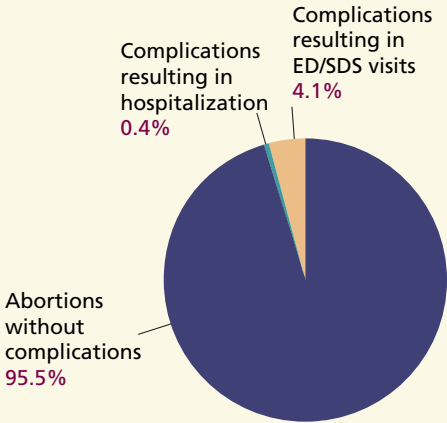
This indicator measures the short-term (within 14 days) complication rate after an abortion. Complications were limited to those that resulted in an emergency department/same day surgery visit or hospitalization, which are important measures of adverse abortion outcomes. Any visit to an emergency department/same day surgery or hospital admission within 14 days was classified as a complication, regardless of the reason for the visit/admission. Thus, some events unrelated to abortion may be included which would result in an overestimation of complication rates.

**Findings:** Overall in Ontario, emergency department/same day surgery visits or hospitalizations within 14 days and for any reason were observed after 4.5 percent of abortions, 0.4 percent of abortions resulted in hospitalization (see Exhibit 10D.12).

**Exhibit 10D.12** | Rates of short-term abortion complications (percentage of abortions) resulting in hospitalization and/or emergency department/same day surgery visits, in Ontario, 2007

**FINDINGS**

- The vast majority of abortions (95.5 percent) did not result in emergency department/same day surgery visits or hospitalizations.
- The short-term complication rate was 4.5 per 100 abortions, of which, 0.4 per 100 abortions resulted in hospitalization.
- The overall rates of short-term post-abortion complications varied by age, ranging from 5.2 per 100 abortions among women aged 15-19 to 3.5 per 100 abortions among women aged 40-49 (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

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# Section 10D

## SUMMARY OF FINDINGS

The vast majority of abortions in Ontario were performed before 16 weeks gestation and complication rates were low. As expected, age was the most important predictor of both the abortion rate and the number of abortions per 100 live births (abortion ratio). Neighbourhood income was also associated with the abortion rate and ratio, with the highest rate and ratio among women residing in the lowest-income neighbourhoods. The abortion rate and ratio were higher among women living in urban areas compared to women living in rural areas. Although there was at least one hospital in each Local Health Integration Network (LHIN) that provided abortions, abortion rates varied widely by LHIN.

### Abortion Rate

Almost all procedures (93 percent) were early stage abortions (performed before 16 weeks gestation). Women aged 20-24 had the highest rate of induced abortion at 3.4 per 100 women compared with 2.5 per 100 women aged 25-29 and 1.8 per 100 women aged 15-19. Rates varied by neighbourhood income, rural/urban residency and LHIN. Women residing in the lowest-income neighbourhoods were more than twice as likely to have an abortion as women residing in the highest-income neighbourhoods (2.1 per 100 abortions versus 1.0 per 100 abortions, respectively). The abortion rate varied across LHINs, ranging from 0.9 per 100 women in the Erie St. Clair LHIN to 2.5 per 100 women in the Central West LHIN. Urban women were more likely to have an abortion than their rural counterparts.

### Ratio of Abortions to Live Births

Women aged 15-19, were by far the most likely age group to have an abortion rather than a live birth if they became pregnant (152 abortions per 100 live births).

Women aged 20-24 and aged 40-49 also had abortion ratios that were higher than the overall population ratio of 37/100 live births. The lowest abortion ratio was in women aged 30-34, where birth rates are highest. The abortion ratio varied by LHIN, ranging from 18 per 100 live births in the Erie St. Clair and North West LHINs to 55 induced abortions per 100 live births in the Central West LHIN. The abortion ratio also varied by neighbourhood income; women residing in lower-income neighbourhoods had higher abortion ratios than women living in the highest-income neighbourhoods. The abortion ratio for women living in urban areas was more than twice that of their rural counterparts.

### Proportion of Ontario Hospitals Performing In-Patient or Out-Patient Abortions

Thirty-five of Ontario's 114 acute care hospitals (31 percent), excluding hospitals with religious affiliation or designation for a specific patient group such as children, provided abortions. All Ontario teaching hospitals (excluding hospitals with religious affiliations and those designated for specific patient groups, such as children) compared to 26 percent of non-teaching hospitals did so. Eighty-six percent of the largest hospitals (based on bed size) performed abortions but none of the province's smallest hospitals did. Every LHIN had at least one hospital that performed abortions. However, because some LHINs, particularly the North East and North West LHINs, are very large, having one hospital per LHIN does not necessarily mean that a woman can obtain a hospital abortion within a reasonable distance from her community.

Almost all hospital abortions were surgical and 94 percent were performed at less than 16 weeks gestation.

**Prior Induced Abortion Among Women Having a Hospital Abortion**

Forty percent of the women having a hospital abortion reported having a history of a previous abortion. Women who were older and those who resided in lower-income neighbourhoods were more likely to report having a history of a previous abortion.

**Rate of Short-Term Abortion Complications**

Emergency department/same day surgery visits or hospitalizations for any reason were observed after 4.5 percent of abortions; however, only 0.4 percent of abortions had a complication that resulted in hospitalization. Complication rates varied by age, with women aged 15-19 having the highest complication rate.

# Section 10E

## *Hysterectomy*

### INTRODUCTION

A hysterectomy is a surgical procedure to remove the uterus. Hysterectomy is the most common major surgical procedure in gynaecology.

Hysterectomies are done for many different indications, the majority of which are for benign conditions including fibroids, endometriosis, prolapse of the uterus, pelvic inflammatory disease or abnormal vaginal bleeding. In these cases, surgery is often done to alleviate symptoms and to improve quality of life.<sup>128</sup> Hysterectomies are also performed for cancers that arise in the uterus, cervix or endometrium or they can be performed if cancer spreads from other sites in the abdomen (e.g., colon or ovary) to the uterus. This section will focus on hysterectomies performed for benign conditions.

Previous research has shown that rates of hysterectomy for benign conditions vary a great deal across countries and even across regions within countries.<sup>16,17</sup> An earlier study showed that some of this variation is related to indications that are discretionary.<sup>16</sup> Along with geographic variation, there is evidence of variation in hysterectomy rates for benign conditions across socioeconomic strata. It has been reported that lower-income or less well educated women are more likely than higher-income women or women with more education to have hysterectomies for benign conditions.<sup>18,19,129</sup> There are many confounding factors in exploring these differences in rates of hysterectomy including the incidence of the underlying pathology, women's own decision making, as well as the ability of women to afford drug therapies or alternative

treatments.<sup>129</sup> There is some evidence that some women with some benign conditions experience an improvement of quality of life with the operation when compared to medical therapy.<sup>130</sup> It is important that the decision to have a hysterectomy is an informed choice of the woman after considering the pros and cons of all different treatment options.

There are different surgical techniques used to perform hysterectomies. In an abdominal hysterectomy, the uterus is removed through different types of incisions in the lower abdomen. In the vaginal approach for hysterectomy, the uterus is removed through an incision in the vagina. With a laparoscopic technique, the surgeon makes small incisions and the uterus can be removed ultimately from the apex of the vagina. Compared to traditional, open, abdominal hysterectomy, both vaginal hysterectomy and laparoscopic approaches to hysterectomy result in lower hospital lengths of stay, shorter recovery, improved patient satisfaction and decreased risks of complications.<sup>131-133</sup> The vaginal approach is recommended as a preferred option in order to decrease the risks of complications and improve the recovery from hysterectomy. A laparoscopic, surgical approach is indicated for the procedure if its use can avoid the need for a laparotomy. Abdominal hysterectomy then is the third option, if the minimally invasive approaches are not technically feasible or may be contraindicated.<sup>134-136</sup>



There is some evidence of regional and socioeconomic variation in access to laparoscopic hysterectomy. A cross-sectional study conducted in the U.S. showed that women with lower incomes were less likely to undergo laparoscopic hysterectomy compared with abdominal hysterectomy and found regional variation in types of procedure used.<sup>18</sup> While there are many factors that influence the choice of approach, surgeon preference is an important determinant of the procedure selected. There are significant variations in surgical approaches by surgeon and hospital type (teaching versus community).<sup>21,22</sup>

Whatever the operative technique, hysterectomy is a major surgical procedure and women who have these procedures are at risk for complications such as infection, organ injury and blood clots. These complications can have important effects on health status and in very rare cases, can lead to death. Complications are also associated with longer hospital lengths of stay and an increased risk of readmission to hospital. Some patients with complex medical conditions or advanced reproductive tract pathology may be at increased risk for complications. Variation in complication rates after hysterectomy across hospitals and regions may reflect different populations but could also suggest variations in the quality of care. The 2006 Hospital Report<sup>87</sup> used an expert panel to define a set of complications that were felt to be related to suboptimal quality of care for hysterectomies performed for a subset of benign conditions, specifically fibroids and abnormal uterine bleeding.

In this section of the chapter, we report on indicators that measure three important aspects of care related to hysterectomies performed for benign conditions including:

- Rates of hysterectomy for benign gynaecological conditions

- Proportion of all hysterectomies for benign conditions that are performed with a minimally invasive approach (either vaginally or laparoscopically)
- Complication rates in women undergoing hysterectomy for select benign gynaecological conditions

The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify women aged 15-84 who had a hysterectomy for benign gynaecological conditions in 2007. The benign gynaecological conditions included in the analysis were: fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, uterine prolapse and inflammatory diseases of female pelvic organs as a main or type 2 diagnosis (see [Appendix 10.3](#) for a full list of diagnostic codes used). The denominator for measuring the rate of hysterectomies was the number of women aged 15-84 residing in Ontario in 2007, obtained from the Registered Persons Database (RPDB). The methods of performing the hysterectomies were abdominal, vaginal or laparoscopic. This information was also obtained from the CIHI-DAD and were based on Canadian Classification of Interventions (CCI) codes. The complication rate for women who had hysterectomies was measured using data from the CIHI-DAD and the CIHI Same Day Surgery (SDS) database. This population was limited to women who had a hysterectomy for selected benign gynaecological conditions (fibroids excessive, frequent and irregular menstruation, other abnormal uterine and vaginal bleeding) as the expected rate and type of complications for these benign conditions is different from the rate and type expected for the other benign conditions (endometriosis or prolapse). Findings for each of these indicators are presented by age, neighbourhood income, neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN).

## EXHIBITS AND FINDINGS

### HYSTERECTOMY RATE FOR BENIGN CONDITIONS

**Indicator:** This indicator measures the hysterectomy rate for benign gynaecological conditions per 100,000 women aged 15-84 in 2007.

**Background:** Hysterectomy is a common procedure in women and most hysterectomies are performed for benign gynaecological conditions.<sup>137</sup> Previous studies have shown variations in hysterectomy rates for benign conditions by geography and socioeconomic status.<sup>16-19</sup> Variation in hysterectomy rates for benign conditions is driven by a range of factors including disease incidence, practice patterns, availability of alternative treatments, and women's preferences.<sup>16,129</sup> Thus, it is not clear what is the optimal procedure rate. Some women may experience barriers to getting a needed hysterectomy while others may undergo a hysterectomy when other approaches to management of their condition are preferable.

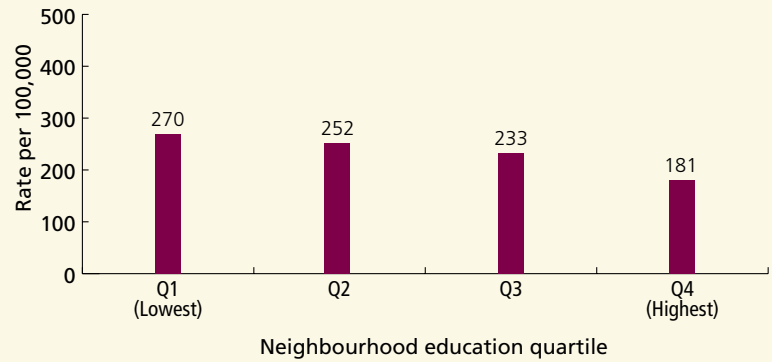
Hysterectomy rates in Ontario have declined over time from 654 per 100,000 in 1985/86 to 476 per 100,000 in 1997/98, although there remains significant regional variation in rates.<sup>138</sup> Our initial analysis showed that the overall provincial rate of hysterectomy in 2007 was 337 per 100,000 women aged 15-84, out of which 46 per 100,000 were in women with a diagnosis of gynaecological cancer, 258 per 100,000 were in women who had benign gynaecological conditions and 33 per 100,000 were in women with other diagnoses such as metastatic cancer from other sites or infection. We have restricted this indicator to hysterectomy rates for benign gynaecological conditions. The benign gynaecological conditions included in the analysis were: fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs. Data for this indicator were obtained from Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD). The methodology of the CIHI Health Indicators report used for calculation of the hysterectomy rate was used for analysis of this indicator. Thus, women with previous hysterectomy were not excluded from the analysis.

**Findings:** Overall in Ontario, 258 per 100,000 women aged 15-84 underwent a hysterectomy for a benign gynaecological condition.

**Exhibit 10E.1 | Age-standardized hysterectomy rates for benign conditions<sup>^</sup> per 100,000 women aged 15-84, by neighbourhood education quartile, in Ontario, 2007**

**FINDINGS**

- Hysterectomy rates for benign conditions varied by neighbourhood educational attainment.
- Hysterectomy rates were highest for women living in neighbourhoods with the lowest average educational attainment (270 per 100,000 women) and lowest for women living in neighbourhoods with the highest average educational attainment (181 per 100,000 women).
- Differences associated with neighbourhood income were small (data not shown).



**DATA SOURCES:** Canadian Institute for health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Statistics Canada 2006 Census

**NOTE:** See [Appendix 10.3](#) for details about neighbourhood education quartile calculation

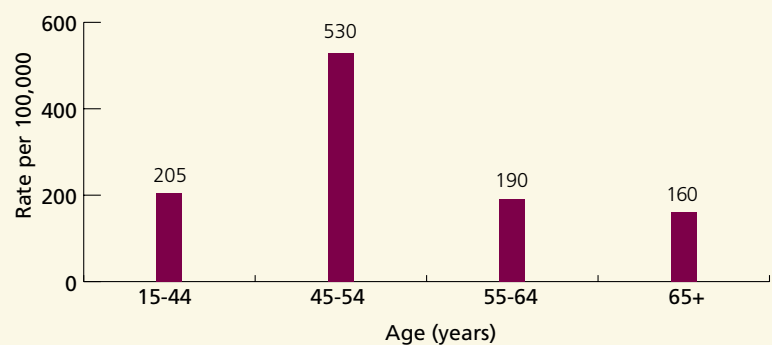
<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs.

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**Exhibit 10E.2 | Hysterectomy rates for benign conditions<sup>^</sup> per 100,000 women aged 15-84, by age group, in Ontario, 2007**

**FINDINGS**

- The hysterectomy rate for benign indications was highest among women aged 45-54 (530 per 100,000 women); the rate was more than double that seen for women in any other age group.



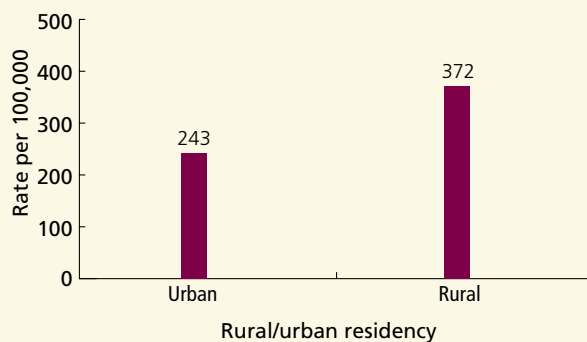
**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs

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**Exhibit 10E.3** | Age-standardized hysterectomy rate for benign conditions<sup>^</sup> per 100,000 women aged 15-84, by rural/urban residency, in Ontario, 2007**FINDINGS**

- Hysterectomy rates for benign conditions were higher—by more than 50 percent—among women living in rural areas (372 per 100,000) compared to those living in urban areas (243 per 100,000).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

**NOTE:** See [Appendix 10.3](#) for details about rural/urban residency

<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs

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**Exhibit 10E.4** | Age-standardized hysterectomy rate for benign conditions<sup>^</sup> per 100,000 women aged 15-84, by Local Health Integration Network (LHIN), in Ontario, 2007

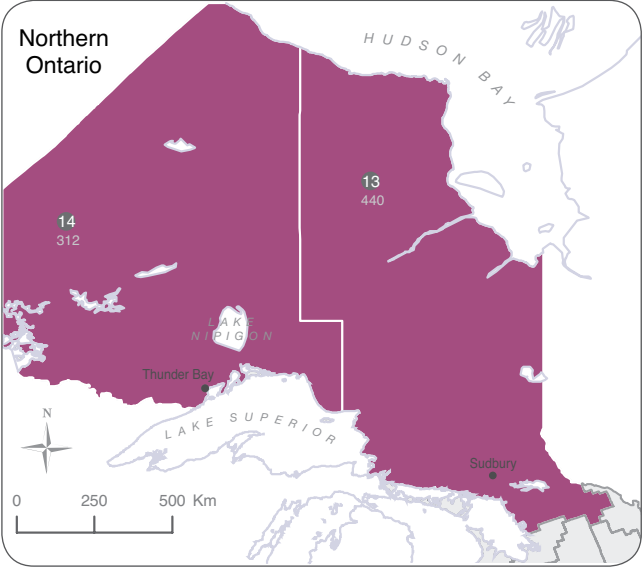
**FINDINGS**

- Hysterectomy rates for benign gynaecological conditions varied across LHINs with a greater than three-fold difference between the lowest and the highest rates.
- The rates ranged from 133 per 100,000 women (Toronto Central LHIN) to 440 per 100,000 women (North East LHIN).

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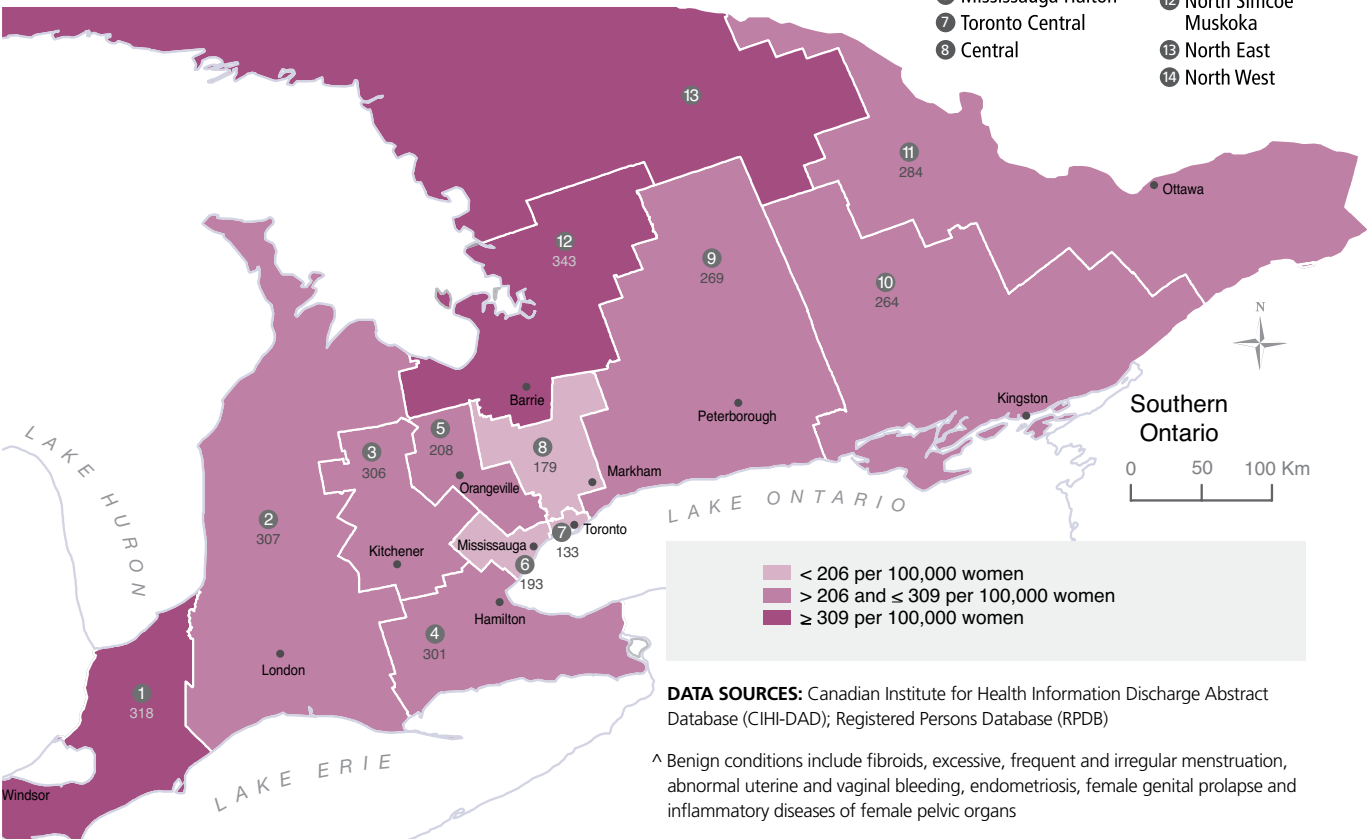
**Overall Ontario**

In Ontario, 258 per 100,000 women aged 15-84 had a hysterectomy for a benign gynaecological condition in 2007.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs

## USE OF LAPAROSCOPIC OR VAGINAL HYSTERECTOMY

**Indicator:** This indicator measures the percentage of women aged 15-84 who had a hysterectomy in 2007 for a benign gynaecological condition (fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs) who had either a vaginal or a laparoscopic hysterectomy.

**Background:** The approach to hysterectomy depends on the surgeon's expertise, the indications for surgery, the nature of the disease, patient characteristics and patient choice.<sup>134</sup> Because vaginal or laparoscopic hysterectomies are associated with lower rates of morbidity, fewer postoperative complications and a faster recovery time than abdominal hysterectomy, they are generally preferred over abdominal hysterectomy for most benign indications.<sup>139,140</sup> However, a U.S. cohort study found that household income, insurance status and race were important independent predictors of access to laparoscopic hysterectomy for benign conditions.<sup>19</sup>

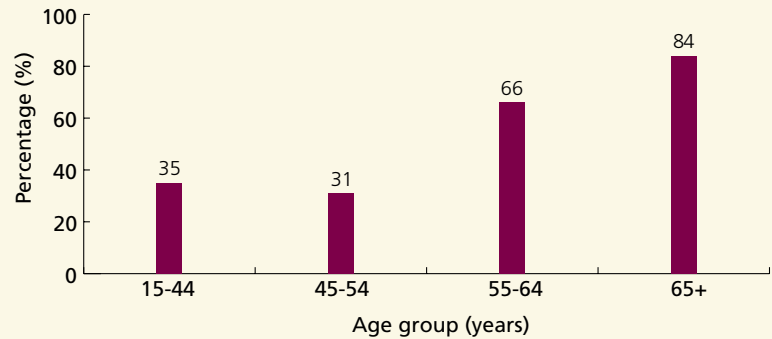
While the optimal proportion of hysterectomies that should be performed through the vaginal or laparoscopic route is not known, these methods are preferred when there are no clinical issues preventing their use.<sup>140</sup> Hysterectomies performed vaginally or laparoscopically were identified from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) based on Canadian Classification of Interventions (CCI) procedure codes (see [Appendix 10.3](#) for details about the included codes).

**Finding:** Overall in Ontario, among women aged 15-84 who underwent a hysterectomy for a benign gynaecological condition, 41 percent had either a vaginal or a laparoscopic hysterectomy and 59 percent had an abdominal hysterectomy.

**Exhibit 10E.5 | Percentage of women aged 15-84 who had a hysterectomy for a benign condition^ who had a vaginal or laparoscopic hysterectomy, by age group, in Ontario, 2007**

**FINDINGS**

- The proportion of women who underwent a hysterectomy for a benign condition who had a vaginal or laparoscopic hysterectomy varied by age.
- Women aged 15-44 and 45-54 were less likely to have a vaginal or laparoscopic hysterectomy than women aged 65 and older (35 percent, 31 percent and 84 percent, respectively). This likely reflects the incidence of underlying pathology. Younger women are more likely to have hysterectomy done for fibroids where the size of the uterus may impinge minimal access surgery. Older women are more likely to have their hysterectomy done for prolapse where the vaginal route is the best approach.
- The percentage of hysterectomies for benign gynaecological conditions that were performed vaginally or laparoscopically did not vary by neighbourhood income or by average neighbourhood educational attainment (data not shown).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

^ Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs.

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**Exhibit 10E.6 | Age-standardized percentage of women aged 15-84 who had a hysterectomy for a benign condition<sup>^</sup> who had a vaginal or laparoscopic hysterectomy, by Local Health Integration Network (LHIN), in Ontario, 2007**

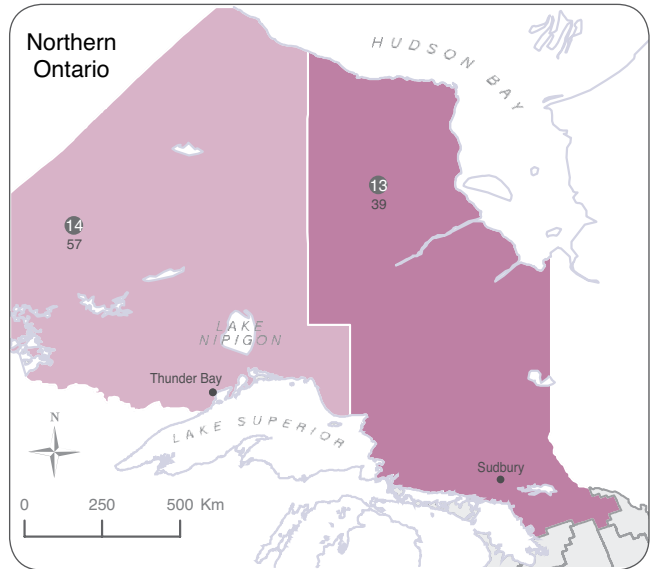
**FINDINGS**

- The percentage of women who underwent a hysterectomy for a benign gynaecological condition who had a vaginal or laparoscopic hysterectomy varied markedly across LHINs.
- There was a two-fold difference in rates across LHINs. The rates ranged from 30 percent in the Central East LHIN to 63 percent in the South West LHIN.
- The percentage of women who underwent a hysterectomy for a benign condition who had a vaginal or laparoscopic hysterectomy was somewhat higher among women living in rural areas as compared to women living in urban areas; 45 percent versus 41 percent, respectively (data not shown).

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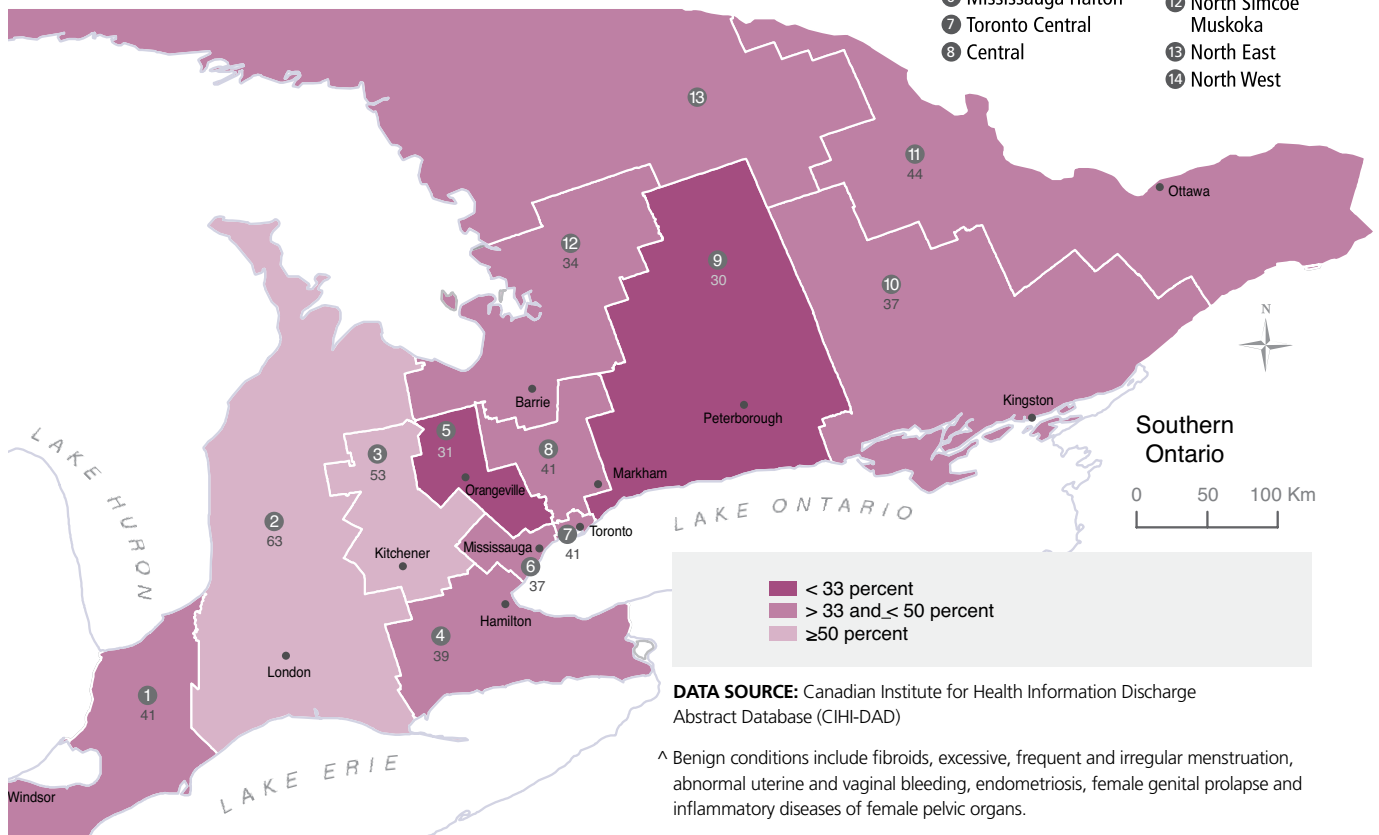
**Overall Ontario**

In Ontario, among women aged 15-84 who underwent a hysterectomy for a benign gynaecological condition, 41 percent had either a vaginal or a laparoscopically assisted hysterectomy.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



< 33 percent  
 > 33 and < 50 percent  
 ≥ 50 percent

**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs.

## COMPLICATION RATES IN WOMEN WHO UNDERWENT HYSTERECTOMIES FOR SELECTED BENIGN CONDITIONS

**Indicator:** This indicator measures the percentage of women who experienced any of a defined set of in-hospital complications after having a hysterectomy for selected benign gynaecological conditions (fibroids or abnormal uterine bleeding).

**Background:** Complication rates are indicators that may reflect both the complexity of a patient population and quality of care. The methods used to identify and calculate complication rates after a hysterectomy were developed and used by the Hospital Report and focused on a set of indications that would be expected to have similar risks and patterns of complications. The types of complications included hemorrhage, anesthesia and respiratory complications, surgical site and other infections, dehydration and others. According to the Hospital Report, in 2006 the rates of complications among women after hysterectomy for selected benign conditions varied by hospital type ranging from 1.4-2.6 percent.<sup>87</sup> According to a study conducted in the U.S., older age and comorbidities were associated with higher rates of complications after hysterectomy.<sup>141</sup>

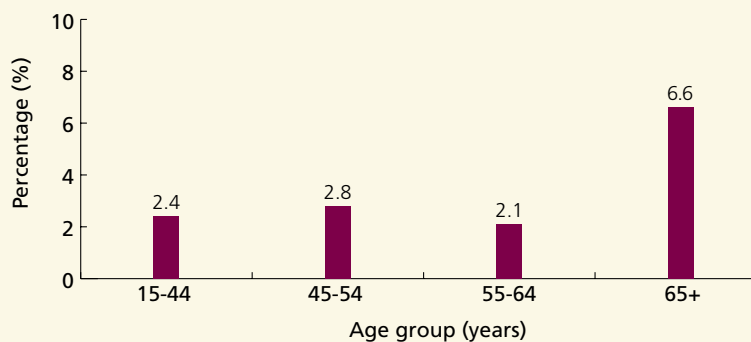
Data on complications (see [Appendix 10.3](#) for a complete list of complications included) during the hospital stay for a hysterectomy were obtained from Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and the Same Day Surgery (SDS) data. The population was limited to women who had a hysterectomy for fibroids, excessive, frequent and irregular menstruation and other abnormal uterine and vaginal bleeding,<sup>87</sup> as these are expected to result in similar patterns of complications. Our data capture is limited by lack of specific information on the disease extent leading to hysterectomy. Patients with extensive disease such as stage 4 endometriosis or previous complex pelvic surgeries will have a higher risk of complications with their hysterectomy and this data is not captured at present. For women who had a same day surgery, complications were included if an inpatient admission occurred on the same day the women had her procedure completed if it represented one of the included complications.

**Finding:** In Ontario, 2.6 percent of women who underwent a hysterectomy for a benign gynaecological condition (fibroids or abnormal uterine bleeding) had complications while in hospital.

**Exhibit 10E.7** | Percentage of women who experienced complications<sup>^</sup> while in hospital after a hysterectomy for a benign gynaecological condition (fibroids, abnormal uterine bleeding), by age group, in Ontario, 2007

**FINDINGS**

- Complication rates after a hysterectomy for fibroids or for abnormal uterine bleeding varied by age.
- Women aged 65 and older had complication rates that were about three times higher than women in any other age group (6.6 percent versus between 2.1-2.8 percent, respectively).
- Complication rates after a hysterectomy for fibroids or for abnormal uterine bleeding did not vary by neighbourhood income, average neighbourhood educational attainment or by rural/urban residency (data not shown).

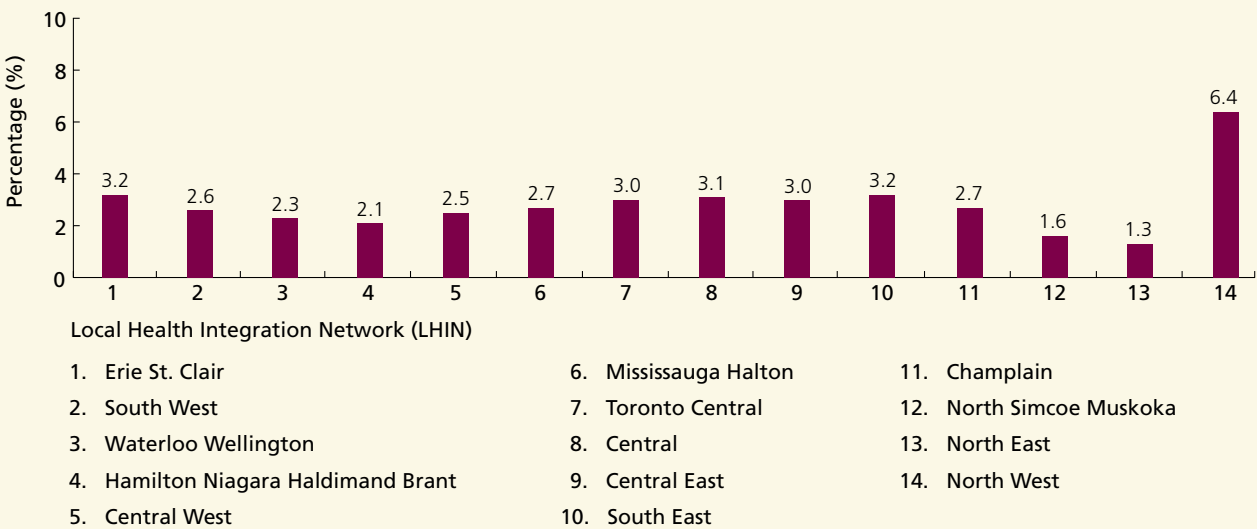


**DATA SOURCE:** Canadian Institute for health Information Discharge Abstract Database (CIHI-DAD)

<sup>^</sup> See [Appendix 10.3](#) for a list of included complications.

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**Exhibit 10E.8** | Age-standardized percentage of women who experienced complications<sup>^</sup> while in hospital after a hysterectomy for a benign gynaecological condition (fibroids, abnormal uterine bleeding), by Local Health Integration Network (LHIN), in Ontario, 2007



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

<sup>^</sup> See [Appendix 10.3](#) for a list of included complications

**FINDINGS**

- While the complication rates after a hysterectomy for a benign gynaecological condition (fibroids, abnormal uterine bleeding) varied from 1.3 percent (North East LHIN) to 6.4 percent (North West LHIN), the differences were not significant. This may be because of limited power to detect differences due to small numbers.

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# Section 10E

## SUMMARY OF FINDINGS

In general, hysterectomy indicators varied by age and Local Health Integration Network (LHIN), with little variation by neighbourhood income or average neighbourhood educational attainment. While hysterectomy rates in Ontario have been decreasing for decades, we found over a three-fold variation in hysterectomy rates across Local Health Integration Networks (LHINs). Likewise, there were large regional differences among women who had a hysterectomy in the percentage who underwent the preferred vaginal or laparoscopic routes for hysterectomy compared to an abdominal procedure. Findings for the indicators reported in this section are summarized below.

### Hysterectomy Rates for Benign Gynaecological Conditions

Overall in Ontario, 258 per 100,000 women in Ontario had a hysterectomy for a benign gynaecological condition. Rates did not vary by neighbourhood income, but did vary somewhat by rural/urban residency, age and LHIN. The hysterectomy rates were highest in women aged 45-54 and were higher in women living in rural areas compared to urban areas. Regional variation in hysterectomy rates ranged from 133 per 100,000 women (Toronto Central LHIN) to 440 per 100,000 women (North East LHIN).

### Laparoscopic or Vaginal Hysterectomy

Vaginal or laparoscopic hysterectomy is associated with lower rates of morbidity, faster recovery and better outcomes for women than abdominal hysterectomy. In Ontario, among women who underwent a hysterectomy for a benign gynaecological condition, 41 percent had a vaginal or laparoscopic hysterectomy. Women aged 65 and older were more likely than women aged 15-44 or women aged 45-54 (84 percent, 35 percent and 31 percent, respectively) to have had a vaginal or laparoscopic hysterectomy. The percentage of women who had a vaginal or laparoscopic hysterectomy did not vary by neighbourhood income or average neighbourhood educational attainment, but did vary somewhat by rural/urban residency and substantially by region ranging from 30 percent in the Central East LHIN to 63 percent in the South West LHIN.

### Complication Rates for Women Who Had Hysterectomies for Selected Benign Conditions

In Ontario, 2.6 percent of women who had a hysterectomy in 2007 for fibroids or abnormal bleeding had in-hospital complications after the surgery. Women aged 65 and older were 2-3 times more likely to experience complications than younger women. Complication rates did not vary by neighbourhood income or average neighbourhood educational attainment. As with other indicators in this section, there was regional variation in complication rates, however, our power to detect differences was limited by sample size.

# Section 10F

## *Sexually Transmitted Infections*

### INTRODUCTION

Sexually transmitted infections (STIs) are an important cause of avoidable morbidity and mortality among women and men.

STIs are transmitted by direct sexual contact via genital, anal or oral fluids of an infected person and can also be transmitted from mother to fetus. STIs can have significant health consequences and their incidence is associated with a wide range of biological, psychological and social determinants. While there have been many efforts aimed at STI-related prevention, education and health promotion, rates of STIs continue to rise in Ontario and nationally.<sup>142,143</sup> According to the Public Health Agency of Canada, STI rates have been increasing steadily since 1997. This trend is consistent with trends seen in other industrialized countries.<sup>142</sup>

Many STIs go undiagnosed and untreated. Rates of STI infection and their impact on health status can be reduced through public health and health promotion strategies as well as through clinical diagnosis and management, particularly in primary care. Prevention and intervention programs are most effective when targeted towards high risk groups. Reporting indicators for these diseases provides information to assess needs, target interventions, and monitor their effectiveness. In the [POWER Study Burden of Illness chapter](#) (chapter 3),<sup>144</sup> we reported that in Ontario in 2006, the incidence of chlamydia and gonorrhea were 206 and 35 per 100,000 population aged 15 and older, respectively. Incidence of both conditions varied by sex and age.

Sexually transmitted infections are an important public health concern in Canada and are included as nationally notifiable diseases. Rates of chlamydia, gonorrhea and syphilis in Canada have increased significantly between 1999-2008.<sup>142</sup> Chlamydia and gonorrhea rates are almost double what they were in 1999 and syphilis rates have seen a five-fold increase in the same period.<sup>142</sup> Canadian guidelines emphasize that both primary (identifying and treating infected individuals) and secondary (preventing further spread through strategies such as safer sex counselling and partner notification) prevention of infection is needed to decrease disease rates.<sup>143</sup> While the groups that are most affected by each infection vary, the recent Canadian STI guidelines<sup>143,145,146</sup> have highlighted some populations that are at increased risk including: immigrants and refugees, inmates and offenders, men who have sex with men (MSM)/women who have sex with women (WSW), sex workers and drug users.

Data on STI incidence were obtained from the integrated Public Health Information System (iPHIS) at the Ontario Ministry of Health and Long-Term Care (MOHLTC) and were extracted in September, 2010. Only confirmed cases were included and these may change due to periodic data quality checks or updating of reporting.

## EXHIBITS AND FINDINGS

### INCIDENCE OF NEW CASES OF CHLAMYDIA

**Indicator:** This indicator measures the incidence of new cases (per 100,000 population aged 15 and older) of chlamydia in the Ontario population aged 15 and older.

**Background:** Genital chlamydia is the most commonly reported sexually transmitted infection (STI) in Canada. Rates of chlamydia have almost doubled between 1999 and 2008.<sup>142</sup> Three-quarters of women and half of all men infected with chlamydia will have no symptoms. The lack of symptoms reduces the likelihood of testing and diagnosis, therefore, reported rates underestimate the true incidence of the disease in the population. Untreated chlamydia can lead to pelvic inflammatory disease (PID), which can result in chronic pelvic pain, ectopic pregnancy, and infertility. During pregnancy, chlamydia infection can increase the risk of prematurity and low birth weight in infants. For infected women who deliver vaginally, chlamydia can cause conjunctivitis and pneumonia in newborn infants. Since this infection disproportionately affects a younger population (women in particular) the consequences of untreated infection are of particular concern. In the [POWER Study Burden of Illness chapter \(chapter 3\)](#),<sup>144</sup> we reported that the rate of chlamydial infection was 252 per 100,000 women and 157 per 100,000 men.

Routine chlamydia screening and early treatment reduce the burden of this condition. Current Canadian STI guidelines recommend regular chlamydia screening for sexually active women aged 25 and under, high-risk women (e.g., new sexual partner, two or more sexual partners in the previous year) and all pregnant women. While the evidence for screening in men is not conclusive, the current Canadian guidelines recommend that all sexually active males under the age of 25 should be screened, however men are less likely to undergo screening than women.<sup>143</sup> Like all bacterial STIs, chlamydia increases the risk of acquisition and/or transmission of HIV.

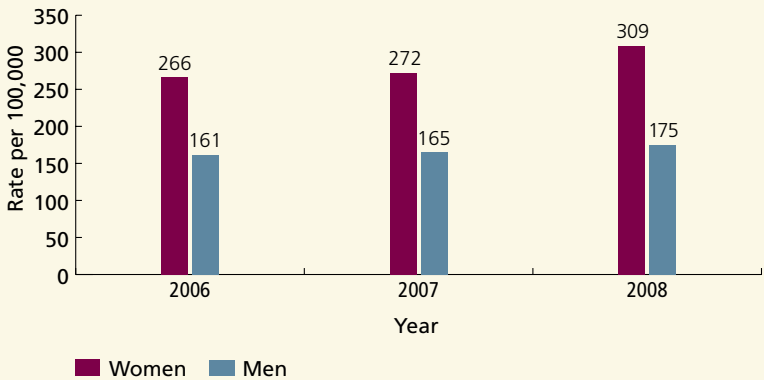
**Findings:** In 2008, the rate of new cases of chlamydia among Ontarians aged 15 and older was 244 per 100,000 population. Women had significantly higher rates of chlamydia than men, 309 per 100,000 women compared to 175 per 100,000 men.



**Exhibit 10F.1 | Incidence of new cases of chlamydia (per 100,000 population), by sex and year, in Ontario, 2006-2008**

**FINDINGS**

- Chlamydia rates have increased somewhat over time, which is consistent with reported trends.
- In each year, women were more likely than men to have been diagnosed with chlamydia. Men with chlamydial infection may be less likely to be diagnosed, so the actual difference in incidence between men and women is likely less than reported here.



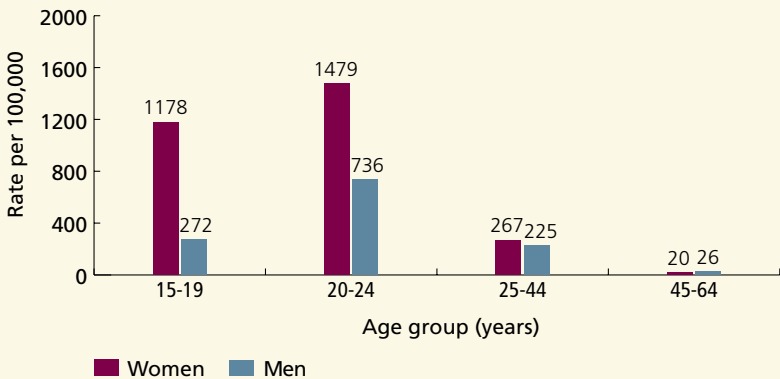
**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15 and older

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**Exhibit 10F.2 | Incidence of new cases of chlamydia (per 100,000 population), by sex and age group, in Ontario, 2008**

**FINDINGS**

- Chlamydia rates varied by age; women and men aged 20-24 had higher chlamydia rates than younger and older adults.
- With the exception of those aged 45-64, women had higher rates of chlamydial infection than similarly aged men. Differences in screening patterns may have contributed to these differences.



**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15-64

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## INCIDENCE OF NEW CASES OF GONORRHEA

**Indicator:** This indicator measures the incidence of new cases (per 100,000 population aged 15 and older) in the Ontario population aged 15 and older.

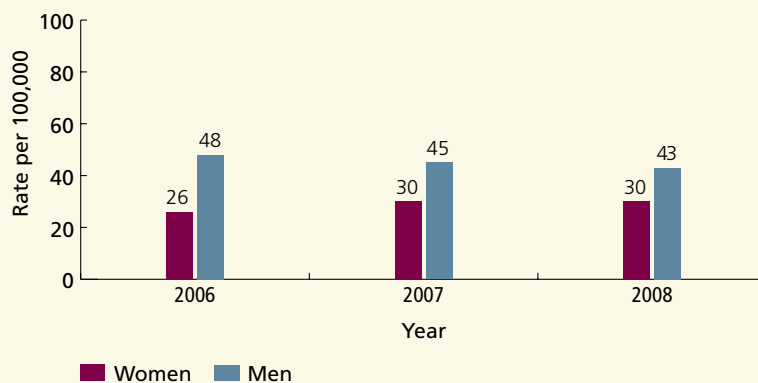
**Background:** Gonorrhea is the second most commonly reported sexually transmitted infection (STI) in Canada.<sup>142</sup> The overall rate of gonorrheal infection in Canada more than doubled between 1997 and 2006 and the most affected groups were men aged 20-24 and women aged 15-19.<sup>142</sup> The consequences of untreated gonorrheal infection can be quite severe for women (e.g., pelvic inflammatory disease which can lead to chronic pelvic pain, ectopic pregnancy and infertility). As well, gonorrhea can be transmitted to newborn infants if the mother remains untreated. Men with an untreated infection are at risk of epididymitis. Gonorrhea in an HIV-positive individual increases virus transmission, and conversely, those with gonorrhea who are exposed to HIV are more susceptible to infection.<sup>147</sup>

**Findings:** In 2008, the rate of new cases of gonorrhea among Ontarians aged 15 and older was 36 per 100,000 population. Men had significantly higher rates of new infection than women (30 per 100,000 women compared to 43 per 100,000 men).

### Exhibit 10F.3 | Incidence of new cases of gonorrhea (per 100,000 population), by sex and year, in Ontario, 2006-2008

#### FINDINGS

- Gonorrhea rates have declined slightly over time among men, with a slight increase among women.
- In each year, men were more likely than women to have been diagnosed with gonorrhea.



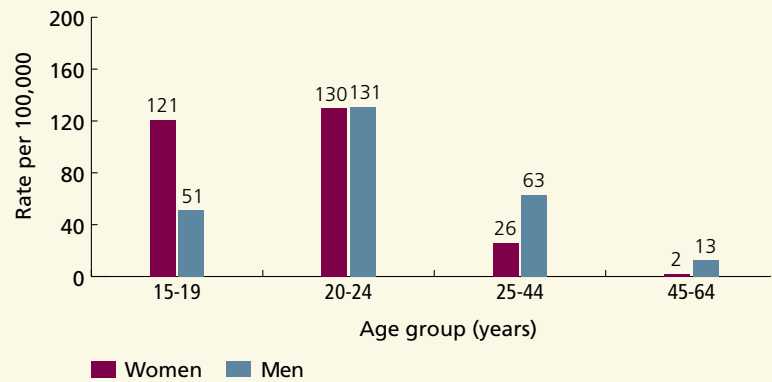
**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15 and older

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**Exhibit 10F.4 | Incidence of new cases of gonorrhea (per 100,000 population), by sex and age group, in Ontario, 2008**

**FINDINGS**

- Among women, the incidence of new cases of gonorrhea was highest among those aged 20–24, followed by those aged 15–19 (131 and 121 per 100,000, respectively).
- The incidence of new reported cases of gonorrhea were similar in men and women among those aged 20–24, and higher among men than among women aged 25–44 (63 vs. 26 per 100,000) and aged 45–64 (13 vs. 2 per 100,000).
- Among those aged 15–19, gonorrhea case rates among women were more than twice the rates reported among men (121 vs. 51 per 100,000 respectively).



**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15-64

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## INCIDENCE OF NEW CASES OF SYPHILIS

**Indicator:** This indicator measures the incidence of new cases (per 100,000 population aged 15 and older) of syphilis in the Ontario population aged 15 and older.

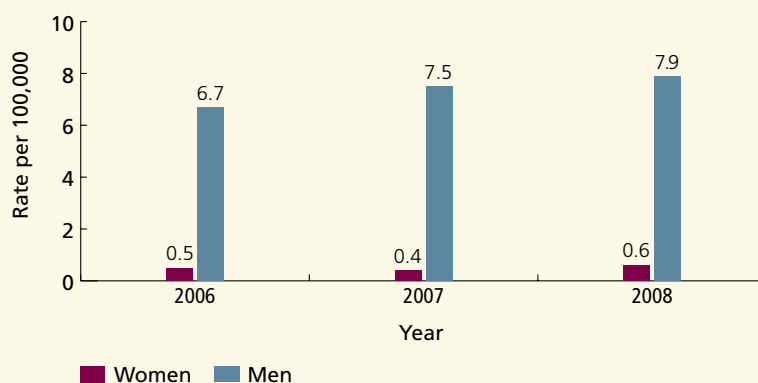
**Background:** Syphilis rates in Canada have shown a seven-fold increase between 1999 and 2008, from 0.6 per 100,000 to 4.2 per 100,000. Syphilis rates are historically higher in men than in women and in 2008, men accounted for 86.1 percent of all cases.<sup>142</sup> Untreated syphilis will progress through primary, secondary, tertiary and latent stages; the late latent state is not infectious. If left untreated, syphilis infection may lead to serious complications including damage to the central nervous system, cardiovascular system and other internal organs as well as death. Women can transmit syphilis to their infants (congenital syphilis). We will not report on rates of congenital syphilis in this section. As with other sexually transmitted infections, syphilis infection increases the risk of HIV infection and transmission.<sup>143</sup>

**Findings:** In 2008, the rate of new cases of syphilis among Ontarians aged 15 and older was 4.2 per 100,000 population. Men had higher rates than women (0.6 per 100,000 women compared to 7.9 per 100,000 men).

### Exhibit 10F.5 | Incidence of new cases of syphilis (per 100,000 population), by sex and year, in Ontario, 2006-2008

#### FINDINGS

- Syphilis rates have increased slightly over time among men.
- In all years, men were substantially more likely than women to have been diagnosed with syphilis.



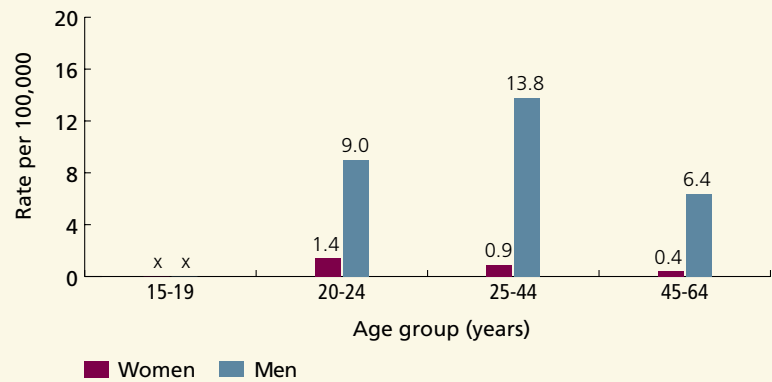
**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15 and older

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**Exhibit 10F.6 | Incidence of new cases of syphilis (per 100,000 population), by sex and age group, in Ontario, 2008**

**FINDINGS**

- Syphilis rates were highest among women aged 20-24 compared to older women.
- Among men, rates were highest among those aged 25-44 compared to younger and older men.
- Among adults aged 20 and older, men had higher rates of syphilis than women.
- For both women and men, the numbers of reported cases were negligible among those aged 15-19.



**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15-64  
X Suppressed due to small numbers

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## INCIDENCE OF NEW CASES OF HEPATITIS B

**Indicator:** This indicator measures the incidence rate (per 100,000 population aged 15 and older) or rate of new cases of acute hepatitis B in the Ontario population aged 15 and older.

**Background:** Hepatitis B is a viral infection that is transmitted through sexual contact and through contact with blood and bodily fluids (semen, vaginal secretions and saliva). While the majority of people who become infected with hepatitis B will naturally clear their infection, ten percent of individuals will become chronically infected and infectious. The incidence of acute hepatitis B is estimated to be 2.3 per 100,000 and the rate is higher in men than in women.<sup>143,148</sup>

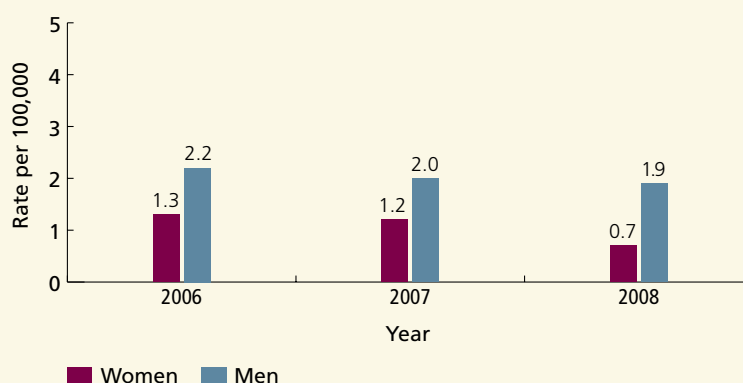
The major risk factors for hepatitis B infection include injection drug use and sexual risk behaviours. Hepatitis B is a vaccine preventable disease and the introduction of targeted and school-based immunization programs followed by a universal program for vaccination in children in Ontario has substantially reduced the incidence of the disease.<sup>148</sup>

**Findings:** In 2008, the rate of new cases of hepatitis B among Ontarians aged 15 and older was 1.3 per 100,000 population. Men had significantly higher rates than women (0.7 per 100,000 women compared to 1.9 per 100,000 men).

### Exhibit 10F.7 | Incidence of new cases of hepatitis B (per 100,000 population), by sex and year, in Ontario, 2006-2008

#### FINDINGS

- Hepatitis B rates have declined slightly over time for women and for men.
- In each year, men were more likely than women to have been diagnosed with hepatitis B.



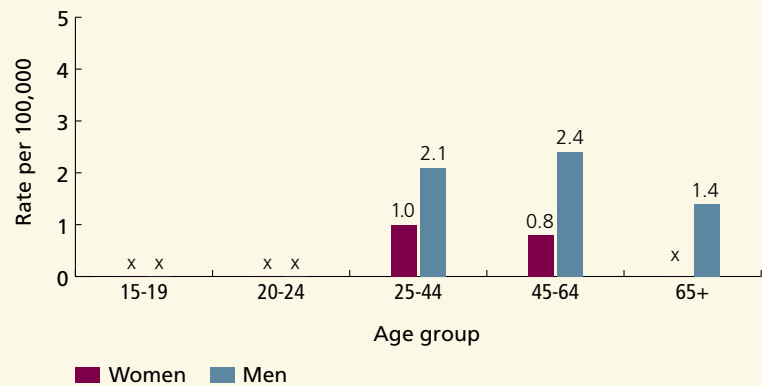
**DATA SOURCE:** Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15 and older

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**Exhibit 10F.8 | Incidence of new cases of hepatitis B (per 100,000 population), by sex and age group, in Ontario, 2008**

**FINDINGS**

- Among women, the rate of new cases of hepatitis B could only be reported among those aged 25-64 and were slightly higher among the younger age group. For women aged 15-24 or 65 and older, the number of cases in 2008 was too small to report.
- Among men, hepatitis B rates were highest among those aged 45-64 compared to younger and older men. Rates among those aged 15-24 could not be reported due to the small numbers of cases.
- Among adults aged 25-44 and 45-64, the incidence of new cases of hepatitis B was two to three times higher among men than among women.



**DATA SOURCE:** Data source: Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care  
Population is limited to those aged 15 and older  
X Suppressed due to small numbers

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# Section 10F

## SUMMARY OF FINDINGS

Sexually transmitted infections (STIs) are an important public health problem in Ontario. In this section, we report the incidence of new cases of chlamydia, gonorrhea, syphilis and hepatitis B infection. For all four STIs, the rates varied by sex and age group with some variation in rates over time.

### Incidence of New Cases of Chlamydia

The provincial rate of new cases of chlamydia in 2008 was 244 per 100,000 population aged 15 and older, with higher rates among women than among men (309 per 100,000 women versus 175 per 100,000 men). The sex difference may be due to differences in screening rates for women and men, rather than due to real differences in infection rates. The rate of new cases of chlamydial infection has increased somewhat over time. It also varied by age and was highest among women aged 20-24 followed by women aged 15-19. Among men, the rate of new cases was highest among those aged 20-24.

### Incidence of New Cases of Gonorrhea

The overall provincial rate of new cases of gonorrhea in 2008 was 36 per 100,000 population aged 15 and older, with higher rates among men than among women (43 per 100,000 men versus 30 per 100,000 women). The rate of new cases of gonorrhea varied by age and was highest among men and women aged 20-24.

### Incidence of New Cases of Syphilis

The overall provincial rate of new cases of syphilis in 2008 was 4.2 per 100,000 population aged 15 and older, with higher rates among men than among women (7.9 per 100,000 men versus 0.6 per 100,000 women). The rate of new cases of syphilis infection has increased somewhat over time among men, but the pattern is less clear among women. Among adults aged 20 and older, men had higher rates of syphilis than women.

### Incidence of New Cases of Hepatitis B

The overall provincial rate of new cases of hepatitis B in 2008 was 1.3 per 100,000 population aged 15 and older, with higher rates among men than among women (0.7 per 100,000 men versus 1.9 per 100,000 women). The rate of new cases of hepatitis B has declined slightly over time. Among adults aged 25-44 and 45-64, the rate of new cases of hepatitis B was two to three times higher among men than among women.

# Chapter Summary of Findings

In this chapter we report on the reproductive and gynaecological health of Ontario women and present results on the performance of the Ontario health care system for quality of care indicators associated with childbirth (prenatal, delivery and postpartum care), abortion, hysterectomy and sexually transmitted infections. Table 1 provides a summary of where differences were observed by age, neighbourhood income, average neighbourhood educational attainment, rural/urban residency and Local Health Integration Network (LHIN). The indicators we measured consistently varied by LHIN, the age of women and somewhat by rural/urban residency (where data could reliably be reported). Few indicators varied by neighbourhood income or average neighbourhood educational attainment. Some indicators of childbirth were additionally stratified by delivery type.

## Prenatal Care

Indicators of prenatal care included the type of health professional providing prenatal care to women, maternal multiple marker screening and screening for group B streptococcus (GBS). The type of provider for prenatal care and screening rates for GBS varied across LHINs, and all three indicators varied somewhat by age, but did not vary by neighbourhood income or education.

The vast majority of women who gave birth in Ontario hospitals—80 percent—received prenatal care from an obstetrician, 27 percent received care from a general practitioner/family physician (GP/FP) and six percent received at least some prenatal care from a midwife. Since women may get prenatal care from more than one type of professional, the percentages will add up to more than 100 percent.

Older women were more likely than younger women to receive prenatal care from an obstetrician and younger women were more likely to receive care from

a GP/FP, which may be reflective of older women's increased likelihood of complications. Women were far more likely to receive care from a GP/FP or a midwife if they lived in the northern part of the province than if they lived in southern Ontario.

Sixty-six percent of women underwent maternal multiple marker screening and the screening rate increased with age which is consistent with the notion that the rates of genetic and congenital problems that the screening tests detect increase with age. Women who are at higher risk, based on age, may be more willing to undergo screening. Rates of maternal multiple marker were not reported by LHIN, because of a large number of records with missing postal code information. Improvements in data quality in the future will allow better estimates of regional rates of screening.

GBS screening rates between 35 and 37 weeks gestation for women who delivered in hospital after 37 weeks gestation were quite high (93 percent). Rates varied slightly by age but did not vary by the neighbourhood income or average neighbourhood educational attainment of the mother. GBS screening rates varied by LHIN from 82 percent in the Hamilton Niagara Haldimand Brant LHIN to 97 percent in the Central East LHIN. This suggests that the screening program is better implemented in some LHINs than in others.

## Childbirth

The childbirth indicators measured included rate of live births to teenage mothers, providers attending childbirths, intervention rates (induction, episiotomy, assisted vaginal delivery and caesarean delivery) and measures of maternal and neonatal outcomes (rates of third and fourth degree lacerations, severe maternal morbidity, birth trauma or injury to newborns and low

five-minute Apgar score). The indicators in this section all varied significantly across LHINs (where data could reliably be reported), some varied by maternal age but there was little or no variation by neighbourhood income or by average neighbourhood educational attainment, with the exception of live births to teenage mothers.

The rate of live births to teenage mothers (aged 15-19) was 10 per 1,000. The rates increased with age, from 1.2 per 1,000 among women aged 15 to 21.4 per 1,000 women aged 19. These rates also varied across LHINs from 3.8 per 1,000 women aged 15-19 in the Mississauga Halton LHIN to 28.2 per 1,000 women aged 15-19 in the North West LHIN. Importantly, teenagers who lived in the lowest-income or lowest average educational attainment neighbourhoods had birth rates that were more than five times higher than teenagers who lived in the highest-income and highest-educated neighbourhoods.

Most women (86 percent) had an obstetrician in attendance when they give birth in hospitals. Women aged 35 and older were more likely to have an obstetrician and less likely to have a GP/FP attend their childbirth than women aged 20 and younger; this may reflect the increased likelihood of complications among older women compared to younger women. Aside from the age-related variation, there was also wide LHIN variation in the types of provider attending childbirths; women from northern Ontario were more likely to have care provided by a midwife and less likely to have care provided by an obstetrician than women from southern Ontario.

## Interventions

Among women who delivered in Ontario hospitals, one-quarter of deliveries were induced; one in five women with full-term (37 or more weeks gestation), singleton, vertex, vaginal deliveries had an episiotomy; One in ten vaginal deliveries were forceps- and/or vacuum-assisted and almost three in ten deliveries in Ontario were done by caesarean section. Where rates could reliably be reported, intervention rates all varied

somewhat by maternal age and by LHIN. Based on the additional stratifications that were analysed, it was clear that the use of these interventions was driven in part by clinical factors. For example, caesarean section rates were higher for women with a past history of caesarean sections or with breech presentations compared to women with full-term, singleton vertex presentations.

Among women who had full-term, singleton, vertex presentations, induction rates were higher among nulliparous women (no prior deliveries) versus multiparous (at least one prior delivery) women (32 percent versus 22 percent, respectively). Among nulliparous women only, induction rates increased with age.

Among all women who delivered in Ontario hospitals, episiotomy rates were almost four times higher in assisted (forcep and/or vacuum) deliveries compared to spontaneous deliveries—53 percent versus 14 percent respectively. Episiotomy rates varied by LHIN among women who had full-term, singleton, vertex deliveries from seven percent (North West LHIN) to 31 percent (Central LHIN). In all LHINs, rates were higher among women who had assisted vaginal deliveries compared to women who had spontaneous vaginal deliveries. Episiotomy rates also varied somewhat by age, but only among women with assisted vaginal deliveries.

Rates of forceps- and/or vacuum-assisted vaginal deliveries varied by LHIN. The rate of forceps-assisted vaginal deliveries ranged from 0.7 percent in the North Simcoe Muskoka LHIN to 6.2 percent in the Erie St. Clair LHIN. The rates of vacuum-assisted vaginal deliveries ranged from 2.0 percent in the South West LHIN to 10.0 percent in the Toronto Central LHIN. In most LHINs (with the exception of three), it was more common for women to have vacuum-assisted rather than forceps-assisted vaginal deliveries. The rates of assisted vaginal deliveries decreased as age increased, for both vacuum-assisted and forceps-assisted vaginal deliveries.

Twenty-eight percent of all hospital deliveries were done by caesarean section and this rate varied across subgroups of women. Among women with a history of previous caesarean section, 84 percent of deliveries

were done by caesarean section; among women with full-term, singleton, breech presentations, 98 percent of deliveries were done by caesarean section; among women with full-term, singleton, vertex presentations, 23 percent of deliveries were done by caesarean section. Among all women who delivered in Ontario, caesarean section rates increased with age, from 18 percent among women aged 20 and younger to 36 percent among women aged 35 and older. Provincial caesarean section rates—as with all other interventions—varied by LHIN ranging from 24 percent of deliveries in the South West LHIN to 31 percent of deliveries in the North Simcoe Muskoka LHIN. Caesarean section rates also varied by LHIN among women who had a previous caesarean section ranging from 71 percent in the North West LHIN to 89 percent in the North Simcoe Muskoka LHIN; and among women who had full-term, singleton, vertex presentations, from 17 percent of deliveries in the South West LHIN to 26 percent of deliveries in the North Simcoe Muskoka LHIN.

### Maternal and Neonatal Outcomes

The overall rates of adverse outcomes (severe maternal morbidity, birth trauma to newborns and low five-minute Apgar score) were low and provide evidence that Ontario is overall a very safe place for women to give birth and for babies to be born. As with other indicators in this section, outcomes did not vary by neighbourhood income or by average neighbourhood educational attainment, but did vary by age group and by LHIN.

Among women with full-term, singleton, vertex, vaginal deliveries, 3.2 percent of deliveries resulted in third or fourth degree perineal lacerations. Laceration rates were highest among women aged 21–34 and varied by LHIN, from 1.5 percent in the North Simcoe Muskoka LHIN to 4.4 percent in the Toronto Central LHIN.

Among women who delivered in Ontario hospitals, the severe maternal morbidity rate within 30 days of delivery was 39.4 per 1,000 deliveries. The most

common cause of severe maternal morbidity—accounting for 95 percent of cases—was postpartum hemorrhage (36.6 per 1,000 deliveries) and the most common type of postpartum hemorrhage was atonic postpartum hemorrhage. The rates of severe maternal morbidity varied by LHIN from 24 per 1,000 deliveries in the Mississauga Halton LHIN to 71 per 1,000 deliveries in the North West LHIN. A similar pattern was seen for postpartum hemorrhage. The rates of both severe maternal morbidity and postpartum hemorrhage were higher among women residing in rural areas compared to women residing in urban areas.

Overall in Ontario, the rate of birth trauma or injury to neonates was 6.6 per 1,000 live births and the rate of low five-minute Apgar score (three or less) was 0.25 percent or 2.5 per 1,000 full-term newborns. As with other indicators, neonatal outcomes varied by LHIN.

### Postpartum Care

The postpartum care indicators included rates of early hospital discharge for women who had vaginal and caesarean deliveries as well as maternal and neonatal readmission rates. Maternal readmission rates were measured at 14 days and 90 days post-discharge and neonatal readmission rates were measured at 28 days after delivery. As with other indicators in this chapter, the measures of postpartum care did not vary by neighbourhood income or neighbourhood educational attainment, but did vary by LHIN.

Nearly three-quarters of women who had a vaginal delivery were discharged from hospital early (i.e., within 48 hours of delivery) and almost 90 percent of women who had a caesarean section were discharged from hospital early (i.e., within 96 hours of delivery). Early discharge rates varied across LHINs, ranging from 53 percent (North West LHIN) to 83 percent (Waterloo Wellington LHIN) for women who had vaginal deliveries and from 68 percent (North West LHIN) to 94 percent (Erie St. Clair LHIN) for women who had

caesarean deliveries. Rural women were somewhat less likely than urban women to be discharged early from hospital, irrespective of the type of delivery.

Maternal readmission rates within 14 days (all-cause or postpartum-related) and within 90 days (all-cause) of discharge were consistently higher for women who delivered by caesarean section than for women who delivered vaginally. Among women who delivered in Ontario hospitals, about one in 160 women were readmitted within two weeks after a vaginal delivery and about one in 70 were readmitted within two weeks after a caesarean delivery; 85 percent of 14-day readmissions were for diagnoses specifically associated with postpartum morbidity. Fourteen-day readmission rates (all-cause and postpartum-related) for women who delivered by caesarean section were more than double the rates seen for women who delivered vaginally. Fourteen-day readmission rates varied by LHIN for all women, irrespective of type of delivery. Readmission rates varied by age for women who delivered by caesarean section and were highest among women aged 20 and younger.

Ninety-day readmission rates are more reflective of care received in the community, after hospital discharge. For women who delivered in Ontario hospitals, the 90-day maternal readmission rate was 1.4 percent, and—as was the case for 14-day readmission rates—women who delivered by caesarean section were more likely to be readmitted than women who delivered vaginally (2.1 percent of deliveries versus 1.2 percent of deliveries, respectively). As well, 90-day readmission rates were highest among women aged 20 and younger who had caesarean sections and were higher for women who lived in rural areas compared to women who lived in urban areas. Ninety-day readmission rates varied by LHIN, ranging from 0.7 percent (Central West LHIN) to 2.2 percent (North West LHIN) for women who had vaginal deliveries and from 1.4 percent (North Simcoe

Muskoka LHIN) to 3.8 percent (North West LHIN) for women who had caesarean deliveries.

About one in 30 infants were readmitted to hospital within 28 days of birth and jaundice accounted for almost half of all neonatal readmissions. Neonatal readmission rates varied by LHIN, ranging from 2.8 percent in the South West and Hamilton Niagara Haldimand Brant LHINs to 4.4 percent in the Erie St. Clair LHIN and were higher among those living in urban areas as compared to rural areas.

### Abortion

Abortion indicators included the abortion rate, abortion ratio (to live births) and complication rates. We also report the proportion of hospitals (excluding hospitals with religious affiliation or designation for a specific patient group such as children) that provide abortion services and the proportion of women who have a history of abortions among women having an abortion. The vast majority of abortions in Ontario (93 percent) were performed early on in the pregnancy (less than 16 weeks gestation) and had low complication rates. As expected, a woman's age was the most important predictor of the abortion rate and the number of abortions per 100 live births (abortion ratio). Neighbourhood income and rural/urban residency were also associated with the abortion rate and ratio. Although there was at least one hospital in each LHIN that provided abortions, abortion rates and ratios varied by LHINs.

Women aged 20-24 had the highest rate of induced abortion compared to older and younger women. Women residing in the lowest-income neighbourhoods were more than twice as likely to have an abortion as women residing in the highest-income neighbourhoods (2.1 abortions per 100 women versus 1.0 abortions per 100 women, respectively). The abortion rate varied by LHIN, ranging from 0.9 per 100 women in the Erie St. Clair LHIN to 2.5 per

100 women in the Central West LHIN. Women living in urban areas were more likely to have an abortion than women living in rural areas. Forty percent of the women having a hospital abortion reported having a history of a previous abortion. Women who were older and who resided in lower-income neighbourhoods were more likely to report a history of a previous abortion than their counterparts.

The abortion ratio measures the number of abortions in relation to the total number of live births. Women aged 15-19, had the highest abortion ratio (152 abortions per 100 live births). The lowest abortion ratio was in women aged 30-34, where birth rates are highest. Women residing in lower-income neighbourhoods had higher abortion ratios compared to women living in the highest-income neighbourhoods. The overall abortion ratio varied by LHIN, ranging from 18 induced abortions per 100 live births in the Erie St. Clair and North West LHINs to 55 induced abortions per 100 live births in the Central West LHIN. Women living in urban areas had abortion ratios that were more than twice that of their rural counterparts.

Thirty-five (31 percent) of Ontario's 114 acute care hospitals (excluding hospitals with religious affiliation or designation for a specific patient group such as children) provide abortion services. All Ontario teaching hospitals (excluding hospitals with religious affiliation or designation for a specific patient group such as children) provide abortions but only slightly more than one-quarter of the non-teaching hospitals do so. Eighty-six percent of the largest bed size hospitals provide abortions but none of the province's smallest bed size hospitals do. Despite each LHIN having at least one hospital that performed abortions, there was still wide variation in rates across LHINs. LHINs are large geographic areas so the hospital may be a considerable distance from some women living in the LHIN. It should be noted that we did not examine gestational age limits for these hospitals.

Short-term complications, defined as any emergency department/same day surgery visit or hospitalization within 14 days after the abortion, regardless of the reason for the visit, were reported in 4.5 percent of abortions; however only 0.4 percent of abortions resulted in hospitalization. Complication rates varied by age, with women aged 15-19 having the highest complication rates; however, complications requiring hospitalization did not show age-related variation. Some events unrelated to abortion may be included which will result in an overestimation of complication rates.

### Hysterectomy

In the section on hysterectomy, we report the hysterectomy rate for benign gynaecological conditions, the rate of laparoscopic or vaginal hysterectomy and the complication rates following hysterectomy. As with many of the other indicators in this chapter, there was variation by age and LHIN, with little variation by neighbourhood income or average neighbourhood educational attainment.

Overall, 258 per 100,000 women had a hysterectomy for a benign gynaecological condition in 2007. Rates varied somewhat by rural/urban residency, age and LHIN. The hysterectomy rates were highest in women aged 45-54 and were higher among women living in rural areas compared to women living in urban areas. Regional variation in hysterectomy rates ranged from 133 per 100,000 women (Toronto Central LHIN) to 440 per 100,000 women (North East LHIN).

Vaginal or laparoscopic hysterectomy is associated with lower complication rates and better outcomes for women than abdominal hysterectomy. Among women who underwent a hysterectomy for a benign gynaecological condition, 41 percent had a vaginal or laparoscopic hysterectomy. Women aged 65 and older were more likely than women aged 15-44 or women aged 45-54 (84 percent, 35 percent and 31 percent, respectively) to have had a vaginal or laparoscopic



hysterectomy. The percentage of women who had a vaginal or laparoscopic hysterectomy varied somewhat by rural/urban residency and substantially by LHIN, ranging from 30 percent in the Central East LHIN to 63 percent in the South West LHIN.

In Ontario, 2.6 percent of women who had a hysterectomy in 2007 for fibroids or abnormal bleeding had in-hospital complications after the surgery. Women aged 65 and older were 2-3 times more likely to experience complications than younger women. As with other indicators in this section, complication rates varied by LHIN, ranged from 1.3 percent (North East LHIN) to 6.4 percent (North West LHIN), however the variation was not significant, possibly due to small numbers and limited power to detect differences.

### **Sexually Transmitted Infections**

The incidence of new cases of sexually transmitted infections (STI) among Ontarians aged 15 and older in 2008 was highest for chlamydia (244 per 100,000 population) followed by gonorrhea (36 per 100,000 population), syphilis (4.2 per 100,000 population) and hepatitis B (1.3 per 100,000 population). With the exception of chlamydia, STI rates were higher among men than among women. Chlamydia rates were higher for women than for men, possibly due to differences in screening. Rates of all infections varied by age.







**Table 10.1** | Factors associated with differences in burden of disease, access to care, quality of care and outcomes associated with reproductive and gynaecological health

Indicators	Overall Result	Stratification Factor				
		Age	Income	Education	Rural / Urban Residency	LHIN
Prenatal Care (3 indicators)						
Types of health care professionals who provided prenatal care after the first trimester to women who delivered in hospital						
• Obstetricians	80%	Y	N	N	•	Y
• General practitioners/family physicians (GP/FPs)	27%	Y	N	N	•	Y
• Midwives	6%	Y	N	N	•	Y
Percentage of women who gave birth in hospital who underwent at least some multiple marker screening for Down's syndrome, trisomy 18 and/or open neural tube defects	66%	Y	•	•	•	•
Percentage of women who were screened for group B streptococcus (GBS) colonization between 35 and 37 weeks gestation among women who gave birth in a hospital after 37 weeks gestation	93%	Y	N	N	•	Y
Childbirth (10 indicators)						
Rate of live births to teenage women aged 15-19	10^	Y	Y	Y	Y	Y
Provider type						
Types of health care professionals who attended in-hospital births						
• Obstetricians	86%	Y	N	N	•	Y
• GP/FPs	9%	Y	N	N	•	Y
• Midwives	4%	N	N	N	•	Y

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Indicators	Overall Result	Stratification Factor				
		Age	Income	Education	Rural / Urban Residency	LHIN
Childbirth (10 indicators)						
Interventions						
Labour induction rate (percentage of hospital deliveries)	25%	Y	N	N	•	•
• Labour induction rate (percentage of hospital deliveries) among women with full-term (37 or more weeks gestation) singleton vertex deliveries						
– Nulliparous women	32%	Y	N	N	•	•
– Multiparous women	22%	N	N	N	•	•
Episiotomy rate (percentage of deliveries) among women with full-term singleton vertex deliveries	20%	N	N	N	•	Y
• Episiotomy rate (percentage of deliveries) among women who had <b>spontaneous</b> vaginal deliveries	14%	N	N	N	•	Y
• Episiotomy rate (percentage of deliveries) among women who had <b>assisted</b> vaginal deliveries (forceps or vacuum extracted)	53%	Y	N	N	•	Y
Percentage of women who gave birth who had assisted vaginal births (vacuum extraction and/or forceps)						
• Forceps-assisted vaginal births	2.8%	Y	N	N	•	Y
• Vacuum-assisted vaginal births	7.1%	Y	N	N	•	Y
• Forceps and vacuum-assisted births	0.4%	Y	N	N	•	Y
Rate of caesarean section among women:						
• Who gave birth	28%	Y	N	N	•	Y
• With full-term singleton vertex presentation	23%	Y	N	N	N	Y
• Who had a previous caesarean section	84%	N	N	N	•	Y
• With full-term singleton breech presentation	98%	N	N	N	•	N

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Indicators	Overall Result	Stratification Factor				
		Age	Income	Education	Rural / Urban Residency	LHIN
Maternal and neonatal health outcomes						
Percentage of deliveries resulting in third or fourth degree perineal lacerations among women with full-term singleton vertex vaginal deliveries	3.2%	Y	N	N	•	Y
• Third degree perineal lacerations	2.7%	Y	N	N	•	Y
• Fourth degree perineal lacerations	0.5%	Y	N	N	•	Y
Rate of severe maternal morbidity (e.g., postpartum hemorrhage, eclampsia, amniotic fluid embolism, pulmonary and circulatory disorders)	39.4 <sup>‡</sup>	N	N	Y	Y	Y
• Rate of postpartum hemorrhage	36.6 <sup>‡</sup>	N	Y	Y	Y	Y
Rate of birth trauma or injury to newborns	6.6 <sup>#</sup>	•	N	•	N	•
Percentage of term newborns (37 and more weeks of gestation) who had a 5-minute Apgar score of 3 and less	0.3%	N	N	N	•	Y
Postpartum Care (4 indicators)						
Percentage of women discharged early from hospital after childbirth						
• Less than 48 hours after vaginal delivery	73%	Y	N	N	Y	Y
• Less than 96 hours after caesarean delivery	88%	N	N	N	Y	Y
Percentage of women who were readmitted to hospital within 14 days post-discharge after giving birth						
• All-cause readmissions	0.8%	Y	N	N	N	Y
• Post-partum related readmissions	0.7%	N	N	N	N	Y
• After a vaginal delivery						
– All-cause readmissions	0.6%	N	N	N	N	Y
– Post-partum related readmissions	0.5%	N	N	N	N	Y

POWER Study

Indicators	Overall Result	Stratification Factor				
		Age	Income	Education	Rural / Urban Residency	LHIN
Postpartum Care (4 indicators) (continued)						
• After a caesarean delivery						
– All-cause readmissions	1.4%	Y	N	N	N	Y
– Post-partum related readmissions	1.2%	Y	N	N	N	Y
Percentage of women who were readmitted to hospital within 90 days post-discharge after giving birth (all-cause readmissions)	1.4%	Y	N	N	Y	Y
• Vaginal delivery	1.2%	N	N	N	Y	Y
• Caesarean section	2.1%	Y	N	N	N	Y
Percentage of newborns who were readmitted to the hospital within 28 days of birth	3.5%	•	N	•	Y	Y
Abortion (4 indicators)						
Rate of induced abortions in women aged 15-49						
• All abortions	1.5 <sup>x</sup>	Y	Y	•	Y	Y
• Early stage (less than 16 weeks gestation) abortions	1.4 <sup>x</sup>	Y	Y	•	Y	Y
Number of induced abortions in women aged 15-49 per 100 live births (abortion ratio)						
• All abortions	37	Y	Y	•	Y	Y
• Early stage (less than 16 weeks gestation) abortions	34	Y	Y	•	Y	Y
Percentage of induced abortions performed in hospitals among women who had previous abortions	40%	Y	Y	•	Y	Y
Rate of short-term abortion complications resulting in hospitalization and/or emergency department/same day surgery (ED/SDS) visitss	45 <sup>y</sup>	Y	Y	•	Y	Y
• Inpatient hospitalization	0.4 <sup>y</sup>	N	N	•	Y	Y
• ED/SDS visits	4.5 <sup>y</sup>	Y	N	•	Y	Y

POWER Study

Indicators	Overall Result	Stratification Factor				
		Age	Income	Education	Rural / Urban Residency	LHIN
Hysterectomy (3 indicators)						
Hysterectomy rate for benign gynaecological conditions among women aged 15-84	258 <sup>†</sup>	Y	Y	Y	Y	Y
Percentage of women aged 15-84 who had a hysterectomy for a benign gynaecological condition who had either a vaginal or a laparoscopically-assisted hysterectomy	41%	Y	N	N	Y	Y
Percentage of women who experienced complications while in hospital after a hysterectomy for a benign gynaecological condition (fibroids, abnormal uterine bleeding)	2.6%	Y	N	N	N	N
Sexually Transmitted Infections (4 indicators)						
	Overall Result	Sex	Age			
Rates of new cases of chlamydia	244 <sup>‡</sup>	Y	Y			
Rates of new cases of gonorrhea	36 <sup>‡</sup>	Y	Y			
Rates of new cases of syphilis	4.2 <sup>‡</sup>	Y	Y			
Rates of new cases of hepatitis B	1.3 <sup>‡</sup>	Y	Y			
‡ Rate per 1,000 deliveries		¥ Rate per 100 abortions				
# Rate per 1,000 live births		† Rate per 100,000 women aged 15-84				
^ Rate per 1,000 women aged 15-19		∞ Rate per 100,000 population aged 15 and older				
x Rate per 100 women aged 15-49						

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# Discussion

This chapter reports on indicators related to reproductive and gynaecological health for conditions and clinical situations that are primarily unique to women.

We included measures of teenage pregnancy, prenatal care, childbirth, postpartum care, abortion and hysterectomy in women as well as rates of sexually transmitted infections (STIs) in women and men. Because of the central role that pregnancy and childbirth play in the lives of many women, a substantial proportion of the chapter deals with indicators related to prenatal care, the processes and consequences of childbirth and postpartum care and outcomes. Unlike other POWER chapters that have a focus on the differences in care between men and women, this chapter looks predominantly at care provided to women and focuses on the relationship between the demographic and socioeconomic characteristics of these women—how old they are, neighbourhood income and education levels and where they live—and the care that they receive.

There is much good news. Overall rates of adverse outcomes related to childbirth are low. Hysterectomy rates have declined and the proportion that is done through the less invasive vaginal or laparoscopic routes has increased. A key finding was that there is a substantial amount of regional variation in many indicators of obstetrical and gynaecological care. Key components of reproductive care for women such as who provides prenatal care, how babies are delivered (e.g., vaginally or by caesarean section), whether a woman has a hysterectomy for a benign, gynaecological condition and whether the procedure is performed in the least invasive way possible varied substantially across Local Health Integration Networks (LHINs).

Neighbourhood level income and education were not associated with most indicators of reproductive and gynaecological care. On the other hand, women living in low-income neighbourhoods or neighbourhoods where average educational attainment is low are more likely to have children when they are teenagers than women living in higher-income neighbourhoods or neighbourhoods with higher average educational attainment. Induced abortion rates also varied by neighbourhood income, with the highest rates in women residing in lower-income neighbourhoods.

Part of the regional variation in reproductive care in Ontario may be the result of differences in women's health needs. However, it is unlikely that differences in need can explain all the observed variation. In many clinical situations there is no clear evidence that one course of action is better than another and women should be able to make informed choices based on a clear understanding of the risks and benefits of the alternatives and taking into account their preferences and values. In many cases two women in the same clinical situation might legitimately and appropriately decide on different treatment options. Inherent in this is the idea that access to legitimate alternatives and a commitment to shared decision making should not be limited by where a woman lives.

Improving access to reproductive health care that encompasses a full range of therapeutic options requires that there be a sufficient number of health care providers with the appropriate training to deliver



those options. These services need to be appropriately distributed throughout the province. Women's access to essential services should not be limited by their socioeconomic position or where they live. In addition, women need to be provided with the information required to make an informed choice. Therefore, strategies to improve access must address multiple factors related to the health system: provider training; funding and distribution; as well as the social determinants of health that may underpin a lack of access. Essential and commonly used reproductive and gynaecological health care should be accessible within a reasonable distance of where a woman lives.

In Canada, all the professions involved in providing obstetrical care have worked together to develop joint policies around childbirth that recommend the development of national practices guidelines, that recognize the importance of interdisciplinary care and that promote informed and shared decision making.<sup>149</sup> The Society of Obstetricians and Gynaecologists of Canada, the Association of Women's Health, Obstetrical and Neonatal Nurses of Canada, the Canadian Association of Midwives, the College of Family Physicians of Canada and the Society of Rural Physicians of Canada have worked together to ensure that all women have access to advanced obstetrical care.<sup>150</sup> It is also possible to learn from other jurisdictions in their efforts to improve reproductive and gynaecological care. For example in the U.S., a partnership of provider and public organizations has produced a book that focuses on improving the quality of perinatal care by applying evidence-based practice and clinical guidelines that illustrates specific strategies and interventions that incorporate robust process and systems change.<sup>151,152</sup>

There are many therapeutic options for women with dysfunctional uterine bleeding including medical/hormonal options and surgical approaches, including hysterectomy. Research to evaluate patient satisfaction

and quality of life for women choosing these various treatments should be encouraged. For example, hysterectomy done by the vaginal route is associated with lower complication rates and better outcomes for women than abdominal hysterectomy, and is preferred when clinical factors allow. However, it requires specialized training. Developing preceptorships in minimally invasive approaches to hysterectomy would increase the pool of gynaecologists who could offer this service. Recognizing that most women with menstrual disturbances first seek care from their family physician, the College of Family Physicians of Canada has developed a popular program on the treatment of benign uterine conditions to provide family physicians with the knowledge and skills required to treat many menstrual disturbances without need for referral.

The process of informed consent for treatment is an important part of the provision of clinical care. Informed consent as articulated in [Ontario's] Health Care Consent Act, 1996<sup>153</sup> includes disclosure of the nature of the treatment; expected benefits, material risks and material side effects of the treatment; alternative courses of action and likely consequences of not having the treatment. This information needs to be provided to a woman regardless of the provider's practice styles or preferences or regional access to the required services. A clearer understanding of the extent to which regional variations in reproductive care for women in Ontario relate to their informed choices and/or access to resources is essential to the development of policies and initiatives that will result in women having access to appropriate services and receiving the material information that is required in order to make an informed clinical decision.

## KEY FINDINGS

With few exceptions, performance on most indicators did not vary by neighbourhood income or average neighbourhood educational attainment. We found important regional variation on most indicators examined, with wide variation observed across LHINs for some indicators.

### Prenatal Care

- Most women who gave birth in Ontario hospitals—80 percent—received prenatal care from an obstetrician, 27 percent received care from a general practitioner/family physician (GP/FP) and six percent received prenatal care from a midwife. Since women may get prenatal care from more than one type of professional, the percentages will add up to more than 100 percent.
- Women who live in the northern part of the province were more likely to receive prenatal care from a family doctor or a midwife than those who live in southern Ontario.
- About two-thirds of pregnant women underwent maternal multiple marker screening for chromosomal anomalies (Down syndrome, trisomy 18) and/or open neural tube defects as part of their prenatal care and over 90 percent of women who delivered after 37 weeks gestation were screened for group B streptococcus (GBS) colonization.

### Childbirth

- The overall rates of adverse outcomes (severe maternal morbidity, birth trauma to newborns and low five-minute Apgar score) were low and provide evidence that Ontario is a very safe place for women to give birth and for babies to be born.

- Overall, the rate of live births to teenage mothers (aged 15-19) was 10 per 1,000. Teenagers who lived in the lowest-income neighbourhoods had live birth rates that were over five times higher than teenagers who lived in the highest-income neighbourhoods (20.6 versus 3.6 per 1,000 women aged 15-19, respectively). A similar pattern was observed by average neighbourhood educational attainment.
- Twenty-eight percent of all hospital deliveries were done by caesarean section. Among women who had full-term, singleton, vertex presentations, 23 percent of deliveries were done by caesarean section. Among women who had a history of caesarean section, 84 percent of deliveries were done by caesarean section.
- Provincial caesarean section rates varied by LHIN from 24 percent of deliveries in the South West LHIN to 31 percent of deliveries in the North Simcoe Muskoka LHIN. Episiotomy and assisted delivery rates also varied by LHIN.

### Postpartum Care

- Nearly three-quarters of women who had a vaginal delivery were discharged home early (i.e., within 48 hours of delivery) and almost 90 percent of women who had a caesarean section were discharged home early (i.e., within 96 hours of delivery). Early discharge rates varied across LHINs from 53 percent (North West LHIN) to 83 percent (Waterloo Wellington LHIN) for women who had vaginal deliveries and from 68 percent (North West LHIN) to 94 percent (Erie St. Clair LHIN) for women who had caesarean deliveries. Rural women were somewhat less likely than urban women to be discharged early from hospital, irrespective of the type of delivery.

- All-cause or postpartum-related maternal readmission rates within 14 days or readmission rates within 90 days of discharge were consistently higher for women who delivered by caesarean section than for women who delivered vaginally.
- About one in 30 infants was readmitted to hospital within 28 days of birth and jaundice accounted for almost half of all of these neonatal readmissions. Neonatal readmission rates varied by LHIN and were higher among those living in urban areas as compared to rural areas.

### Abortion

- Women residing in the lowest-income neighbourhoods were more than twice as likely to have an abortion as women residing in the highest-income neighbourhoods, 2.1 abortions per 100 women versus 1.0 abortion per 100 women, respectively. Urban women were more likely to have an abortion than their rural counterparts. Regional variation in abortion rates ranged from 0.9 per 100 women (Erie St. Clair LHIN) to 2.5 per 100 women (Central West LHIN).
- Complication rates after abortion were low; 4.1 percent of abortions were associated with a subsequent emergency department or same day surgery visit for any reason and 0.4 percent were associated with a subsequent hospital admission.

### Hysterectomy

- Hysterectomy rates in the province have declined over time. Overall, 258 out of every 100,000 women had a hysterectomy for a benign gynaecological condition; rates varied by average neighbourhood educational attainment. Regional variation in hysterectomy rates ranged from 133 per 100,000 women (Toronto Central LHIN) to 440 per 100,000 women (North East LHIN).
- Hysterectomy done by the vaginal or laparoscopic route is associated with lower complication rates and better outcomes for women than abdominal hysterectomy, and is preferred when clinical factors allow. The percentage of women who had a vaginal or laparoscopic hysterectomy varied substantially by LHIN ranging from 30 percent in the Central East LHIN to 63 percent in the South West LHIN.

## LIMITATIONS

Although we have a great deal of data on the types of services received and increasingly on some important outcomes through the Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal database, there are some important limitations to the data. Perhaps most importantly, we know much more about the services received than the services offered to women. In area of reproductive care for women, where in so many cases there are options for care and where preferences and values of patients and clinical details are so important in determining appropriate care, more data on the choices offered to women and their families and better data on the specific clinical circumstances are essential to determining if regional differences in care reflect differences in what patients want or differences in the types of care they are offered. We were able to assess rates of screening for chromosomal anomalies (Down syndrome, trisomy 18) and/or open neural tube defects using data from the Ontario Maternal Multiple Marker Screening (OMMMS)

program. However, we can not assess, whether a woman was offered screening or the extent to which a women was provided information about the benefits and risks of screening and was able to make an informed decision about undergoing screening.

We use neighbourhood level data on income and education but we lack detailed individual level data on these characteristics that are essential to understanding equity. Neighbourhood level measures capture the impact on health of living in a low-income neighbourhood or neighbourhoods with lower average educational attainment. While these measures have also been well-validated as proxy measures of individual socioeconomic status, they are subject to measurement error in neighbourhoods where households with a mix of income or education levels reside. Importantly, where data on postal code are substantially and/or systematically missing, neighbourhood level values cannot be attributed.

## WHAT WE CANNOT MEASURE

The chapter provides data on many important aspects of reproductive care for women, however, there are many other aspects of reproductive and gynaecological health where indicators were identified but for which data were not available.

Thanks to the investment in BORN Ontario, we now have access to data on childbirth that is much more comprehensive than the data that were previously available through other administrative sources. However, these data are collected at the time of birth and the data available at the time these analyses were conducted were limited to women who delivered in hospitals. If we are to better understand prenatal care we need to expand data collection to include a more systematic way to collect data on prenatal care and outcomes including areas such as the timing and content of prenatal visits and the incidence and management of miscarriages and ectopic pregnancy. Enhancements to BORN will allow us to capture out of hospital births in future research.

We also need data on broader aspects of health issues related to menstrual pain and bleeding. This chapter provides data on hysterectomy rates but we were unable to find comprehensive and useful data on the burden of illness and medical management of these conditions.

We do not report data about patterns of contraceptive use. This is a fundamental part of the lives of many women and, as in many situations in reproductive care, there are a range of choices that can be made. These choices have important implications for women's health and access to information and choices around

contraception and family planning has important implications. A related but distinct issue is data on sexual education and behaviour. Although we know the rates of sexually transmitted infections, we do not know the rates of screening for these infections, particularly in young people who have the highest rates of chlamydial infection.

We also were not able to provide information about the incidence and management of infertility. This is an area in which care has developed outside the publicly funded health care system in Ontario and as a result of this, it is difficult to obtain comprehensive data on the services provided and the outcomes of care.

Outside of demographic data on age and place of residence, we did not have access to data on other important characteristics of women, such as ethnicity, immigration and language, which may help us to understand and assess the care provided to them. As seen in the [POWER Study Access to Health Care Services](#) chapter,<sup>154</sup> these variables play an important role in access to and satisfaction with care and could also play an important role in our better understanding of reproductive care for women. Better data on ethnicity and language can be obtained through over sampling specific populations in surveys to increase sample size, targeted surveys specifically assessing the health of populations of interest, collecting data on ethnicity and language in administrative data, or linking data sets containing this information to health data.

## KEY MESSAGES

There is much good news in our examination of reproductive and gynaecological health in the province of Ontario. The overall rates of adverse outcomes related to childbirth were low and provide evidence that Ontario is a very safe place for women to give birth and for babies to be born. Hysterectomy rates have declined and the proportion that is done through the less invasive vaginal or laparoscopic routes has increased. Socioeconomic factors, such as neighbourhood income or average neighbourhood educational attainment, were not associated with performance on many indicators of gynaecological and reproductive health care.

Despite our progress, more work needs to be done and there are opportunities to improve care. There was substantial variation in the type of obstetrical and gynaecological care provided related to where women lived in the province. Women who lived in different LHINs had different rates for a range of common procedures including hysterectomy and interventions related to childbirth. There were large differences in teenage pregnancy and abortion rates between rich and poor women. Caesarean section rates are high and vary by region. Hysterectomy rates vary by region and more women who have hysterectomies could have the surgery done using less invasive techniques. Important data gaps need to be closed. For example, we were unable to assess whether performance on these indicators varied by ethnicity.

There are ways to improve care for women and their families around important aspects of reproductive health and at the centre of many of the key strategies is a commitment not only to rely on the best evidence but to ensure that women are actively involved in the decision making process and that their knowledge, perspectives, beliefs and values are respected. The

following actions can accelerate progress, improve quality and outcomes of care for reproductive and gynaecological health and can help eliminate remaining inequities.

### **Shared decision making is essential to optimizing reproductive and gynaecological care.**

- Many decisions around reproductive care are embedded in social norms and individual and family preferences and values. In this context, a model of shared decision making—where providers and women communicate and use both best clinical evidence and a respect for individual preferences and autonomy to determine the appropriate course of action—is essential.
- There is clear evidence that interventions such as induction of labour and delivery by caesarean section are effective in specific clinical situations. However, in many cases the use of these interventions involves complex trade-offs between risks and benefits and women and their families should be encouraged to make an informed choice that takes into account preferences, values and patient autonomy.

### **There is opportunity to reduce substantial geographic variation in the clinical management, services provided, and outcomes of reproductive health and gynaecological care.**

- Large regional variations in rates of interventions in childbirth, hysterectomy rates and type of procedure used raise concerns that access to services or provider practice styles may limit choices available to women and their families.
- Interventions to optimize and standardize care across the province, including the use of learning networks and telemedicine, should be considered.

**There is a need to better understand the reasons for regional variation in caesarean section rates and the overall increase in these rates over the last decade and there is an opportunity to reduce the observed regional variation.**

- Better understanding and communication of the risks and benefits of caesarean section in different clinical situations would support women in making shared and informed decisions about their treatment choices.
- Efforts to reduce variation could focus on first time caesarean sections in low-risk women and on offering a trial of labour, when appropriate, as an alternative to repeat caesarean section in women with a previous caesarean section.

**There is opportunity to reduce substantial geographic variation in the use of hysterectomy for benign conditions as well as to increase the proportion of hysterectomies done by the less invasive vaginal or laparoscopic routes.**

- A woman's decision to have a hysterectomy for benign conditions should be based on informed decision making after consideration of alternatives.
- Once the decision is made, the procedure should be performed by the least invasive procedure allowed by clinical circumstances.

**There is opportunity to reduce rates of teen pregnancy and abortion among low-income women.**

- There were higher rates of teen pregnancy and abortion among low-income women. Reproductive health programs that reach out to low-income women, particularly low-income teens are needed. There is evidence that school and community-based interventions can reduce teenage pregnancy rates.

**There is a need to improve quality, availability and timeliness of data to assess reproductive health and gynaecological care in the province.**

- While data quality and availability to assess reproductive health and gynaecological care in the province has improved, there is still much to be done to improve the quality, availability and timeliness of data.
- Data on ethnicity would allow us to assess performance on these indicators and outcomes of care to Ontario's diverse communities.





# Appendix 10.1

## INDICATORS AND THEIR LINKS TO PROVINCIAL STRATEGIC OBJECTIVES

### APPENDIX 10.1 | Reproductive and Gynaecological Health indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives

Indicator	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC strategic objectives
<b>Section 10A—Prenatal Care</b>		
Types of health providers of prenatal care	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use &amp; appropriate distribution of resources across the system</li> </ul>
Maternal multiple marker screening rate	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
Screening rate for group B streptococcus colonization	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
<b>Section 10B—Childbirth</b>		
Live births to teenage women	<ul style="list-style-type: none"> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve health status of Ontarians</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> </ul>
<b>Provider Type</b>		
Types of health providers attending childbirth	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Efficient</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use &amp; appropriate distribution of resources across the system</li> </ul>

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## APPENDIX 10.1 | Reproductive and Gynaecological Health indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives

Indicator	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC strategic objectives
<b>Interventions</b>		
Induction of labour	<ul style="list-style-type: none"> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> </ul>
Episiotomy rate	<ul style="list-style-type: none"> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> </ul>
Rate of forceps- or vacuum-assisted vaginal deliveries	<ul style="list-style-type: none"> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> </ul>
Caesarean section rate	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
<b>Maternal and Neonatal Health Outcomes</b>		
Rate of third or fourth degree perineal lacerations	<ul style="list-style-type: none"> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> </ul>
Severe maternal morbidity rate	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Birth trauma or injury to newborns	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Low five-minute Apgar score in full-term newborns	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>

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## APPENDIX 10.1 | Reproductive and Gynaecological Health indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives

Indicator	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC strategic objectives
<b>Section 10C—Postpartum Care</b>		
Early postpartum maternal discharge rate	<ul style="list-style-type: none"> <li>• Efficient</li> <li>• Patient-centered</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use &amp; appropriate distribution of resources across the system</li> </ul>
Fourteen-day maternal readmission rate	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Ninety-day maternal readmission rate	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Neonatal readmission rate (within 28 days following birth)	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
<b>Section 10D—Abortion Indicators</b>		
Abortion rate	<ul style="list-style-type: none"> <li>• Focused on population health</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve access to appropriate health services</li> </ul>
Ratio of abortions to live births (Abortion ratio)	<ul style="list-style-type: none"> <li>• Focused on population health</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve access to appropriate health services</li> </ul>
Inpatient and outpatient abortions in acute care hospitals	<ul style="list-style-type: none"> <li>• Appropriately resourced</li> <li>• Accessible</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve productive use &amp; appropriate distribution of resources across the system</li> <li>• Improve access to appropriate health services</li> </ul>

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## APPENDIX 10.1 | Reproductive and Gynaecological Health indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives

Indicator	Link(s) to OHQC Attributes of a High-Performing Health System	Link(s) to MOHLTC strategic objectives
<b>Section 10D—Abortion Indicators (continued)</b>		
Prior induced abortions among women having a hospital abortion	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centered</li> <li>• Accessible</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> <li>• Improve access to appropriate health services</li> </ul>
Rate of short-term post abortion complications	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
<b>Section 10E—Hysterectomy Indicators</b>		
Hysterectomy rate for benign conditions	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Accessible</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use &amp; appropriate distribution of resources across the system</li> <li>• Improve access to appropriate health services</li> </ul>
Use of laparoscopic or vaginal hysterectomy	<ul style="list-style-type: none"> <li>• Patient-centered</li> <li>• Effective</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use &amp; appropriate distribution of resources across the system</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Complication rates in women who underwent hysterectomies for selected benign conditions	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>
<b>Section 10F—Sexually Transmitted Infections</b>		
Sexually transmitted infection disease rates	<ul style="list-style-type: none"> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve clinical &amp; population health outcomes</li> </ul>

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# Appendix 10.2

## INDICATORS AND THEIR SOURCES

### APPENDIX 10.2 | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 10A—Prenatal Care</b>		
<b>Screening</b>		
Types of health providers of prenatal care	<ul style="list-style-type: none"> <li>• Canadian Institute for Health Information. Giving birth in Canada: Providers of maternity and infant care.<sup>1</sup></li> <li>• Maaten S, Guttman A, Kopp A. Care for Women During Pregnancy and Childbirth. In: Jaakimainen L, Upshur R, Klein Geltnik JE, Leong A, Maaten, Schultz SE, Wang L, editors. Primary Care in Ontario: ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences; 2006.<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>
Maternal multiple marker screening rate	<ul style="list-style-type: none"> <li>• Korst LM, Gregory KD, Lu MC, Reyes C, Hobel CJ, Chavez GF. A Framework for the Development of maternal quality of care indicators <i>Matern Child Health J</i> 2005; 9(3):317-41.<sup>33</sup></li> <li>• Summers AM, Farrell SA, Huang T, Meier C, Wyatt PR. Maternal serum screening in Ontario using the triple marker test. <i>J Med Screen</i> 2003; 10(3):107-11<sup>35</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> <li>• Ontario Maternal Multiple Marker Screening</li> </ul>
Screening rate for group B streptococcus colonization	<ul style="list-style-type: none"> <li>• Korst LM, Gregory KD, Lu MC, Reyes C, Hobel CJ, Chavez GF. A Framework for the Development of maternal quality of care indicators <i>Matern Child Health J</i> 2005; 9(3):317-41.<sup>33</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>

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## APPENDIX 10.2 | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 10B—Childbirth Indicators</b>		
Live births to teenage women	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
<b>Provider Type</b>		
Types of health providers attending childbirth	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Giving birth in Canada: Providers of maternity and infant care.<sup>1</sup></li> <li>Maaten S, Guttman A, Kopp A. Care for Women During Pregnancy and Childbirth. In: Jaakimainen L, Upshur R, Klein Geltnik JE, Leong A, Maaten, Schultz SE, Wang L, editors. Primary Care in Ontario: ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences; 2006.<sup>2</sup></li> <li>Zeitlin J, Wildman K, Breart G, Alexander S, et al. PERISTAT: indicators for monitoring and evaluating perinatal health in Europe.<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>
<b>Interventions</b>		
Induction of labour	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>
Episiotomy rate	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> <li>Howe N, Paul J, Levinton C. <i>Hospital Report 2006: Acute Care. Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> </ul>	<ul style="list-style-type: none"> <li>Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>
Rate of forceps- or vacuum-assisted vaginal deliveries	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>

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## APPENDIX 10.2 | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Interventions (continued)</b>		
Caesarean section rate	<ul style="list-style-type: none"> <li>• Howe N, Paul J, Levinton C. Hospital Report 2006: Acute Care. <i>Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> <li>• Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>^155</sup></li> <li>• Korst LM, Gregory KD, Lu MC, Reyes C, Hobel CJ, Chavez GF. A Framework for the Development of maternal quality of care indicators <i>Matern Child Health J</i> 2005; 9(3):317-41.<sup>33</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> <li>• Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
<b>Maternal and neonatal health outcomes</b>		
Rate of third or fourth degree perineal lacerations	<ul style="list-style-type: none"> <li>• Korst LM, Gregory KD, Lu MC, Reyes C, Hobel CJ, Chavez GF. A Framework for the Development of maternal quality of care indicators <i>Matern Child Health J</i> 2005; 9(3):317-41.<sup>33</sup></li> <li>• Howe N, Paul J, Levinton C. <i>Hospital Report 2006: Acute Care. Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> <li>• Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>^155</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>
Severe maternal morbidity rate	<ul style="list-style-type: none"> <li>• Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>^155</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
Birth trauma or injury to newborns	<ul style="list-style-type: none"> <li>• Canadian Institute for health Information; Patient Safety Indicators.<sup>157</sup></li> <li>• Agency for Health Research and Quality. Patient Safety Indicators.<sup>158</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
Low five-minute Apgar score in full-term newborns	<ul style="list-style-type: none"> <li>• Ontario Perinatal Surveillance System. The Ontario Perinatal Surveillance System Report 2008.<sup>51</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Better Outcomes and Registry Network (BORN) Ontario's Niday Perinatal Database</li> </ul>

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## APPENDIX 10.2 | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 10C—Post-partum Care</b>		
Early postpartum maternal discharge rate	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
Fourteen-day, maternal readmission rate	<ul style="list-style-type: none"> <li>Howe N, Paul J, Levinton C. <i>Hospital Report 2006: Acute Care. Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
Ninety-day maternal readmission rate	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
Neonatal readmission rate (within 28 days following birth)	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mombaby linked database)</li> </ul>
<b>Section 10D—Abortion Indicators</b>		
Abortion rate	<ul style="list-style-type: none"> <li>Statistics Canada. Induced abortions<sup>104</sup></li> </ul>	<ul style="list-style-type: none"> <li>Ontario Health Insurance Plan (OHIP)</li> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>National Ambulatory Care Reporting System (NACRS)</li> <li>Registered Persons Database (RPDB)</li> </ul>
Ratio of abortions to live births (Abortion ratio)	<ul style="list-style-type: none"> <li>Public Health Agency of Canada. Canadian Perinatal Health Report, 2003 Edition<sup>155</sup></li> </ul>	<ul style="list-style-type: none"> <li>Ontario Health Insurance Plan (OHIP)</li> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>National Ambulatory Care Reporting System (NACRS)</li> <li>Registered Persons Database (RPDB)</li> </ul>

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## APPENDIX 10.2 | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 10D—Abortion Indicators (continued)</b>		
Inpatient and outpatient abortions in acute care hospitals	<ul style="list-style-type: none"> <li>Studies on Access to Abortion Services in Ontario (SAAS)<sup>159</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>National Ambulatory Care Reporting System (NACRS)</li> <li>Ontario Ministry of Health and Long-Term Care Master Numbering System (MNS) database</li> <li>Hospital Statistics (number of beds staffed and in operation)</li> </ul>
Prior induced abortions among women having a hospital abortion	<ul style="list-style-type: none"> <li>Studies on Access to Abortion Services in Ontario (SAAS)<sup>159</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>National Ambulatory Care Reporting System (NACRS)</li> <li>Registered Persons Database (RPDB)</li> </ul>
Rate of short-term post abortion complications	<ul style="list-style-type: none"> <li>Studies on Access to Abortion Services in Ontario (SAAS)<sup>159</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>National Ambulatory Care Reporting System (NACRS)</li> </ul>
<b>Section 10E—Hysterectomy Indicators</b>		
Hysterectomy rate for benign conditions	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Health Indicators 2008<sup>160</sup></li> <li>Statistics Canada. Health indicators. Definitions and Data sources<sup>161</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> <li>Registered Persons Database (RPDB)</li> </ul>
Use of laparoscopic or vaginal hysterectomy	<ul style="list-style-type: none"> <li>Howe N, Paul J, Levinton C. <i>Hospital Report 2006: Acute Care. Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> </ul>
Hysterectomy complications in women with selected benign conditions	<ul style="list-style-type: none"> <li>Howe N, Paul J, Levinton C. <i>Hospital Report 2006: Acute Care. Women's Health Technical Summary</i>. 2006.<sup>87</sup></li> </ul>	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)</li> </ul>

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**APPENDIX 10.2** | Reproductive and Gynaecological Health indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 10F—Sexually Transmitted Infections</b>		
Sexually transmitted infection disease rates	<ul style="list-style-type: none"><li>• Association for Public Health Epidemiologist of Ontario (APHEO)<sup>162</sup></li></ul>	<ul style="list-style-type: none"><li>• Integrated Public Health Information System (iPHIS), Ontario Ministry of Health and Long-Term Care</li></ul>

^ The updated 2008 edition of the report is currently available

# Appendix 10.3

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

The indicators we report are the result of a rigorous selection process, which included an extensive literature review of peer-reviewed and grey literature (see [Introduction to the POWER Study](#), chapter 1 for a more detailed description of the indicator selection process). The review of the literature identified 206 indicators. The working group reviewed the indicators using the defined indicator selection criteria and prepared a list containing potential indicators for inclusion for review by a Technical Expert Panel (TEP). Indicators were then selected through a modified Delphi process by the TEP using a two step process—first through an online questionnaire and then at a face-to-face meeting on June 27, 2008. The final list included 30 reproductive and gynaecological health indicators, of which 26 were included in the chapter (see [Appendix 10.1](#) for a complete indicator list).

All the indicators are reported at the provincial level and at the Local Health Integration Network (LHIN) level when data quality and sample size allowed. At the provincial level, these indicators were stratified by neighbourhood income, average neighbourhood educational attainment, age, urban/rural residency and LHIN as allowed by sample size and data availability. At the LHIN level, indicators were stratified by age and by neighbourhood income as allowed by sample size and data availability.

### 2. Datasets

#### Ontario Health Insurance Plan (OHIP)

The OHIP claims database covers all reimbursement claims to the Ontario Ministry of Health and Long Term Care (MOHLTC), made by fee-for-service physicians, community-based laboratories and radiology facilities.

The OHIP database at ICES contains encrypted patient and physician identifiers, code for service provided, date of service and the associated diagnosis and fee paid. Services which are missing from the OHIP claims data include some lab services, services received in provincial psychiatric hospitals, services provided by health service organizations and other alternate funding plans, diagnostic procedures performed on an inpatient basis, lab services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through Alternate Fee Plans (AFPs). Their concentration in certain specialties or geographic areas could distort an analysis.

#### Canadian Institute for Health Information (CIHI-DAD)

The CIHI-DAD contains information abstracted from hospital records. It includes patient-level data for acute and chronic care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. The main data elements of the CIHI-DAD at ICES are encrypted patient identifier, patient demographics (age, sex, geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay).

#### National Ambulatory Care Reporting System (NACRS)

NACRS is a data collection tool used to capture patient and clinical information on patient visits to hospital and community based ambulatory care: day surgery, outpatient clinics and emergency departments. Client visit data are collected at the time of service in participating facilities, but data collection methods may vary by facility.

## **CIHI-DAD: ICES Mother-Baby (MOMBABY)**

### **Linked Database**

The MOMBABY dataset is a cumulative database created by linking the CIHI-DAD inpatient admission records of delivering mothers to those of their newborns. The linking algorithm uses information from the charts of the mother and the infant including: maternal and newborn chart numbers, institution numbers, postal code, admission/discharge dates and procedure codes. The database includes additional information on maternal gestational age at admission and at delivery, newborn gestational age (in weeks) at delivery and flags that identify multiple births and still births.

### **Niday Perinatal Database**

The Niday Perinatal database, maintained by Better Outcomes and Registry Network (BORN) Ontario (formerly the Ontario Perinatal Surveillance System (OPSS)), is a real-time, web-based data entry and analysis application capturing 100 percent of hospital births in the province (as of November, 2009). It is estimated that approximately five percent of the births in the province were missing from the Niday database during this reporting period as hospitals have been gradually joining the database. The database includes information on the number and characteristics of women giving birth in the province, the number of babies born in the province, use of prenatal, perinatal and postnatal services, interventions during labour and birth and infant outcomes (for more details, see [www.bornontario.ca](http://www.bornontario.ca)).

### **The Ontario Maternal Multiple Marker Screening (OMMMS) Program**

The Ontario Maternal Multiple Marker Screening (OMMMS) Program, funded by the Ontario MOHLTC, offers voluntary, prenatal screening for Down syndrome, open neural tube defects and trisomy 18 syndrome to all pregnant women in Ontario. About 65-70 percent of pregnant women in Ontario are screened each year. The OMMMS database collects data from five Ontario laboratories performing the screening tests, as well as data on follow up services provided to screen positive

women, such as amniocentesis, chorionic villus sampling and ultrasound results from 18 genetic centres across the province. Information collected in the database include patient demographics, pregnancy details, test and interpretation results, utilization of genetic counseling, cytogenetic tests and ultrasound examinations.

### **Registered Persons Database (RPDB)**

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex, address, date of death (where applicable) and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address is removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data from the RPDB are enhanced with available information through other administrative data sources at ICES; however the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality.<sup>163</sup> To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada. The adjusted dataset was used to determine population denominators.

### **Master Numbering System (MNS)**

The MNS is a dataset that contains general institution number and location information for all institutions opened since April 1970, along with the 'open' and 'close' variables that indicate the time period during which the number was in use. There is one record for every institution number ever issued. The dataset includes also one entry number per institution and information on institution types.

### **Integrated Public Health Information System (IPHIS)**

The analyse for the sexually-transmitted infection (STI) section was based on preliminary data of confirmed cases of chlamydia, gonorrhea, syphilis, hepatitis B virus. These reportable diseases with onset dates between 2006 and 2008 as reported in the integrated Public Health Information System (IPHIS). The iPHIS database is administered and supported by the Infectious Diseases Surveillance Section of the MOHLTC. The Surveillance Section collects information on all cases of reportable diseases in Ontario from public health units; it conducted data extraction and analysis for these indicators.

### **3. Regional and Socioeconomic Variables**

Analyses using administrative data from OHIP, CIHI-DAD and NACRS were conducted at the provincial level, by neighbourhood income quintile, average neighbourhood educational attainment, age group, rural/urban residency and LHIN. Analyses at the LHIN level were stratified first by sex and by neighbourhood income for select indicators. Where numbers were too small, results were either not reported or were aggregated. Where possible, relative rates were calculated for lowest-to-highest income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons.

Analyses using data from BORN Ontario's Niday Perinatal database and from the OMMMS database were conducted at the provincial and LHIN level, by age group, neighbourhood income quintile, average neighbourhood educational attainment, and LHIN. Where possible, relative rates were calculated for lowest to highest income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons.

#### **Neighbourhood Income Quintile**

Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person

equivalent (IPPE), which is a household size adjusted measure of household income based on 2006 census summary data at the dissemination area (DA) and using person-equivalents implied by the 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as proxy for overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilizations. Individual geographic information from ICES databases was used to define the best known postal code for each person on July 1 of each year (available from 1991 to 2004). Postal codes were then used to assign people to enumerations areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Enumeration areas (EA) and DAs are small adjacent geographic areas, designated for collection of census data. DAs replaced EAs in 2001 and have a population of 400–700 persons.

#### **Neighbourhood Educational Attainment Quartile**

Since individual level information on education is not available in the administrative data, the analysis is done using neighborhood-level information obtained from the 2006 Statistics Canada census. The percentage of the population (age 25-64) with a post-secondary certificate, diploma, or degree was calculated for each DA. Ontario neighbourhoods were classified into one of four approximately equal-sized groups (education quartiles), ranked from the quartile containing neighborhoods with the lowest percentages of postsecondary education (Q1) to the quartile containing neighborhoods with the highest percentages of postsecondary education (Q4). Using postal codes, each person was linked to their DA (using the Postal Code Conversion File from Statistics Canada) and then assigned the education quartile associated with that DA.



## Location of Residence (Urban Versus Rural)

In the administrative data, rural/urban residency was assigned based on a Statistics Canada derived variable. Urban areas are those continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts. Areas are designated as rural, urban core, urban fringe, urban area outside CMAs and CAs, secondary urban code and mix or urban/rural areas. This variable is further dichotomized into rural and urban location by Statistics Canada.

## Patients' Residence

For all analyses presented in the report, the definition of "Local Health Integration Network (LHIN) of patient residence" is based on where each person lived.

## Standardization

All indicators were standardized to the study cohort using the indirect method. For the Niday data, this was all women who delivered in hospital in 2007.

## 4. Indicators

### Sources of Prenatal Care

The types of health care professionals (obstetricians, general practitioners/family physicians (GP/FP) and/or midwives) who provided prenatal care after first trimester to women who gave birth in an Ontario hospital in 2007 were measured using data from Niday Perinatal database. Prenatal care providers were defined as any provider who saw a patient more than once (excluding brief consultations). The options for selecting providers included: midwife, family physician, obstetrician, nurse practitioner (advanced practice nurse/clinical nurse specialist (APN/CNS)), none and other. If a woman during pregnancy received prenatal care from more than one type of professional, all providers were included in the analysis. As such, the results across strata will not add to 100 percent. We calculated crude and age-adjusted rates (adjusted to number of women who gave birth in Ontario hospitals in 2007) and the associated 95 percent confidence intervals.

## Maternal Multiple Marker Screening

The percentage of women who gave birth in an Ontario hospital in 2007 who were screened for any chromosomal anomalies (Down syndrome and trisomy 18) and/or open neural tube defects (maternal multiple marker screening) as part of their prenatal care was measured using the OMMMS database. The denominator, the number of women who gave birth and Ontario hospitals in 2007, was identified from the Niday Perinatal database. This would include women who had miscarriages, abortions or who delivered at home, however the denominator was limited to women who delivered in hospital. This results in somewhat of an overestimation of the true rate of screening, however given the low rates of miscarriages and abortion later in pregnancy, the differences are not likely to be large. For this indicator we report only crude rates and 95 percent confidence intervals, since the Niday Perinatal database and OMMMS were not linked. Also, due to the large number of records with missing postal code information, we were not able to report rates by LHIN.

### Screening for Group B Streptococcus (GBS) Colonization

The percentage of women who gave birth in an Ontario hospital in 2007 after 37 weeks of gestation who received screening for group B streptococcus (GBS) colonization was measured using the Niday Perinatal database. It was derived from the variable "group B streptococcus screening" which asks if the woman was screened for GBS between 35-37 weeks of gestational age. We calculated crude and age-adjusted rates (adjusted to number of women who gave birth in Ontario hospitals in 2007) and the associated 95 percent confidence intervals.

### Live Birth to Teenage Women

The rate of live births in 2007 (per 1,000 women) to mothers aged 15-19 was measured using the ICES MOMBABY linked CIHI-DAD database. Data on live births in women aged 15-19 were identified by linking the records of mothers who were aged 15-19

to baby's records and including records with ICD-10 diagnostic codes of live births (Z37.0—single live birth; Z37.2—twins, both live born; Z37.3—twins, one liveborn and one stillborn; Z37.5—other multiple births, all liveborn; Z37.6—other multiple births, some liveborn). We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Types of Providers Attending Childbirth

The types of health providers (midwives, GP/FPs or obstetricians), who attended hospital births in Ontario in 2007 were measured using the “delivered by” section from the Niday Perinatal database. This section indicates the health professional that delivered the baby. The list of options included GP/FPs, obstetrician, midwife, nurse practitioner (APN/CNS) and other. Only one type of provider can be identified as attending the birth. We report the percentages of deliveries that were performed by midwives, GP/FPs or obstetricians, as these represent the majority of deliveries. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Induction of Labour

The percentage of women who gave birth in an Ontario hospital in 2007 and had their labour induced was measured using the data from the “labour type” section from the Niday Perinatal database, which indicates the type of labour associated with the birth. The response options included: “induced—medical or surgical intervention to initiate uterine contractions prior to onset of spontaneous labour”, “spontaneous—that initiated without intervention” and “no labour—caesarean section”. Given some of the regional coding variation that was previously noted by BORN Ontario, this indicator was not reported by LHIN.<sup>54</sup>

This indicator was calculated among women who gave birth in an Ontario hospital who had full-term, singleton, vertex, deliveries stratified by parity. Women with full-term singleton vertex deliveries were identified by using the following fields in the Niday Perinatal database: “gestational age” which indicates the number

of completed weeks at birth, “multiple gestations” which indicates the number of babies in this pregnancy after 20 weeks of gestation, and “presentation” which refers to how the fetus is situated in the uterus. The data on parity were taken from the “parity” section which is defined as the sum of previous term and preterm babies. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Rate of Episiotomy

The episiotomy rate was calculated among women who gave birth in an Ontario hospital in 2007 who had full-term, singleton, vertex, vaginal deliveries using data from the “episiotomy” field of the Niday Perinatal database. This indicator was additionally stratified by whether the birth was spontaneous or assisted by means of forceps and/or vacuum extraction. Women with spontaneous or assisted births were identified by using data from “labour type” section of the database, which indicates the type of labour for that birth and also by using data from the “delivery type” section of the database, which indicates the type of delivery, the response options included: “vaginal” and “caesarean section”. The types of assistance provided to women with assisted vaginal births were identified from the “forceps/vacuum” (operative vaginal delivery) section of the Niday Perinatal database, which indicates whether this was an assisted vaginal birth. The response options included: “forceps”, “vacuum”, “forceps and vacuum”, “none” and “unknown”. We calculated crude and age-adjusted rates (adjusted to number of women who gave birth in Ontario hospitals in 2007) and the associated 95 percent confidence intervals.

### Rate of Assisted Vaginal Births

The rate of assisted vaginal birth (forceps and/or vacuum extraction) was calculated as a proportion of women who gave birth in an Ontario hospital in 2007. Using the “forceps/vacuum” (operative vaginal delivery) section of the Niday Perinatal database, which indicates whether the birth was assisted. The response options included: “forceps”, “vacuum”, “forceps and vacuum”, “none”

and “unknown”. We calculated crude and age-adjusted rates (adjusted to number of women who gave birth in Ontario hospitals in 2007) and the associated 95 percent confidence intervals.

### Rate of Caesarean Section

The caesarean section rate among women who gave birth in an Ontario hospital in 2007 was calculated using the “delivery type” section of the Niday Perinatal database. The response options included: “vaginal” and “caesarean section”. Rates were calculated among all women who delivered; women who had a previous caesarean section ; women who had full-term, singleton, vertex deliveries and women who had full-term, singleton, breech deliveries. The data were taken from sections that provide information on “delivery type”, “previous caesarean section”, “gestational age”, “multiple gestation” and “presentation”. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Rate of Significant Perineal Lacerations

The rates of third or fourth degree perineal lacerations were calculated among women who gave birth in an Ontario hospital in 2007 who had full-term, singleton, vertex, vaginal deliveries using data from the “lacerations” section of the Niday Perinatal database. The section indicates the type of laceration from the following response options: “unknown”, “none”, “1<sup>st</sup> degree”, “2<sup>nd</sup> degree”, “3<sup>rd</sup> degree”, “4<sup>th</sup> degree”, and “cervical tear” and “other”. The rates of “3<sup>rd</sup> degree”, “4<sup>th</sup> degree” and “3<sup>rd</sup> & 4<sup>th</sup> degree” tears were reported. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Severe Maternal Morbidity Rate

The rates of severe maternal morbidity and postpartum hemorrhage among women who gave birth in an Ontario hospital in 2007 were calculated using data from the CIHI-DAD. Severe maternal morbidity was defined based on the list of conditions developed by Canadian Perinatal Surveillance System (CPSS).<sup>163</sup> Patients were

identified as having severe maternal morbidity if they had any of the conditions in their acute care records (ICD 10 diagnosis codes) as any diagnosis type within one month after childbirth. The identification of postpartum hemorrhage was based on admission records during the same period with a diagnosis of postpartum hemorrhage (ICD 10 072) as any diagnosis type. Women who gave birth in Ontario hospitals in 2007 were identified through the ICES MOMBABY linked database. For overall severe maternal morbidity and postpartum hemorrhage we calculated crude and age-adjusted rates and the associated 95 percent confidence intervals. We calculated crude rates for specific severe maternal morbidity conditions including: atonic postpartum hemorrhage; eclampsia; uterine dehiscence or rupture; obstetrical pulmonary embolism; cardiac arrest or failure or cerebral anoxia following obstetrical surgery; pulmonary edema; shock (obstetrical, septic or pulmonary); cerebrovascular disorders; anesthesia complications; acute renal failure following labour and delivery; adult respiratory distress syndrome; amniotic fluid embolism; myocardial infarction.

### Birth Trauma Injury to Newborns

The rate (per 1,000 live births) of birth trauma/injury to infants born in Ontario hospitals in 2007 was measured using the CIHI-DAD. The CIHI-DAD was used to identify newborns (live births only) with an ICD10 diagnostic code of P10-P15 as either the main diagnosis (type M) or a type1 diagnosis. These represent significant diagnoses, and are used to code conditions that impact a patient's course of treatment and length of stay. The conditions that were included were: intracranial laceration and hemorrhage due to birth injury, birth injuries to central nervous system, scalp, skeleton, peripheral nervous system or other birth injuries. Preterm and low-birth weight infants were excluded from the analysis if they also had subdural and/or cerebral hemorrhage. Newborns with congenital malformations and deformations of the musculoskeletal system (Q65 –Q79) and the central nervous system (Q00 –Q07) were also excluded from the analysis. We calculated crude rates and the associated 95 percent confidence intervals.

### Low Five-Minute Apgar Score in Term Newborns

The percentage of low (a score of three or less) Apgar score at five minute in full-term newborns (37 and more weeks of gestation) was measured among infants born in an Ontario hospital in 2007 using the Niday Perinatal database. The data were obtained from the section that indicates the Apgar score at five minutes after birth. We calculated crude rates and the associated 95 percent confidence intervals.

### Early Post-Partum Maternal Discharge from Hospital

The percentage of women who were discharged early from hospital following childbirth was calculated among women who gave birth in an Ontario hospital in 2007 who had vaginal and caesarean deliveries. Early maternal discharge from hospital was defined as less than 48 hours after childbirth for women who had a vaginal delivery and less than 96 hours after childbirth for women who had a caesarean section. The length of stay was based on the time between the date of birth and discharge and was obtained from the CIHI-DAD. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### 14-Day Maternal Readmissions

The percentage of women who had a non-elective readmission to hospital within 14 days post-discharge after giving birth in an Ontario hospital in 2007 was calculated using data from the CIHI-DAD. We report 14-day readmission rates for any reason (all-cause) and for a set of specific post-partum-related diagnoses among women who had vaginal deliveries and who had caesarean sections. The all-cause readmissions were defined as any non-elective readmission to hospital within 14 days of discharge following childbirth. The 14-day cause-specific readmission rates were based on admissions that included a most responsible diagnosis representing complications associated with delivery as identified by the 2006 Hospital Report<sup>87</sup> and include for example: hypertension, eclampsia, diabetes, infections,

hemorrhage, anesthesia complications and obstetric embolism. Only the first admission during the follow up period was counted. Women who signed out (against medical advice) or died after childbirth were excluded from the analysis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### 90-Days Maternal Readmissions

The percentage of women who had a non-elective readmission to hospital within 90 days post-discharge after giving birth in an Ontario hospital in 2007 was calculated using data from the CIHI-DAD. We report 90-day readmission rates among women who had vaginal deliveries and who had caesarean sections. The all-cause readmissions were defined as any non-elective readmission to hospital within 90 days of discharge following childbirth. Only the first admission during the follow up period was counted. Women who signed out (against medical advice) or died after childbirth were excluded from the analysis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### Rate of Neonatal Hospital Readmissions After Discharge Following Birth

The percentage of newborns readmitted to hospital within 28 days of birth was measured using CIHI-DAD and ICES MOMBABY linked database. The neonatal readmissions were defined as any readmission to hospital occurring within 28 days after birth. The denominator was the number of live births in 2007 and was obtained from the ICES MOMBABY linked database. Data on readmissions were obtained from the CIHI-DAD. Extreme low birth weight (less than 1,000g) infants and infants that died before being discharged were excluded from the analysis. The top ten principle diagnoses for neonatal readmissions were identified from the most responsible diagnosis code of the readmission records. We calculated crude rates and the associated 95 percent confidence intervals.

## Abortion Rate

This indicator measures the number (per 100 women aged 15-49) of overall and early stage (less than 16 weeks gestation) induced abortions in Ontario in 2007. OHIP, CIHI-DAD and NACRS databases were used to identify abortions that were performed on women aged 15-49 in 2007 based on ICD10 diagnosis codes, CCI intervention codes (CIHI-DAD and NACRS) and OHIP fee codes (OHIP). The combination of an intervention code (5CA88 or 5CA89) and also a diagnosis code starting with O04 or O08 was used to identify medical and surgical abortions performed in hospitals. OHIP billing records containing fee codes S752 or S785 and not matching a hospitalization were used to identify surgical abortions performed out of hospitals. Women's ages and places of residence were obtained from the RPDB. The denominator was the Ontario population of women aged 15-49 obtained from the RPDB.

OHIP fee codes were used to differentiate between "early" (under 16 weeks gestation) and "late" (16 weeks or later gestation) stage abortions performed out of hospital. The indicators present the number of abortions and not the number of women who underwent an abortion. When identifying abortion procedures, any abortion records dated within 40 days of a previous abortion (for the same woman) were considered to represent short-term complications rather than new abortion procedures, and were deleted from the analysis. Abortions performed through hysterotomy were not included in the analysis due to missing information on gestational age. Medical abortions (as differentiated from surgical abortions) performed outside hospitals were also not included in the analysis, because these cannot be consistently identified using OHIP billing codes. However, in both cases, the numbers were very low and did not affect the overall rates. For stratified analyses, records with missing information on age, postal code or any other variable required for the analysis were excluded. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

## Ratio of Abortions to Live Births

This indicator measures the number (per 100 live births) of induced abortions in women aged 15-49 for all abortions and for early stage abortions (less than 16 weeks of gestation) as a proportion of all live births in Ontario in 2007. Details on the identification of abortions in women aged 15-49 and the definitions of early and late stage abortions are described previously for the Abortion rate indicator. The number of live births in Ontario in 2007 was identified using the CIHI-DAD. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

## Proportion of Ontario Hospitals Performing Abortions

This indicator measures the percentage of Ontario hospitals performing inpatient and outpatient abortion procedures. Data on the number of hospitals were obtained from the Ontario MOHLTC Master Numbering System database. For this indicator only elective abortions were included. Only acute care and ambulatory care hospitals were included. Hospitals with a religious affiliation and specialty (i.e. children's) hospitals were excluded from the analysis. Hospital corporations and hospital alliances having a single board were considered to be a single "hospital" for the purposes of this analysis, since a corporation or alliance may offer abortions at only one of their sites. Overall, 114 hospitals were included in the analysis. A hospital was considered to provide abortions if at least six procedures were performed during the 2007 calendar year. Hospitals that were members of the Council of Academic Hospitals of Ontario were categorized as teaching hospitals. (<http://www.caho-hospitals.com/about-us/member-hospitals/>) The bed size quartiles were calculated based on the number of beds reported in 2006.



### **Hospital Abortions by History of Previous Hospital Abortions**

This indicator measures the percentage of induced abortions performed in Ontario hospitals in 2007 among women who had a history of previous abortions. For this indicator, in-hospital abortions were identified using the algorithm described above. Data on the number of women who had previous abortions were obtained using the “previous therapeutic abortions” variable in the CIHI-DAD. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Rate of Short-Term Post-Abortion Complications**

This indicator measures the rate (per 1,000 abortions) of short-term (within 14 days) complications that resulted in hospitalization and/or emergency department/same day surgery visits after an abortion. Short-term complications after an abortion were defined as any visit (regardless of the cause) to an emergency department or any hospital admission within 14 days following the abortion and were obtained from CIHI-DAD and NACRS.

If the abortion was followed by more than one emergency department visit or by an emergency department visit plus a hospitalization, only the first event was counted. If the abortion was followed by an inpatient hospitalization and also by an emergency department visit or a same day hospital visit, this was counted as a hospitalization. Complications treated in clinics were not captured in the analysis, nor were immediate complications (i.e. complications that occurred during the same hospitalization as the abortion). The reason for the hospital or emergency department visit was not considered, and therefore the rate may include some events that were not related to the abortion. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Rate of Hysterectomy for Benign Gynaecological Conditions**

The hysterectomy rate (per 100,000 women aged 15-84) for benign gynaecological conditions was measured using the CIHI-DAD. Patients were identified as having a hysterectomy for a benign gynaecological condition if they underwent a hysterectomy and the admission record included a most responsible diagnosis or type 1 diagnosis of: leiomyoma of the uterus, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs (ICD 10 diagnostic codes D25, N92, N93, N80, N8, and N70-N77). Hysterectomy was identified based on Canadian Classification of Health Interventions (CCI) codes: 1RM89, 1RM91 and also 1.RM.87. BA-GX, 1.RM.87.CA-GX, 1.RM.87.DA-GX, 1.RM.87.LA-GX if they also were coded with the extent attribute 'SU', identifying them as subtotal hysterectomies. The denominator was the Ontario population of women aged 15–84 obtained from RPDB. Records of women with no age and postal code information were excluded from the analysis. Women with previous hysterectomy were not excluded from the analysis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Method of Performing Hysterectomies in Patients with Benign Gynaecological Conditions**

Among women aged 15-84 who had a hysterectomy for a benign gynaecological condition (for details, see indicator rate of hysterectomy for benign gynaecological conditions) the percentage who had either a vaginal or a laparoscopically assisted hysterectomy in 2007 was measured. Methods of performing hysterectomies were identified through the CIHI-DAD using the CCI

intervention codes: (hysterectomy using laparoscopic approach or vaginal approach 1RM89DA; 1RM89AA; 1RM89CA; 1RM91CA; 1.RM.87.BA-GX; 1.RM.87.CA-GX; 1.RM.87.DA-GX; and hysterectomy using open approach 1RM89LA; 1RM91LA; 1.RM.87.LA-GX. Records of women with no age and postal code information were excluded from the analysis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Hysterectomy Complications in Women with Selected Benign Conditions**

The complication rate for hysterectomy was measured in women who had hysterectomies for fibroids or abnormal uterine bleeding (selected benign gynaecological conditions) in 2007 as these are expected to result in similar patterns of complications. Complications occurring during the admission for the hysterectomy were included and were identified using the CIHI-DAD. The algorithm used to identify and calculate the complications was developed based on the 2006 Hospital Report<sup>87</sup> and focused on a set of indications that would be expected to have similar patterns of complications. The list of complications included: hemorrhage, dehydration, surgical site and other infections, injury. Admission records that included one of these diagnoses as a type 2 diagnosis and a length of stay in hospital greater than the provincial average of three days for abdominal hysterectomies and two days for vaginal or laparoscopically assisted hysterectomies were included.

Patient with bladder suspension (combined with hysterectomy) 1PL.74 and 1 RM 89; vaginal repair (1RS 80); pelvic exenteration (1.PM.91); genital prolapse and pelvic sling (N81. and any of: 1.PL.74.AF-^^, 1.PL.74.ALFF, 1.PL.74.CA-XX-K); endometriosis of the bowel or

pelvic cavity and bowel resection: (N80.0-N80.5, N80.8 and any of: 1.NK.87., 1.NM.87., 1.NM.89., .NM.91.) and major procedures in pregnancy and childbirth were excluded from the analysis. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

### **Incidence of New Cases of Sexually Transmitted Infections (Chlamydia, Gonorrhea, Syphilis, Hepatitis B Virus)**

Cross-tabulations of iPHIS data were used to describe the incidence of new cases of chlamydia, gonorrhea, syphilis and hepatitis B virus in Ontario. Descriptive analyses were conducted at the provincial and health region level by sex and age group and year. Crude incidence rates were calculated using population denominators from the 2006 provincial estimates obtained from the 2006 Census.

The results based on iPHIS data should be interpreted with caution for the following reasons:

- Data are preliminary and are subject to change in the future.
- A significant proportion of records reported to iPHIS are missing postal code information. Because differences in incidence rates observed across regions may be due to differences in reporting postal code across regions these indicators were not reported at the LHIN level.
- The higher rates of chlamydia observed in women compared to men may be due to differences in manifestation of symptoms which may lead to fewer men being tested as well as much higher rates of routine screening in women.
- While this is reported as incidence of new cases, it is prone to reporting biases and to screening biases.



## REFERENCE LIST

- (1) Canadian Institute for Health Information. Giving birth in Canada: providers of maternity and infant care. Ottawa: Canadian Institute for Health Information, 2004.
- (2) Maaten S, Guttman A, Kopp A, Handa M, Jaakkimainen L. Chapter 2: care of women during pregnancy and childbirth. In: Jaakkimainen L, Upshur R, Klein-Geltink JE, Leong A, Maaten S, Schultz SE, et al., editors. Primary care in Ontario: ICES atlas. Toronto: Institute for Clinical Evaluative Sciences, 2006.
- (3) Carroli G, Mignini L. Episiotomy for vaginal birth. *Cochrane Database Syst Rev* 2009(1):CD000081.
- (4) Graham ID, Carroli G, Davies C, Medves JM. Episiotomy rates around the world: an update. *Birth* 2005;32(3):219-223.
- (5) Hartmann K, Viswanathan M, Palmieri R, Gartlehner G, Thorp J, Jr., Lohr KN. Outcomes of routine episiotomy: a systematic review. *JAMA* 2005;293(17):2141-2148.
- (6) Leeb K, Baibergenova A, Wen E, Webster G, Zelmer J. Are there socio-economic differences in caesarean section rates in Canada? *Healthc Policy* 2005;1(1):48-54.
- (7) Baicker K, Buckles KS, Chandra A. Geographic variation in the appropriate use of cesarean delivery. *Health Aff (Millwood)* 2006;25(5):w355-67.
- (8) Statistics Canada. Induced abortions per 100 live births. Accessed August 18, 2010 at <http://www40.statcan.ca/l01/cst01/health42a-eng.htm>.
- (9) Palley HA. Canadian abortion policy: national policy and the impact of federalism and political implementation on access to services. *Publius J Federalism* 2006;36(4):565-586.
- (10) Richer K. Abortion in Canada: twenty years after R. v. Morgentaler. In: Library of Parliament, editor. Ottawa: Law and Government Division, 2008.
- (11) Ferris LE, McMain-Klein M. Small-area variations in utilization of abortion services in Ontario from 1985 to 1992. *CMAJ* 1995;152(11):1801-7.
- (12) Jones RK, Zolna MR, Henshaw SK, Finer LB. Abortion in the United States: incidence and access to services, 2005. *Perspect Sex Reprod Health* 2008;40(1):6-16.
- (13) Jones RK, Darroch JE, Henshaw SK. Contraceptive use among U.S. women having abortions in 2000-2001. *Perspect Sex Reprod Health* 2002;34(6):294-303.
- (14) Canadian Institute for Health Information. Health indicators 2010. Ottawa: Canadian Institute for Health Information, Statistics Canada, 2010.
- (15) Krzyzanowska MK, Barbera L, Elit L, Kwon J, Lofters A, Saskin R, Yeritsyan N, Bierman AS, Cancer. In: Bierman AS, editor. Project for an Ontario women's health evidence-based report: volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (16) Hall RE, Cohen MM. Variations in hysterectomy rates in Ontario: does the indication matter? *CMAJ* 1994;151(12):1713-1719.
- (17) Walker AM, Jick H. Temporal and regional variation in hysterectomy rates in the United States, 1970-1975. *Am J Epidemiol* 1979;110(1):41-46.
- (18) Jacoby VL, Autry A, Jacobson G, Domush R, Nakagawa S, Jacoby A. Nationwide use of laparoscopic hysterectomy compared with abdominal and vaginal approaches. *Obstet Gynecol* 2009;114(5):1041-1048.
- (19) Abenhaim HA, Azziz R, Hu J, Bartolucci A, Tulandi T. Socioeconomic and racial predictors of undergoing laparoscopic hysterectomy for selected benign diseases: analysis of 341487 hysterectomies. *J Minim Invasive Gynecol* 2008;15(1):11-15.
- (20) Jacoby VL, Vittinghoff E, Nakagawa S, Jackson R, Richter HE, Chan J, et al. Factors associated with undergoing bilateral salpingo-oophorectomy at the time of hysterectomy for benign conditions. *Obstet Gynecol* 2009;113(6):1259-1267.
- (21) Bottle A, Aylin P. Variations in vaginal and abdominal hysterectomy by region and trust in England. *BJOG* 2005;112(3):326-8.
- (22) Gimbel H, Ottesen B, Tabor A. Danish gynaecologists' opinion about hysterectomy on benign indication: results of a survey. *Acta Obstet Gynecol Scand* 2002;81(12):1123-31.
- (23) Society of Obstetricians and Gynaecologists of Canada. SOGC clinical practice guidelines. No 71 healthy beginnings: guidelines for care during pregnancy and childbirth, 1998.

- (24) Centers for Disease Control and Prevention; Health Resources and Services Administration. Chapter 16: Maternal, infant, and child health. Healthy People 2010: Objectives for Improving Health, 2000.
- (25) Villar J, Khan-Neelofur D. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database Syst Rev* 2000;(2):CD000934.
- (26) Farrell S, Roye C, Crane J, Davis D, Heywood M, Lalonde A, et al. Statement on wait times in obstetrics and gynaecology. *J Obstet Gynaecol Can* 2008;30(3):248-70.
- (27) Heaman MJ, Green CG, Newburn-Cook CV, Elliott LJ, Helewa ME. Social inequalities in use of prenatal care in Manitoba. *J Obstet Gynaecol Can* 2007;29(10):806-816.
- (28) Summers AM, Langlois S, Wyatt P, Wilson RD. Prenatal screening for fetal aneuploidy. *J Obstet Gynaecol Can* 2007;29(2):146-79.
- (29) Money DM, Dobson S. The prevention of early-onset neonatal group B streptococcal disease. *J Obstet Gynaecol Can* 2004;26(9):826-840.
- (30) Canadian Task Force on Preventive Health Care. Prevention of group B streptococcal infection in newborns: recommendation statement from the Canadian Task Force on Preventive Health Care. *CMAJ* 2002;166(7):928-30.
- (31) Ontario Women's Health Council. Executive report of the Ontario maternity care expert panel: emerging crisis, emerging solutions: Ontario Maternity Care Expert Panel, 2006.
- (32) Public Health Agency of Canada. Website. Accessed December 22, 2010 at <http://www.phac-aspc.gc.ca/index-eng.php>, 2010.
- (33) Korst LM, Gregory KD, Lu MC, Reyes C, Hobel CJ, Chavez GF. A framework for the development of maternal quality of care indicators. *Matern Child Health J* 2005;9(3):317-341.
- (34) Summers AM, Langlois S, Wyatt P, Wilson R. SOGC Clinical practice Guideline No 187. Prenatal screening for fetal aneuploidy, 2007.
- (35) Summers AM, Farrell SA, Huang T, Meier C, Wyatt PR. Maternal serum screening in Ontario using the triple marker test. *J Med Screen* 2003;10(3):107-111.
- (36) Wilson RD, Davies G, Desilets V, Reid GJ, Summers A, Wyatt P, et al. The use of folic acid for the prevention of neural tube defects and other congenital anomalies. *J Obstet Gynaecol Can* 2003;25(11):959-973.
- (37) Society of Obstetricians and Gynaecologists of Canada. Women's health information, pregnancy group B Streptococcus infection in pregnancy. Ottawa, 2010.
- (38) Davies HD, Adair CE, Schuchat A, Low DE, Sauve RS, McGeer A. Physicians' prevention practices and incidence of neonatal group B streptococcal disease in 2 Canadian regions. *CMAJ* 2001;164(4):479-485.
- (39) Schrag S, Gorwitz R, Fultz-Butts K, Schuchat A. Prevention of perinatal group B streptococcal disease. Revised guidelines from CDC. *MMWR Recomm Rep* 2002;51(RR-11):1-22.
- (40) Money D, Dobson S. SOGC clinical practice guidelines: no 149 the prevention of early-onset neonatal group B streptococcal disease, 2004.
- (41) James DC. Maternal screening and treatment for group B streptococcus. *J Obstet Gynecol Neonatal Nurs* 2001;30(6):659-666.
- (42) Statistics Canada. Table 051 -004 Births, estimates, by province and territory, CANSIM (database).
- (43) Canadian Institute for Health Information. Giving birth in Canada: a regional profile. Ottawa: Canadian Institute for Health Information, 2004.
- (44) Martin JA, Hamilton B, Sutton PD, Ventura SJ, Menaker F, Kirmeyer S, et al. Births: final data for 2006. national vital statistics reports, 2009.
- (45) Rotermann M. Second or subsequent births to teenagers. *Health Rep* 2007;18(1):39-42.
- (46) Chen XK, Wen SW, Fleming N, Demissie K, Rhoads GG, Walker M. Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *Int J Epidemiol* 2007;36(2):368-373.
- (47) Hoffman SD, Maynard RA. Kids having kids: economic costs and social consequences of teen pregnancy. Washington, D.C.: The Urban Institute Press, 2008.
- (48) Swann C, Bowe K, McCormick G, Kosmin M. Teenage pregnancy and parenthood: a review of reviews: Health development Agency, 2003.

- (49) Kost K, Henshaw, S., Carlin, L. U.S. teenage pregnancies, births and abortions: national and state trends and trends by race and ethnicity. California: Guttmacher Institute, 2010.
- (50) Department for Education and Skills. Teenage pregnancy: accelerating the strategy to 2010. Nottingham, UK: Department for Education and Skills, 2006.
- (51) Ontario Perinatal Surveillance System. The Ontario perinatal surveillance system report 2008. Ottawa 2008.
- (52) Crane J. Induction of labour at term. *J Obstet Gynaecol Can*, 2001;717-728.
- (53) Kornelsen J, Moola S, Grzybowski S. Geographic induction of rural parturient women: is it time for a protocol? *J Obstet Gynaecol Can* 2007;29(7):583-5.
- (54) Walker M. Personal communication February 1, 2011. Toronto.
- (55) Klein MC, Gauthier RJ, Robbins JM, Kaczorowski J, Jorgensen SH, Franco ED, et al. Relationship of episiotomy to perineal trauma and morbidity, sexual dysfunction, and pelvic floor relaxation. *Am J Obstet Gynecol* 1994;171(3):591-8.
- (56) Klein MC, Janssen PA, MacWilliam L, Kaczorowski J, Johnson B. Determinants of vaginal-perineal integrity and pelvic floor functioning in childbirth. *Am J Obstet Gynecol* 1997;176(2):403-10.
- (57) Cargill YM, MacKinnon CJ, Arsenault MY, Bartellas E, Daniels S, Gleason T, et al. Guidelines for operative vaginal birth. *J Obstet Gynaecol Can* 2004;26(8):747-761.
- (58) Public Health Agency of Canada. Canadian Perinatal Health Report, 2008 edition. Ottawa, 2008.
- (59) Statistics Canada. Maternity experiences survey (MES). Available at <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5019&lang=fr&db=imdb&adm=8&dis=2>, 2006.
- (60) Kropp N, Hartwell T, Althabe F. Episiotomy rates from eleven developing countries. *Int J Gynaecol Obstet* 2005;91(2):157-159.
- (61) Canadian Institute for Health Information. Health care in Canada 2010. Ottawa: Canadian Institute for Health Information, Statistics Canada, 2010.
- (62) Joseph KS, Dodds L, Allen AC, Jones DV, Monterrosa L, Robinson H, et al. Socioeconomic status and receipt of obstetric services in Canada. *Obstet Gynecol* 2006;107(3):641-650.
- (63) Gysler M, Jarvis, S., Quigley, A.,. Niday perinatal database for the GTA: fifth annual statistical report. In: The Maternal & Newborn Services Task Force and Child Health Network for the Greater Toronto Area, editor. Toronto, Ontario, 2008.
- (64) Srinivas SK, Stamilio DM, Sammel MD, Stevens EJ, Peipert JF, Odibo AO, et al. Vaginal birth after caesarean delivery: does maternal age affect safety and success? *Paediatr Perinat Epidemiol* 2007;21(2):114-120.
- (65) Liu S, Heaman M, Joseph KS, Liston RM, Huang L, Sauve R, et al. Risk of maternal postpartum readmission associated with mode of delivery. *Obstet Gynecol* 2005;105(4):836-42.
- (66) Liu S, Liston RM, Joseph KS, Heaman M, Sauve R, Kramer MS. Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term. *CMAJ* 2007;176(4):455-60.
- (67) Galyean AM, Lagrew DC, Bush MC, Kurtzman JT. Previous cesarean section and the risk of postpartum maternal complications and adverse neonatal outcomes in future pregnancies. *J Perinatol* 2009;29(11):726-30.
- (68) Gilliam M, Rosenberg D, Davis F. The likelihood of placenta previa with greater number of cesarean deliveries and higher parity. *Obstet Gynecol* 2002;99(6):976-80.
- (69) Kotaska A, Menticoglou S, Gagnon. SOGC clinical practice guideline no 226: vaginal delivery of breech presentation, 2009.
- (70) Hannah ME, Hannah WJ, Hewson SA, Hodnett ED, Saigal S, Willan AR. Planned caesarean section versus planned vaginal birth for breech presentation at term: a randomised multicentre trial. Term Breech Trial Collaborative Group 2. *Lancet* 2000;356(9239):1375-1383.
- (71) Lalonde AB. Vaginal breech delivery guideline: the time has come. *J Obstet Gynaecol Can* 2009;31(6):483-4, 485-6.

- (72) Doyle NM, Riggs JW, Ramin SM, Sosa MA, Gilstrap LC, 3rd. Outcomes of term vaginal breech delivery. *Am J Perinatol* 2005;22(6):325-8.
- (73) Hopkins LM, Esakoff T, Noah MS, Moore DH, Sawaya GF, Laros RK, Jr. Outcomes associated with cesarean section versus vaginal breech delivery at a university hospital. *J Perinatol* 2007;27(3):141-6.
- (74) Williams A, Adams EJ, Bolderson J, Tincello DG, Richmond DH. Effect of a new guideline on outcome following third-degree perineal tears: results of a 3-year audit. *Int Urogynecol J Pelvic Floor Dysfunct* 2003;14(6):385-389.
- (75) Reynders FC, Senten L, Tjalma W, Jacquemyn Y. Postpartum hemorrhage: practical approach to a life-threatening complication. *Clin Exp Obstet Gynecol* 2006;33(2):81-84.
- (76) Leduc D, Senikas V, Lalonde AB, Ballerman C, Biringer A, Delaney M, et al. Active management of the third stage of labour: prevention and treatment of postpartum hemorrhage. *J Obstet Gynaecol Can* 2009;31(10):980-993.
- (77) American College of Obstetricians and Gynaecologists. ACOG practice bulletin: clinical management guidelines for obstetrician-gynaecologists number 76, October 2006: postpartum hemorrhage. *Obstet Gynecol* 2006;108(4):1039-1047.
- (78) International Confederation of Midwives, International Federation of Gynaecology and Obstetrics, Society of Obstetricians and Gynaecologists of Canada. International joint policy statement no.136—management of the third stage of labour to prevent postpartum hemorrhage. *J Obstet Gynaecol Can* 2003;25(11):952-953.
- (79) Parker LA. Part 1: early recognition and treatment of birth trauma: injuries to the head and face. *Adv Neonatal Care* 2005;5(6):288-297.
- (80) Canadian Institute for Health Information. Giving birth in Canada: regional trends from 2001-2002 to 2005-2006. Ottawa: Canadian Institute for Health Information, 2007.
- (81) Papile LA. The Apgar score in the 21st century. *N Engl J Med* 2001;344(7):519-520.
- (82) Moster D, Lie RT, Irgens LM, Bjerkedal T, Markestad T. The association of Apgar score with subsequent death and cerebral palsy: A population-based study in term infants. *J Pediatr* 2001;138(6):798-803.
- (83) Ministry of Health and Long Term Care. Healthy babies healthy children report card. Accessed November 24, 2010 at [http://www.health.gov.on.ca/english/public/pub/ministry\\_reports/healthy\\_babies\\_report/hbabies\\_report.html](http://www.health.gov.on.ca/english/public/pub/ministry_reports/healthy_babies_report/hbabies_report.html), 2010.
- (84) Lydon-Rochelle M, Holt VL, Martin DP, Easterling TR. Association between method of delivery and maternal rehospitalization. *JAMA* 2000;283(18):2411-2416.
- (85) Glazener CM, Abdalla M, Stroud P, Naji S, Templeton A, Russell IT. Postnatal maternal morbidity: extent, causes, prevention and treatment. *Br J Obstet Gynaecol* 1995;102(4):282-287.
- (86) Porcellato CM, Stewart DE, Murray M, Baker GR, Brown AD. Hospital report 2002. women's health—an excerpt of hospital report 2002: acute care. Toronto: The Hospital Report Research Collaborative, 2002.
- (87) Howe N, Jilian, P., Levinton, C. Hospital report 2006: acute care. women's health technical summary. Ottawa Canadian Institute for Health Information, 2006.
- (88) Cargill Y, Martel M. SOGC Policy Statement 190. Postpartum Maternal and Newborn Discharge. *J Obstet Gynaecol Can* 2007:357-359.
- (89) Watt S, Sword W, Krueger P. Longer postpartum hospitalization options—who stays, who leaves, what changes? *BMC Pregnancy Childbirth* 2005;5:13.
- (90) Datar A, Sood N. Impact of postpartum hospital-stay legislation on newborn length of stay, readmission, and mortality in California. *Pediatrics* 2006;118(1):63-72.
- (91) American Academy of Pediatrics. Committee on Fetus and Newborn. Hospital stay for healthy term newborns. *Pediatrics* 2010;125(2):405-409.
- (92) Lee KS, Perlman M, Ballantyne M, Elliott I, To T. Association between duration of neonatal hospital stay and readmission rate. *J Pediatr* 1995;127(5):758-66.
- (93) Paul IM, Lehman EB, Hollenbeak CS, Maisels MJ. Preventable newborn readmissions since passage of the newborns' and mothers' health protection act. *Pediatrics* 2006;118(6):2349-58.

- (94) Ellberg L, Hogberg U, Lundman B, Kallen K, Hakansson S, Lindh V. Maternity care options influence readmission of newborns. *Acta Paediatr* 2008;97(5):579-583.
- (95) Canadian Paediatric Society. Guidelines for detection, management and prevention of hyperbilirubinemia in term and late preterm newborn infants (35 or more weeks' gestation)—Summary. *Paediatr Child Health* 2007;12(5):401-18.
- (96) Chan A, Keane RJ. Prevalence of induced abortion in a reproductive lifetime. *Am J Epidemiol* 2004;159(5):475-80.
- (97) Henshaw SK, Adewole I, Singh S, Bankole A, Oye-Adeniran B, Hussain R. Severity and cost of unsafe abortion complications treated in Nigerian hospitals. *Int Fam Plan Perspect* 2008;34(1):40-50.
- (98) Statistics Canada. Induced abortions by province and territory of report, available at <http://www40.statcan.ca/l01/cst01/health40a-eng.htm> 2010.
- (99) Statistics Canada. Percentage distribution of induced abortions by gestation period. Accessed August 18, 2010 at <http://www.arcc-cdac.ca/StatsCan-gestation-times-1995-2003.xls>, 2003.
- (100) Zhou W, Nielsen GL, Moller M, Olsen J. Short-term complications after surgically induced abortions: a register-based study of 56 117 abortions. *Acta Obstet Gynecol Scand* 2002;81(4):331-336.
- (101) Ferris LE, McMain-Klein M, Colodny N, Fellows GF, Lamont J. Factors associated with immediate abortion complications. *CMAJ* 1996;154(11):1677-85.
- (102) Kulier R, Fekih A, Hofmeyr GJ, Campana A. Surgical methods for first trimester termination of pregnancy. *Cochrane Database Syst Rev* 2001(4):CD002900.
- (103) Sedgh G, Henshaw S, Singh S, Ahman E, Shah IH. Induced abortion: estimated rates and trends worldwide. *Lancet* 2007;370(9595):1338-1345.
- (104) Statistics Canada. Induced Abortion Statistics. Accessed August 16, 2010 at <http://www.statcan.gc.ca/pub/82-223-x/82-223-x2008000-eng.htm>:Ministry of Industry 2008.
- (105) Statistics Canada. Table 106-9002—Pregnancy outcomes, by age group, Canada, provinces and territories, annual, CANSIM (database). Accessed June 7, 2010 at <http://www5.statcan.gc.ca/cansim/a05?lang=eng&id=1069002&paSer=&pattern=106-9002&stByVal=1&csid=>.
- (106) Marston C, Cleland J. Relationships between contraception and abortion: a review of the evidence. *Int Fam Plan Perspect* 2003;29(1):6-13.
- (107) Statistics Canada. Therapeutic abortion survey. Detailed information for 2006. available at: [www.statcan.gc.ca/imdb-bmdi/document/3209\\_D4\\_T2\\_V7-eng.pdf](http://www.statcan.gc.ca/imdb-bmdi/document/3209_D4_T2_V7-eng.pdf), 2008.
- (108) Supreme Court of Canada. *R v Morgentaler R. v. Morgentaler*, 1 S.C.R. 30, January 28, 1988 Docket: 19556 Judgements of the Supreme Court of Canada, 1988.
- (109) Davis V. SOGC clinical practice guidelines. no 184 induced abortion guidelines, 2006.
- (110) Ferris LE, Main-Klein M, Colodny N, Fellows GF, Lamont J. Factors associated with immediate abortion complications. *CMAJ* 1996;154(11):1677-1685.
- (111) Creinin MD, Darney PD. Methotrexate and misoprostol for early abortion. *Contraception* 1993;48(4):339-48.
- (112) Ulmann A, Silvestre L, Chemama L, Rezvani Y, Renault M, Aguilhaume CJ, et al. Medical termination of early pregnancy with mifepristone (RU 486) followed by a prostaglandin analogue. Study in 16,369 women. *Acta Obstet Gynecol Scand* 1992;71(4):278-83.
- (113) Say L, Brahmi, D., Kulier, R., Campana, A., Gülmezoglu, A.M.,. Medical versus surgical methods for first trimester termination of pregnancy. *Cochrane Database of Systematic Reviews* 2002 2010(Issue 4. Art. No.: CD003037).
- (114) Shaw J. Reality Check. A close look at accessing abortion services in Canadian hospitals: Canadians for choice, 2006.
- (115) Sethna C, Doull M. Far from home? A pilot study tracking women's journeys to a Canadian abortion clinic. *J Obstet Gynaecol Can* 2007;29(8):640-647.
- (116) Statistics Canada. Induced abortion by age group. Accessed August 16, 2011 at <http://www40.statcan.ca/l01/cst01/health43-eng.htm>.
- (117) Pazol K, Gamble SB, Parker WY, Cook DA, Zane SB, Hamdan S. Abortion surveillance—United States, 2006. *MMWR Surveill Summ* 2009;58(8):1-35.
- (118) Jones RK, Finer, L. B., Singh S. Characteristics of U.S. abortion patients, 2008. New York: Guttmacher Institute, 2010.



- (119) Guttmacher Institute. Abortion: worldwide levels and trends. New York: Guttmacher Institute, 2009.
- (120) Singh S, Wulf D, Hussain R, Bankole A, Sedgh G. Abortion worldwide: a decade of uneven progress: New York Guttmacher Institute, 2009.
- (121) Sedgh G, Henshaw SK, Singh S, Bankole A, Drescher J. Legal abortion worldwide: incidence and recent trends. *Int Fam Plan Perspect* 2007;33(3):106-116.
- (122) Guttmacher Institute. Facts on induced abortion worldwide. New York: Guttmacher Institute, 2007.
- (123) Statistics Canada. Induced abortion statistics: Ministry of Industry 2008.
- (124) Jones RK, Singh S,., Finer, L.B., Frohwirth, L.F., . Repeat abortion in the United States. New York: Guttmacher Institute, 2006.
- (125) Fisher WA, Singh SS, Shuper PA, Carey M, Otchet F, Lean-Brine D, et al. Characteristics of women undergoing repeat induced abortion. *CMAJ* 2005;172(5):637-641.
- (126) Jagannathan R. Relying on surveys to understand abortion behavior: some cautionary evidence. *Am J Public Health* 2001;91(11):1825-31.
- (127) International Planned Parenthood Federation. Death and denial: unsafe abortion and poverty. United Kingdom, 2006.
- (128) Jacobson GF, Shaber RE, Armstrong MA, Hung YY. Hysterectomy rates for benign indications. *Obstet Gynecol* 2006;107(6):1278-1283.
- (129) Uskul AK, Ahmad F, Leyland NA, Stewart DE. Women's hysterectomy experiences and decision-making. *Women Health* 2003;38(1):53-67.
- (130) Kuppermann M, Varner RE, Summitt RL, Jr., Learman LA, Ireland C, Vittinghoff E, et al. Effect of hysterectomy vs medical treatment on health-related quality of life and sexual functioning: the medicine or surgery (Ms) randomized trial. *JAMA* 2004;291(12):1447-55.
- (131) Malik E, Buchweitz O, Muller-Steinhardt M, Kressin P, Meyhofer-Malik A, Diedrich K. Prospective evaluation of the systemic immune response following abdominal, vaginal, and laparoscopically assisted vaginal hysterectomy. *Surg Endosc* 2001;15(5):463-6.
- (132) Huggins GR, Sondheimer SJ. Complications of female sterilization: immediate and delayed. *Fertil Steril* 1984;41(3):337-55.
- (133) Wu JM, Wechter ME, Geller EJ, Nguyen TV, Visco AG. Hysterectomy rates in the United States, 2003. *Obstet Gynecol* 2007;110(5):1091-1095.
- (134) Lefebvre G, Allaire C, Jeffrey J, Vilos G, Arneja J, Birch C, et al. SOGC clinical guidelines. Hysterectomy. *J Obstet Gynaecol Can* 2002;24(1):37-61.
- (135) Kovac SR. Clinical opinion: guidelines for hysterectomy. *Am J Obstet Gynecol* 2004;191(2):635-40.
- (136) American College of Obstetricians and Gynaecologists. ACOG practice bulletin, No. 239 operative laparoscopy. Washington, D.C.: American College of Obstetricians and Gynaecologists, 1997.
- (137) Merrill RM, Layman AB, Oderda G, Asche C. Risk estimates of hysterectomy and selected conditions commonly treated with hysterectomy. *Ann Epidemiol* 2008;18(3):253-260.
- (138) Ontario Womens Health Council. Achieving best practices in the use of hysterectomy. Toronto: Ministry of Health and Long Term Care, 2002.
- (139) Kives S, Lefebvre G, Wolfman W, Leyland N, Allaire C, Awadalla A, et al. Supracervical hysterectomy. *J Obstet Gynaecol Can* 2010;32(1):62-68.
- (140) Laberge PY, Singh SS. Surgical approach to hysterectomy: introducing the concept of technicity. *J Obstet Gynaecol Can* 2009;31(11):1050-3.
- (141) Smith LH, Waetjen LE, Paik CK, Xing G. Trends in the safety of inpatient hysterectomy for benign conditions in California, 1991-2004. *Obstet Gynecol* 2008;112(3):553-61.
- (142) Public Health Agency of Canada. Report on Sexually Transmitted Infections In Canada: 2008, 2008.
- (143) Public Health Agency of Canada. Canadian Guidelines on Sexually Transmitted Infections, 2008.
- (144) Bierman AS, Angus J, Ahmad F, Shiller S, Glazier R, Vahabi M, et al. Burden Of Illness. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.

- (145) MacDonald N, Wong T. Canadian guidelines on sexually transmitted infections, 2006. *CMAJ* 2007;176(2):175-6.
- (146) Wong T, Singh A, Mann J, Hansen L, McMahon S. Gender differences in bacterial STIs in Canada. *BMC Womens Health* 2004;4 Suppl 1:S26.
- (147) Public Health Agency of Canada. 2004 Canadian Sexually Transmitted Infections Surveillance Report. *Canada Communicable Disease Report*, 2007:1-69.
- (148) Public Health Agency of Canada. Viral hepatitis and emerging bloodborne pathogens in Canada. *Canada Communicable Disease Report*, 2001:starting on page 16.
- (149) Society of Obstetricians and Gynaecologists of Canada (SOGC), the Association of Women's Health, Obstetric and Neonatal Nurses of Canada (AWHONN Canada), the Canadian Association of Midwives (CAM), the College of Family Physicians of Canada (CFPC), and the Society of Rural Physicians of Canada (SRPC). Joint policy statement on normal childbirth. No. 221, December 2008;30(12):1163–1165.
- (150) College of Family Physicians of Canada, Society of Rural Physicians of Canada, Society of Obstetricians and Gynaecologists of Canada. Joint position paper on training for rural family practitioners in advanced maternity skills and cesarean section. *Can Fam Physician* 1999; 45:2416-22, 2426-32
- (151) March of Dimes. Working together for stronger healthier babies. Accessed February 15, 2011 at: [http://www.marchofdimes.com/professionals/medicalresources\\_39weeks.html](http://www.marchofdimes.com/professionals/medicalresources_39weeks.html).
- (152) March of Dimes. Toward improving the outcome of pregnancy III. Accessed February 15, 2011 at [http://www.marchofdimes.com/TIOPIII\\_FinalManuscript.pdf](http://www.marchofdimes.com/TIOPIII_FinalManuscript.pdf), 2010.
- (153) Ministry of Health and Long Term Care. Health care consent act, 1996. Available at [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_96h02\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_96h02_e.htm), 1996.
- (154) Bierman AS, Angus J, Ahmad F, Degani N, Vahabi M, Glazier R, et al. Access to health care services. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009/10.
- (155) Health Canada. Canadian perinatal health report. Ottawa: Minister of Public Works and Government Services Canada, 2003.
- (156) Zeitlin J, Wildman K, Breart G, Alexander S, Barros H, Blondel B, et al. PERISTAT: indicators for monitoring and evaluating perinatal health in Europe. *Eur J Public Health* 2003;13(3 Suppl):29-37.
- (157) Canadian Institute for Health Information. Patient safety in Canada: an update. Ottawa: Canadian Institute for Health Information, 2007.
- (158) Agency for Research and Quality. Patient Safety Indicators Overview. AHRQ Quality Indicators. Accessed May 7, 2010 at [http://www.qualityindicators.ahrq.gov/psi\\_overview.htm](http://www.qualityindicators.ahrq.gov/psi_overview.htm), 2006.
- (159) Institute for Clinical Evaluative Sciences. Studies on access to abortion services (SAAS) available at: [http://www.ices.on.ca/webpage.cfm?site\\_id=1&org\\_id=2&morg\\_id=0&gsec\\_id=2968&item\\_id=2968&category\\_id=63](http://www.ices.on.ca/webpage.cfm?site_id=1&org_id=2&morg_id=0&gsec_id=2968&item_id=2968&category_id=63).
- (160) Canadian Institute for Health Information. Health indicators 2008. Ottawa: Canadian Institute for Health Information, Statistics Canada, 2008.
- (161) Statistics Canada. Health indicators. Definitions and data sources. Available at: <http://www.statcan.gc.ca/pub/82-221-x/4060874-eng.htm>, 2000.
- (162) Association of Public Health Epidemiologists in Ontario. <http://www.apheo.on.ca/>.
- (163) Iron K, Zagorski BM, Sykora K, Manuel DG. Living and dying in Ontario: an opportunity for improved health information. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2008.
- (164) Health Canada. Special report on maternal mortality and severe morbidity in Canada — Enhanced surveillance: the path to prevention. Ottawa: Minister of Public Works and Government Services Canada, 2004.



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### Echo: Improving Women's Health in Ontario

Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# HIV Infection

## *Chapter 11*

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### INSIDE

- Incidence, Prevalence and Risk Behaviours
- Community Services for HIV
- Clinical Care
- Health Outcomes



Project for an Ontario Women's Health Evidence-Based Report

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# Executive Summary

## ISSUE

Care for people living with Human Immunodeficiency Virus (HIV) has experienced significant clinical advances in the last 15 years, resulting in markedly improved survival, functional status and quality of life for those living with HIV.<sup>1</sup>

Antiretroviral agents have made sustained suppression of viral load levels feasible for the large majority of treated patients in resource-rich countries. Newer antiretrovirals have less toxicity and easier dosing schedules than older drugs.<sup>2</sup> Effective monitoring and treatment during pregnancy have resulted in dramatic reductions in the rates of mother-to-infant HIV transmission.<sup>3,4</sup> People living with HIV are projected to live into the sixth or seventh decade of life, many with no or minimal symptoms.<sup>5</sup> On a population level, decreased average viral load levels have been associated with decreased transmission.<sup>6</sup> Despite these important advances, inequities in HIV care for some groups persist. Furthermore, although substantial gains have been made to curb the number of new infections, the incidence of HIV infection in Canada continues to demonstrate disproportionately high rates among men who have sex with men, people who inject drugs, Aboriginal peoples and people from HIV-endemic countries.<sup>7</sup> Ensuring that the clinical and public health gains associated with advances in HIV treatment reach all HIV-infected people remains an essential, but elusive goal.

In Canada, an estimated 65,000 people were living with HIV as of the end of 2008. Women accounted for about 22 percent of the total number of people living with HIV; between 12,200 and 16,400 Canadian women are believed to be HIV-positive.<sup>7</sup> In Ontario, as of the end of 2008, 26,630 people were living with HIV, based on modelled estimates.<sup>8</sup> While prevalence continues to be higher among men than among women, women have constituted an increasing proportion of the HIV-positive

population over time.<sup>8</sup> Thus, it is important to study both the patterns of illness and outcomes of care of HIV-positive women and among specific groups of women with HIV or at risk for HIV infection.

This chapter of the POWER Study report addresses access and quality of care issues for women and men living with HIV infection or at risk for HIV infection in Ontario. In the first section, the **incidence, prevalence and risk behaviours** of Ontario women and men are profiled including: modelled estimates of HIV incidence and prevalence, reported numbers of AIDS cases, and HIV risk behaviours. The second section reports on indicators of **community services for HIV**, including the amount of

### ABOUT THIS CHAPTER

The chapter has four sections:

- A. Incidence, Prevalence and Risk Behaviours
- B. Community Services for HIV
- C. Clinical Care
- D. Health Outcomes

government funding provided regionally and provincially to community-based HIV services and measures of service delivery and utilization. The section on **clinical care** includes indicators of HIV prenatal screening, treatment of pregnant, HIV-positive women, measures of quality of life, symptom burden, CD4 count and viral load. The final section on **health outcomes** reports on HIV-related hospitalizations and mortality.

## STUDY

The indicators we report are the result of a rigorous selection process which included an extensive literature review of existing indicators as well as input and agreement from experts in the field (see [Introduction to the POWER Study, chapter 1](#)).<sup>9</sup> The indicators that have been included have been identified through a number of sources and many of these indicators are widely used to measure quality of care. We build on these reports by incorporating a gender and equity analysis (see [The POWER Study Framework, chapter 2](#)).<sup>10</sup> Such analyses are important because women and men have different patterns of disease, disability and mortality. Women and men also differ with regards to social contexts, health care, and biology, which together contribute to observed gender differences in health. Furthermore, well-

documented health inequities among women and men associated with sociodemographic factors are such that differences in illness burden between specific groups of women may be larger than overall differences between women and men.

Data from several sources were used to produce this section. These include data from Statistics Canada's 2006 Census; the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007; the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); the Ontario Registrar General, Vital Statistics; the Ontario HIV Treatment Network Cohort Study (OCS); the Canadian Pediatric AIDS Research Group (CPARG) perinatal HIV surveillance program; the Ontario Agency for Health Protection and Promotion—HIV Laboratory, Public Health Laboratory; the Enhanced Surveillance of Risk Behaviours among Injection Drug Users in Canada (I-Track) Study and the Ontario Community-based HIV and AIDS Reporting Tool (OCHART). Indicators were stratified by sex and then further stratified by socioeconomic status, age, ethnicity, country/region of birth, HIV-exposure category and geographic region where data were available and sample size allowed. A complete list of the indicators in this chapter and their data sources can be found in [Appendix 11.2](#).

## KEY FINDINGS

### **Over 4,700 women are living with HIV in Ontario, most of whom acquired HIV through sexual contact.**

Based on modelled estimates, there are 26,630 people living with HIV infection in Ontario (21,880 men and 4,750 women). Women account for 18 percent of infections. Based on publicly reported, hierarchical exposure categories,<sup>8</sup> the most commonly attributed exposure category among women was heterosexual/non-endemic (45 percent of infections), followed by heterosexual/endemic (42 percent of infections). While only 13 percent of HIV infections among women were attributed to injection drug use, this represents an HIV prevalence of five percent among female injection drug users (IDU) in Ontario (based on an estimated population at risk) ([Exhibit 11A.1](#)).

### **Women who immigrated from a country where HIV is endemic account for more than half of all new infections among women.**

Based on modelled estimates, there were 4,735 new HIV infections between 2006 and 2008 (3,545 men and 1,190 women). Women accounted for almost one-quarter of new infections. Modelled incidence has been relatively stable over the three-year period. Among women, the majority of new infections (58 percent) were among women whose exposure category was heterosexual/endemic. The population-specific incidence was highest among women IDUs (236 per 100,000 person-years at risk), followed by women from an HIV-endemic country (94 per 100,000 person-years at risk), who had markedly lower rates ([Exhibit 11A.4](#)).

### **Women reported lower rates of condom use than men.**

Condoms remain an important way to prevent HIV infection.<sup>11,12</sup> Among survey respondents aged 15-49 who had multiple sex partners in the previous 12 months, 59 percent reported that they had used a

condom at their last sexual intercourse. Women were less likely than men to report this (53 percent versus 65 percent). Younger women and men were more likely than older adults to report condom use at their last sexual encounter ([Exhibit 11A.6](#)). Condom use also varied by ethnocultural group ([Exhibit 11A.7](#)) and time since immigration ([Exhibit 11A.8](#)). Irrespective of age, ethnicity, or time since immigration, women consistently had lower rates of condom use at their last sexual encounter than men.

### **Women who inject drugs report riskier injection behaviours than men.**

Equipment sharing among IDUs is a high-risk activity for acquiring HIV. Among Ontario I-Track participants, 18 percent reported injecting with previously used needles, 34 percent reported receiving previously used injection paraphernalia (water, cooker or filter), 21 percent reported lending previously used needles and 33 percent reported lending previously used paraphernalia. Women were more likely to participate in all of these risk behaviours than men ([Exhibit 11A.9](#)). HIV-positive participants were less likely than HIV-negative participants to report lending previously used paraphernalia, but they reported high rates of receipt of previously used equipment, which raises concerns about transmission of other strains of HIV or other blood borne viruses, such as hepatitis C, that can co-infect and impact outcomes for people who are living with HIV ([Exhibit 11A.10](#)).

### **Approximately one-third of the users of community-based HIV services are women.**

In 2008/09, between the AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Plan (ACAP) of the Public Health Agency of Canada (PHAC), \$23.8 million in funding was allocated to 83 programs providing community-based HIV services ([Exhibit 11B.1](#)). In the first half of 2008/09, 17,636 people accessed support



services; one-third of users were women, though they account for only 18 percent of the HIV-positive population in Ontario. Among those receiving services for injection drug use, 10,805 accessed outreach services and 9,175 accessed services provided on site (in-services). Women accounted for almost 40 percent of users of IDU outreach and in-services, though they represent a smaller proportion of the IDU population than men ([Exhibit 11B.2](#)). These findings suggest that women are higher users of community-based services than men.

**Over 90 percent of HIV-positive pregnant women who knew their HIV status received antiretrovirals during pregnancy which could prevent mother-to-child transmission.**

Prenatal screening for HIV in Ontario occurs at very high rates; 95 percent of pregnant women who received prenatal testing in 2009 were screened for HIV ([Exhibit 11C.2](#)). From 2005 to 2009, 91 percent of pregnant women who knew they were HIV-positive received antiretroviral therapy which would prevent the vast majority of mother-to-child transmission of HIV during pregnancy or delivery. The percentage of HIV-positive, pregnant women who received antiretroviral therapy varied by exposure category and ethnocultural group. Women who identified injection drug use as their HIV exposure category had the lowest treatment rates during pregnancy ([Exhibit 11C.4](#)) and Aboriginal women were less likely to have been on antiretroviral therapy during pregnancy than women from other ethnocultural groups.

**Health-related quality of life among adults with HIV infection is worse than the quality of life in the general population, especially mental health status.**

Quality of life was measured with the Medical Outcomes Survey Short-Form 12 (SF-12) questionnaire among participants in the OCS, a voluntary, clinic-based cohort. The questionnaire provides a physical health summary (PHS) and a mental health summary (MHS) score, both

of which are standardized to the U.S. general population with a mean score of 50. The mean MHS score was clinically lower among OCS participants than the standard population mean (46 versus 50, respectively). The mean PHS score was also lower among OCS participants than the standard population mean (49 versus 50, respectively), however this difference was not clinically important. The mean PHS and MHS scores were worse among those with lower educational attainment ([Exhibit 11C.5](#)). The mean PHS and MHS scores varied by age ([Exhibit 11C.6](#)) and by HIV exposure category. Importantly, women who injected drugs had a mean MHS score of 38 (12 points lower than the standard population score of 50) ([Exhibit 11C.7](#)); although this estimate is based on a small numbers of female IDUs and might not be precisely estimated.

**Women reported higher symptom burden than men.**

Symptom questionnaires capture the burden of HIV infection, associated conditions, social factors, and treatment-related adverse events. Based on the AIDS Clinical Trial Group (ACTG) symptom index, the mean number of symptoms that OCS respondents reported bothered them or bothered them a lot was 3.9 (out of 20); women reported more symptoms that bothered them than men (4.5 versus 3.7, respectively) ([Exhibit 11C.8](#)). With respect to specific symptoms, the percentage of OCS respondents who indicated that fatigue, nervousness, pain or sadness bothered them or bothered them a lot ranged from one in five to one in three respondents. Women were more likely to report sadness than men (45 percent versus 31 percent, respectively) ([Exhibit 11C.9](#)).

### **A significant proportion of patients do not receive a viral load test soon after being diagnosed HIV-positive.**

Almost one in five women and men who were newly diagnosed with HIV had not had a first viral load test within three months of testing positive and one in fourteen women and one in ten men who were newly diagnosed with HIV had not had a viral load test within 12 months of testing positive ([Exhibit 11C.13](#)). The mean number of days to a first viral load test among people who had newly tested positive for HIV was 65 days and the median was 36 days. Women had slightly longer mean and median times to first viral load test than men.

### **About one out of five HIV-positive individuals in HIV care in Ontario did not undergo guideline-concordant viral load testing.**

According to clinical care guidelines, viral load testing should be performed every four months; less frequent testing (every six months) may be appropriate for patients who have reliable adherence, high CD4 counts and sustained virologic suppression.<sup>2</sup> Of the 9,410 people living with HIV who were identified as being in HIV care, 82 percent had two or more viral load tests in 2008. This did not vary by sex, but did vary somewhat by age ([Exhibit 11C.15](#)) and by public health region ([Exhibit 11C.16](#)).

### **Women were less likely than men to have all their viral loads below the level of quantification.**

An indicator of treatment success is suppressed viral load. Among people living with HIV who had a viral load test in the latter half of 2007 and at least one in 2008, 63 percent had all their 2008 viral loads below the level of quantification. Women were less likely than men to have all undetectable viral load results (58 percent versus 64 percent) ([Exhibit 11C.17](#)). The sex difference is partially due to the younger age distribution among women as compared to men ([Exhibit 11C.18](#)).

### **HIV admissions were most common among people living in low-income neighbourhoods.**

Between 2004/05 and 2006/07, there were 2,448 non-elective admissions that included an HIV diagnosis. Of these, 70 percent (1,713 admissions) identified HIV as contributing significantly to the length of stay ([Exhibit 11D.3](#)). The number of admissions for which HIV contributed significantly to the length of stay varied by Local Health Integration Network (LHIN), age and neighbourhood income. Among women, the proportion of all non-elective admissions for which HIV contributed significantly to the length of stay was 0.8 per 1,000 admissions among women living in the lowest-income neighbourhoods versus 0.4 per 1,000 admissions among women living in the highest-income neighbourhoods ([Exhibit 11D.4](#)). A similar pattern was seen for men.

### **The highest HIV-related mortality rate among women and men was experienced by those born in sub-Saharan Africa.**

There were 157 HIV-related deaths reported in 2006, for an HIV-related mortality rate of 1.3 per 100,000 population. The HIV-related mortality rate was higher among men than among women and varied by age and by country or region of birth ([Exhibit 11D.9](#)). The highest mortality rate among women and men was experienced by those born in sub-Saharan Africa. Deaths among people living with HIV infection may be under-reported or miscoded and will not include deaths among HIV-infected people where the cause of death was not HIV.

## KEY MESSAGES

We examined broadly HIV prevention and care throughout Ontario, focusing on gender, socioeconomic status, ethnicity, country/region of birth, HIV-exposure category and geography, where data were available. Considerable progress has been made in the last 15 years in the prevention of HIV transmission and in the treatment of people living with HIV. Yet these advances are not always delivered equitably. Difference in access to treatment, quality of care and prevention efforts are often related to the social determinants of health, suggesting the need for broad intersectoral action to improve health, such as with the education, legal and income support systems.

The HIV epidemic remains concentrated in Ontario's major urban centres, although people living with HIV reside in every LHIN. However, the nature of the epidemic varies across regions. Local planning will be important to address the divergent prevention and care needs of women and men, with particular attention to recent immigrants from HIV-endemic countries (who may arrive to Canada already infected or who may become infected after they immigrate), Aboriginal people, people who inject drugs and men who have sex with men.

HIV-infected people who are unaware of their HIV status are more likely to transmit the virus. Our findings build on previous analyses that suggest that many people in Ontario who are living with HIV remain unaware of their status<sup>8</sup> and reveal a second, less appreciated gap in care. Specifically, many people who know that they are HIV-positive do not receive guideline-concordant health care for their HIV infection on a regular basis. These important findings highlight the need to consider the way HIV testing and care is structured and delivered in Ontario.

The following six actions can help to accelerate progress in reducing the burden of HIV infection, improve health outcomes among women and men living with HIV, and reduce health inequities related to HIV infection.

### **More comprehensive data, and better data linkages are required to measure important quality indicators.**

- Ontario has excellent data to measure HIV-related indicators in some areas, due in part to centralized coordination of some important laboratory tests (including HIV diagnostic testing, HIV viral load testing and genotypic resistance testing) as well as the Laboratory Enhancement Program (which collects supplementary risk and test history data as well as incidence testing) at the Public Health Laboratory. Administrative health data are also available at the Institute for Clinical and Evaluative Sciences (ICES). However, there are significant gaps in data and important areas that cannot be measured at the population level.
- Understanding the context of HIV care is important for interpreting many quality indicators. Initiatives to link databases in Ontario, such as those linking OCS and the Public Health Laboratory to administrative data on physician visits, hospitalizations and drug utilization have the potential to facilitate better measurement and monitoring of important clinical indicators for people receiving care. Further linkages between databases, including HIV testing data (when nominal testing has been performed) and private laboratory data (for CD4 count and other laboratory results) would greatly facilitate measurement of important indicators.
- More information is also needed about continuity of care for HIV positive IDUs and about care for IDUs co-infected with HIV and other blood borne diseases, in particular hepatitis C.

**Targeted prevention efforts are needed for some groups, including Aboriginal people and older women.**

- Over 1,000 people each year are newly diagnosed with HIV infection and people from some groups, particularly Aboriginal women and men and older women, are either diagnosed late or enter care late in the course of their infection. Strategies to promote HIV prevention, testing and access to care need to continue and targeted efforts directed at hard-to-reach groups would improve the health of Ontarians living with HIV and those at risk for HIV infection.

**HIV testing in pregnancy is high among women receiving prenatal care. Questions remain about women not receiving care and about the quality of consent.**

- HIV transmission from a mother to child can be almost eliminated with antiretroviral therapy and obstetrical interventions. A surveillance system in Ontario provides real time data on HIV screening uptake in pregnant women. The dramatic fall in the number of infants born with HIV infection in Ontario and the very high testing rates during pregnancy indicate important areas where coordinated intervention and clinical practice guidelines have changed care and improved health outcomes. Although only a few women decline testing during pregnancy, we do not have data to characterize who these women are or their reasons for not being tested. Future research might be able to retrospectively characterize women who decline testing.
- Similarly, we do not have comprehensive data on HIV prevalence among pregnant women who do not receive prenatal care, though these numbers are small. With the advent of new testing technologies, such as rapid point of care testing which can deliver a test result in minutes (compared to the conventional test which takes two weeks), there is a potential to increase testing rates prior to delivery. However, we do not know how many women would accept rapid point-of-care testing

or what the potential yield of such testing would be in Ontario. Answers to these important questions are needed to further reduce, and eventually eliminate mother-to-child HIV transmission in the province.

- The impressive testing rates among pregnant women come with an important caveat. We do not have systematic data regarding the number of women who were tested without consent or for whom the quality of consent is suboptimal.
- The high testing rates among pregnant women indicate the successful implementation of a public health program. This program might serve as a model to increase testing rates among other groups, including those who are high risk yet have low testing rates.

**Prevention efforts among people who inject drugs seem to be effective but targeted interventions for women who inject drugs are needed.**

- Overall, the prevalence of HIV among IDUs remains at about five percent in Ontario, although the rates vary significantly across cities. Although this is a concerning absolute rate, it is relatively low compared to prevalence rates among IDUs internationally and elsewhere in Canada. Plausible explanations for this low rate include early and widespread adoption of needle and syringe exchange programs, a network of addiction and supportive services for IDUs, and the enhanced availability of drug substitution treatment for IDUs, specifically the expansion of methadone maintenance therapy (MMT) and the availability of low-threshold MMT (in which individuals are allowed to continue in MMT even if they continue to use drugs while in the program).
- Self-reported risky behaviours for women who inject drugs remain high, such as injection with previously used needles and drug paraphernalia. These findings suggest that women are at particularly high risk of acquiring HIV and targeted interventions for female IDUs might be beneficial.

- OCS data suggest that IDUs are diagnosed relatively early in the course of HIV infection in Ontario compared to other groups. Such early diagnosis has important benefits for both the individual (facilitating treatment) and for public health interventions (limiting transmission). Since these findings are based on a voluntary cohort, they are susceptible to selection bias and should be confirmed, if possible, using population-level data.

**Important gaps in access to and quality of HIV care should be investigated.**

- Regular monitoring of HIV status is an important part of care for all people living with HIV, whether or not they are using antiretroviral medications. Viral load monitoring is a good proxy measure of receiving HIV-specific health care. Of those who had a viral load test in the latter half of 2007 one in five did not undergo at least two additional tests in the next year. These findings suggest that almost 20 percent of individuals living with HIV who are in care are not receiving guidelines concordant HIV care. Further analyses are required to identify the reasons for infrequent viral load testing among those who have presented to care.
- We observed a significant discrepancy between the number of people (over several years) who have tested HIV-positive in Ontario and the number who received regular, guideline-concordant, HIV-specific health care, based on viral load testing. Overall, 16,860 people were estimated to be alive and aware of their HIV-positive status as of the middle of 2007, of whom 10,930 (65 percent) received at least one viral load test during the year<sup>13</sup> and 9,410 (55 percent) received at least one test in the latter half of 2007. These findings suggest that

a large proportion of individuals who have received a positive HIV test are not having their infection regularly monitored. These estimates are consistent with findings from the U.S.<sup>14</sup> and from elsewhere in Canada.<sup>15</sup> Research to identify system and patient-level factors that contribute to loss to follow up and interventions to improve retention are priority areas for future research and programming.

**Despite effective treatment, some people living with HIV experience many symptoms and reduced quality of life, particularly women, injection drug users and people with lower educational attainment.**

- The experience of living with HIV is not the same for all groups. As with other chronic diseases, we found higher rates of depressive symptoms among women living with HIV compared to men living with HIV.
- Individuals with a history of injection drug use had worse mental and physical health status than non-users and women fared worse than men. These findings suggest that people who have injected drugs, and particularly women, have unique health needs that may not be fully addressed.
- We also found worse mental and physical health status among individuals with lower educational attainment. These findings underscore the need for ongoing attention to social determinants both generally, to address the health needs of individuals from all socioeconomic strata, and specifically, to ensure effective and accessible physical and mental health rehabilitation services for people living with HIV.

# Introduction

The Human Immunodeficiency Virus (HIV) attacks and kills vital white blood cells, called CD4 T-helper cells (commonly referred to as CD4 cells), leading to immune suppression and associated clinical sequelae, including a variety of opportunistic infections and malignancies.

Left untreated, HIV will lead to premature mortality. HIV can be spread from person to person through sex, sharing of injection equipment, receipt of contaminated blood products and through mother-to-child transmission. During the first decade of the epidemic, HIV had devastating impacts on individuals and society.

## The chapter has four sections:

- Incidence, Prevalence and Risk Behaviours
- Community Services for HIV
- Clinical Care
- Health Outcomes

People living with HIV experienced high morbidity and mortality and societies experienced high productivity losses, given the low average age of those infected. HIV care has undergone significant clinical advances in the last 15 years, resulting in markedly improved survival, functional status and quality of life for those living with HIV.<sup>1</sup> This chapter of the POWER Study Report addresses access and quality of care issues for women and men living with HIV infection or at risk for infection in Ontario.

An estimated 65,000 Canadians were living with HIV infection as of the end of 2008. Women account for approximately 22 percent of the total number of people living with HIV; thus, in Canada there were an estimated 12,200 to 16,400 women living with HIV.<sup>7</sup> An estimated 2,300 to 4,300 new HIV infections occurred in Canada in 2008, which was similar to or slightly higher than the 2005 estimate. Nationally, men comprised 78 percent of new infections in 2008 and transmission was mainly through sex between men. Women were infected through heterosexual sex (71 percent) and injection drug use (29 percent). While substantial gains have been made since the beginning of the epidemic to curb the number of new infections, the incidence of HIV infection in Canada continues to be disproportionately high among men who have sex with men, people who inject drugs, Aboriginal people and people who have immigrated from areas where HIV is endemic.<sup>7</sup> In 2008, based on modelled estimates, 26,630 people were living with HIV in Ontario. While prevalence continues to be higher among men than among women, women have constituted an increasing proportion of the HIV-positive population over time.<sup>8</sup> Thus, it is important to study both the patterns of illness and outcomes of care of HIV-positive women and among specific groups of women with HIV or at risk for HIV infection.



The burden and complexity of HIV is compounded by larger, societal, gender-based inequities that women experience. In Canada, women are more likely than men to have low incomes, to be underpaid and unpaid for their labour,<sup>16,17</sup> and to experience work-related mental stress.<sup>18</sup> This socioeconomic disparity is associated with poor physical health and functioning among women.<sup>19</sup> Low-income women are also more likely than middle- and higher-income women to experience intimate partner violence,<sup>20,21</sup> to be unstably housed<sup>21</sup> and to have untreated mental health diagnoses,<sup>22</sup> all of which are associated with poor health outcomes.<sup>23-26</sup> Social marginalization and associated stigma, discrimination and vulnerability, are also common among HIV-infected people and have contributed to the challenges of living with this infection. Women living with HIV are more likely than women without HIV to have experiences of childhood sexual abuse,<sup>27</sup> which is also associated with poor treatment outcomes.<sup>28</sup> Together, these social factors negatively influence how HIV-positive women access health care, the quality of care they receive and their health outcomes.<sup>29,30</sup>

Women access HIV care and services less frequently than HIV positive men.<sup>31,32</sup> Several large U.S. cohort studies have reported that women are about 1.5 times less likely to receive clinically indicated antiretroviral therapy than men and that the uptake of antiretroviral therapy in women lagged behind the uptake rate in men.<sup>33,34</sup> This disparity was observed even in a study of privately insured individuals in the United States in 2000, of whom 71 percent of men received antiretroviral therapy compared to 39 percent of women.<sup>35</sup> These differences in care may translate into worse outcomes. In a cohort study of 11 U.S. sites from the early 2000s, hospitalization rates were significantly higher among women (40 percent higher hospitalization rates than men) as well as among patients with greater immunosuppression, Blacks, injection drug users, those aged 50 and older and those on Medicaid/Medicare.<sup>36</sup>

In contrast, a few studies have indicated that women may use more health services than men. In Vancouver, women who injected drugs had a shorter time to initiation of addiction treatment than male users<sup>37</sup> and among residents of Vancouver's Downtown Eastside, women were more likely than men to use health services.<sup>38</sup> Another study reported more frequent HIV testing among women who inject drugs compared to men.<sup>39</sup> The HIV Cost and Services Utilization Study reported that women were not more likely to go without care than men<sup>40</sup> and a secondary analysis of a randomized controlled trial reported that women had higher CD4 cell counts, were more likely to have ever been prescribed an antiretroviral drug and were less likely than men to have AIDS at baseline enrolment.<sup>41</sup> The same study reported that women and men had similar numbers of primary care visits, emergency room visits, annual admission rates and lengths of stay for hospitalization.<sup>41</sup> These conflicting findings suggest the need for continued research into gender differences in HIV.

Inequities may also exist among women and determinants of equity besides gender have been well documented.<sup>42,43</sup> Among 273 women who were living with HIV, women were more likely to receive HIV specialist care if they did not inject drugs, were not depressed or had health insurance. Accessing a specialist was significantly associated with receiving antiretroviral therapy and related advice.<sup>44</sup> Other studies have focused on a variety of outcomes, including: accessibility and use of HIV testing;<sup>39,45-48</sup> access to HIV services among those identified as being HIV-positive;<sup>31,32</sup> the association between access to care and health status;<sup>34,49-52</sup> and the association between socioeconomic factors and outcomes for which access to HIV therapies and health services may be an intermediate step.<sup>53-56</sup> A recent review focused on factors associated with diminished access to antiretroviral therapy in industrialized countries found that lower socioeconomic status was associated with lower rates of antiretroviral



drug prescription.<sup>32</sup> In a Canadian study, lower socioeconomic status was associated with higher rates of prescribing of sub-optimal HIV treatment regimens, despite the provision of universal health care and drug benefits for HIV-positive individuals.<sup>56</sup> Several U.S. studies have demonstrated that African Americans have had consistently lower rates of initiating HIV-related therapies.<sup>57-60</sup> Such findings may be confounded by injection drug use, since such use is often associated in the American context with race, poverty, ethnicity, and gender. HIV care and outcomes for transgendered individuals have not been well studied, though this population may be at particular risk of discrimination and attendant inequities.

In summary, despite major scientific advances in the treatment and prevention of HIV, the equitable delivery of quality services to women remains problematic. Indeed, disparities could be widening, leading to a significant amount of unaddressed and avoidable morbidity and mortality. Furthermore, untimely access to prevention and treatment by members of marginalized groups may lead to increased transmission of HIV, since virologic control is an important determinant of transmission risk.<sup>6, 43</sup> By documenting where such inequities exist, our study can suggest priorities for funding or the need for specialized services targeted to specific groups of women with unmet needs.

This chapter includes a comprehensive set of indicators addressing both prevention and treatment of HIV infection. We report indicators that are relevant to the general population, as well as indicators specifically

relevant to high-risk populations (such as injection drug users and some recent immigrants). In recognition of the social and emotional impact of HIV infection, we have also included indicators relevant to community-based delivery of services alongside medical and health interventions. We conclude this chapter by discussing the research, policy, and practice implications of the study results; identifying limitations of the data and highlighting future opportunities in research and clinical practice.

Data from several sources were used to produce this chapter. These include data from Statistics Canada's 2006 Census; the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007; the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Vital Statistics, Ontario Registrar General; the Ontario HIV Treatment Network Cohort Study (OCS); the Canadian Pediatric AIDS Research Group (CPARG) perinatal HIV surveillance program; the Ontario Agency for Health Protection and Promotion—HIV Laboratory, Public Health Laboratory; the Enhanced Surveillance of Risk Behaviours among Injection Drug Users in Canada (I-Track) Study and the Ontario Community-based HIV and AIDS Reporting Tool (OCHART). Indicators were stratified by sex and then further stratified by socioeconomic status, age, ethnicity, country/region of birth, HIV-exposure category and geographic region where data were available and sample size allowed. A complete list of the indicators and their data sources can be found in [Appendix 11.2](#).

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**Exhibit 11D.8** HIV-related mortality (number of deaths), by sex and age group, in Ontario, 2006 ..... 88

**Exhibit 11D.9** HIV-related mortality (per 100,000 population), by sex and region/country of birth, in Ontario, 2006 ..... 88



# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

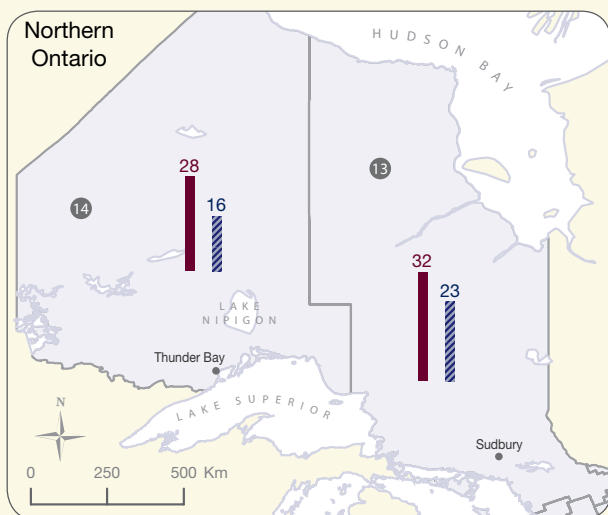
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

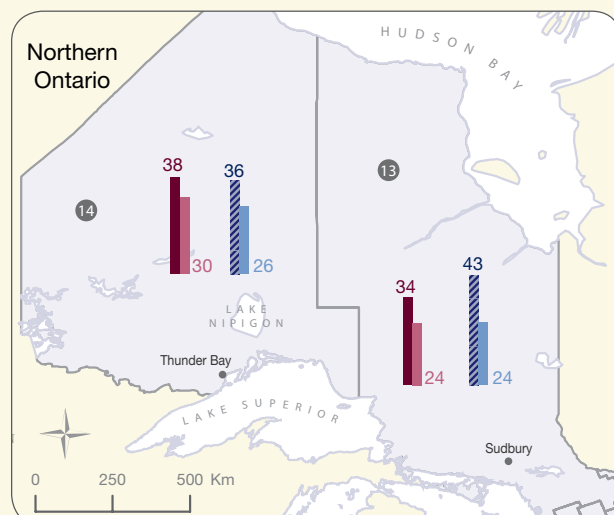
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

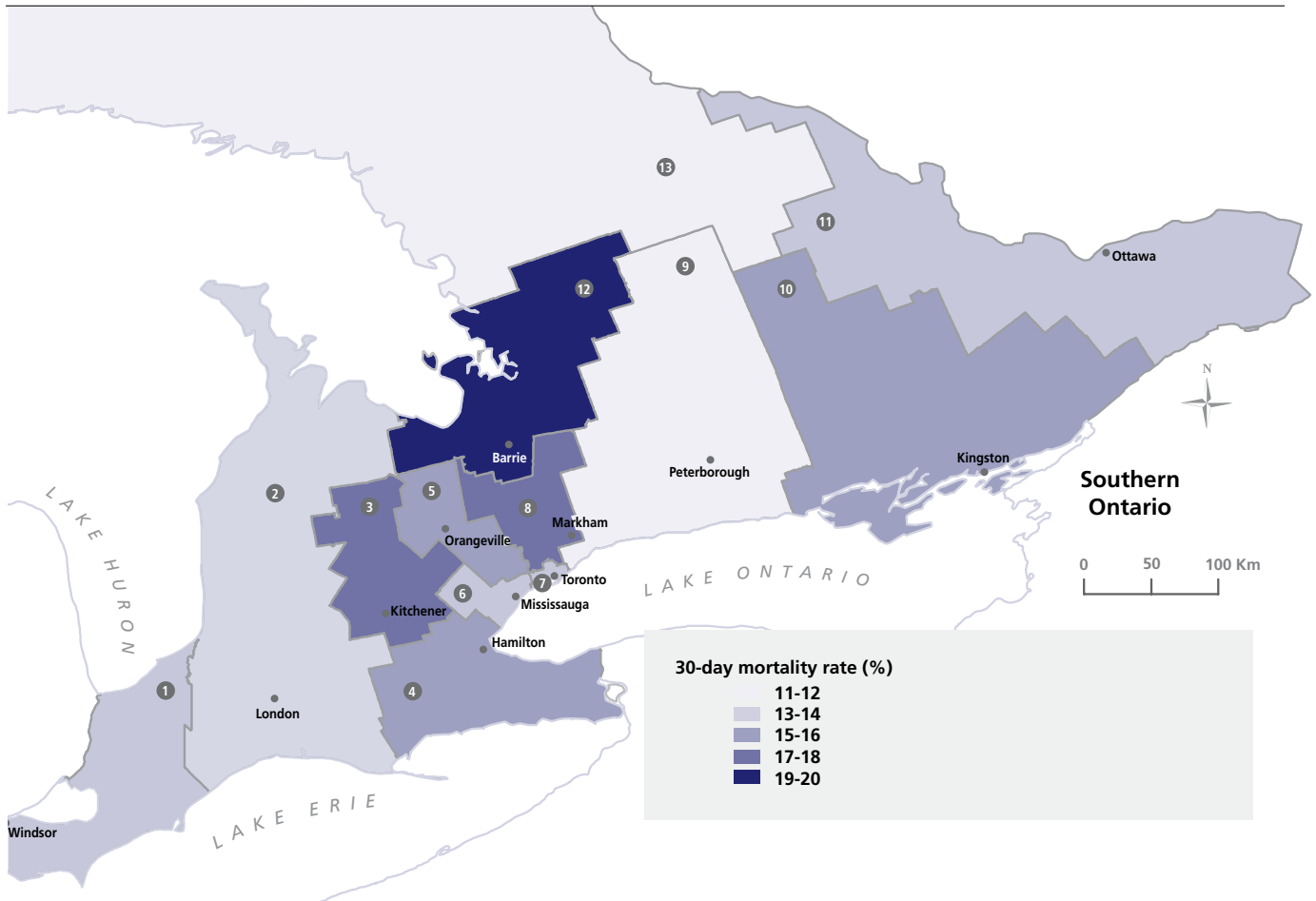


## CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**









# Section 11A

## *Incidence, Prevalence and Risk Behaviours*

### INTRODUCTION

This section presents the latest evidence about incidence and prevalence of HIV infections in Ontario.

Specifically, we present rates of new HIV infection and the total cumulative numbers of cases over time. Given that HIV remains under-diagnosed and likely under-reported, we focus on modelled estimates of these numbers rather than on observed counts. About 26,630 people were thought to be living with HIV infection in Ontario as of the end of 2008 and, of these, one-third remained unaware of their infection.<sup>8</sup> This is a serious concern from an individual health perspective, since only those who are aware of their infection can benefit from HIV-related health care, including antiretroviral therapy. Under-diagnosis is also a serious concern from a public health perspective because people who are unaware of their HIV infection will not be in treatment and the risk of HIV transmission is higher among people in whom viral load is not suppressed.<sup>6, 61</sup>

In Ontario, as in the rest of Canada, there are significantly more cases of HIV infection among men than women, with men having sex with men accounting for the most frequent mode of HIV transmission. Women are at least as likely to contract HIV as men through other risk behaviours, such as injection drug use. Women are more vulnerable than men to HIV acquisition through heterosexual contact than men, as male-to-female transmission is more efficient than female-to-male transmission.

People originating from countries where HIV is endemic are disproportionately affected by HIV in Ontario.<sup>8</sup> Within such communities, HIV is most commonly transmitted through heterosexual contact. Potential immigrants to Canada must have mandatory HIV testing and many HIV-positive immigrants are denied entry because their disease will pose burdens for the Canadian health care system.<sup>62</sup> There are many reasons to be concerned about HIV risks and services among immigrant groups: some individuals may not recognize their HIV risk; some might be unwilling to access testing due to fear or discrimination; and some might be unwilling or unable to access testing or health services if they do not have documentation to be in Canada legally. Additionally, immigrants and refugees who are HIV-positive might be reluctant to seek care for fear of disclosure, potentially compromising their health. [The POWER Study Access to Health Care Services chapter](#)<sup>63</sup> reported worse access and less satisfaction with care for some ethnic groups and for more recent immigrants, without consideration of specific health conditions. With enhanced reporting and data collection, Ontario can now report data on HIV testing among immigrants and refugee communities. This information is important to inform service planning and delivery of HIV care and prevention. However, efforts are also needed to increase awareness of HIV risk and testing rates among immigrants and in some ethnocultural groups.

Injection drug users (IDUs) are at risk of acquiring HIV, and women who inject drugs may have greater risk than men. Women who use drugs are more likely than men to require assistance with injection and to inject with a previously used needle and are more likely to have a sexual partner who is also a user.<sup>64,65</sup> Therefore, compared to men, women who inject drugs are more likely to engage in riskier injection practices, have partners who engage in risky activities, and have greater biological vulnerability through sexual transmission. Because of this, women who inject drugs may need targeted interventions to reduce their HIV risk.

Illicit drug use is strongly linked to systemic issues of inequity and marginalization, including poverty and racism. Some drug-related legal policies increase social marginalization and create systemic barriers to accessing prevention and treatment services. HIV prevention among IDUs is linked to the availability of harm reduction measures including effective outreach and education, counselling and support, access to sterile injection equipment, access to high quality drug treatment including methadone substitution therapy for opiate users, and access to primary care and mental health services.<sup>66</sup> Programs that engage members of the IDU community in their development and in delivering services have shown success in engaging marginalized IDUs and increasing their use of available services.<sup>67</sup> Women-specific programs have been developed in some cities to address the specific concerns of women, such as violence and child protection service issues, and the need for a safe place to provide mutual support.

In this section we report on indicators of:

- Modelled HIV prevalence
- Modelled HIV incidence
- Reported AIDS cases
- Condom use at last sexual encounter
- Needle and paraphernalia sharing among injection drug users

Estimates of HIV prevalence and incidence were modelled by the Ontario HIV Epidemiologic Monitoring Unit (OHEMU) using data from the Ontario Agency for Health Protection and Promotion—Public Health Laboratory, including the Laboratory Enhancement Program and data from Vital Statistics, Ontario Registrar General. The measure of AIDS cases was based on data from the Ministry of Health and Long-Term Care integrated Public Health Information System (iPHIS). These indicators are reported annually by the OHEMU.<sup>68</sup> Data on condom use were from combined cycles of the Canadian Community Health Survey (CCHS) 2005 (Cycle 3.1) and 2007 and were limited (based on CCHS restrictions) to respondents aged 15-49. Data on injection risk behaviours were from the Ontario sites of the Enhanced Surveillance of Risk Behaviours among Injection Drug Users in Canada (I-Track) Study. I-Track Study Ontario sites included: Toronto, Sudbury, Thunder Bay, Kingston and Ottawa. Data were collected as part of the second phase of I-Track which ran from 2007-2008, with the exception of Ottawa which included data from 2006 and 2008. All indicators were stratified by sex and then further stratified by age, income, education, ethnicity, geography and Local Health Integration Network (LHIN), where data were available and where sample size allowed. For further details on methods, see [Appendix 11.3](#).

## EXHIBITS AND FINDINGS

### MODELLED HIV PREVALENCE

**Indicator:** This indicator measures the prevalence of HIV and the number of HIV-positive individuals in the Ontario population as of the end of 2008, based on modelled estimates.

**Background:** In Ontario, the number of people living with HIV has almost doubled from 1996 to 2010.<sup>8</sup> While men who have sex with men (MSM) remain the most affected group, the data indicate increased numbers of infections since 2003 among individuals from HIV-endemic regions (heterosexual/endemic) and those exposed through heterosexual contact (heterosexual/non-endemic).<sup>8</sup> While the rise in HIV prevalence is partly due to persistent HIV transmission, prevalence has also increased due to decreasing mortality related to the use of antiretroviral therapies.<sup>8,69-70</sup> Because HIV-positive people living in developed countries can live long lives as a result of improved treatment options and access to care, HIV is now a chronic disease for many infected people in these regions. Accordingly, HIV-positive people require comprehensive health services, analogous to the needs of people with other chronic conditions such as cancer, diabetes, and cardiovascular disease.<sup>70,71</sup> Therefore, the measurement of HIV prevalence helps to identify the burden of the disease and can help target prevention and treatment services.

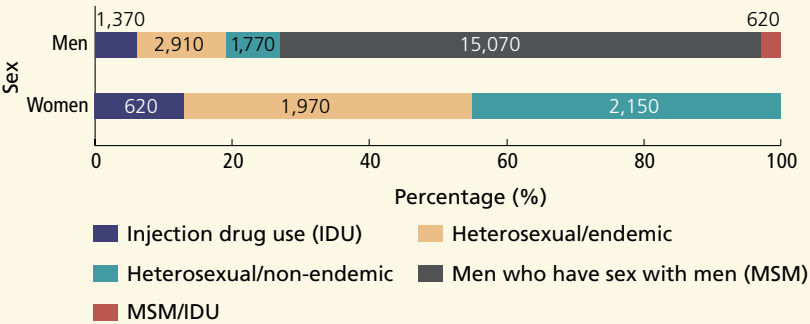
This indicator is based on data from the HIV Laboratory, the Public Health Laboratory of the Ontario Agency of Health Protections and Promotion (OAHP), and mortality data from Vital Statistics, Ontario Registrar General. The findings are available in the Report on HIV/AIDS in Ontario.<sup>8</sup> Because not all HIV-infected persons have been tested, reported HIV cases under-estimate the true prevalence. Accordingly, we report modelled HIV prevalence while recognizing the limitations and potential imprecision of model-based approaches.

**Findings:** The modelled HIV prevalence in Ontario as of the end of 2008 was 268 cases per 100,000 population, representing an estimated 26,630 people living with HIV in the province. The prevalence was higher in men than in women, 456 per 100,000 men (21,880 cases of HIV infection) versus 92 per 100,000 women (4,750 cases of HIV infection). Based on these estimates, women represent 18 percent of the population living with HIV.

**Exhibit 11A.1 | Modelled number and percentage of HIV infections, by sex and exposure category, in Ontario, 2008**

**FINDINGS**

- Based on the modelled prevalence, 13 percent of infections (620 infections) among women were attributable to injection drug use, 42 percent (1,970 infections) were among women whose exposure was heterosexual/endemic and the remaining 45 percent (2,150 infections) were attributable to heterosexual/non-endemic exposure.
- The large majority of infections among men (70 percent; 15,070 infections) were attributable to MSM risk.
- Among the estimated population of IDUs, the prevalence of HIV was about equal among women and men; approximately five percent (5,193 per 100,000 female IDUs versus 4,910 per 100,000 male IDUs) (data not shown).



**DATA SOURCES:** Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto incorporating data from the HIV Laboratory Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Laboratory Enhancement Program, Public Health Division, Ministry of Health and Long-Term Care; Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census

**NOTE:** Exposure is classified according to a mutually exclusive hierarchy which assigns each case to the exposure category (one only) which most likely represents the source of infection.

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## Exhibit 11A.2 | Modelled number of HIV infections among women, by Local Health Integration Network (LHIN), in Ontario, 2008

### FINDINGS

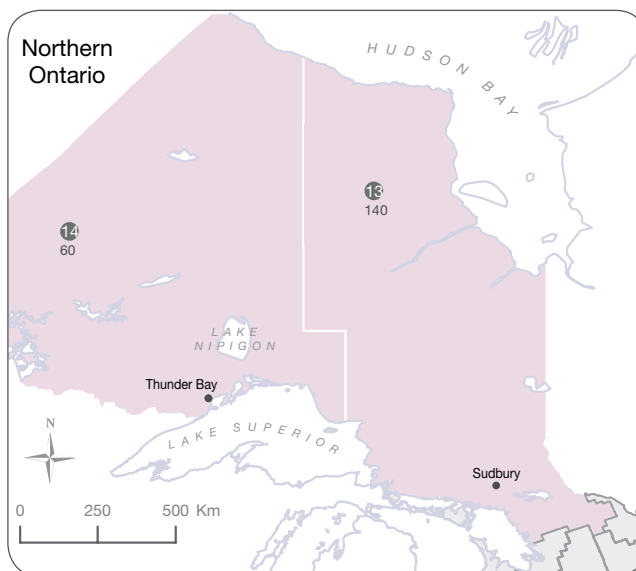
- Among women, the modelled number of HIV infections ranged from 25 HIV-infected women in the North Simcoe Muskoka LHIN to 1,050 HIV-infected women in the Toronto Central LHIN.
- Among women, modelled HIV prevalence ranged from 40 per 100,000 women in the Waterloo Wellington LHIN to 225 per 100,000 women in the Toronto Central LHIN (data not shown).
- Among men, modelled HIV prevalence ranged from 66 per 100,000 men in the North Simcoe Muskoka LHIN to 1,526 per 100,000 men in the Toronto Central LHIN (data not shown).
- Modelled HIV prevalence was highest in the Toronto Central LHIN, 844 per 100,000 people, representing 7,530 HIV-infected individuals (data not shown).

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### Overall Ontario

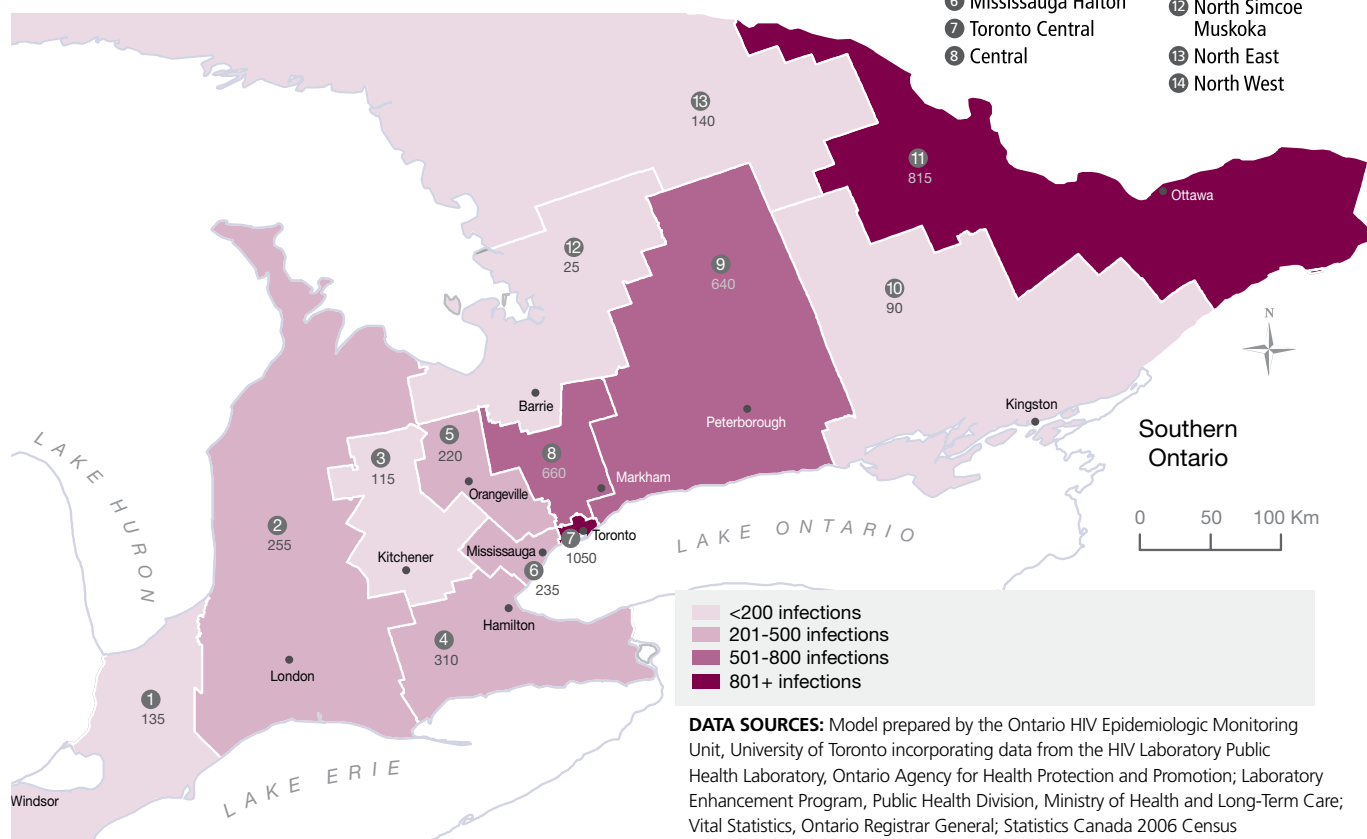
In Ontario in 2008, based on modelled estimates, there were 4,750 women living with HIV.

4,750



### Local Health Integration Networks (LHINs)

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



<200 infections  
 201-500 infections  
 501-800 infections  
 801+ infections

**DATA SOURCES:** Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto incorporating data from the HIV Laboratory Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Laboratory Enhancement Program, Public Health Division, Ministry of Health and Long-Term Care; Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census

## MODELLED HIV INCIDENCE

**Indicator:** This indicator measures the modelled HIV incidence in Ontario from 2006 to 2008.

**Background:** HIV continues to be an epidemic of concern in Canada. In Ontario, an average of 1,125 HIV new diagnoses was made each year from 2002 to 2008.<sup>8</sup> Men who have sex with men (MSM) were the group with the highest HIV incidence in 2008 and also represented the largest proportion of new infections; however, the proportion of people diagnosed with HIV who were women increased considerably from three percent prior to 2001 to approximately 25 percent from 2002 to 2008.<sup>8</sup>

Anonymous or non-nominal testing (without identifying information) increases testing rates but limits the public health surveillance of HIV and leads to under-estimation of the true rates. HIV reporting is based on rates among nominally tested (with identifying information) individuals. However, HIV testing rates vary by characteristics such as sex, age and participation in HIV risk behaviours such as injection drug use and unprotected sex.<sup>72-74</sup> The stigma associated with HIV infection often poses a barrier for people considering HIV testing and a positive result can have a negative impact on one's personal and social life.<sup>75-77</sup> For these reasons, some individuals will choose not to be tested and their HIV status will remain unknown, with important implications for control of the epidemic. People who are HIV-positive but unaware of their status have a higher rate of HIV transmission than people who have been tested for two reasons. First, knowledge of HIV status decreases risky behaviours. Second, treatment decreases viral load, resulting in decreased transmission of HIV.<sup>61,78</sup>

The nominal rates of HIV diagnoses in Ontario for 2006, 2007 and 2008 were 9.5 per 100,000, 8.9 per 100,000 and 8.3 per 100,000, respectively, based on data from the integrated Public Health Reporting System (data received, September 2010), which is substantially lower than the estimated incidence reported below.

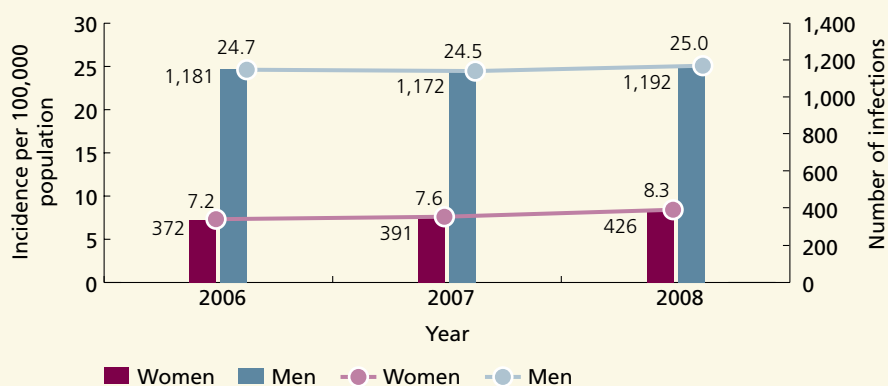
In this chapter, we report estimates from the Report on HIV/AIDS in Ontario,<sup>8</sup> using data from the HIV Laboratory, the Public Health Laboratory of the Ontario Agency of Health Protections and Promotion (OAHP) and the Laboratory Enhancement Study for the years 2006-2008. Annual HIV incidence was modelled using HIV incidence, HIV prevalence, HIV diagnoses, and AIDS incidence and mortality based on repeat testing data and use of the detuned assay (a tool used to estimate when infection occurred).<sup>79</sup> To the extent possible, duplicate counting of HIV-positive persons undergoing subsequent HIV-positive testing was avoided.

**Findings:** The overall modelled HIV incidence in Ontario for 2006-2008 was 15.9 per 100,000 adults per year. HIV incidence was higher in men than in women, 24.7 per 100,000 men per year versus 7.7 per 100,000 women per year.

### Exhibit 11A.3 | Modelled number of new HIV infections and HIV incidence (per 100,000 people per year), by sex and year, in Ontario, 2006-2008

#### FINDINGS

- The modelled HIV incidence among women increased slightly from 2006 to 2008, from 7.2 per 100,000 women in 2006 to 8.3 per 100,000 women in 2008. HIV incidence among men did not vary during the same time period.
- The modelled number of HIV infections in women increased slightly from 372 infections in 2006 to 391 infections in 2007 and 426 infections in 2008.



**DATA SOURCES:** Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto incorporating data from the HIV Laboratory Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Laboratory Enhancement Program; Public Health Division, Ministry of Health and Long-Term Care; Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census

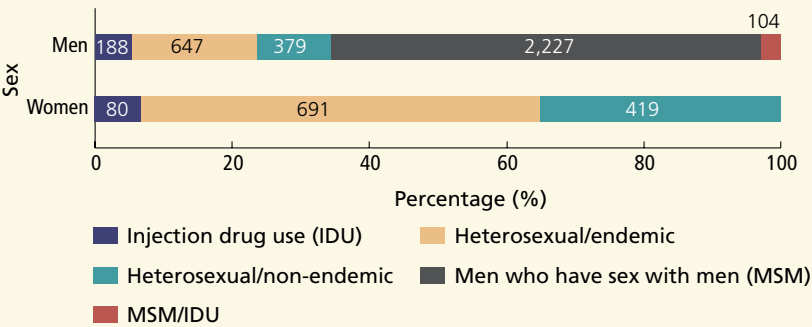
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**Exhibit 11A.4 | Modelled number and percentage of new HIV infections attributable to exposure categories, by sex, in Ontario, 2006-2008**

**FINDINGS**

- Based on the modelled incidence over the three-year period, seven percent of infections (80 infections) among women were attributed to injection drug use, 58 percent (691 infections) were attributed to heterosexual/endemic risk and the remaining 35 percent (419 infections) were attributed to heterosexual/non-endemic exposure.
- The majority of incident infections among men (63 percent, 2,227 infections) were attributed to MSM risk.
- The HIV incidence rate was highest among women who reported injecting drugs (236 per 100,000 person-years), followed by women whose exposure category was heterosexual/endemic (94 per 100,000 person-years) (data not shown).
- The modelled HIV incidence was highest in the Toronto Central Local Health Integration Network (LHIN) at 76 per 100,000 person-years (2,028 infections). Across all LHINs, HIV incidence was higher in men than in women (data not shown).



**DATA SOURCES:** Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto incorporating data from the HIV Laboratory Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Laboratory Enhancement Program; Public Health Division, Ministry of Health and Long-Term Care; Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census

**NOTE:** Exposure is classified according to a mutually exclusive hierarchy which assigns each case to the exposure category (one only) which most likely represents the source of infection

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## REPORTED AIDS CASES

**Indicator:** This indicator measures the number of reported AIDS cases per 100,000 population in Ontario from 2006 to 2008.

**Background:** AIDS represents the most advanced stages of HIV infection. An AIDS diagnosis is made when an HIV-infected individual has one of a set of conditions associated with immunodeficiency such as tuberculosis or *Pneumocystis jiroveci* pneumonia.<sup>80,81</sup> An AIDS diagnosis suggests that opportunities to prevent the development of AIDS and adverse outcomes were missed, either because HIV infection was not diagnosed early or because HIV treatment was not initiated early. Measuring the incidence of AIDS can provide important information about access to care and the effectiveness and timeliness of testing and treatment.

As of November 2009, over 8,500 AIDS cases had been reported in Ontario.<sup>8</sup> Women account for nine percent of all AIDS cases; however, in 2008, women accounted for 27 percent of new AIDS cases.<sup>8</sup> Although AIDS incidence reached a trough in 2000, it has since increased and there is considerable uncertainty about the true AIDS incidence in 2008.<sup>8</sup> Aside from the uncertainty about the number of AIDS cases, the clinical significance of an AIDS diagnosis has changed considerably since the start of the HIV epidemic given advances in treatment and increased survival among HIV patients. More specifically, many AIDS diagnoses no longer portend a reduced life expectancy.

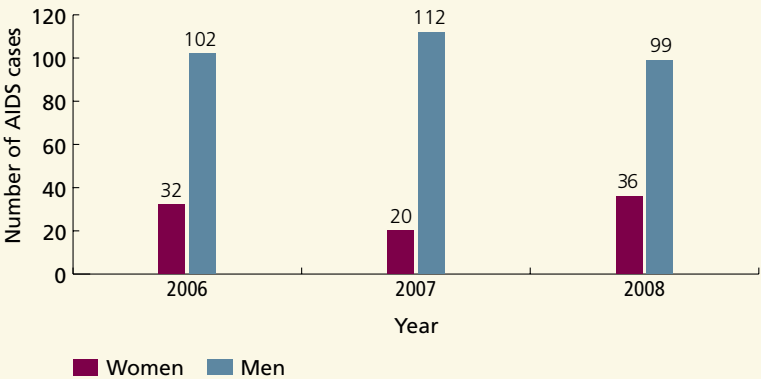
This indicator is based on data presented in the Report on HIV/AIDS in Ontario<sup>8</sup> using data from the Public Health Division, Ontario Ministry of Health and Long-Term Care, the Ministry's Integrated Public Health Information System (IPHIS). The Health Protection and Promotion Act outlines the communicable diseases that are designated reportable in Ontario. Under this act, reportable diseases (including AIDS) must be reported to the local public health unit by physicians, laboratories, administrators of hospitals, schools, and public institutions.<sup>82</sup> A proportion of AIDS cases in Ontario are reported only through death certificates, which may result in an under-estimation of actual numbers of AIDS cases. Furthermore, it is likely that AIDS cases are under-estimated especially in more recent years due to delayed diagnosis and reporting.<sup>8</sup>

**Findings:** The overall rate of reported AIDS cases in Ontario from 2006 to 2008 was 1.1 per 100,000 adults per year, representing 401 reported AIDS cases during the three-year period. The rate was higher in men than in women; 1.8 per 100,000 men per year versus 0.5 per 100,000 women per year or 313 AIDS cases among men versus 88 AIDS cases among women during the three year period.

**Exhibit 11A.5 |** Reported number of AIDS cases, by sex and year, in Ontario, 2006-2008

**FINDINGS**

- The reported number of AIDS cases did not vary by year for women or for men.
- AIDS cases among women ranged from 32 cases in 2006 to 20 cases in 2007 and 36 cases in 2008.
- In Ontario, the reported number of AIDS cases per year between 2006 and 2008 was approximately three to five-fold higher for men than for women.



**DATA SOURCES:** Integrated Public Health Information System (iPHIS), Public Health Branch, Ministry of Health and Long-Term Care; Statistics Canada 2006 Census. Data prepared by the Ontario HIV Epidemiologic Monitoring Unit (OHEMU)

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## RISK BEHAVIOURS

### CONDOM USE AT LAST SEXUAL INTERCOURSE

**Indicator:** This indicator measures the percentage of Ontarians aged 15-49 who were sexually active in the previous 12 months who indicated they had used a condom at their last sexual intercourse. The sample excludes those who reported having only one sexual partner in the previous 12 months.

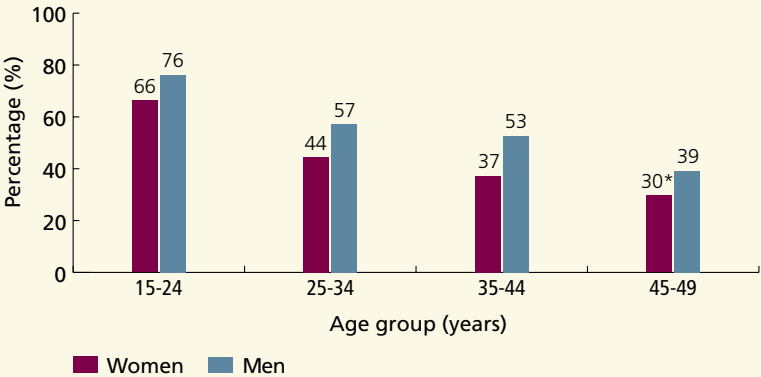
**Background:** According to the 2010 UNAIDS report on the global AIDS epidemic, 13 percent of Canadians aged 15-49 reported having sex with more than one partner in the past 12 months.<sup>83</sup> The same report suggests that only a small proportion reported using a condom at their last sexual intercourse; however the source and methodology were not specified. Prevention is one of the mainstays of the response to HIV and consistent condom use has been found to be over 90 percent effective in preventing transmission of HIV. Condoms are an integral and essential part of comprehensive prevention and care programs.<sup>11,12</sup> While the number of new infections globally is declining (since the peak of the epidemic in 1999), it is believed that continued investment in prevention, targeted delivery and scaling up of HIV prevention programs is needed if we are to see continued declines in HIV rates.<sup>83</sup>

**Findings:** Overall, 59 percent of sexually active adults aged 15-49 with multiple partners in the last year had used a condom at their last sexual encounter. Women reported lower rates of condom use than men (53 percent versus 65 percent, respectively).

**Exhibit 11A.6 | Percentage of sexually active^ Ontarians aged 15-49 who reported using a condom at their last sexual encounter, by sex and age group, in Ontario, 2005 and 2007**

**FINDINGS**

- Among women and men who indicated that they had multiple partners in the last year, the percentage that indicated they had used a condom at their last sexual encounter declined with age.
- Across all age groups, women had lower rates of condom use at their last sexual encounter than men.
- The proportion of women who indicated they had used a condom at their last sexual encounter declined from 66 percent among those aged 15-24 to 30 percent among those aged 45-49.
- Among men, 76 percent of those aged 15-24 compared to 39 percent of those aged 45-49 indicated they had used a condom at their last sexual encounter.
- Women with secondary school graduation or higher had lower levels of condom use than women with less education. Women had lower levels of condom use at their last sexual encounter than men across all levels of educational attainment (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

\* Interpret with caution due to high sampling variability

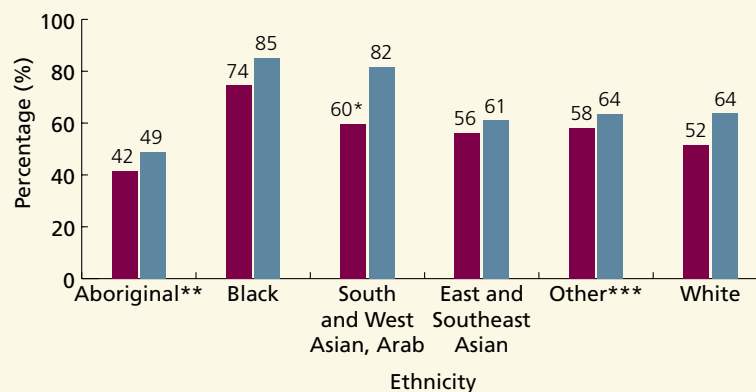
^ “Sexually active” refers to those who reported being sexually active within the last twelve months and having more than one sexual partner during this period

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**Exhibit 11A.7** | Age-adjusted percentage of sexually active<sup>^</sup> Ontarians aged 15-49 who reported using a condom at their last sexual encounter, by sex and ethnicity, in Ontario, 2005 and 2007

**FINDINGS**

- Women had lower rates of condom use than men, irrespective of ethnicity; this difference was only significant among White respondents.
- Women and men who self-identified as Black had higher rates of condom use at last sexual encounter than people from other ethnicities.



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> "Sexually active" refers to those who reported being sexually active within the last twelve months and having more than one sexual partner during this period

\* Interpret with caution due to high sampling variability

\*\* Includes self-identified off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

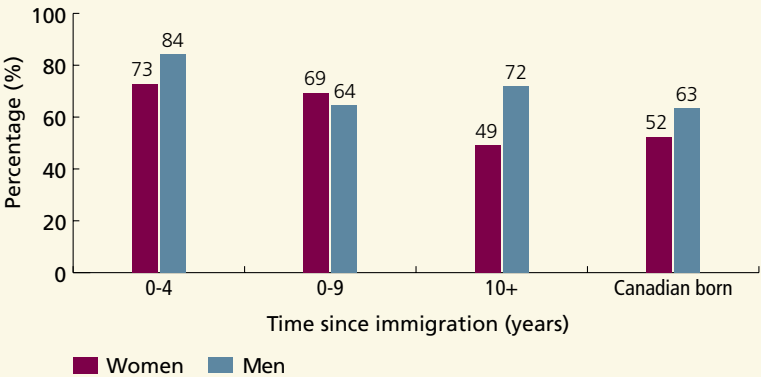
\*\*\* Includes Latin American, other racial and multiple racial origins

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**Exhibit 11A.8 |** Age-adjusted percentage of sexually active^ Ontarians aged 15-49 who reported using a condom at their last sexual encounter, by sex and time since immigration, in Ontario, 2005 and 2007

**FINDINGS**

- Women who had been in the country for ten or more years had significantly lower rates of condom use than their male counterparts.
- Women who had been in the country for less than five years had higher rates of condom use at their last sexual encounter than women who were Canadian born. A similar pattern was seen for men.
- These results do not account for marital status, awareness of sexually transmitted infections, or other changes that might occur along with the length of time since immigration.



**DATA SOURCE:** Data source: Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

^ “Sexually active” refers to those who reported being sexually active within the last twelve months and having more than one sexual partner during this period

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## NEEDLE AND PARAPHERNALIA SHARING AMONG INJECTION DRUG USERS

**Indicator:** This indicator measures the percentage of surveyed injection drug users (IDU) who reported sharing (lending or receiving) previously used injection equipment including needles and injection paraphernalia (water, cooker and filter) in the previous six months.

**Background:** One of the high risk populations for HIV transmission are IDUs, because of the increased risk associated with the sharing of needles and injection paraphernalia, increased sexual risk behaviours when intoxicated, and increased exposure to other people who are HIV-positive through their sexual or drug using networks. Needle sharing among IDUs is one of the leading causes of HIV and hepatitis C, worldwide.<sup>66</sup> It is estimated that approximately 10 percent of all persons living with HIV worldwide have been infected through risky drug injection. The Public Health Agency of Canada estimated that 17 percent of all Canadian HIV infections in 2008 were attributable to injection drug use.<sup>7</sup> In 2008, there were an estimated 2,300 to 4,300 new HIV infections in Canada and between 600 and 1,120 of these were among women. Among women, an estimated 29 percent of new HIV infections in 2008 were attributed to injection drug use, up from 27 percent in 2005.<sup>7</sup> Ontario rates are considerably lower (see Exhibit 11A.4). HIV-positive IDUs are still counselled to avoid sharing equipment since they can be infected with new strains of HIV (called “superinfection”) which might have unique resistance profiles and can result in antiretroviral failure and limited future treatment options. Transmission of other blood borne infections, such as hepatitis B or C virus, is also a concern.

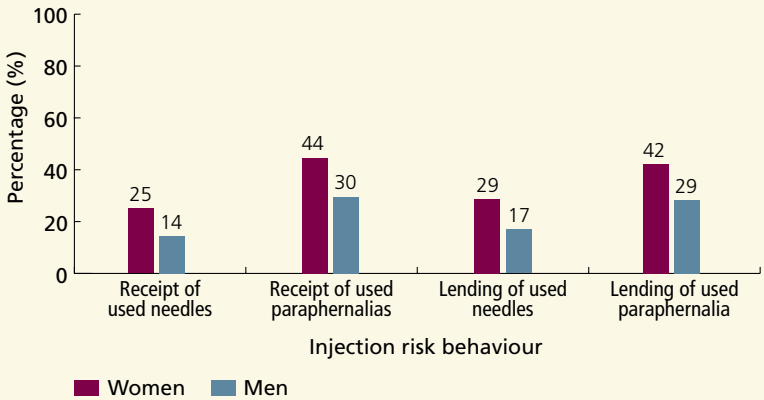
The Canadian government, in line with recommendations from the World Health Organization and UNAIDS has incorporated enhanced surveillance among IDUs (disease prevalence and risk behaviours) as these data help explain changes in HIV incidence and prevalence, inform program design for prevention programs and can be used to evaluate the effectiveness of existing prevention programs. The Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track) study is a repeat, cross-sectional survey intended to provide enhanced surveillance data and to track the HIV and hepatitis C risk behaviours of IDUs in urban and semi-urban areas across Canada. The Ontario sites include Toronto, Ottawa, Kingston, Sudbury and Thunder Bay. Data for this indicator were collected during the phase II reporting which occurred between 2006 and 2008, depending on the site.

**Findings:** Among I-Track study respondents, 18 percent (206/1,153) reported injecting with used needles, 34 percent (397/1,156) reported receiving used injection paraphernalia (water, cooker and filter), 21 percent reported lending used needles (214/1,026) and 33 percent (379/1,154) reported lending used paraphernalia in the previous six months. Compared to men, a greater proportion of female IDUs reported sharing (lending and receiving) previously used needles and injection paraphernalia in the last six months (see Exhibit 11A.9).

**Exhibit 11A.9 | Percentage of injection drug users (IDUs) who reported risky injection behaviours, by sex and type of behaviour, in Ontario, 2006-2008**

**FINDINGS**

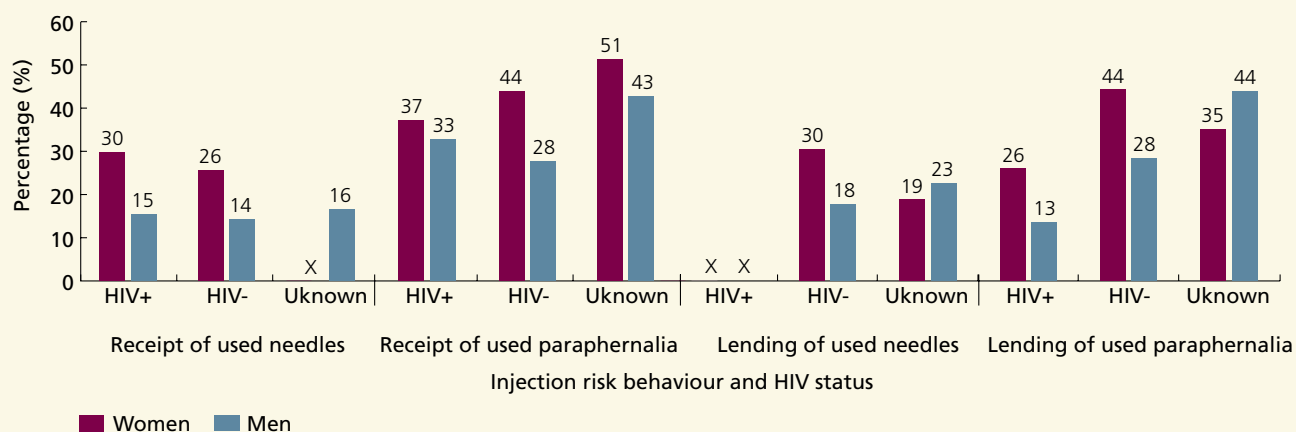
- Women were more likely to participate in all injection risk behaviours than men.
- Twenty-five percent of female IDUs and 14 percent of male IDUs reported injecting with previously used needles in the previous six months.
- Forty-four percent of female IDUs and 30 percent of male IDUs reported receiving previously used injection paraphernalia in the previous six months.
- Twenty-nine percent of female IDUs and 17 percent of male IDUs reported lending used needles to another person in the previous six months.
- Forty-two percent of female IDUs and 29 percent of male IDUs reported lending used paraphernalia to another person in the previous six months.



**DATA SOURCE:** Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track); phase 2—Ontario sites (Toronto, Sudbury, Thunder Bay, Kingston and Ottawa)

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**Exhibit 11A.10** | Percentage of injection drug users (IDUs) who reported risky injection behaviours, by sex, type of behaviour and HIV status, in Ontario, 2006-2008



**DATA SOURCE:** Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track); phase 2—Ontario sites (Toronto, Sudbury, Thunder Bay, Kingston and Ottawa)

X Suppressed due to small numbers

### FINDINGS

- Women were more likely to participate in all injection risk behaviours than men, irrespective of HIV status, though the differences were significant only for HIV-negative women.
- HIV-positive IDUs reported lower rates of lending of injection paraphernalia than HIV-negative IDUs. The proportion of HIV-positive women and men who reported lending needles could not be reported because of small numbers, which suggests that very few of them were participating in this behaviour.
- HIV-positive IDUs reported high rates of receiving used equipment (needles and paraphernalia), which raises concerns about the risk of superinfection with HIV or of other blood borne infections such as hepatitis B or C.
- IDUs who reported that they did not know their HIV status also reported high rates of participation in risk behaviours.

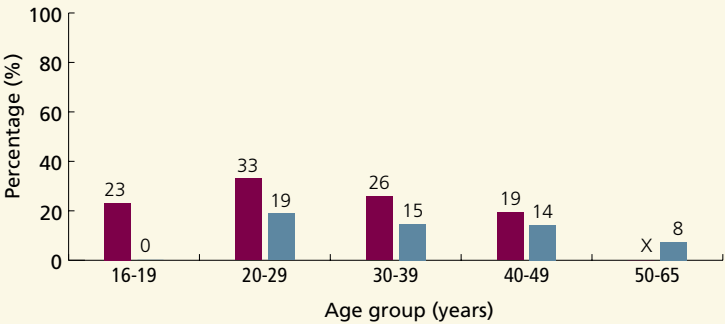
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**Exhibit 11A.11 | Percentage of injection drug users (IDUs) who reported risky injection behaviours, by sex, type of behaviour and age group, in Ontario, 2006-2008**

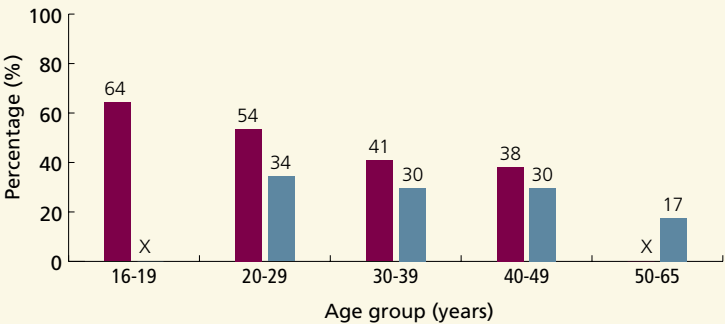
**FINDINGS**

- In the overall survey population, sharing of injection paraphernalia (lending and receiving) in the last six months was highest among the youngest IDUs.
- Sharing of needles (lending and receiving) varied by age for all IDUs.

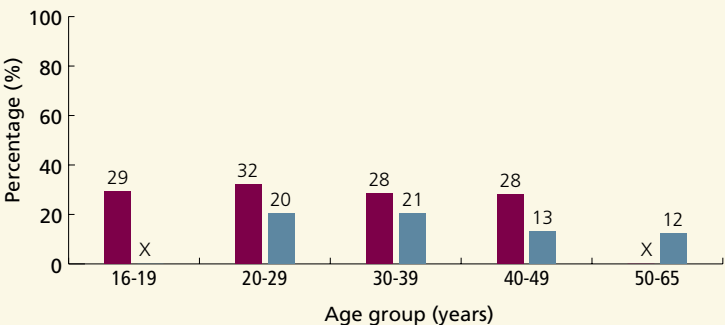
**Receipt of used needles**



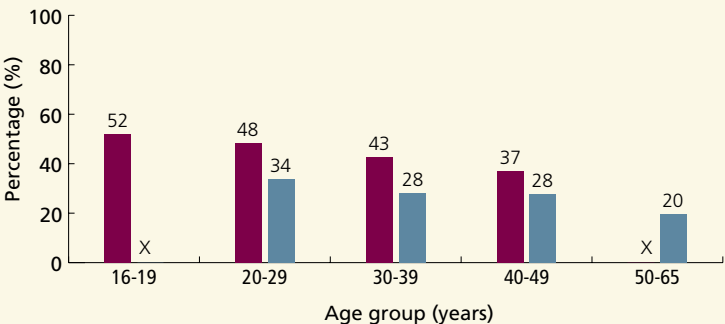
**Receipt of used paraphernalia**



**Lending of used needles**



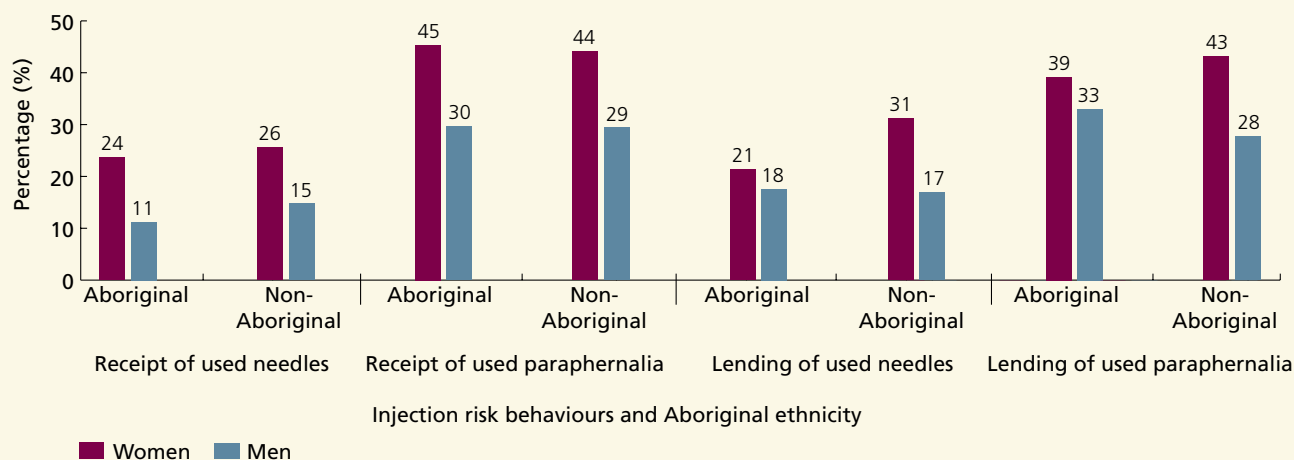
**Lending of used paraphernalias**



**DATA SOURCE:** Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track); phase 2—Ontario sites (Toronto, Sudbury, Thunder Bay, Kingston and Ottawa)

X Suppressed due to small numbers

**Exhibit 11A.12** | Percentage of injection drug users (IDU) who reported risky injection behaviours, by sex, type of behaviour and Aboriginal ethnicity, in Ontario, 2007 and 2008



**DATA SOURCE:** Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track); phase 2—Ontario sites (Toronto, Sudbury, Thunder Bay, Kingston and Ottawa)

### FINDINGS

- Among non-Aboriginal IDUs, women were more likely to participate in all four injection risk behaviours than men.
- Among Aboriginal IDUs, women were more likely than men to inject with used needles.
- Among Aboriginal IDUs, lending of used injection paraphernalia was higher among women than among men; however this difference was not significant, possibly due to small numbers.
- Injection risk behaviours, other than injecting with used needles, varied significantly by site of recruitment. Among Ottawa participants, the rates of participation in all injection risk behaviours were considerably higher among women than among men (data not shown).

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# Section 11A

## SUMMARY OF FINDINGS

This section reports on the modelled incidence and prevalence of HIV and the reported number of AIDS cases in Ontario. We also report on HIV-related risk/prevention behaviours, specifically condom use at last sexual encounter for adults with multiple sexual partners and needle and paraphernalia sharing rates among women and men who used injection drugs. Incidence and prevalence varied by sex, as expected. Rates of participation in risk behaviours also varied by sex; women reported higher rates of risky behaviours and lower rates of protective behaviours than men.

### HIV Prevalence

Based on modelled estimates, there are 26,630 people living with HIV infection in Ontario (21,880 men and 4,750 women). Women account for 18 percent of infections. Among women, the most commonly attributed exposure category was heterosexual/non-endemic (45 percent of infections), followed by heterosexual/endemic exposure (42 percent of infections). While only 13 percent of the prevalent HIV infections among women were attributed to injection drug use (13 percent), this represents an HIV prevalence of five percent among female injection drug users (IDU) in Ontario (based on an estimated population of IDUs). Among men, the most commonly attributed exposure category was men who have sex with men. The modelled prevalence of HIV infection in Ontario varied by Local Health Integration Network (LHIN) and was highest in the Toronto Central LHIN (225 per 100,000 women and 1,526 per 100,000 men in Toronto).

### HIV Incidence

Based on modelled estimates, there were 4,735 new HIV infections between 2006 and 2008 (3,545 men and 1,190 women). Women accounted for almost one-quarter of new infections. Modelled incidence has been stable over the three-year period. Among women, the majority of new infections (58 percent) were among women whose exposure was heterosexual/endemic. For women, the estimated incidence in the at-risk population was highest for women who inject drugs (236 per 100,000 person-years or 0.2 percent per year), and was next highest among women from an HIV-endemic country (94 per 100,000 person-years), who had markedly lower rates. As was the case for prevalence, modelled incidence was highest in the Toronto Central LHIN for both women and men.

### Reported AIDS Cases

This indicator measures the number of reported AIDS cases in Ontario between 2006 and 2008. AIDS is a publicly reportable disease and as such, cases must be reported to local public health units. However, it is likely that AIDS cases are under-estimated due to delayed diagnosis and under-reporting. A total of 401 cases of AIDS were reported from 2006 to 2008, representing 1.1 cases per 100,000 adults per year in Ontario. The reported number of cases per year was three- to five-fold higher for men than for women.

### Condom Use at Last Sexual Encounter

Adults aged 15-49 who reported having multiple sexual partners within the previous twelve months were asked if they had used a condom at their last sexual encounter. Fifty-nine percent of respondents reported that they had; however, women were less likely than men to report this (53 percent versus 65 percent). Younger women and men were more likely than older adults to report condom use at their last sexual encounter. Women and men who had been in Canada for less than five years had higher rates of condom use at their last sexual encounter than those who were Canadian born. Condom use also varied by ethnicity, though women had lower rates of condom use at last sexual encounter than men, irrespective of ethnicity. Condom use did not vary by LHIN.

### Needle and Paraphernalia Sharing Among Injection Drug Users

This indicator was measured among the Ontario respondents of a national study of drug use; the Ontario sites included Toronto, Ottawa, Sudbury, Thunder Bay and Kingston. Among Ontario respondents surveyed, 18 percent reported injecting with used needles, 34 percent reported receiving used injection paraphernalia (water, cooker and filter), 21 percent reported lending used needles and 33 percent reported lending used paraphernalia. Women were more likely to participate in all risk behaviours than men. Risk behaviours, other than receipt of used needles varied by site of recruitment. HIV-positive participants were less likely than HIV-negative participants to report lending used paraphernalia, but HIV-positive participants reported high rates of receipt of used equipment, which raises concerns about transmission of other strains of HIV or other blood borne viruses, such as hepatitis C, that can co-infect and impact outcomes for people who are living with HIV.





# Section 11B

## *Community Services for HIV*

### INTRODUCTION

Since the early 1980s, the Ontario government has funded a number of AIDS Service Organizations (ASO) and other agencies to provide community-based health and social services (such as counselling, employment services, home care visits, and assistance with housing) to people living with HIV.

Use of community-based services including treatment for mental health, substance abuse, and case management has been shown to positively affect initiating and maintaining medical treatments. A U.S. study found that use of specific support or ancillary services (such as assistance with housing, case management, treatment for substance abuse and the provision of mental health treatment) was associated with getting medical care earlier and with remaining in care.<sup>84,85</sup> The study also found that the use of ancillary services improves care systems and augments clinical disease management.<sup>84,85</sup> Another U.S. study indicated that access to case management resulted in lower rates of unmet need for supportive services such as advocacy for benefits, home health care, counselling, housing and substance abuse programs.<sup>86</sup> However these studies did not stratify their analyses by sex.

A few U.S. studies report outcomes of women's use of community support services. Halkitis and colleagues<sup>87</sup> found that for Black and Latina women living with HIV in New York, rates of use of case management services were similar to rates of use of supportive services. The authors concluded that case management helps retain women in health care and links them to other services. Similarly, Magnus and colleagues<sup>88</sup> found that receipt of case management and other ancillary services was associated with multiple benefits including retention

in primary care. Interactive case management, though labour and time intensive, was found to reduce the unmet service needs of women with and at risk for HIV infection.

Cain<sup>89</sup> suggested that many Canadian ASOs developed education or support services in the absence of other available services, and to fill a need for social support due to the large numbers of people who were "rejected by friends and family". ASOs were established to accommodate the needs of men who have sex with men, however, as the epidemiology of the disease has shifted to include many more women, more research documenting how women use ancillary supports or whether existing ancillary supports meet their needs is required. In particular, more specific focus on unmet need for housing services, child care/parenting support, reproductive support services for women, and drug treatment and abuse services are required. For instance, one Ontario qualitative study highlighted how "my children and my home" were the two most challenging stressors faced by women living with HIV.<sup>90</sup> The quantity, duration and intensity of case management for women living with HIV in Ontario needs to be better understood. In addition, the extent to which ASOs meet different women's needs and whether women have unmet needs that ASOs could accommodate requires further research.

A cross-sectional study of HIV-positive adults found that four out of five people used ASO services at least once in a year and almost one in four used ASO services at least 52 times per year. The study also found that Ontario's ASOs were serving very vulnerable populations, while aiding people's entry to and retention in medical services.<sup>91</sup> A second study of a sample of clients of an Ontario ASO, found that "high users" (those that used ASO services at least weekly over the past year), rated their own health as significantly worse than "low users" (those who had used the services 51 or fewer times in the previous year).<sup>92</sup> High users were also found to access emergency departments more often than low users, and used HIV specialist services far less. Respondents who used drop-in services felt that they helped them to cope more effectively with their problems. The extent to which program flexibility influence women's choices, and therefore decisions, to use services is an important area for further research. Both studies primarily included male respondents, thus a better understanding of women's utilization patterns is required, as is a better understanding of which women are more likely to be high or low users.

In this section, we report on measures of HIV community care services, including:

- Estimates of service funding to community-based HIV services
- Community-based HIV services and utilization

Community-based HIV programs funded by the AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the Public Health Agency of Canada's (PHAC) AIDS Community Action Program (ACAP) are required to report the services and activities they deliver to inform planning and to account for public resources. The findings for the indicators included in this section are based on data collected from 83 programs through the Ontario Community-based HIV and AIDS Reporting Tool (OCHART) in both halves of the 2008 fiscal year. Programs reporting in OCHART include programs that provide services to people within their geographic catchment and provincial programs that are considered to have a mandate to serve the entire province and may or may not provide services directly to people living with HIV or people at risk for HIV (i.e., some provincial organizations provide services for other organizations such as training). The data reflect the services provided by organizations that receive funding through the AIDS Bureau and ACAP and may not reflect the breadth of HIV services available in a given area. For further details on methods see [Appendix 11.3](#).

## ESTIMATES OF SERVICE FUNDING TO COMMUNITY-BASED HIV SERVICES

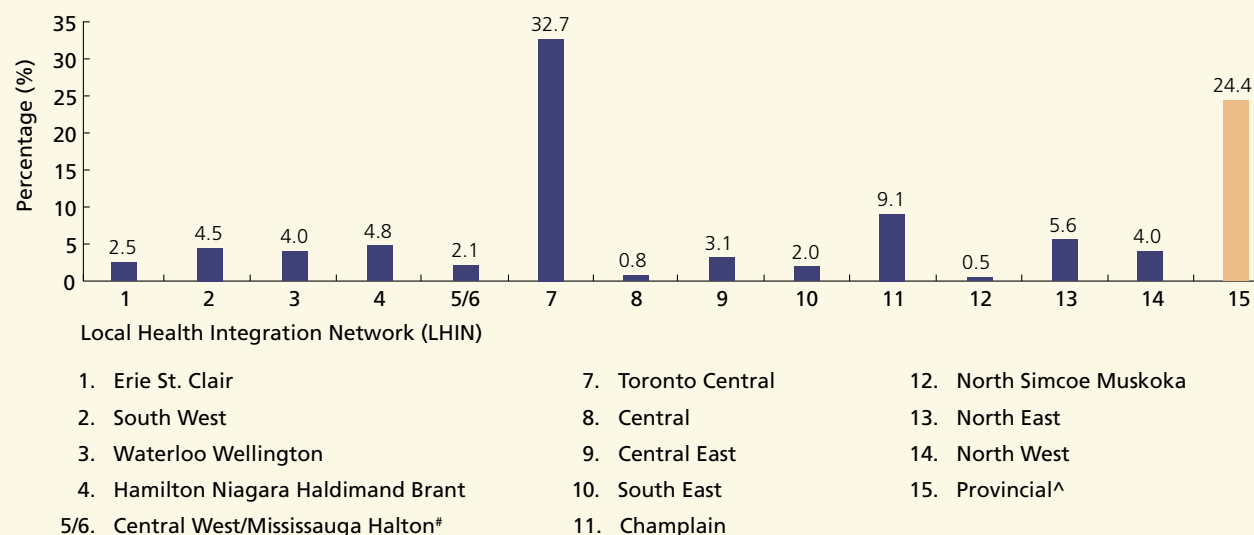
**Indicator:** This indicator measures the total funding (in dollars) provided by the AIDS Bureau of the Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Plan (ACAP) of the Public Health Agency of Canada (PHAC) to community-based HIV services in Ontario for the period 2008/09.

**Background:** Estimates of service funding levels provide a better understanding of the resources available to organizations to provide HIV support, education and prevention services to their communities. In Ontario, two of the main funders of community-based HIV services are the AIDS Bureau and ACAP. In 2008/09, programs were funded that served local areas and along with others that served the entire province. The majority of programs that were funded were located in AIDS Service Organizations (ASOs); other programs that received funding were located in community health centres, hospitals or other service providers. More than one-third of the programs were situated in the Toronto Central Local Health Integration Network (LHIN),<sup>93</sup> which reflects the higher burden of HIV infection in the Toronto area (see Exhibit 11A.2). According to modelled estimates, 62 percent of HIV-positive individuals live in Toronto and among incident cases, 61 percent are in Toronto.<sup>8</sup> Thus, the distribution of resources is higher in areas where the incidence rates are high.

Data for this indicator are collected as part of regular program reporting to funders using the Ontario Community-based HIV and AIDS Reporting Tool (OCHART). The purpose of the reporting is to describe the range of services provided, to identify issues and trends, to inform planning and to account for funding dollars.

**Findings:** In Ontario in 2008/09, \$23.8 million were allocated to community-based HIV services by the AIDS Bureau and ACAP.

### Exhibit 11B.1 | Proportion of funding to community-based HIV services, by Local Health Integration Network (LHIN), in Ontario, 2008/09



**DATA SOURCE:** Ontario Community-based HIV and AIDS Reporting Tool (OCHART)

**NOTES:** <sup>#</sup>Funding and data for the Mississauga Halton and Central West LHINs are combined

<sup>^</sup>The estimate of provincial funding refers to funding of programs with a provincial mandate

#### FINDINGS

- Nearly one-third of the funding from the AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and from the AIDS Community Action Plan (ACAP) of the Public Health Agency of Canada (PHAC) was allocated to community-based HIV services located in the Toronto Central LHIN (32.7 percent), which is less than the proportion of HIV infection that is attributed to Toronto.
- Community-based HIV services that served the entire province were allocated almost one-quarter (24.4 percent) of the funding dollars provided by the AIDS Bureau and ACAP.
- At least one community-based HIV service is funded in each LHIN.

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## COMMUNITY-BASED HIV SERVICES AND UTILIZATION

**Indicator:** This indicator measures the types of community-based HIV services provided by agencies that are funded by the AIDS Bureau of the Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Plan (ACAP) of the Public Health Agency of Canada (PHAC) and the numbers of women and men who accessed these services in 2008/09.

**Background:** The programs that receive funding through the AIDS Bureau and/or ACAP provide a variety of services including ones that can be broadly categorized as support, education and outreach. Depending on the type of service provided, the target population will include varying proportions of people living with HIV, people at risk for HIV infection, people affected by HIV (i.e., family and friends of someone living with HIV), people providing HIV care and the general population. We will report primarily on the use of support services and services for injection drug users (IDUs) in this section. Support services include counselling, practical support, referrals, training and skills development. Programs for IDUs additionally include harm reduction services, needle exchange programs, addiction treatment, HIV testing and other support services. These can be delivered either at a fixed location (in-service) or through mobile locations and outreach (outreach).

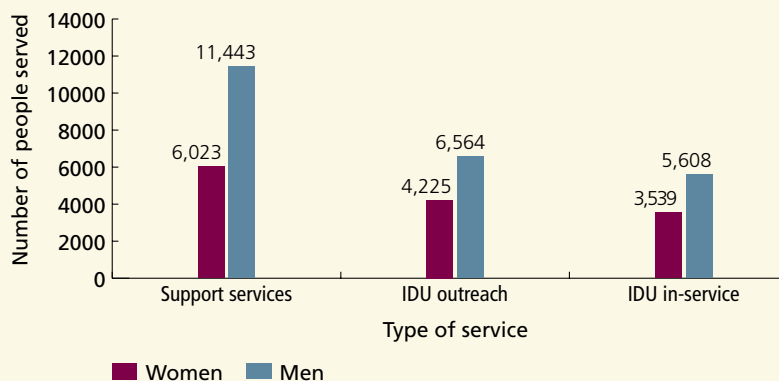
Data for this indicator were collected as part of regular program reporting to funders using the Ontario Community-based HIV and AIDS Reporting Tool (OCHART). The purpose of the reporting is to describe the range of services provided, to identify issues and trends, to inform planning and to account for funding dollars.

**Findings:** In Ontario in 2008/09 in the first half of the year, 17,636 people accessed support services, 10,805 accessed IDU outreach services and 9,175 accessed IDU in-services. In the second half of the year, 15,382 people accessed support services, 12,983 accessed IDU outreach services and 9,697 accessed IDU in-services. In both halves of the fiscal year and for all service types, fewer absolute numbers of women accessed services than men ([see Exhibit 11B.2](#)); however, given the lower prevalence among women, this is consistent with what would be expected.

## Exhibit 11B.2 | Number of individuals who used different types of community-based HIV services funded by the AIDS Bureau and the AIDS Community Action Plan (ACAP), by sex, in Ontario, first half of 2008/09 fiscal year<sup>^</sup>

### FINDINGS

- During the first half of the year, more than one-third of users of support services were women. Given that women comprise 18 percent of the HIV-positive population in Ontario. This suggests that women are higher users of community-based services than men. A similar pattern was seen for services used in the second half of the year (data not shown).
- Nearly four in ten IDU outreach and IDU in-service users were women. Given that women represent a smaller proportion of the IDU population than this, it suggests that women are potentially higher users of IDU services than men. A similar pattern was seen for services used in the second half of the year (data not shown).



**DATA SOURCE:** Ontario Community-based HIV and AIDS Reporting Tool (OCHART)

**NOTE:** IDU = injection drug user

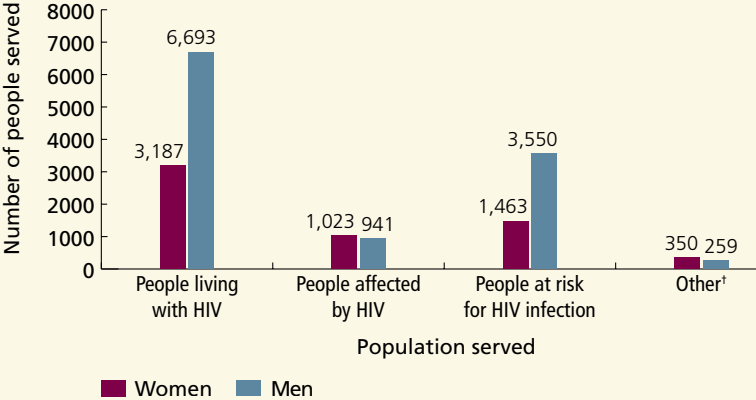
<sup>^</sup>OCHART utilization data reporting is divided into half-year periods; data from the first half of the year (H1) are reported

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**Exhibit 11B.3** | Number of people who used community-based HIV support services funded by the AIDS Bureau and the AIDS Community Action Plan (ACAP), by sex and population served, in Ontario, first half of 2008/09 fiscal year<sup>^</sup>

**FINDINGS**

- During the first half of the year, over one-third of the individuals who used community-based HIV services funded by the AIDS Bureau or ACAP were women.
- More than half the women who were using community-based HIV services were HIV-positive and one in five women were identified as being at risk for HIV infection.
- A similar number of women and men who were identified as being affected by HIV used community-based HIV services.
- Similar patterns were seen for services used in the second half of the year (data not shown).



**DATA SOURCE:** Ontario Community-based HIV and AIDS Reporting Tool (OCHART)  
<sup>†</sup>Other groups include the general public and social service and health providers  
<sup>^</sup>OCHART utilization data reporting is divided into half-year periods; data from the first half of the year (H1) are reported

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# Section 11B

## SUMMARY OF FINDINGS

The AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Program (ACAP) of the Public Health Agency of Canada (PHAC) fund agencies providing community-based health and social services to people living with HIV, people affected by HIV (i.e., family and friends of someone living with HIV), those at risk for HIV infection and the general public. This section reports on community service indicators based on data collected through the Ontario Community-based HIV and AIDS Reporting Tool (OCHART). The indicators include measures of funding and service utilization.

### Estimates of Service Funding to Community-Based HIV Services

In 2008/09, between the AIDS Bureau and ACAP, \$23.8 million in funding were allocated to 83 programs providing community-based HIV services. Almost one-third of the funding went to programs providing services in the Toronto Central Local Health Integration Network (LHIN), which is less than the proportion of infections attributed to Toronto. About one-quarter of the funding went to agencies with a mandate to provide services provincially. The remaining funding went to programs providing regional services throughout the rest of the province.

### Community-Based HIV Services and Utilization

Services provided include support, education and outreach services—including services to injection drug users (IDU), which are separately enumerated. For this indicator we report utilization information for support services, IDU outreach service and IDU in-services. Reporting of service utilization in OCHART is divided into half years. In the first half of 2008/09, 17,636 people accessed support services; one-third of users were women, though they account for only 18 percent of the HIV-positive population. Among those receiving IDU services, 10,805 accessed outreach services and 9,175 accessed services provided on site (IDU in-services). Women accounted for almost 40 percent of users of IDU outreach and in-services, though they represent a smaller proportion of the IDU population than men. These findings suggest that women are higher users of community-based services than men.

# Section 11C

## *Clinical Care*

### INTRODUCTION

Current treatments for HIV have been successful in transforming the experience of being HIV-positive from an acute, rapidly progressive, fatal disease to a chronic, manageable condition.

However, to obtain maximal benefit from therapy, people living with HIV must have timely and appropriate diagnosis, referral to HIV care, monitoring and appropriate initiation and adherence to therapy. Many patients present for clinical care with advanced disease and compromised immune function (lower CD4 count at presentation).<sup>94</sup> Late presentation may occur if people do not perceive themselves to be at risk for HIV and therefore do not undergo testing until symptoms occur or because individuals have other barriers which prevent them from obtaining adequate care including poverty, lack of education, unstable housing, drug and alcohol addiction, mental health issues, and stigma and fear of discrimination. For women, the threat of violence with disclosure and competing demands on their time such as child care and other family commitments might be particularly important concerns.

Rigorous evidence regarding optimal antiretroviral therapy for women is lacking. Much of the evidence regarding HIV therapy has been extrapolated to women from large randomized controlled studies in men. Although most studies have insufficient power to analyze gender differences, women and men appear to have similar responses to antiretroviral therapy but women may do worse with certain regimens<sup>95</sup> and may have higher rates of some adverse events, which could affect adherence—and ultimately long-term response—to therapy.<sup>96</sup> More recent studies of seroconverters (people with newly acquired HIV

infection) have demonstrated similar or slower disease progression in women compared to men, suggesting that differences in outcomes are likely due to inequities in access to and quality of care rather than to differences of biology.<sup>97</sup>

Recommendations for the initiation of antiretroviral therapy continue to evolve and have changed over time, making it difficult to determine the appropriate proportion of people who should be receiving antiretroviral therapy. Current guidelines recommend treatment initiation when the CD4 count is between 350 and 500 cells/mm<sup>3</sup>.<sup>2,98</sup> and some experts recommend initiation at CD4 counts higher than 500/mm<sup>3</sup>, especially for patients with high viral loads or underlying comorbidities that influence HIV progression, such as hepatitis B or C or renal disease. No gender specific guidelines for antiretroviral therapy initiation have been developed. Antiretroviral therapy during pregnancy to prevent mother-to-child transmission is a gender-specific reason for early initiation of therapy. For some women, pregnancy may also be the time when they are diagnosed with HIV infection and first access HIV care. Ontario has a voluntary (opt-in), prenatal screening program that has achieved high rates of testing. This program aims to identify women who are otherwise unaware of their infection so that they can begin antiretroviral treatment and thereby reduce the risk of HIV transmission to infants.

Guidelines are also in place for viral load monitoring. HIV clinical guidelines recommend that viral load levels should be performed at regular intervals, regardless of treatment status. Viral load monitoring is used to inform decisions regarding initiation of treatment and to assess virologic control for patients on therapy and for those not yet on therapy and is recommended every 3-4 months.<sup>2,98,99</sup> Updated U.S. guidelines suggest that if patients are adherent, viral load is suppressed, and CD4 counts are greater than 350 cells/mm<sup>3</sup>, viral load monitoring may be performed at six-month intervals.<sup>98</sup>

Quality of life remains a paramount concern for people living with HIV. Quality of life might be negatively influenced by the disease itself, by associated stigma and discrimination (particularly for mental health-related quality of life), by associated comorbidities, and by treatment factors. Quality of life can be measured with generic or HIV-specific instruments. Measuring the symptom burden of people living with HIV can yield additional information, particularly when the symptoms are classified according to how burdensome they are.

In this section we report on indicators of access to HIV-related health care and quality of care including:

- The rate of prenatal screening for HIV
- Interventions to prevent vertical transmission of HIV in pregnant, HIV-positive women

- Health-related quality of life among adults living with HIV
- Symptom burden among adults living with HIV
- CD4 count when entering clinical care
- Time to first viral load: access to care
- Two or more viral load tests within 12 months: quality of care
- Viral load below the level of quantification among adults living with HIV

Data for the indicators of CD4 count when entering care, quality of life and symptom burden are from the Ontario Cohort Study of the Ontario HIV Treatment Network. The indicators of prenatal HIV screening and viral load are based on data from the Ontario Agency for Health Protection and Promotion (OAHPP) Public Health Laboratory and analysed by the Ontario HIV Monitoring and Epidemiological Unit (OHMEU). The indicator of appropriate interventions for HIV-positive pregnant women was based on data from the Canadian Pediatric AIDS Research Group (CPARG). All indicators were stratified by sex and then further stratified by age, income, education, ethnicity, geography and Local Health Integration Network (LHIN), where data were available and where sample size allowed. For further details on methods see [Appendix 11.3](#).



## PRENATAL SCREENING FOR HIV

**Indicator:** This indicator measures the proportion of pregnant women who were screened for HIV in Ontario in 2009.

**Background:** In 1994, the Pediatric AIDS Clinical Trial Group 076 Study reported that antiretroviral treatment of pregnant women reduced the rate of mother-to-child transmission of HIV from 25 percent to 8.3 percent.<sup>3</sup> Since then, additional studies have demonstrated that HIV transmission from mother to infant can be reduced to one percent or less with the use of combination antiretroviral therapy and, when appropriate, caesarean section.<sup>4</sup> In 2001, Remis and colleagues estimated that the HIV prevalence among women of childbearing age was 1.05 per 1,000 pregnant women, representing a four-fold increase over rates from 1990.<sup>100</sup> Given the effectiveness of medical interventions in preventing mother-to-child transmission of HIV, it is important from both public health and patient perspectives to ensure that HIV-infected pregnant women are identified and that they receive antiretroviral therapy during their pregnancy. From 1984 to 2001, 764 infants were born in Ontario to HIV-infected women, of whom almost one-quarter (180 infants) were infected, suggesting either low rates of treatment or lack of awareness of HIV infection by pregnant women and physicians.

Some jurisdictions have adopted “opt-out” HIV screening (in which screening is the rule and women must explicitly refuse to be tested). Ontario mandates “opt-in” screening in which physicians are encouraged to discuss and offer HIV antibody testing to all pregnant women. In 1998, the Ontario Ministry of Health and Long-Term Care commenced a program to encourage physicians to offer HIV testing to all pregnant women in the province. Physicians providing prenatal care who have not requested an HIV test receive a reminder letter from about the importance of screening during pregnancy.<sup>101</sup> Since then, prenatal HIV screening rates have increased from 40 percent of pregnancies in 1999 to 95 percent of pregnancies in 2009. Through prenatal screening in Ontario, 389 HIV-infected women were identified as of the end of 2009. While women must provide informed consent for HIV testing, the quality and consistency of this consent is unknown.

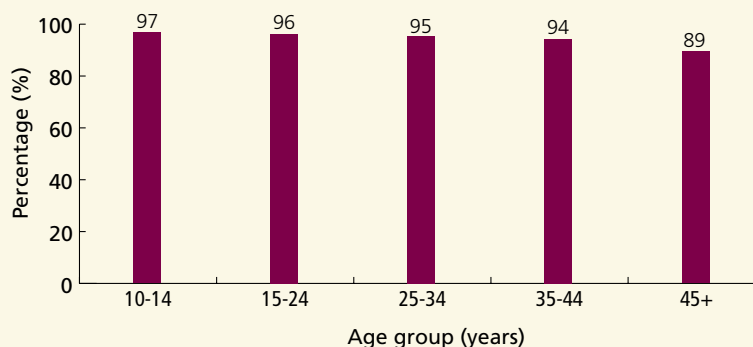
This indicator was analysed by the Ontario HIV Epidemiologic Monitoring Unit using data from the Ontario prenatal testing database and the HIV Laboratory, Public Health Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP). The unit of analysis is pregnancies, which were identified based on prenatal testing data held by the Public Health Laboratory. For women who tested multiple times during a pregnancy (within 258 days), the most recent test was included. For women who did not test through prenatal screening, HIV testing data was linked to the prenatal screening data to identify whether she had been nominally screened during the pregnancy.

**Findings:** In Ontario in 2009, 95 percent of pregnant women were screened for HIV. This is based on 144,370 pregnancies identified through prenatal testing records for 2009. Among screened pregnant women, 28 were identified as HIV-positive.

### Exhibit 11C.1 | Percentage of pregnant women who underwent prenatal HIV screening, by age group, in Ontario, 2009

#### FINDINGS

- HIV prenatal screening rates varied by age; rates declined with age.
- Pregnant women aged 45 and older had the lowest rates of prenatal HIV screening.
- The HIV positive rate among tested women was highest among women aged 35-44 (30 per 100,000 screened pregnant women) (data not shown).



**DATA SOURCES:** Ontario HIV Epidemiologic Monitoring Unit, using Ontario prenatal HIV testing and diagnostic databases, HIV Laboratory, Public Health Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP)

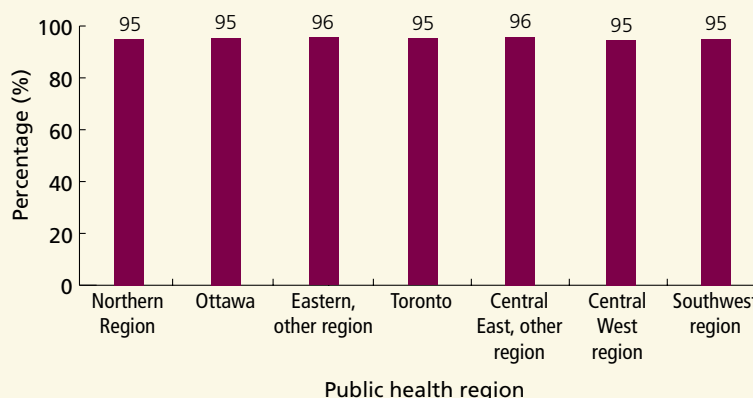
**NOTE:** The denominator for this indicator is the number of pregnancies during the calendar year, identified through prenatal screening data from the Public Health Laboratory

POWER Study

### Exhibit 11C.2 | Percentage of pregnant women who underwent prenatal HIV screening, by public health region, in Ontario, 2009

#### FINDINGS

- HIV prenatal screening rates were high (95 percent or more) across public health regions.
- The Toronto public health region had the largest number of HIV-infected pregnant women identified through screening, followed by Ottawa.
- Ottawa had the highest screen positive rate (78 per 100,000 screened pregnant women) followed by Toronto (40 per 100,000 screened pregnant women) (data not shown).



**DATA SOURCES:** Ontario HIV Epidemiologic Monitoring Unit, using Ontario prenatal HIV testing and diagnostic databases, HIV Laboratory, Public Health Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP)

**NOTE:** The denominator for this indicator is the number of pregnancies during the calendar year, identified through prenatal screening data from the Public Health Laboratory

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## INTERVENTION TO PREVENT MOTHER-TO-CHILD TRANSMISSION OF HIV IN PREGNANT HIV-POSITIVE WOMEN

**Indicator:** This indicator measures the proportion of pregnant HIV-positive women who received clinically appropriate interventions to prevent mother-to-child transmission of HIV during pregnancy and delivery between 2005 and 2009.

**Background:** Since the Pediatric AIDS Clinical Trial Group 076 study that showed that antiretroviral therapy of pregnant HIV-infected women could substantially reduce mother-to-child transmission of HIV,<sup>3</sup> recommendations about optimal therapy have changed considerably. Treatment and care guidelines for pregnant women have identified a number of strategies to reduce transmission of HIV to infants, including identification and treatment of pregnant women, scheduled caesarean delivery and avoidance of breastfeeding (in countries where safe alternatives are available). When making decisions about treatment regimens, health care providers should consider the optimal treatment for an individual woman, the risk of adverse events to the woman and her baby, and the selection of an antiretroviral regimen that will minimize the risk of mother-to-child transmission.<sup>102,103</sup> In Ontario, with current levels of prenatal screening and treatment, the number of HIV-infected infants has been reduced from about ten per year to about three per year, since the program began.<sup>104</sup> Given the current state of knowledge around HIV treatment and prevention, even the birth of a few HIV-infected infants represents missed opportunities for preventing HIV infections.

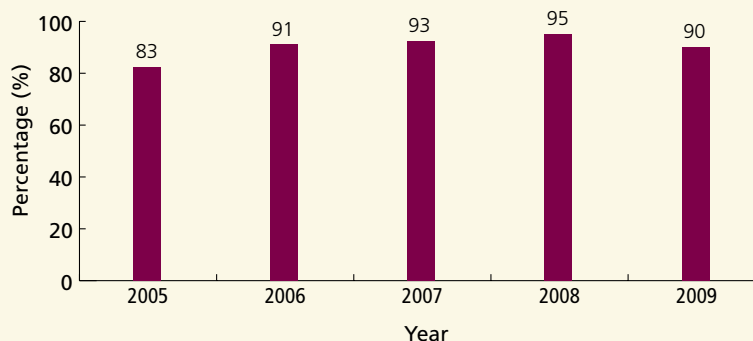
The Canadian Pediatric AIDS Research Group (CPARG) conducts HIV research with HIV-infected and exposed children, infected pregnant women and affected families. The Canadian Perinatal HIV Surveillance Program began in 1991 with the objective to collect data for the active surveillance of infants born to HIV-infected women in Canada. The data include year of birth of the infant, antiretroviral treatment of the mother, and mother-to-child transmission. To be included in the database, infants must be receiving care or have received care at one of the participating sites. The majority of infant-mother pairs were identified prior to delivery.

**Findings:** In Ontario, from 2005 to 2009, 91 percent of pregnant women who knew they were HIV-positive received antiretroviral therapy which would prevent mother-to-child transmission of HIV during pregnancy or delivery. Among women who received antiretroviral therapy, the mother-to-child transmission rate was 1.5 percent compared to 13.3 percent among women who were not on antiretroviral therapy during pregnancy.

### Exhibit 11C.3 | Percentage of HIV-positive pregnant women who received antiretroviral therapy during pregnancy, by year of birth of infants, in Ontario, 2005-2009

#### FINDINGS

- The percentage of HIV-positive, pregnant women who received antiretroviral therapy during pregnancy was lowest in 2005 (83 percent). In more recent years, at least 90 percent of HIV-positive pregnant women received antiretroviral therapy during their pregnancy.



**DATA SOURCE:** Canadian Pediatric AIDS Research Group (CPARG), Canadian Perinatal HIV Surveillance Program

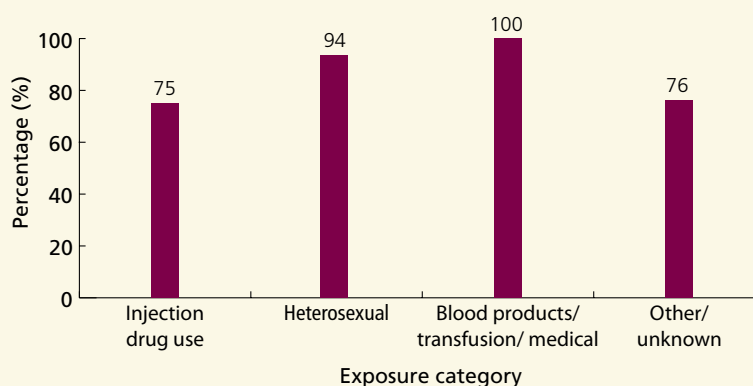
**NOTE:** Sample includes infants born to women who were known to be HIV-positive and who received care at a participating Ontario site

POWER Study

### Exhibit 11C.4 | Percentage of HIV-positive pregnant women who received antiretroviral therapy during pregnancy, by exposure category, in Ontario, 2005-2009

#### FINDINGS

- The percentage of HIV-positive pregnant women who received antiretroviral therapy during pregnancy varied by the HIV exposure category of the woman.
- HIV-positive pregnant women who were injection drug users (IDU) or who reported an unknown exposure category were less likely to have been on antiretroviral therapy during pregnancy than women from another exposure group.
- HIV-positive pregnant women who were of Aboriginal ethnicity were less likely to have been on antiretroviral therapy during pregnancy than women from other ethnocultural groups (data not shown).
- The percentage of HIV-positive pregnant women who received antiretroviral therapy during pregnancy did not vary by site of care (data not shown).



**DATA SOURCE:** Canadian Pediatric AIDS Research Group (CPARG), Canadian Perinatal HIV Surveillance Program

**NOTE:** Sample includes infants born to women who were known to be HIV-positive and who received care at a participating Ontario site

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## EXHIBITS AND FINDINGS

### HEALTH-RELATED QUALITY OF LIFE AMONG ADULTS LIVING WITH HIV

**Indicator:** This indicator measures the health-related quality of life of HIV-positive individuals in the Ontario HIV Treatment Network (OHTN) Cohort Study (OCS) using the Medical Outcomes Survey Short-Form 12 (SF-12) questionnaire. We report the mean physical health summary (PHS) score and the mean mental health summary (MHS) score.

**Background:** Health-related quality of life (HRQOL) is a multidimensional concept which encompasses physical and mental well-being. Within the context of HIV infection, low HRQOL is associated with the development of new opportunistic infections, malignancies, comorbidities and mortality. HRQOL assessments provide a comprehensive look at patient outcomes and integrate both good and bad influences of treatment with the negative effects of disease. HRQOL data can be used in both efficacy and effectiveness research, including clinical applications (e.g., screening tests) and policy applications (e.g., quality assessment and cost-effectiveness analyses).

HRQOL was measured using the SF-12 which includes measures of health dimensions and summary physical and mental health scores. The final scores are transformed to standardized scores, based on the U.S. 1998 general population scores, with a mean of 50 and a standard deviation of 10 to facilitate comparison to population scores. Scores below (or above) 50 indicate worse (or better) HRQOL compared to the reference population.<sup>105</sup> A minimally important difference of about three points is considered clinically meaningful for the PHS score as this difference in quality of life scores has been associated with a 15 percent increased risk of being hospitalized in the subsequent year and is comparable to the disease burden of serious illnesses like heart disease, lung disease, diabetes, arthritis, and cancer.<sup>106</sup> A minimally important difference of three points is considered clinically significant for the MHS score as it is associated with a 30 percent increased risk of using mental health services and a 30 percent increased risk of depression.<sup>106</sup>

Data for this indicator are from OCS participants, who completed their first interview between September, 2007 and March, 2010 (464 women and 2,533 men).

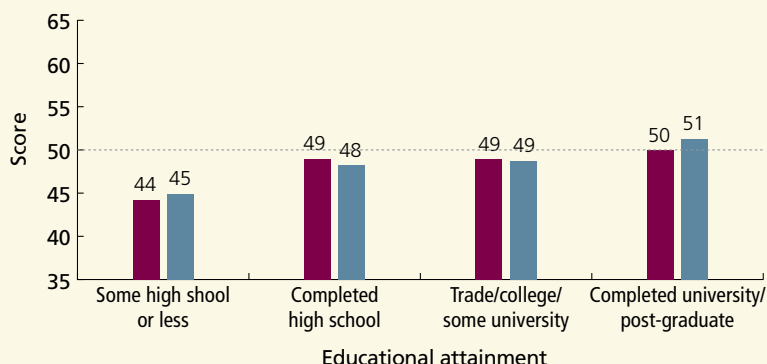
**Findings:** In the OCS population, the mean PHS score was 49 and the mean MHS score was 46, which is clinically lower than the general population mean of 50. The mean PHS score did not vary by sex (48 for women and 49 for men); the mean MHS score was slightly lower for women than for men (44 for women and 46 for men), but this difference was not clinically important.

### Exhibit 11C.5 | Mean physical and mental health summary scores from the Medical Outcomes Survey—Short Form 12, among participants in the Ontario HIV Treatment Network Cohort Study (OCS) population, by sex and educational attainment, in Ontario

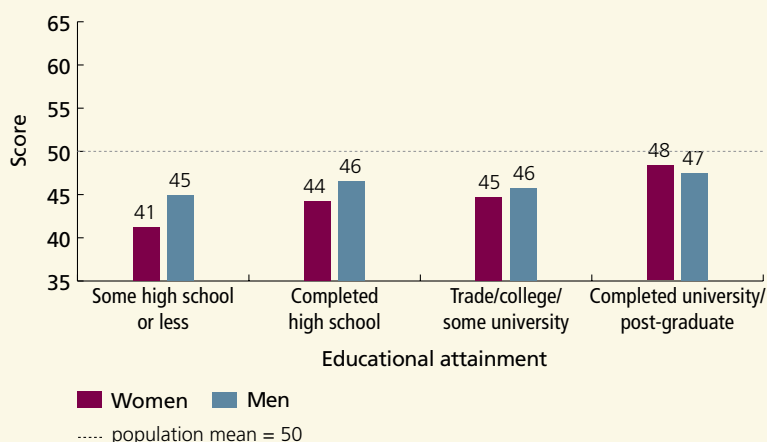
#### FINDINGS

- The mean physical health summary (PHS) and mental health summary (MHS) scores for women and men with HIV varied by educational attainment.
- The mean PHS score for women ranged from 44 among those with some high school education or less to 50 among women who had completed a university degree. A similar difference was seen for men with HIV.
- The mean MHS score for women ranged from 41 among those with some high school education or less to 48 among women who had completed a university degree. MHS scores did not differ by education among men.
- Women who had some high school education or less had clinically lower mean MHS scores than men.
- HIV-positive women and men who were employed full- or part-time had higher mean PHS and MHS scores than those who were unemployed or those who were students, retired or on disability (data not shown). These differences likely reflect lower quality of life among people who are not working but the order of causation is unclear (that is, whether poor quality of life leads to less employment or whether unemployment worsens quality of life).

#### Physical health summary score



#### Mental health summary score



**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed their first interview between September 2007–March 2010 (464 women, 2533 men)

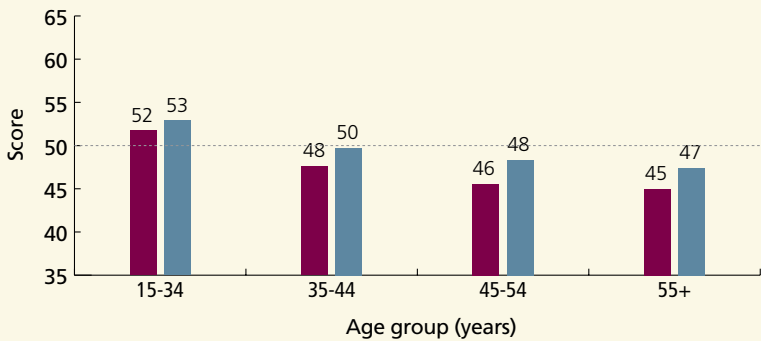
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**Exhibit 11C.6** | Mean physical and mental health summary scores from the Medical Outcomes Survey—Short Form 12, among participants in the Ontario HIV Treatment Network Cohort Study (OCS) population, by sex and age group<sup>^</sup>, in Ontario

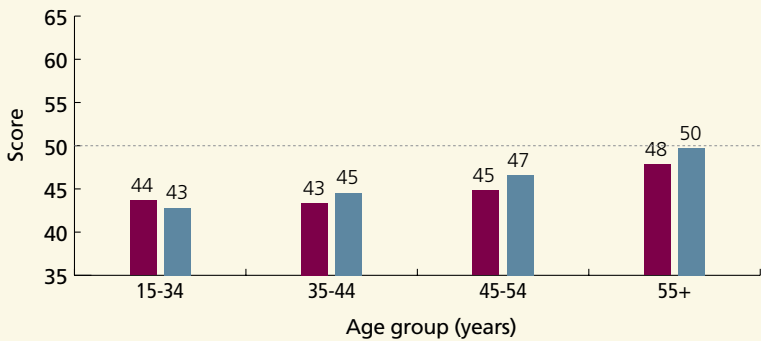
**FINDINGS**

- Mean physical health summary (PHS) score declined with increasing age for women and for men with HIV.
- The mean mental health summary (MHS) score improved with increasing age for women and for men, which could be due to adaptation, increased coping, greater social supports, a selection bias (older people with poor mental health quality of life might not participate in the cohort) or cohort effects (the people who remain longest in the cohort are the ones with best mental health quality of life).
- Though women had lower mean scores than men across most age groups, these differences were generally not clinically meaningful.

**Physical health summary score**



**Mental health summary score**



■ Women ■ Men  
..... population mean = 50

**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed their first interview between September 2007-March 2010 (464 women, 2533 men)

<sup>^</sup> Age at first interview date

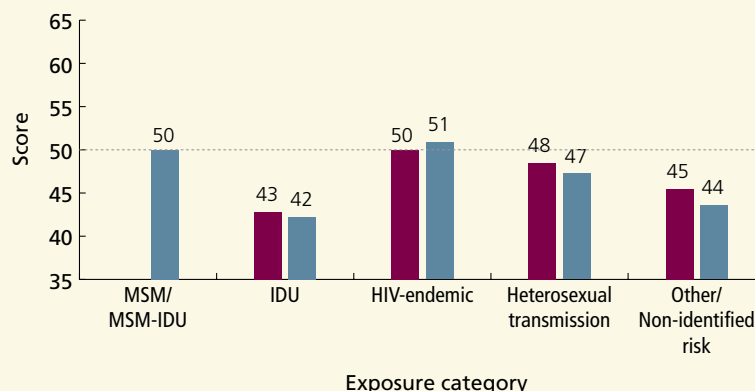
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**Exhibit 11C.7** | Mean physical and mental health summary scores from the Medical Outcomes Survey—Short Form 12, among participants in the Ontario HIV Treatment Network Cohort Study (OCS) population, by sex and exposure category, in Ontario

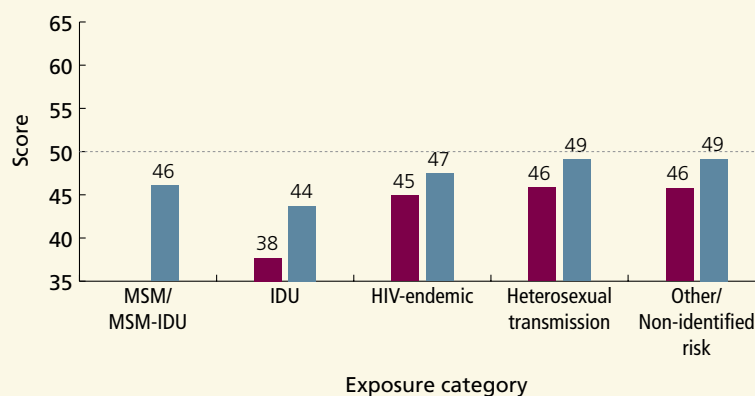
### FINDINGS

- HIV-positive injection drug users (IDU) had significantly worse mean physical health summary (PHS) and mental health summary (MHS) scores than HIV-positive individuals who were from other HIV exposure groups.
- Among HIV-positive IDUs, women had much lower mean MHS scores than men, although the number of women was small so that the difference might not be precisely estimated.

### Physical health summary score



### Mental health summary score



■ Women ■ Men

..... population mean = 50

**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed their first interview between September 2007-March 2010 (464 women, 2533 men)

**NOTE:** MSM = men who have sex with men; IDU = injection drug users

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## SYMPTOM BURDEN AMONG ADULTS WITH HIV

**Indicator:** This indicator measures the overall symptom burden among HIV-positive individuals enrolled in the Ontario HIV Treatment Network (OHTN) Cohort Study (OCS). We report the mean AIDS Clinical Trial Group (ACTG) Symptom Index score, the mean number of symptoms that were rated by respondents as bothering them or bothering them a lot, as well as the prevalence of specific symptoms (sadness, fatigue, pain and nervousness).

**Background:** Symptom burden is closely linked to quality of life in HIV. Symptoms may be due to HIV itself, lifestyle factors or associated treatments. Symptom burden may reflect untreated infection, inadequate attention to toxicities or unavoidable adverse events. Effective symptom management can improve patients' experience of disease and can improve their quality of life.

The ACTG Symptom Index is a 20-item HIV-specific questionnaire that was created based on reports of symptom frequency and bother, as well as expert opinion. Each symptom is scored on a four-point Likert scale ranging from "it doesn't bother me" to "it bothers me a lot". The ACTG has been validated and has been shown to have good content and construct validity. For scoring of the ACTG, it is common to report the percentage of respondents who indicate that a symptom bothers them or bothers them a lot.

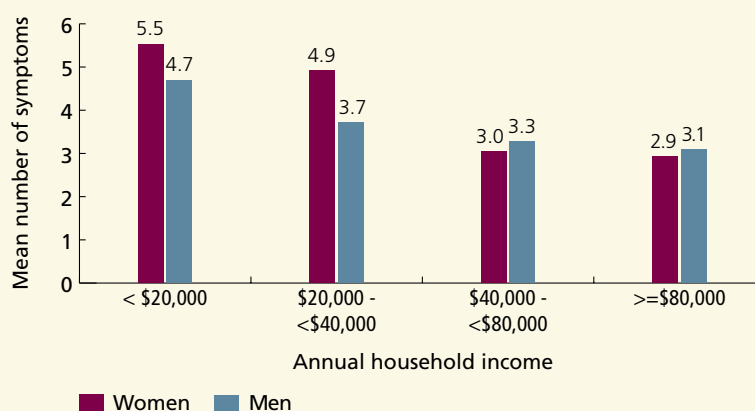
Data for this indicator are from a subset of participants in the OCS, who completed an extended version of the questionnaire (between October 2007 and March 2010; 231 women and 964 men).

**Finding:** The mean symptom distress score for OCS participants was 20. The mean scores did not vary by sex (22 for women and 20 for men). OCS participants reported that a mean of 3.9 symptoms (out of 20) bothered them or bothered them a lot (4.5 symptoms for women and 3.7 symptoms for men). OCS participants were asked whether specific symptoms bothered them or bothered them a lot: fatigue or loss of energy (34 percent); nervousness or anxiety (25 percent); pain, numbness or tingling in the hands and feet (21 percent) and feeling sad, down or depressed (34 percent). Women were more likely than men to report that sadness bothered them ([see Exhibit 11B.1](#)).

### Exhibit 11C.8 | Mean number of AIDS Clinical Trial Group symptoms that participants in the Ontario HIV Treatment Network Cohort Study (OCS) indicated bothered them or bothered them a lot, by sex and annual household income, in Ontario

#### FINDINGS

- The mean number of symptoms that HIV-positive women and men reported bothered them some or a lot varied by annual household income.
- Women who reported an annual income of less than \$20,000 reported a higher mean number of symptoms that bothered them or bothered them a lot than women who had an annual household income of \$40,000 or more (5.5 versus 3.0, respectively). A similar pattern was seen for men.
- Women with some high school education or less reported a higher mean number of symptoms that bothered them or bothered them a lot compared to women with higher educational attainment. For men, the mean number of symptoms that bothered them or bothered them a lot did not vary by educational attainment (data not shown).



**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

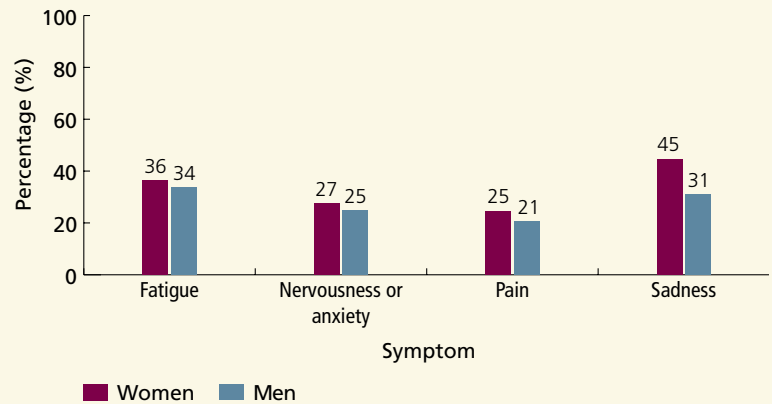
**NOTE:** Includes data from participants who completed an extended questionnaire between October, 2007 and March 2010 (205 women and 921 men)

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**Exhibit 11C.9** | Percentage who reported that specific symptoms bothered them or bothered them a lot, among participants in the Ontario HIV Treatment Network Cohort Study (OCS), by sex and symptom, in Ontario

**FINDINGS**

- Almost half of all women in the OCS reported that they were bothered or bothered a lot by sadness. More than one-third of women indicated that fatigue bothered them and one-quarter of women reported that nervousness or anxiety and pain bothered them or bothered them a lot.
- Women were more likely than men to be bothered by sadness (45 percent versus 31 percent, respectively).
- Women with some high school education or less were more likely to report being bothered some or a lot by the selected symptoms than women with higher educational attainment. Almost three-quarters of women with some high school education or less were bothered some or a lot by sadness and almost two-thirds were bothered some or a lot by fatigue. Among men, the only symptom that was associated with lower educational attainment was pain (data not shown).
- The percentage of women and men who indicated that the selected symptoms bothered them some or a lot varied by employment status. Consistently, those who were employed full- or part-time were less likely to report being bothered some or a lot by the selected symptoms (data not shown).



**DATA SOURCES:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed an extended questionnaire between October, 2007 and March 2010 (231 women and 964 men)

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## CD4 COUNT WHEN ENTERING CLINICAL CARE

**Indicator:** This indicator measures the CD4 count of HIV-positive patients when they first presented to HIV care among HIV-positive individuals enrolled in the Ontario HIV Treatment Network (OHTN) Cohort Study (OCS).

**Background:** CD4 lymphocytes, a component of the immune system, are targeted by HIV and decline with untreated infection. A CD4 count in an individual early in the course of HIV infection is usually between 500 and 1,000 cells/mm<sup>3</sup> and decreases by approximately 80 to 100 cells/mm<sup>3</sup> per year. Most opportunistic illnesses occur at CD4 counts less than 200 cells/mm<sup>3</sup>, and are particularly common when the CD4 count drops below 100 or 50 cells/mm<sup>3</sup>. Although guidelines vary, the recommended threshold for initiating antiretroviral therapy is generally between 350 and 500 cells/mm<sup>3</sup>; some recent guidelines have suggested the higher threshold for most patients.<sup>2,98</sup> Effective antiretroviral therapy can increase or stabilize CD4 counts. Thus, patients who are diagnosed with low CD4 counts when entering care may have had undiagnosed HIV infection for many years or patients might have been diagnosed with HIV but waited for a long time before entering care. Both situations represent lost opportunities to improve both individual and public health.

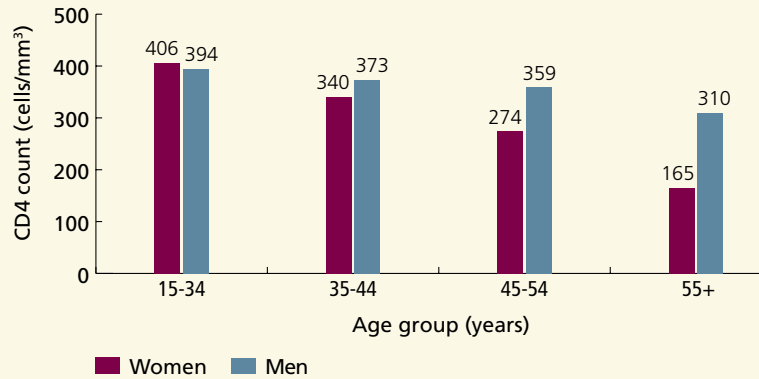
Data for this indicator are from 463 women and 2,561 men who participated in the OCS and completed their first interview between September 2007 and March 2010. CD4 counts were obtained from retrospective review of patients' clinical charts. Participants entered into HIV care between 1985 and 2009.

**Findings:** The mean CD4 count when entering care of OCS participants was 379. The mean CD4 count for women was 375 and the mean count for men was 380.

**Exhibit 11C.10** | Mean CD4 count when entering care for Ontario HIV Treatment Network Cohort Study (OCS) participants, by sex and age group, in Ontario, 1985-2009

**FINDINGS**

- The mean CD4 cell count when entering care declined significantly by age for women and for men.
- Older women had a mean CD4 count when entering care that was below 200, which is an important marker for increased risk of opportunistic illnesses.



**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTES:** Includes data from participants who completed an interview between October 2007 and March 2010

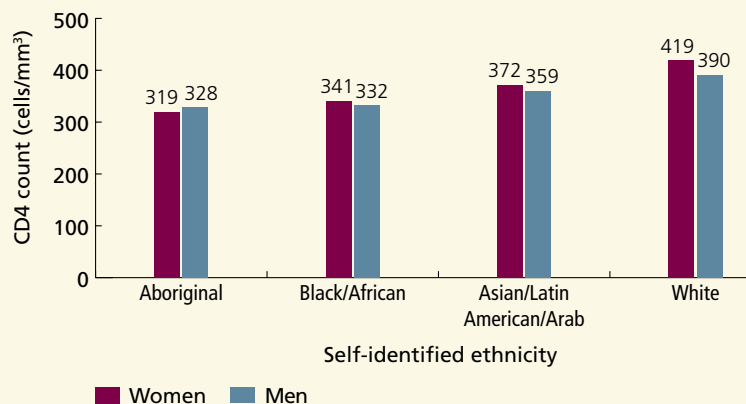
Data are from a retrospective chart review of patients who entered clinical care between 1985-2009 (463 women; 2,561 men)

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### Exhibit 11C.11 | Mean CD4 count when entering care for Ontario HIV Treatment Network Cohort Study (OCS) participants, by sex and ethnicity, in Ontario, 1985-2009

#### FINDINGS

- The mean CD4 cell count when entering care was lower for Aboriginal women and men than for White women and men.
- The mean CD4 cell count when entering care was lower for Black/African women and men than for White women and men.



**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed an interview between October 2007 and March 2010

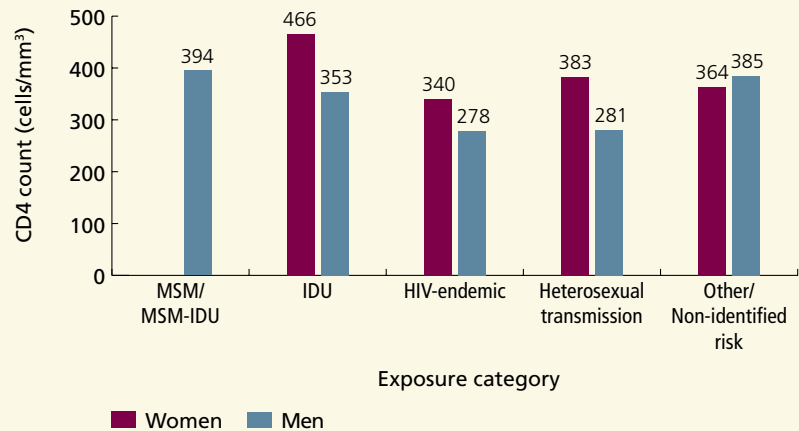
Data are from a retrospective chart review of patients who entered clinical care between 1985-2009 (463 women; 2,561 men)

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**Exhibit 11C.12** | Mean CD4 count when entering care for Ontario HIV Treatment Network Cohort Study (OCS) participants, by sex and exposure category, in Ontario, 1985-2009

**FINDINGS**

- Injection drug users (IDU) in the OCS had higher CD4 counts than people from other HIV exposure categories. Female IDUs had higher CD4 counts when entering care than male IDUs.
- This finding may be explained by frequent HIV testing in this exposure group or could be due to sampling bias in this voluntary cohort.
- Men whose exposure category was heterosexual transmission (includes HIV-endemic and heterosexual transmission) had the lowest mean CD4 counts when entering care.



**DATA SOURCE:** Ontario HIV Treatment Network Cohort Study (OCS)

**NOTE:** Includes data from participants who completed an interview between October 2007 and March 2010

Data are from a retrospective chart review of patients who entered clinical care between 1985-2009 (463 women; 2,561 men)

**NOTE:** MSM = men who have sex with men; IDU = injection drug users

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## TIME TO FIRST VIRAL LOAD: ACCESS TO VIRAL LOAD TESTING

**Indicator:** This indicator measures the time to a first viral load test among Ontarians who nominally tested positive for HIV between June 30, 2005 and December 31, 2005. Among those newly diagnosed with HIV, we report the median and mean time to a first viral test, as well as the percentage of individuals who received their first viral load test within three, six and twelve months.

**Background:** HIV RNA (number of particles/mm<sup>3</sup>), commonly referred to as viral burden or viral load, is the most commonly used measure of viral replication.<sup>107</sup> After initial HIV infection, HIV viral load stabilizes at a viral set point (which differs between individuals). The higher the set point, the more rapidly HIV will progress. Viral load will typically remain relatively stable for many years, despite declining CD4 cell counts. HIV viral load testing is a key component of the clinical assessment of patients that are recently diagnosed with HIV infection. Viral load testing quantifies the amount of HIV-1 virus that is circulating in the blood of an infected person. The results are used, in conjunction with CD4 count, to predict the risk of disease progression, help guide antiretroviral initiation decisions and to monitor treatment success or failure. Given its importance to clinical care, a viral load test is indicated for all people diagnosed with HIV infection. Accordingly, the time to first viral load testing is a good surrogate marker of access to HIV care.<sup>108</sup>

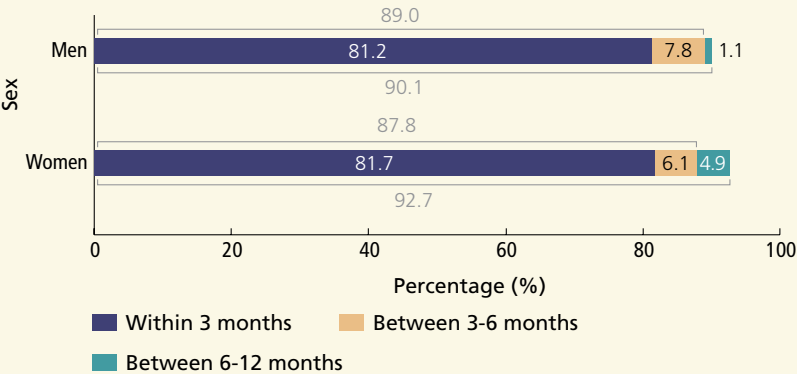
In Ontario, viral load test results are recorded in a central database managed by the Public Health Laboratory. For this indicator, we report the time to a first viral load test for individuals who tested positive for HIV between June 30, 2005 and December 31, 2005. The sample was restricted to patients who tested for HIV nominally (with identifying information) so that they could be linked to the viral load data and followed to determine the time to their first viral load. Data for this indicator were prepared by and are based on the work of Rank and colleagues.<sup>108</sup>

**Findings:** The mean number of days to the first viral load test among HIV-positive individuals who had nominally tested positive was 65 days (median = 36 days). Women had a slightly longer mean and median time to first viral load than men (69 days versus 59 days, respectively (mean) and 45 days versus 35 days, respectively (median)). Eighty-two percent of women and 81 percent of men who were newly diagnosed with HIV had a viral test within three months of testing HIV-positive; however seven percent of women and ten percent of men who were newly diagnosed with HIV had not had a viral load test conducted within 12 months of testing positive for HIV.

**Exhibit 11C.13** | Percentage of HIV-positive adults who received a first viral load test within three, six and twelve months, by sex and follow up period, in Ontario, 2006

**FINDINGS**

- More than 80 percent of women and men who tested positive for HIV during the latter half of 2005 had undergone viral load testing within three months of testing positive. More than 90 percent had undergone a viral load test within one year.
- The percentages of women and men who underwent a viral load test within three months of nominally testing HIV-positive were similar as was the percentage between three and six months. A larger percentage of women underwent viral load testing between six and twelve months than men (4.9 percent versus 1.1 percent, respectively).
- Seven percent of women and 10 percent of men who tested positive for HIV during the latter half of 2005 had not undergone viral load testing within 12 months of testing positive for HIV.



**DATA SOURCE:** Rank and colleagues,<sup>108</sup> using data from the Public Health Laboratory HIV testing and viral load databases

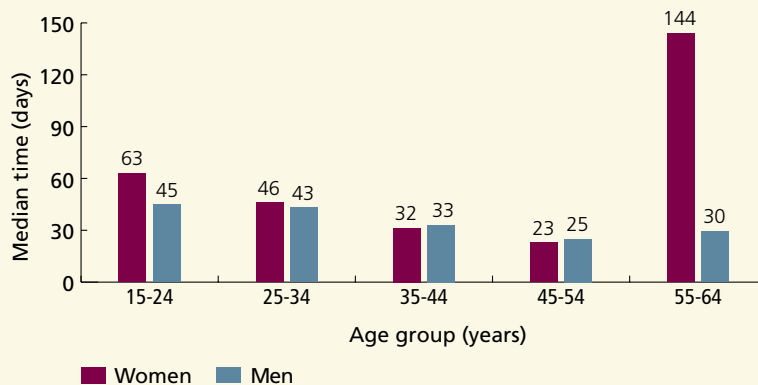
**NOTE:** Sample was limited to people who underwent nominal HIV testing in Ontario and who tested HIV-positive. Individuals who had a past history of having tested HIV-positive were excluded

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**Exhibit 11C.14** | Median time (in days) to first viral load test among adults who nominally tested positive for HIV in the latter half of 2005, by sex and age group, in Ontario, 2006

**FINDINGS**

- Women aged 15-24 and aged 55-64 had a longer median time to first viral load test than similarly aged men.
- The median time to first viral load test declined with increased age (up to age 55) for women and for men.
- The median time to a first viral load for women and men who tested positive for HIV during the latter half of 2005 was less than two months in all public health regions of Ontario (data not shown).
- The numbers of individuals testing positive in the youngest (under age 15) and oldest (aged 65 and older) age categories were too small to report, and some median estimates are based on small numbers of people and should be interpreted with caution.



**DATA SOURCE:** Rank and colleagues,<sup>108</sup> using data from the Public Health Laboratory HIV testing and viral load databases

**NOTE:** Sample was limited to people who underwent nominal HIV testing in Ontario and who tested HIV-positive. Individuals who had a past history of having tested HIV-positive were excluded

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## TWO OR MORE VIRAL LOAD TESTS WITHIN 12 MONTHS: QUALITY OF CARE

**Indicator:** This indicator measures the percentage of people who were receiving HIV care in 2007 who had two or more viral load tests conducted in 2008.

**Background:** According to clinical care guidelines, viral load testing should be performed as soon as possible after diagnosis and every four months subsequently.<sup>2,99,109</sup> The latest guidelines suggest that less frequent testing (every six months) might be appropriate if patients are on antiretroviral therapy, have reliable adherence, a CD4 count above 350 cells/mm<sup>3</sup> and sustained virologic suppression.<sup>2,98</sup> Viral load results provide important information that is used in conjunction with the CD4 cell count to assess the status of HIV disease, to guide recommendations for therapy initiation and switching, to recognize treatment failure and to predict HIV disease progression. Viral load-guided antiretroviral regimen changes can help avert emergence of treatment resistant virus and preserve future treatment options.

This indicator is based on data from the Ontario Public Health Laboratory viral load database. Individuals who received viral load testing through clinical trials are not included in these data. Patients were defined as being in HIV care if they had a viral load test completed in the latter half of 2007 (June 30, 2007-Dec 31, 2007) (9,410). This sample is intended to identify people with HIV who were receiving HIV-specific health care, since regular viral load testing is recommended for all patients, regardless of antiretroviral treatment status or CD4 count. Although we were unable to exclude people who died or who migrated out of Ontario, this likely represents only a small number of cases. These patients were followed through to the end of 2008 to determine the percentage that had undergone two or more viral tests during that year.

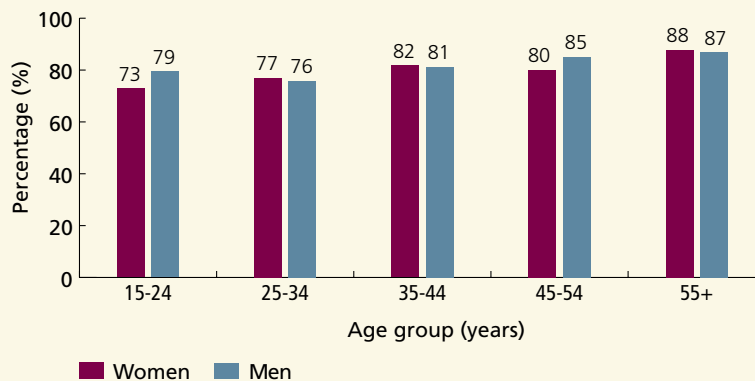
The number of people who received a viral load test in the latter half of 2007 (9,410) is significantly different from the modelled estimate of people in Ontario who knew that they were HIV positive as of the middle of 2007 (16,860),<sup>13</sup> and suggests that a substantial proportion of people living with HIV (44 percent) are not receiving regular, HIV-specific, guideline-concordant care. These estimates are consistent with findings from the U.S.<sup>14</sup> and from elsewhere in Canada.<sup>15</sup>

**Finding:** Of the 9,410 HIV-positive individuals who were identified as receiving HIV care in the latter half of 2007, 82 percent had at least two viral load tests in 2008. This proportion did not vary by sex: 81 percent of women and 83 percent of men had at least two viral load tests in 2008.

### Exhibit 11C.15 | Percentage of HIV-positive adults in HIV care<sup>^</sup> who underwent two or more viral load tests within 2008, by sex and age group, in Ontario, 2008

#### FINDINGS

- The percentage of HIV-positive women and men who had at least two viral load tests in 2008 was similar across all age groups.
- The percentage of women and men who underwent two or more viral load tests within a 12-month period increased with age.
- Less than three-quarters of women aged 15-24 (73 percent) had at least two viral tests within 2008 compared to 88 percent of HIV-positive women aged 55 and older.

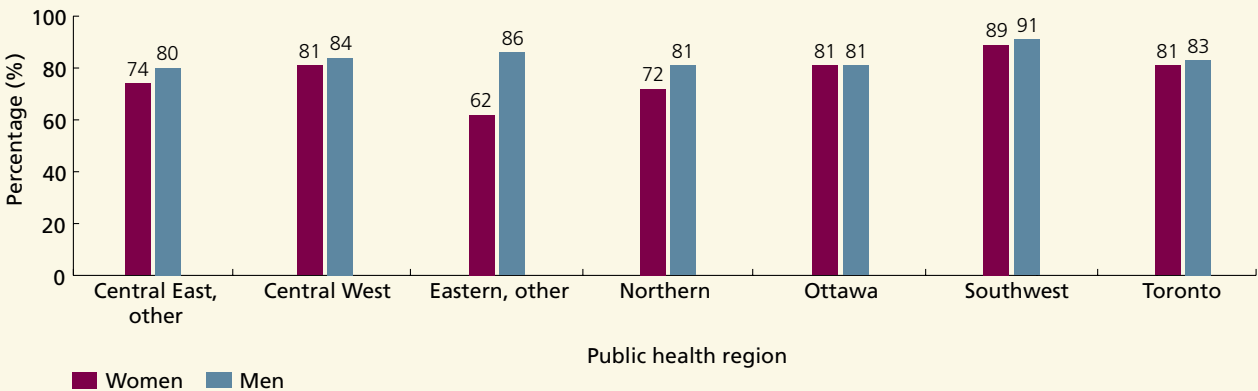


**DATA SOURCE:** Public Health Laboratory—HIV Laboratory, Ontario Agency for Health Protection and Promotion (OAHP). Prepared by Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

<sup>^</sup> HIV care was determined based on viral load use. All individuals had to have a viral load test in the latter half of 2007

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**Exhibit 11C.16** | Percentage of HIV-positive adults in HIV care^ who underwent two or more viral load tests, by sex and public health region, in Ontario, 2008



**DATA SOURCE:** Public Health Laboratory—HIV Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP). Prepared by Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

^ HIV care was determined based on viral load use. All individuals had to have a viral load test in the latter half of 2007

**FINDINGS**

- The percentage of HIV-positive women and men who had at least two viral load tests in 2008 varied across public health regions, from 78 percent in the Central East and other region to 90 percent in the Southwest region (data not shown).
- The percentage of HIV-positive women who had at least two viral load tests in 2008 ranged from 62 percent in the Eastern and other region to 89 percent in the Southwest region.
- The percentage of HIV-positive men who had at least two viral load tests in 2008 ranged from 80 percent in the Central East, other region to 91 percent in the Southwest region.

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## VIRAL LOAD BELOW THE LEVEL OF QUANTIFICATION AMONG ADULTS LIVING WITH HIV

**Indicator:** This indicator measures the percentage of HIV-positive people who were in care in 2007 and in 2008 for whom all viral load results in 2008 were undetectable. We report the percentage of patients for whom all, some or none of their viral loads were undetectable.

**Background:** The aim of antiretroviral therapy is to suppress viral load to below the level of quantification of available assays, commonly called “undetectable”. Virologic suppression is associated with immune reconstitution (increasing CD4 count), slower disease progression (fewer opportunistic illnesses and death), and decreased HIV transmission. Individuals might have detectable virus in their blood if they have not initiated antiretroviral therapy (due to high CD4 counts or individual preference), if they are non-adherent to their antiretroviral therapy, or if their therapy is not effective (most commonly due to the emergence of resistant virus). Because the data do not allow us to distinguish between these possibilities and because of the role of clinical judgment and patient preferences in the decision to initiate therapy, this indicator should be interpreted with caution. Furthermore, women who take antiretroviral therapy during pregnancy to prevent mother-to-child transmission might discontinue therapy after pregnancy if it were not otherwise indicated, resulting in a rising viral load.

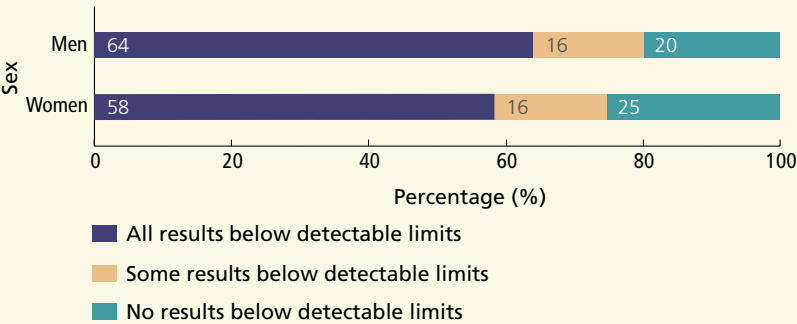
This indicator is based on data from the Public Health Laboratory viral load database. Patients were defined as being in HIV care if they had a viral load test in the latter half of 2007 (June 30, 2007-December 31, 2007) and at least one viral load test in 2008; this represents only HIV-positive individuals who are in care. These patients were followed through to the end of 2008 to determine the percentage of patients for whom all their viral load results during the 12-month follow up period were below quantification. These findings are not adjusted for the number of viral load tests performed.

**Finding:** Of the 8,861 HIV-positive individuals who underwent at least one viral load test in the latter half of 2007 and at least one viral load test in 2008, 63 percent had all their viral load results in 2008 below the level of quantification (undetectable). Men were slightly more likely than women to have all undetectable viral load results (64 percent versus 58 percent, respectively).

**Exhibit 11C.17 | Results of viral load testing among HIV-positive adults in HIV care<sup>^</sup>, by sex, in Ontario, 2008**

**FINDINGS**

- Women were slightly more likely than men to have none of their viral load results below quantification (25 percent versus 20 percent, respectively).
- Women were slightly less likely than men to have all their viral load results below quantification (58 percent versus 64 percent, respectively).



**DATA SOURCE:** Public Health Laboratory—HIV Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP); prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

<sup>^</sup> HIV care determined based on viral load use. All individuals had a viral load test in the latter half of 2007 and at least one test in 2008.

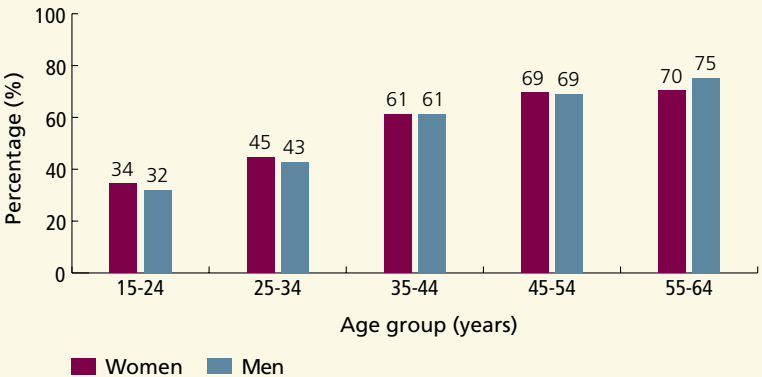
Prepared by Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

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**Exhibit 11C.18 | Percentage of HIV-positive Ontarians in HIV care<sup>^</sup> for whom all their viral load results within a twelve month period were undetectable, by sex and age group, in Ontario, 2008**

**FINDINGS**

- The percentage of HIV-positive adults who had all their viral loads below quantification increased with age for women and for men.
- Younger individuals might have a shorter duration of HIV infection with preserved immunity (high CD4 counts) and accordingly fewer indications for antiretroviral therapy, which could explain lower levels of viral suppression.
- The sex difference seen in the overall rates is at least partially due to the differences in age distributions between women and men. Among HIV-positive adults, women tend to be younger than men.

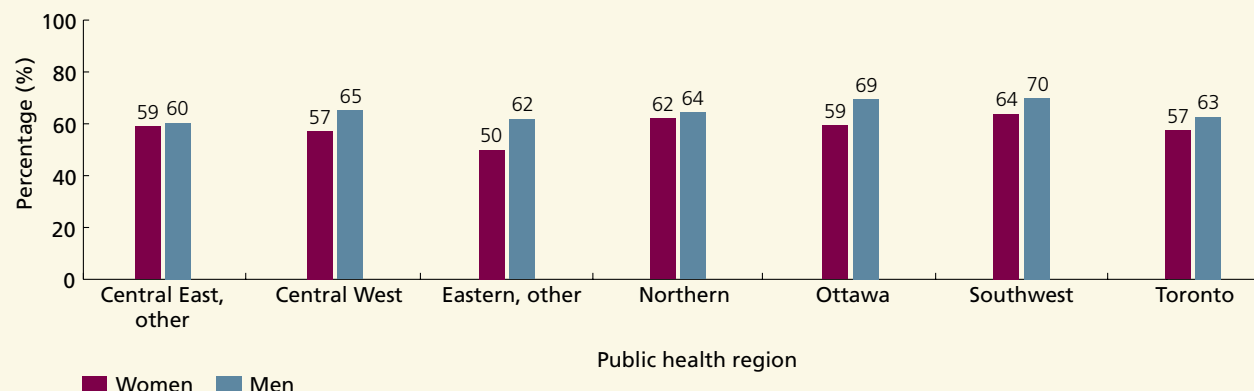


**DATA SOURCE:** Public Health Laboratory—HIV Laboratory, Ontario Agency for Health Protection and Promotion (OAHPP); prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

<sup>^</sup> HIV care determined based on viral load use. All individuals had a viral load test in the latter half of 2007 and at least one test in 2008.

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**Exhibit 11C.19** | Percentage of HIV-positive adults in HIV care<sup>^</sup> for whom all their viral load test results within a twelve month period were below detectable limits, by sex and public health region, in Ontario, 2008



**DATA SOURCE:** Public Health Laboratory—HIV Laboratory, Ontario Agency for Health Protection and Promotion (OAHP); prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto

<sup>^</sup> HIV care determined based on viral load use. All individuals had a viral load test in the latter half of 2007 and at least one test in 2008.

### FINDINGS

- Across almost all public health regions, HIV-positive women were less likely than HIV-positive men to have all their viral loads below detectable limits.
- The percentage of women and men who had all viral loads below detectable limits varied by public health region with the lowest rates reported in the Eastern and other public health region and the highest rates reported in the Southwest public health region.

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# Section 11C

## SUMMARY OF FINDINGS

This section reports on clinical care indicators including: prenatal HIV screening rates; interventions to prevent mother-to-child transmission of HIV; quality of life; symptom burden for people living with HIV; CD4 count when entering clinical care and indicators of viral load testing. All indicators were stratified by sex and then by age, HIV exposure category and geography, where data were available. Indicators from the Ontario HIV Treatment Network (OHTN) Cohort Study (OCS) were additionally stratified by socioeconomic status. The findings for each indicator are described below.

### Prenatal Screening for HIV

Ninety-five percent of pregnant women who received prenatal testing in 2009 were also screened for HIV during pregnancy; 28 cases of HIV infection among pregnant women were identified. Older women, aged 45 and older, had slightly lower screening rates than younger women (89 percent versus 94-97 percent, respectively). Rates of prenatal HIV screening did not vary by public health region.

### Interventions to Prevent Mother-to-Child Transmission of HIV in Pregnant, HIV-Positive Women

The Canadian Perinatal AIDS Research Group (CPARG) perinatal surveillance program collects information on infants born to HIV-infected women who received care at a participating site. From 2005 to 2009, 91 percent of pregnant women who knew they were HIV-positive received antiretroviral therapy during pregnancy, which can prevent mother-to-child transmission of HIV during pregnancy or delivery. The lowest treatment rates were in 2005; 83 percent of pregnant HIV-positive women were on antiretroviral therapy in this year compared to more than 90 percent of women in subsequent years. The

percentage of HIV-positive pregnant women who received antiretroviral therapy also varied by exposure category and ethnocultural group. Women who identified injection drug use as their HIV exposure category had the lowest treatment rates, 75 percent compared to 94 percent among women with heterosexual contact as their HIV exposure. Also, pregnant women who were of Aboriginal ethnicity were less likely to receive antiretroviral therapy than women of other ethnocultural origins. Rates did not vary by site of care.

### Health-Related Quality of Life Among Adults Living with HIV

Health-related quality of life was measured among OCS participants using the Medical Outcomes Survey—Short Form 12 (MOS-SF12) questionnaire. The mean physical health summary (PHS) score of respondents was 49 and the mean mental health summary (MHS) score was 46; the MHS was meaningfully lower than the standard population mean (50). The PHS score did not vary by sex, but women had slightly lower mean MHS scores than men (44 versus 46, respectively). This was not a clinically important difference. The mean PHS and MHS scores among OCS participants varied by educational attainment, age and HIV exposure category. Women and men with some high school education or less had lower mean PHS and MHS scores than HIV-positive participants with higher educational attainment. The mean PHS score for respondents declined with increasing age; however, MHS scores increased with age. Although this effect might be due to features of how the cohort was assembled, it could also suggest that despite a decline in physical health with age, other mechanisms such as improved coping or adaptation become increasingly important. Women and men who injected drugs had lower mean PHS and MHS scores than respondents from



other HIV exposure categories. Importantly, women who injected drugs had a mean MHS score of 38, which is 12 points lower than the standard population score of 50.

### **Symptom Burden Among Adults Living with HIV**

Data on symptom burden was measured among OCS participants using the AIDS Clinical Trial Group (ACTG) symptom index. The measures that are reported are: the mean score; the mean number of symptoms that participants indicated bothered them or bothered them a lot; and the percentage of respondents who reported being bothered or bothered a lot by symptoms related to mental health, fatigue, pain or nervousness and anxiety.

The mean symptom distress score for respondents was 20 and did not vary by sex. The mean number of symptoms that participants reported bothered them or bothered them a lot was 3.9 symptoms; women reported a larger number of symptoms that bothered them than men (4.5 versus 3.7, respectively). Respondents who earned less than \$20,000 per year reported a larger mean number of symptoms that bothered them than those who earned \$40,000 or more per year. A similar pattern was seen for educational attainment. With respect to specific symptoms, the percentage of OCS participants who indicated that selected symptoms bothered them or bothered them a lot ranged from one in five to one in three for the following symptoms: fatigue or loss of energy (34 percent); nervousness or anxiety (25 percent); pain, numbness or tingling in the hands and feet (21 percent); feeling sad, down or depressed (34 percent). Women were more likely to report sadness than men (45 percent versus 31 percent, respectively).

### **CD4 Count When Entering Clinical Care**

Patients who enter care with low CD4 counts may have had undiagnosed HIV infection for many years or may have been diagnosed earlier but not receiving regular HIV care. Both situations represent lost opportunities

to improve both individual and public health, through controlled viral load and access to education and prevention information. Thus, an important indicator of accessing care and testing early in the course of HIV infection is the mean CD4 count when entering care. Among OCS participants, the mean CD4 count when entering care was 379 and did not vary by sex, but did vary by age, ethnicity and HIV exposure category. Women aged 55 and older had a substantially lower mean CD4 count when entering care (165 cells/mm<sup>3</sup>) than younger women or men. This count is particularly worrisome because counts below 200 cells/mm<sup>3</sup> are associated with increased risk of opportunistic illnesses and associated mortality. Aboriginal adults and Black/African adults in the OCS had lower mean counts when entering care than White adults. Injection drug users (IDUs) in the OCS had similar or higher mean CD4 counts than people from other exposure categories. This may be explained by frequent testing in this group or due to the sampling bias that exists in this voluntary cohort.

### **Time to First Viral Load: Access to Viral Load Testing**

Time to first viral load test after an HIV-positive test is a good surrogate marker of access to care. People who were newly diagnosed with HIV infection (through nominal testing) had their records linked to the viral load testing database to determine the time to first viral load test. The mean number of days to first viral load test was 65 days and the median was 36 days. Women had slightly longer mean and median times to a first viral load test than men. One in five women and men who were newly diagnosed with HIV had not had a viral load test within three months of testing positive and seven percent of women and ten percent of men who were newly diagnosed with HIV had not had a viral load test within 12 months of testing positive. The median time to first viral load varied by age group for women, but not for men. The median time to first test was less than two months in all public health regions.

## Two or More Viral Load Tests within 12 Months: Quality of Care

For people living with HIV infection, viral load testing (in conjunction with other clinical markers) is used to assess disease status, guide decisions about therapy initiation and switching, and to indicate treatment failure and possible emergence of resistant virus. This indicator was measured in a sample of people living with HIV who had received a viral load in the latter half of 2007, to identify a cohort of people living with HIV who were receiving HIV care. This cohort was followed for 12 months to identify the percentage who had two or more viral loads in this period. Of the 9,410 people living with HIV who were in HIV care, 82 percent underwent two or more viral loads in 2008. This did not vary by sex, but did vary somewhat by age and by public health region.

The number of people who received a viral load test in the latter half of 2007 (9,410) is significantly different from the modelled estimate of people in Ontario who knew that they were HIV positive as of the middle of 2007 (16,860)<sup>13</sup> and suggests that a substantial proportion of people living with HIV are not receiving regular, HIV-specific, guideline-concordant care. These estimates are consistent with findings from the U.S.<sup>14</sup> and from elsewhere in Canada.<sup>15</sup>

## Viral Load Below The Level of Quantification Among Adults Living with HIV

An indicator of treatment success is suppressed viral load. This indicator was measured in a sample of people living with HIV who had received a viral load in the latter half of 2007 and at least one test in 2008. Of this sample, 63 percent had all their viral loads below the level of quantification in 2008. This varied somewhat by sex, age group and public health region. Women were less likely than men to have all their viral loads below the level of quantification (58 percent versus 64 percent, respectively) and younger adults were less likely to have fully controlled viral load. The observed sex difference is at least partially due to the differences in age distributions between women and men. Among those living with HIV, women are younger than men.

# Section 11D

## *HIV Outcomes*

### INTRODUCTION

Prior to the introduction of effective treatment for HIV in the mid 1990s, HIV was the leading cause of death in young people aged 25-44 in North America.<sup>110</sup>

In 1996, with the release of a new class of anti-HIV drugs, protease inhibitors, and its use in combination with other anti-HIV drugs from a different class, HIV-related mortality rates plummeted. Canada witnessed a greater than 50 percent decline in HIV-related mortality between 1996 and 1997 (from 1307 deaths to 631 deaths). In subsequent years, the number of HIV-related deaths has remained at around 400-500 deaths annually.<sup>7</sup> A similar decline was noted in the U.S. and was generally consistent across age groups, regions and ethnic groups except that Black Americans, especially women, continue to report alarmingly high HIV-related mortality, likely due to vulnerability related to factors such as gender, race, socioeconomic status, addiction, and other social determinants of health.<sup>111</sup>

Hospitalizations and length of stay are important clinical outcomes among people living with HIV. Hospitalization and prolonged length of stay are associated with decreased health status, increased direct medical costs, and lost productivity. Crum-Cianflone and colleagues<sup>112</sup> reported on hospitalizations within a U.S. military cohort from 1999 to 2007 and found that hospitalizations continued to occur at high rates among HIV-infected persons. In 2008, Buchacz and colleagues<sup>113</sup> reported

on hospitalizations from 1994 to 2005 among 7,155 participants in the HIV Outpatient Study at 10 U.S. HIV clinics. They found that the rates of hospitalizations for HIV-infected patients declined substantially during 1994-2005, due mainly to reductions in AIDS defining opportunistic infections. Compared with the period 1994-1997, patients in the combination antiretroviral therapy era were hospitalized with higher CD4+ cell counts and more frequently for chronic end-organ conditions.<sup>113</sup>

Few studies have reported gender differences in hospitalizations. In 2003, Floris-Moore and colleagues<sup>114</sup> reported on hospitalizations in an HIV-infected drug user cohort in New York before and after the availability of combination antiretroviral therapy. In the multivariate analysis, the authors found that in the combination antiretroviral therapy era, female gender and not using combination antiretroviral therapy independently predicted increased hospitalization risk. HIV-related hospitalizations and mortality are important outcomes of quality of care because many of these events are preventable with early diagnosis, proper HIV case management, and antiretroviral therapy. Recent studies have projected that an HIV-positive person with continually suppressed viral load can expect to live into the sixth or seventh decade of life.<sup>5</sup>

In this section, we report indicators of outcomes for people living with HIV in Ontario including:

- HIV admissions
- Length of stay for HIV admissions
- HIV-related mortality

The hospitalization indicators were measured using the Canadian Institute for Health Information

Discharge Abstract Database (CIHI-DAD). HIV-related mortality was measured using data from Vital Statistics, Ontario Registrar General and prepared by the Ontario HIV Epidemiologic Monitoring Unit. We examine the differences associated with sex, income, age, region/country of birth and Local Health Integration Network (LHIN), where data were available and sample size allowed. For further details on methods see [Appendix 11.3](#).



## EXHIBITS AND FINDINGS

### HIV ADMISSIONS

**Indicator:** This indicator reports on non-elective admissions to acute care hospitals that included HIV in any of the diagnosis fields, excluding those related to childbirth. We also report on admissions for which HIV contributed to the length of stay. We report the absolute number of admissions and HIV admissions as a proportion of all acute care hospital admissions.

**Background:** Hospitalization may be an indicator of impaired access to or suboptimal quality of ambulatory care. While it is not possible to eliminate all hospitalizations, many could potentially be avoided through early diagnosis, treatment and monitoring. The introduction of combination antiretroviral therapy to treat HIV infection has resulted in decreases in the hospitalization rates among HIV-positive people.<sup>113-115</sup> However, more recently, hospitalization rates have either declined more slowly or remained constant, possibly due to an increase in treatment-related complications, the increased prevalence of other chronic conditions, and the aging of the HIV-positive population. In the last decade, there have been just over 21,800 HIV-related hospitalizations in Canada.<sup>116</sup> This does not include hospitalizations that may not be directly related to HIV, but for which care will be complicated by the presence of HIV infection.

In a U.S. longitudinal study of health service utilization by HIV-positive adults, the rate of hospital admissions among people living with HIV declined from 19.3 percent in 2002 to 14.8 percent in 2007; the percentage of people with multiple admissions also declined during the same period as did the overall number of inpatient days. Women had higher admission rates in each year and longer lengths of stay, even after adjusting for demographic and clinical factors and insurance status.<sup>36</sup> In Canada, most hospitalized HIV patients are men, but the proportion of women accounting for HIV-related hospitalizations nearly doubled from 11.9 percent in 1994–1995 to 22.9 percent in 2003–2004.<sup>116</sup>

Data for this indicator are from the Canadian Institute for Health Information Discharge Abstracts Database (CIHI-DAD) for the 2004/05–2006/07 fiscal years. Non-elective hospital admissions, excluding those related to childbirth, that included an HIV-related diagnosis in any of the diagnosis fields were included. A subset of admissions where HIV was identified as responsible for length of stay is also reported.

**Finding:** There were 2,448 (522 among women, 1,926 among men) non-elective, admissions that included an HIV diagnosis in Ontario between 2004/05 and 2006/07, or 1.5 per 1,000 non-elective admissions. Of these, 1,713 admissions (380 among women and 1,333 among men) identified HIV as responsible for length of stay, or 1.1 per 1,000 non-elective admissions.

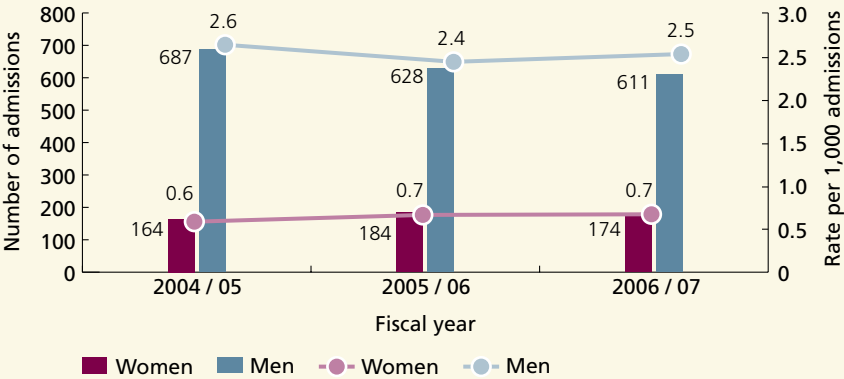
We also estimated the admission rates among HIV-positive individuals, using the modelled prevalence estimates to the end of 2006 (n=24,023),<sup>8</sup> which resulted in a rate of 3.4 admissions per 100 person-years of follow up and a rate of 2.4 per 100 person-years of follow up when admissions were restricted to those where HIV contributed significantly to the length of stay.



**Exhibit 11D.1** | Number and rate (per 1,000 admissions) of non-elective admissions that included an HIV diagnosis, by sex and fiscal year, in Ontario, 2004/05–2006/07

**FINDINGS**

- In each fiscal year, there were between 150 and 200 admissions among women that included an HIV diagnosis.
- The number and proportion of admissions that included an HIV diagnosis did not vary by year.
- The annual number of admissions appears to be declining for men. This was not significant, possibly due to small numbers and limited power to detect differences.



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

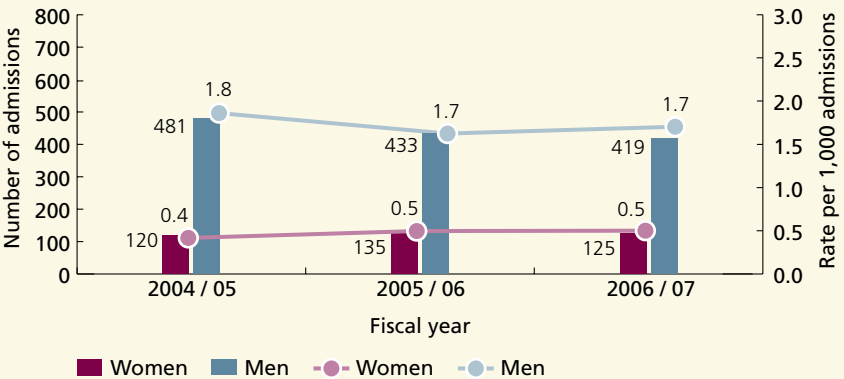
**NOTE:** Admissions related to childbirth were excluded

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**Exhibit 11D.2** | Number and rate (per 1,000 admissions) of non-elective admissions for which HIV contributed significantly to length of stay, by sex and fiscal year, in Ontario, 2004/05–2006/07

**FINDINGS**

- In each fiscal year, there were between 120 and 140 admissions among women for which HIV contributed significantly to the length of stay.
- The number of admissions for which HIV contributed significantly to the length of stay did not vary by year for women or for men.



**DATA SOURCE:** Data Source: Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

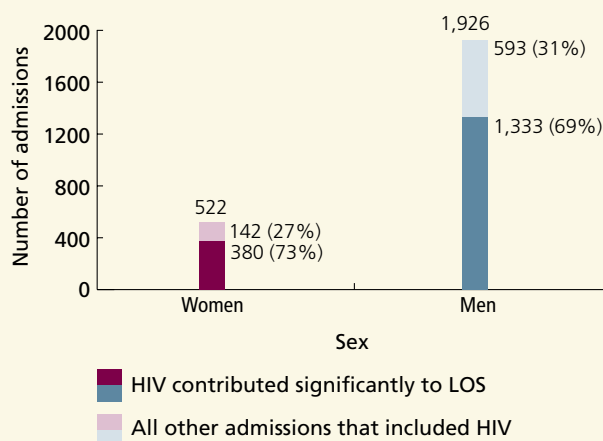
**NOTE:** Admissions related to childbirth were excluded

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### Exhibit 11D.3 | Number of non-elective admissions to acute care hospitals that included an HIV diagnosis, by sex, in Ontario, 2004/05–2006/07

#### FINDINGS

- Seventy percent of admissions that included an HIV diagnosis identified HIV as contributing significantly to the length of stay.
- A similar proportion of HIV admissions among women and men identified HIV as contributing significantly to the length of stay (73 percent versus 69 percent, respectively).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** Admissions related to childbirth were excluded

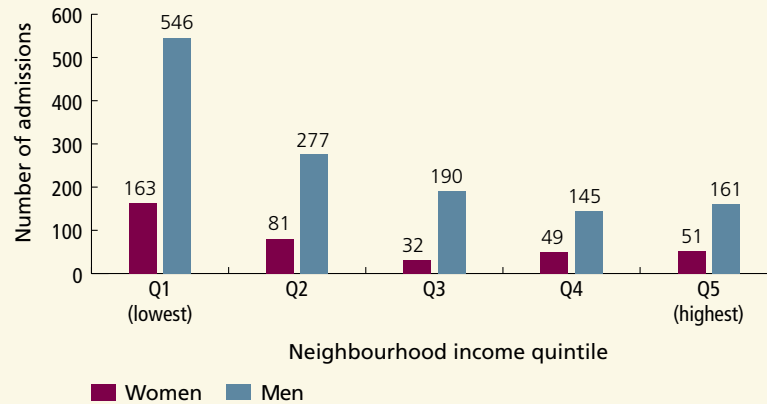
POWER Study



**Exhibit 11D.4 |** Number of non-elective admissions for which HIV contributed significantly to length of stay, by sex and neighbourhood income quintile, in Ontario, 2004/05–2006/07

**FINDINGS**

- The number of admissions that identified HIV as contributing significantly to length of stay was highest among adults living in the lowest-income neighbourhoods. The admission rates were also highest among adults living in the lowest-income neighbourhoods (data not shown).
- The admission rates were 0.8 per 1,000 admissions among women living in the lowest-income neighbourhoods versus 0.4 per 1,000 admissions among women living in the highest-income neighbourhoods (data not shown).
- The admission rates were 3.1 per 1,000 admissions among men living in the lowest-income neighbourhoods versus 1.2 per 1,000 admissions among men living in the highest-income neighbourhoods (data not shown).
- Among women, the admission rates were highest among those aged 35-44 (2.3 per 1,000 admissions) and lowest among those aged 65 and older (0.03 per 1,000 admissions) (data not shown).
- Among men, the admission rates were highest among those aged 35-44 (8.2 per 1,000 admissions) and lowest among those aged 65 and older (0.09 per 1,000 admissions) (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

**NOTE:** Admissions related to childbirth were excluded  
See [Appendix 11.3](#) for details of neighbourhood income quintile calculation

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## LENGTH OF STAY FOR HIV ADMISSIONS

**Indicator:** This indicator measures the average length of stay of non-elective admissions to acute care hospitals that included HIV in any of the diagnosis fields, excluding those related to childbirth. We also report the average length of stay of admissions for which HIV contributed to the length of stay.

**Background:** Across Canada there have been just over 21,800 HIV-related hospitalizations in the last decade.<sup>116</sup> Annually, most hospitalized HIV patients are male, but the proportion of women accounting for HIV-related hospitalizations nearly doubled from 11.9 percent in 1994–1995 to 22.9 percent in 2003–2004.<sup>116</sup> Length of stay reflects both the severity of the illness for which the patient is admitted, as well as the feasibility of discharging patients to the community or to other health care facilities. Compared to men, women might have different health needs, divergent experiences of stigma and discrimination, and a unique set of competing demands and social support structures. Accordingly, gender differences in length of stay could be attributable to multiple factors.

Data for this indicator are from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) for the 2004/05–2006/07 fiscal years. Non-elective hospital admissions that included HIV in any of the diagnosis fields were included, excluding those related to childbirth. A subset of admissions where HIV was identified as primarily responsible for length of stay is also reported.

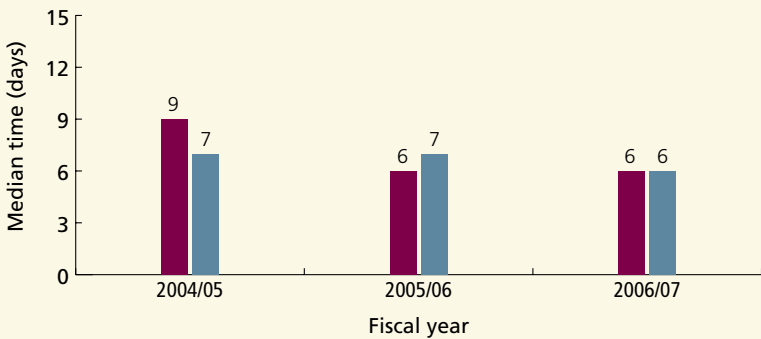
**Finding:** The mean and median lengths of stay for all HIV admissions over the three-year period were 14 days and 7 days, respectively. For admissions where HIV contributed significantly to the length of stay, the mean and median lengths of stay were 17 days and 8 days, respectively. Lengths of stay did not vary by sex.

**Exhibit 11D.5 | Median length of stay for non-elective admissions for which HIV contributed significantly to length of stay, by sex and fiscal year, in Ontario, 2004/05–2006/07**

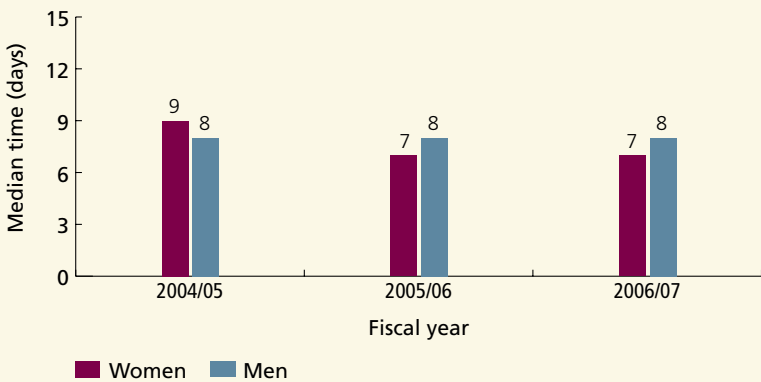
**FINDINGS**

- For admissions that included an HIV diagnosis, the median length of stay for women declined from nine days in 2004/05 to six days in 2006/07. The lengths of stay for men did not vary.
- The median length of stay for admissions where HIV contributed to the length of stay declined among women from nine days in 2004/05 to seven days in subsequent years. The median length of stay for men did not change over time.
- For women, the mean length of stay for admissions where HIV contributed significantly to the length of stay declined from 26 days in 2004/05 to 17 days in 2006/07 (data not shown).

**Any diagnosis**



**HIV contributed to length of stay**



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

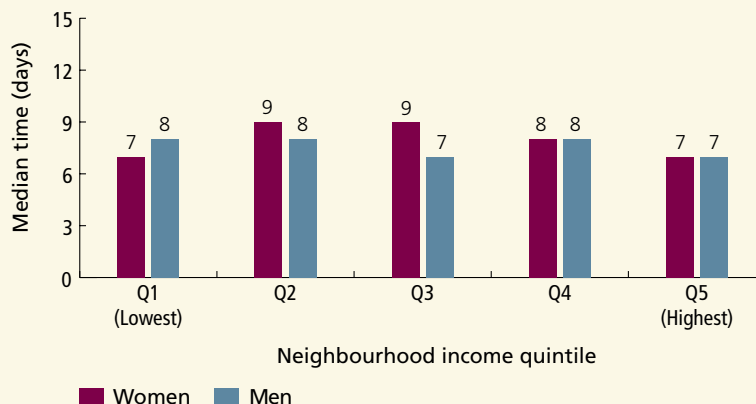
**NOTE:** Admissions related to childbirth were excluded

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### Exhibit 11D.6 | Median length of stay for non-elective admissions for which HIV contributed significantly to length of stay, by sex and neighbourhood income quintile, in Ontario, 2004/05–2006/07

#### FINDINGS

- The median length of stay for admissions where HIV contributed significantly to length of stay did not vary by sex across most neighbourhood income quintiles.
- The median length of stay for admissions where HIV contributed significantly to the length of stay did not vary by neighbourhood income quintile for women or for men.
- The mean length of stay for admissions where HIV contributed significantly to the length of stay varied somewhat by neighbourhood income for women, but not for men. Women living in the highest-income neighbourhoods had a higher mean length of stay than women living in the lowest-income neighbourhoods (24 days versus 16 days, respectively) (data not shown).
- The median length of stay for admissions where HIV contributed significantly to length of stay increased with age for women but not for men from between 7-9 days for women aged 15-54 to 12-13 days for women aged 55 and older (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

**NOTES:** Admissions related to childbirth were excluded

See [Appendix 11.3](#) for details of neighbourhood income quintile calculation

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**Exhibit 11D.7 | Median length of stay for non-elective admissions for which HIV contributed significantly to length of stay, by sex and Local Health Integration Network (LHIN), in Ontario, 2004/05–2006/07**

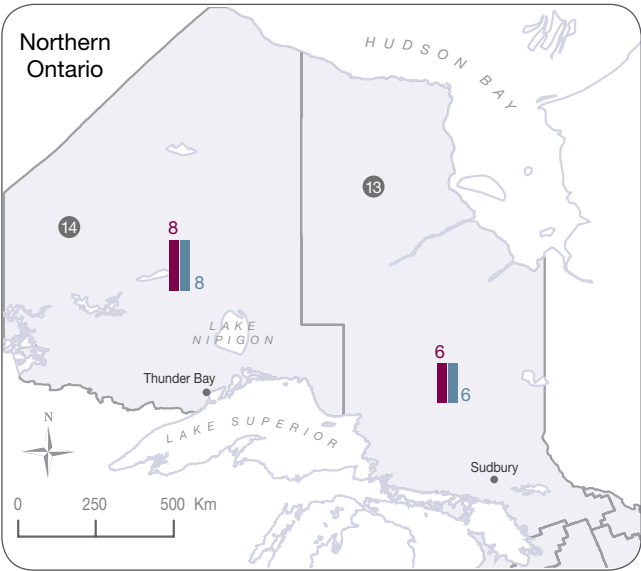
**FINDINGS**

- The median length of stay for admissions where HIV contributed significantly to the length of stay varied by LHIN for women and for men.
- The median length of stay for women ranged from two days (South East LHIN) to 15 days (South West LHIN).
- The median length of stay for men ranged from six days (South West, Hamilton Niagara Haldimand Brant and North East LHINs) to 14 days (Waterloo Wellington LHIN).

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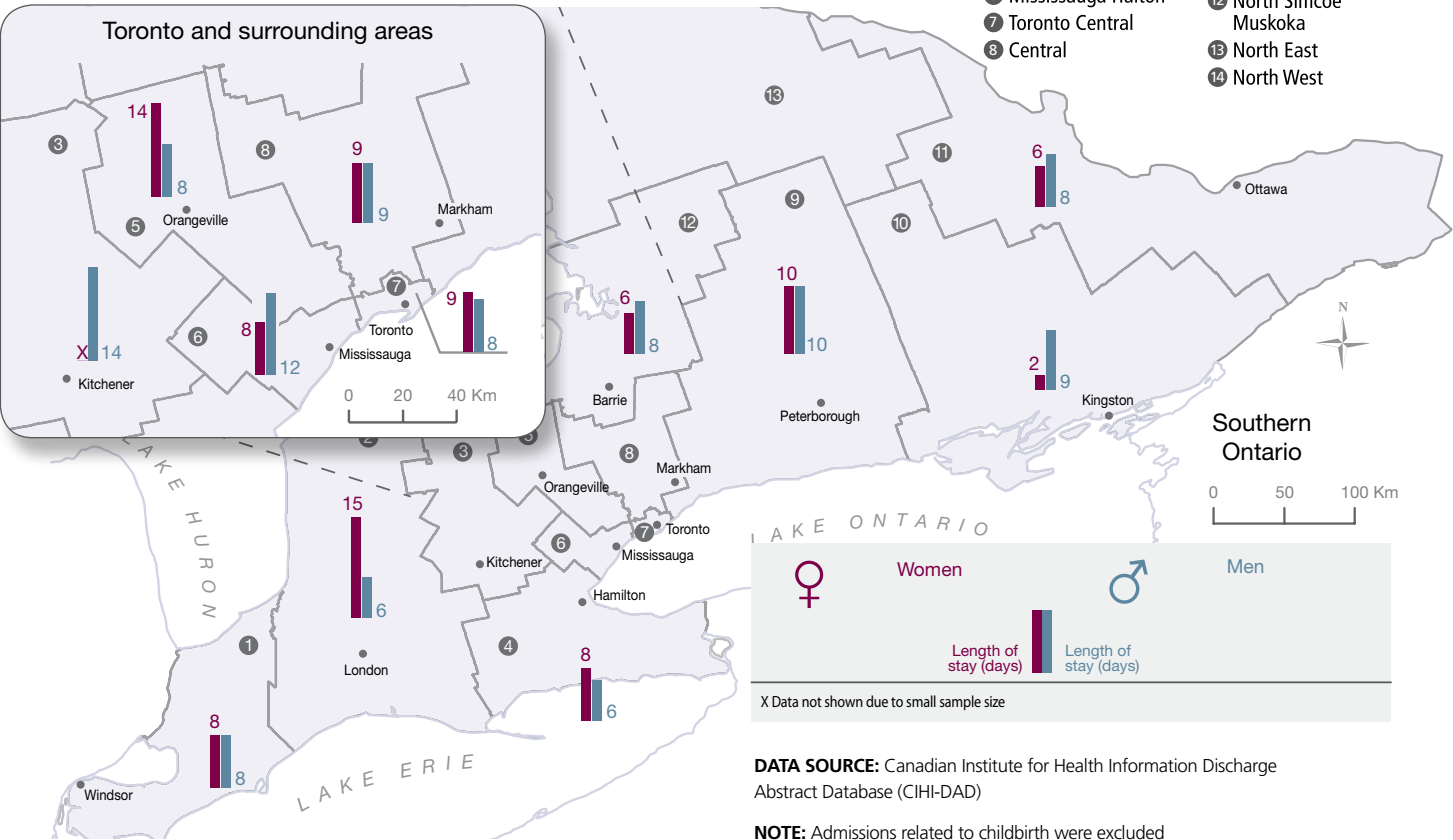
**Overall Ontario**

In Ontario, the median lengths of stay for admissions where HIV contributed significantly to the length of stay were eight days for women and eight days for men.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** Admissions related to childbirth were excluded

## HIV-RELATED MORTALITY

**Indicator:** This indicator measures the number and rate of HIV-related deaths in 2006.

**Background:** In Ontario, as of December 2008, it was estimated that 36,630 people were living with HIV. Of these, 9,670 have died and almost nine out of ten deaths were HIV-related. The majority of these deaths were among men aged 35-39.<sup>8</sup> Fortunately, there have been significant and sustained reductions in HIV-related deaths as a result of improvements in HIV treatment since 1996.<sup>117</sup> Antiretroviral treatments have improved patients' prognoses by suppressing viral replication, slowing CD4 destruction, and prolonging survival.<sup>118</sup> As a consequence of longer life expectancy and treatment side effects, HIV-positive individuals have developed chronic conditions such as hyperglycemia, hyperlipidemia, cardiovascular disease, osteopenia, and malignancies. Other comorbidities, such as hepatitis B or C, become more important as patients live longer. These comorbid illnesses are themselves significant and also complicate HIV management.<sup>117</sup> End-organ failure and treatment-related metabolic adverse events contribute to mortality but are not reflected in HIV-related mortality estimates.<sup>119</sup> Therefore, while this indicator is important, it likely under-estimates the effect of HIV on premature death. Importantly, differences in HIV-related mortality by age, gender, socioeconomic status, ethnicity and region may reflect health inequalities, and prove useful as a starting point for planning and implementing health services and programs.

Data for this indicator were from Vital Statistics, Ontario Registrar General. Preparation of this indicator was done by the Ontario HIV Epidemiologic Monitoring Unit. Deaths among people living with HIV infection may be under-reported or miscoded. Data will not include those people with HIV who die from other causes as it is this other cause that would be recorded on the death certificate, though their care may have been complicated by HIV infection.

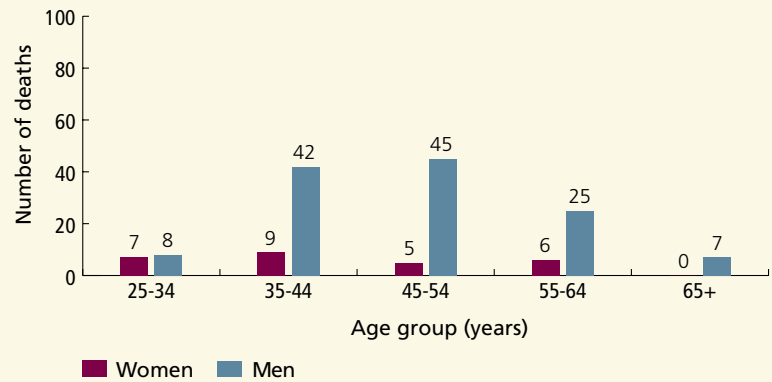
**Finding:** There were 157 HIV-related deaths in 2006 (27 women and 130 men) for an HIV-related mortality rate of 1.3 per 100,000 population. The HIV-related mortality rate among men was higher than among women; 2.2 per 100,000 men versus 0.4 per 100,000 women.

We also estimated the HIV-related mortality among HIV-positive individuals, using the modelled prevalence estimates to the end of 2006 (24,023),<sup>8</sup> yielding an overall mortality rate of 6.5 per 1,000 HIV-infected individuals.

**Exhibit 11D.8 | HIV-related mortality (number of deaths), by sex and age group, in Ontario, 2006**

**FINDINGS**

- Among women, the largest number of HIV-related deaths was among those aged 35-44 followed by those aged 25-34. There were no HIV-related deaths among women under age 25 or aged 65 and older.
- Among men, the largest number of HIV-related deaths was among those aged 45-54 followed by men aged 35-44.
- The HIV-related mortality rate among women was highest among those aged 35-44 and 55-64 (0.9 per 100,000 women) (data not shown).
- Among men, the HIV-related mortality rate was highest among those aged 45-54 (4.9 per 100,000 men) (data not shown).



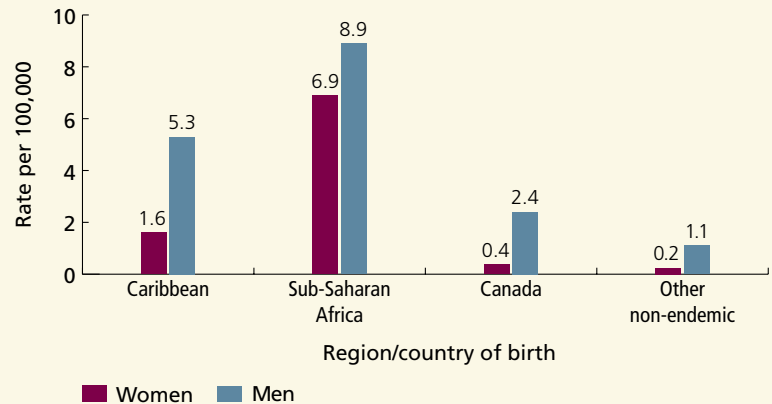
**DATA SOURCES:** Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census; prepared by the Ontario HIV Epidemiologic Monitoring Unit

POWER Study

**Exhibit 11D.9 | HIV-related mortality (per 100,000 population), by sex and region/country of birth, in Ontario, 2006**

**FINDINGS**

- Among women the highest mortality rate was experienced by women born in sub-Saharan Africa (6.9 per 100,000 women) followed by women born in the Caribbean (1.6 per 100,000).
- The highest mortality rate among men was experienced by men born in sub-Saharan Africa (8.9 per 100,000 men) followed by men born in the Caribbean (5.3 per 100,000).
- The largest number of HIV-related deaths was among those born in Canada (116 deaths) (data not shown).



**DATA SOURCES:** Vital Statistics, Ontario Registrar General; Statistics Canada 2006 Census; prepared by the Ontario HIV Epidemiologic Monitoring Unit

POWER Study



# Section 11D

## SUMMARY OF FINDINGS

This section reports on hospital admissions that included an HIV diagnosis and HIV-related mortality.

### HIV Admissions

We report on the number of acute admissions, excluding those related to childbirth, which included an HIV diagnosis in any field between 2004/05–2006/07. We also report the proportion of admissions where HIV contributed significantly to the length of stay. There were 2,448 non-elective admissions that included an HIV diagnosis in any field. Of these, 70 percent (1,713 admissions) identified HIV as contributing significantly to the length of stay. There were more admissions among men than among women; however, a similar proportion of HIV admissions among women and men had HIV as contributing significantly to the length of stay. The number of admissions for which HIV contributed significantly to the length of stay varied by Local Health Integration Network (LHIN), age and neighbourhood income, but not by year. The number and rate of admissions that had HIV as the diagnosis that contributed significantly to length of stay was highest among adults living in the lowest-income neighbourhoods.

We also estimated the admission rates among HIV-positive individuals, using modelled prevalence estimates as of the end of 2006 ( $n=24,023$ ).<sup>8</sup> Among people living with HIV, the HIV admission rate was 3.4 per 100 person-years of follow up and the admission rate for those admissions where HIV contributed significantly to the length of stay was 2.4 per 100 person-years of follow up.

### Length of Stay for HIV Admissions

The mean and median lengths of stay for all HIV admissions over the three-year period were 14 days and 7 days, respectively. For admissions where HIV

contributed significantly to the length of stay, the mean and median lengths of stay were 17 days and 8 days, respectively. Lengths of stay did not vary by sex. The mean and median lengths of stay declined over time for women, but did not change for men. The median length of stay did not vary by neighbourhood income for women or for men, but did vary by LHIN. The median length of stay for admissions where HIV contributed significantly to length of stay increased with age from between 7-9 days among women aged 15-54 to 12-13 days among women aged 55 and older. Median length of stay did not vary by age for men.

### HIV-Related Mortality

This indicator measures the number and rate of HIV-related deaths in 2006 as reported by Vital Statistics, Ontario Registrar General. Deaths among people living with HIV infection may be under-reported or miscoded and will not include deaths among HIV-infected people where the cause of death was not HIV. Given these limitations, there were 157 HIV-related deaths reported in 2006, for an HIV-related mortality rate of 1.3 per 100,000 population. The HIV-related mortality rate was higher among men than among women and varied by age and by country or region of birth. The highest mortality rate among women and men was experienced by those born in sub-Saharan Africa.

We also estimated the HIV-related mortality among people living with HIV, using the modelled prevalence estimates to the end of 2006 (24,023).<sup>8</sup> Based on this, the overall mortality rate is 6.5 per 1,000 HIV-infected individuals.

# Chapter Summary of Findings

This chapter includes sections on:

- Incidence, Prevalence and Risk Behaviours
- Community Services for HIV
- Clinical Care
- Health Outcomes

We report on the modelled incidence and prevalence of HIV and the reported number of AIDS cases in Ontario. We also report on HIV-related risk/prevention behaviours, specifically condom use at last sexual encounter for adults with multiple sexual partners and needle and paraphernalia sharing rates among women and men who inject drugs. For measures of community services for HIV, we report on funding and service utilization. The section on clinical care includes prenatal HIV screening rates, interventions to prevent mother-to-child transmission of HIV, quality of life and symptom burden for people living with HIV, CD4 count when entering clinical care and indicators of access and guideline-based care with respect to viral load testing. The final section on health outcomes reports on hospital admissions that include an HIV diagnosis and HIV-related mortality.

A variety of data sources were used to measure these indicators and as such, the stratifications for each indicator vary. All indicators were stratified by sex and then by age, HIV exposure category, socioeconomic status and geography, where data were available and where sample size allowed. The findings for each indicator are described below.

## HIV Prevalence

Based on modelled estimates, there are 26,630 people living with HIV infection in Ontario (21,880 men and 4,750 women). Women account for 18 percent of infections. Among women, the most commonly attributed exposure category was heterosexual/

non-endemic (45 percent of infections), followed by heterosexual/endemic exposure (42 percent of infections). While only 13 percent of the prevalent HIV infections among women were attributed to injection drug use, this represents an HIV prevalence of five percent among female injection drug users (IDU) in Ontario (based on an estimated population of IDUs). Among men, the most commonly attributed exposure category was men who have sex with men (MSM). The modelled prevalence of HIV infection in Ontario varied by Local Health Integration Network (LHIN) and was highest in the Toronto Central LHIN (225 per 100,000 women and 1,526 per 100,000 men in Toronto).

## HIV Incidence

Based on modelled estimates, there were 4,735 new HIV infections between 2006 and 2008 (3,545 men and 1,190 women). Women accounted for almost one-quarter of new infections. Modelled incidence has been stable over the three year period. Among women, the majority of new infections (58 percent) was among women whose exposure category was heterosexual/endemic. For women, the estimated incidence in the at-risk population was highest among women who inject drugs (236 per 100,000 person-years) and was next highest among women from an HIV-endemic country (94 per 100,000 person-years), who had markedly lower rates. As was the case for prevalence, modelled incidence was highest in the Toronto Central LHIN for both women and men.

## Reported AIDS Cases

This indicator measures the number of reported AIDS cases in Ontario between 2006 and 2008. AIDS is a publicly reportable disease and as such, cases must be reported to local public health units. However, it is likely that AIDS cases are under-estimated due to delayed diagnosis and under-reporting. A total of 401 cases of AIDS were reported from 2006 to 2008, representing

1.1 cases per 100,000 adults per year in Ontario. The reported number of cases per year was three- to five-fold higher for men than for women.

### **Condom Use at Last Sexual Encounter**

Adults aged 15-49 who reported having multiple sexual partners in the previous twelve months were asked if they had used a condom at their last sexual encounter. Fifty-nine percent of respondents reported that they had; however, women were less likely than men to report this (53 percent versus 65 percent, respectively). Younger women and men were more likely than older adults to report condom use at their last sexual encounter. Women and men who had been in Canada for less than five years had higher rates of condom use at their last sexual encounter than those who were Canadian born. Condom use also varied by ethnicity, though women had lower rates of condom use at last sexual encounter than men, irrespective of ethnicity. Condom use did not vary by LHIN.

### **Needle and Paraphernalia Sharing Among Injection Drug Users**

This indicator was measured among the Ontario respondents of a national study of drug use, including data from five Ontario sites: Toronto, Ottawa, Sudbury, Thunder Bay and Kingston. Among Ontario respondents surveyed, 18 percent reported injecting with used needles, 34 percent reported receiving used injection paraphernalia (water, cooker and filter), 21 percent reported lending used needles and 33 percent reported lending used paraphernalia. Women were more likely to participate in all risk behaviours than men. Risk behaviours, other than injection with previously used needles varied by site of recruitment. HIV-positive participants were less likely than HIV-negative participants to report lending used paraphernalia, but HIV-positive participants reported high rates of receipt of used equipment, which raises concerns about transmission of other strains of HIV or other blood borne viruses, such as hepatitis C, that can co-infect and impact outcomes for people who are living with HIV.

### **Estimates of Service Funding to Community-Based HIV Services**

In 2008/09, between the AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Plan (ACAP) of the Public Health Agency of Canada (PHAC), \$23.8 million in funding were allocated to 83 programs providing community-based HIV services. Almost one-third of the funding went to programs providing services in the Toronto Central LHIN and about one-quarter of the funding went to agencies with a mandate to provide services provincially. The remaining funding went to programs providing regional services throughout the rest of the province.

### **Community-Based HIV Services and Utilization**

Community-based HIV programs offer a range of services, including services to IDUs, which are separately enumerated. For this indicator we report utilization information for support services, IDU outreach service and IDU in-services (services provided on site). Reporting of service utilization is divided into half years. In the first half of 2008/09, 17,636 people accessed support services; one-third of users were women, though they account for only 18 percent of the HIV-positive population. Among those receiving IDU services, 10,805 accessed outreach services and 9,175 accessed services provided on site (IDU in-services). Women accounted for almost 40 percent of users of IDU outreach and in-services, though they represent a smaller proportion of the IDU population than men. These findings suggest that women are higher users of community-based services than men.

### **Prenatal Screening for HIV**

Ninety-five percent of pregnant women who received prenatal testing in 2009 were also screened for HIV during pregnancy; 28 cases of HIV infection among pregnant women were identified. Older women, aged 45 and older, had slightly lower screening rates than younger women (89 percent versus 94-97 percent respectively). Rates of prenatal HIV screening did not vary by public health region.

## **Interventions to Prevent Mother-to-Child Transmission of HIV in Pregnant, HIV-Positive Women**

The Canadian Perinatal AIDS Research Group (CPARG) perinatal surveillance program collects information on infants born to HIV-infected women who received care at participating sites. From 2005 to 2009, 91 percent of pregnant women who knew they were HIV-positive received antiretroviral therapy during pregnancy, which can prevent mother-to-child transmission of HIV during pregnancy or delivery. The lowest treatment rates were in 2005; 83 percent of pregnant, HIV-positive women were on antiretroviral therapy in this year compared to more than 90 percent in subsequent years. The percentage of HIV-positive, pregnant women who received antiretroviral therapy also varied by exposure category and ethnocultural group. Women who identified injection drug use as their HIV exposure category had the lowest treatment rates; 75 percent compared to 94 percent among women with heterosexual contact as their HIV exposure. Also, pregnant women who were of Aboriginal ethnicity were less likely to receive antiretroviral therapy than women of other ethnocultural origins. Rates did not vary by site of care.

## **Health-Related Quality of Life Among Adults Living with HIV**

Health-related quality of life was measured among Ontario HIV Treatment Network (OHTN) Cohort Study (OCS) participants using the Medical Outcomes Survey—Short Form 12 (MOS-SF12) questionnaire. The mean physical health summary (PHS) score of participants was 49 and the mean mental health summary (MHS) score was 46; the MHS was clinically lower than the standard population mean (50). The PHS score did not vary by sex, but women had slightly lower mean MHS scores than men (44 versus 46, respectively). This was not a clinically important difference. The mean PHS and MHS scores among OCS participants varied by educational attainment, age and HIV exposure category. Women and men with some high school education or less had lower mean scores than HIV-positive participants with

higher educational attainment. The mean PHS score for participants declined with age, however MHS increased with age. Although this effect might be due to features of how the cohort was assembled, it could also suggest that despite a decline in physical health with age, other mechanisms such as improved coping or adaptation become increasingly important. Women and men who injected drugs had lower mean PHS and MHS scores than participants from other HIV exposure categories. Importantly, women who injected drugs had a mean MHS score of 38, which is 12 points lower than the standard population score of 50.

## **Symptom Burden Among Adults Living with HIV**

Data on symptom burden was measured among OCS participants using the 20-item AIDS Clinical Trial Group (ACTG) symptom index. The measures that are reported are the mean score, the mean number of symptoms that participants indicated bothered them or bothered them a lot and the percentage of respondents who reported being bothered or bothered a lot by symptoms related to mental health, fatigue, pain or nervousness and anxiety.

The mean symptom distress score for respondents was 20 and did not vary by sex. The mean number of symptoms that participants reported bothered them or bothered them a lot was 3.9 symptoms; women reported a larger number of symptoms that bothered them than men (4.5 versus 3.7, respectively). Participants who earned less than \$20,000 per year reported a larger mean number of symptoms that bothered them than those who earned \$40,000 or more per year. A similar pattern was seen for educational attainment. The percentage of OCS participants who indicated that specific symptoms bothered them or bothered them a lot ranged from one in five to one in three for the following symptoms: fatigue or loss of energy (34 percent); nervousness or anxiety (25 percent); pain, numbness or tingling in the hands and feet (21 percent); feeling sad, down or depressed (34 percent). Women were more likely to report sadness than men (45 percent versus 31 percent, respectively).

### CD4 Count when Entering Clinical Care

Patients who enter care with low CD4 counts may have had undiagnosed HIV infection for many years or may have been diagnosed earlier but not receiving regular HIV care. Both situations represent lost opportunities to improve both individual and public health, through controlled viral load and access to education and prevention information. Thus, an important indicator of accessing testing and care early in the course of HIV infection is the mean CD4 count when entering clinical care. Among OCS participants, the mean CD4 count when entering care was 379 and did not vary by sex, but did vary by age, ethnicity and HIV exposure category. Women aged 55 and older had a substantially lower mean CD4 count when entering care (165 cells/mm<sup>3</sup>) than younger women or men. This count is particularly worrisome because counts below 200 cells/mm<sup>3</sup> are associated with increased risk of opportunistic illnesses and associated mortality. Aboriginal adults and Black/African adults in the OCS had lower mean counts when entering care than White adults. IDUs in the OCS had similar or higher mean CD4 counts than people from other exposure categories. This may be explained by frequent testing in this group or due to the sampling bias that exists in this voluntary cohort.

### Time to First Viral Load—Access to Viral Load Testing

Time to first HIV viral load test after an HIV-positive test is a good surrogate marker of access to care. People who were newly diagnosed with HIV infection (through nominal testing) had their records linked to the viral load testing database to determine the time to a first viral load test. The mean number of days to a first viral load test was 65 days and the median was 36 days. Women had slightly longer mean and median times to a first viral load test than men. One in five women and men who were newly diagnosed with HIV had not had a first viral load test within three months of testing positive and seven percent of women and ten percent of men who were newly diagnosed with HIV had not had a viral load within 12 months.

### Two or More Viral Load Tests within 12 Months: Quality of Care

For people living with HIV infection, viral load testing (in conjunction with other clinical markers) is used to assess disease status, guide decisions about therapy initiation and switching, and to indicate treatment failure and possible emergence of resistant virus. This indicator was measured in a sample of people living with HIV who had received a viral load in the latter half of 2007, to identify a cohort of people living with HIV who were receiving HIV care. This cohort was followed for 12 months to identify the percentage who had two or more viral loads in this period. Of the 9,410 people living with HIV who were in HIV care, 82 percent underwent two or more viral loads in 2008. This did not vary by sex, but did vary somewhat by age and by public health region.

The number of people who received a viral load test in the latter half of 2007 (9,410) is significantly different from the modelled estimate of people in Ontario who knew that they were HIV positive as of the middle of 2007 (16,860)<sup>13</sup> and suggests that a substantial proportion of people living with HIV are not receiving regular, HIV-specific, guideline-concordant care. These estimates are consistent with findings from the U.S.<sup>14</sup> and from elsewhere in Canada.<sup>15</sup>

### Viral Load Below the Level of Quantification

An indicator of treatment success is suppressed viral load. This was measured in a sample of people living with HIV who had received a viral load in the latter half of 2007 and at least one test in 2008. In this cohort, 63 percent of people had all their viral loads in 2008 below the level of quantification. This varied somewhat by sex, age group and public health region. Women were less likely than men to have all their viral loads below the level of quantification (58 percent versus 64 percent, respectively) and younger adults were less likely to have fully controlled viral load. The observed sex difference is at least partially due to the differences in age distributions between women and men. Among those living with HIV, women are younger than men.



## HIV Admissions

We report on the number of acute admissions, excluding those related to childbirth, which included an HIV diagnosis between 2004/05–2006/07. We also report the proportion of admissions where HIV contributed significantly to the length of stay. There were 2,448 non-elective admissions that included an HIV diagnosis in any field. Of these, 70 percent (1,713 admissions) identified HIV as contributing significantly to the length of stay. There were more admissions among men than among women; however, a similar proportion of HIV admissions among women and men identified HIV as contributing significantly to the length of stay. The number of admissions for which HIV contributed significantly to the length of stay varied by LHIN, age and neighbourhood income, but not by year. The number and rate of admissions that had HIV as the diagnosis that contributed significantly to length of stay was highest among adults living in the lowest-income neighbourhoods.

We also estimated the admission rates among HIV-positive individuals, using modelled prevalence estimates as of the end of 2006 ( $n=24,023$ ).<sup>8</sup> Among people living with HIV, the HIV admission rate was 3.4 per 100 person-years of follow up and the admission rate for those admissions where HIV contributed significantly to the length of stay was 2.4 per 100 person-years of follow up.

### Length of Stay for HIV Admissions

The mean and median lengths of stay for all HIV admissions over the three-year period were 14 days and 7 days, respectively. For admissions where HIV contributed significantly to the length of stay, the mean

and median lengths of stay were 17 days and 8 days, respectively. Lengths of stay did not vary by sex.

The mean and median lengths of stay declined over time for women, but did not change vary for men. The median length of stay did not vary by neighbourhood income for women or for men, but did vary by LHIN. The median length of stay for admissions where HIV contributed significantly to length of stay increased with age from between 7-9 days among women and aged 15-54 to 12-13 days among women aged 55 and older. Median length of stay did not vary by age for men.

## HIV-Related Mortality

This indicator measures the number and rate of HIV-related deaths in 2006 as reported by Vital Statistics, Ontario Registrar General. Deaths among people living with HIV infection may be under-reported or miscoded and will not include deaths among HIV-infected people where the cause of death was not HIV. Given these limitations, there were 157 HIV-related deaths reported in 2006, for an HIV-related mortality rate of 1.3 deaths per 100,000 population. The HIV-related mortality rate was higher among men than among women and varied by age and by country or region of birth. The highest mortality rate among women and men was experienced by those born in sub-Saharan Africa.

We also estimated the HIV-related mortality among people living with HIV, using modelled prevalence estimates as of the end of 2006 (24,023).<sup>8</sup> Based on this, the overall mortality rate is 6.5 per 1,000 HIV-infected individuals.

# Discussion

Although considerable progress has been made in the last 15 years in the prevention of HIV transmission and in the treatment of people living with HIV, these advances are not always delivered equitably.

Differences in access to treatment, quality of care and prevention efforts are often related to social determinants of health, suggesting the need for broad, intersectoral action to improve health including interventions that incorporate health, education, legal and income systems. Whereas HIV was once a disease with a high mortality and a low median age at death, with effective treatment it has now become a manageable, but complex chronic disease. People living with HIV can expect a life expectancy of several decades with effective treatment, but will face multiple health issues related to aging, disease progression, comorbidities and treatment toxicity. Furthermore, these health issues act cumulatively and often synergistically.

In this chapter, we examined health indicators that reflect the state of HIV prevention and treatment throughout Ontario. We focused on sex, socioeconomic, demographic and geographic variation in indicators reflecting efforts to prevent HIV infection and effectively treat those who are infected. Stratifying data by these characteristics allowed us to identify where care could be improved for specific groups of people living with HIV. The data in this chapter came primarily from administrative and survey data as well as data collected for research. These data provide important information that can help to identify gaps in treatment and prevention services, groups needing special priority and programs deserving prioritization.





## KEY FINDINGS

### **Over 4,700 women are living with HIV in Ontario, most of whom acquired HIV through sexual contact.**

Based on modelled estimates, there are 26,630 people living with HIV infection in Ontario (21,880 men and 4,750 women). Women account for 18 percent of infections. Based on publicly reported, hierarchical exposure categories,<sup>8</sup> the most commonly attributed exposure category among women was heterosexual/non-endemic (45 percent of infections), followed by heterosexual/endemic (42 percent of infections). While only 13 percent of HIV infections among women were attributed to injection drug use, this represents an HIV prevalence of five percent among female injection drug users (IDU) in Ontario (based on an estimated population at risk).

### **Women who immigrated from a country where HIV is endemic account for more than half of all new infections among women.**

Based on modelled estimates, there were 4,735 new HIV infections between 2006 and 2008 (3,545 men and 1,190 women). Women accounted for almost one-quarter of new infections. Modelled incidence has been relatively stable over the three-year period. Among women, the majority of new infections (58 percent) were among women whose exposure category was heterosexual/endemic. The population-specific incidence was highest among women who inject drugs (236 per 100,000 person-years at risk), followed by women from an HIV-endemic country (94 per 100,000 person-years at risk), who had markedly lower rates.

### **Women reported lower rates of condom use than men.**

Condoms remain an important way to prevent HIV infection.<sup>11,12</sup> Among survey respondents aged 15-49 who had multiple sex partners in the previous 12 months, 59

percent reported that they had used a condom at their last sexual intercourse. However, women were less likely than men to report this (53 percent versus 65 percent). Younger women and men were more likely than older adults to report condom use at their last sexual encounter. Condom use also varied by ethnocultural group and time since immigration. Irrespective of age, ethnicity, or time since immigration, women consistently had lower rates of condom use at their last sexual encounter than men.

### **Women who inject drugs report riskier injection behaviours than men.**

Equipment sharing among injection drug users is a high-risk activity for acquiring HIV. Among Ontario participants of the Enhanced Surveillance of risk Behaviours among Injecting Drug Users (I-Track) study, 18 percent reported injecting with used needles, 34 percent reported receiving used injection paraphernalia (water, cooker or filter), 21 percent reported lending used needles and 33 percent reported lending used paraphernalia. Women were more likely to participate in all of these risk behaviours than men. HIV-positive participants were less likely than HIV-negative participants to report lending used paraphernalia, but they reported high rates of receipt of used equipment, which raises concerns about transmission of other strains of HIV or other blood borne viruses, such as hepatitis C, that can co-infect and impact outcomes for people who are living with HIV.

### **Approximately one-third of the users of community-based HIV services are women.**

In 2008/09, between the AIDS Bureau of the Ontario Ministry of Health and Long-Term Care (MOHLTC) and the AIDS Community Action Plan (ACAP) of the

Public Health Agency of Canada (PHAC), \$23.8 million in funding was allocated to 83 programs providing community-based HIV services. In the first half of 2008/09, 17,636 people accessed support services; one-third of users were women, though they account for only 18 percent of the HIV-positive population in Ontario. Among those receiving services for injection drug use, 10,805 accessed outreach services and 9,175 accessed services provided on site (IDU in-services). Women accounted for almost 40 percent of users of IDU outreach and in-services, though they represent a smaller proportion of the IDU population than men. These findings suggest that women are higher users of community-based services than men.

**Over 90 percent of HIV-positive pregnant women who knew their HIV status received antiretrovirals during pregnancy which could prevent mother-to-child transmission.**

Prenatal screening for HIV in Ontario occurs at very high rates; 95 percent of pregnant women who received prenatal testing in 2009 were screened for HIV in 2009. From 2005 to 2009, 91 percent of pregnant women who knew they were HIV-positive received antiretroviral therapy which would prevent the vast majority of the mother-to-child transmission of HIV during pregnancy or delivery. The percentage of HIV-positive, pregnant women who received antiretroviral therapy varied by exposure category and ethnocultural group. Women who identified injection drug use as their HIV exposure category had the lowest treatment rates during pregnancy and Aboriginal women were less likely to have been on antiretroviral therapy during pregnancy than women from other ethnocultural groups.

**Health-related quality of life among adults with HIV infection is worse than the quality of life in the general population, especially for mental health status.**

Quality of life was measured with the Medical Outcomes Survey Short-Form 12 (SF-12) questionnaire among participants in the OCS, a voluntary, clinic-based cohort. The questionnaire provides a physical health summary (PHS) and a mental health summary (MHS) score, both of which are standardized to the U.S. general population with a mean score of 50. The mean MHS score was clinically lower among OCS participants than the standard population mean (46 versus 50, respectively). The mean PHS score was also lower among OCS participants than the standard population mean (49 versus 50, respectively) however, this difference was not clinically important. The mean PHS and MHS scores were worse among those with lower educational attainment. The mean PHS and MHS scores varied by age and by HIV exposure category. Importantly, women who injected drugs had a mean MHS score of 38 (12 points lower than the standard population score of 50); although this estimate is based on a small number of female IDUs and might not be precisely estimated.

**Women reported higher symptom burden than men.**

Symptom questionnaires capture the burden of HIV infection, associated conditions, social factors, and treatment-related adverse events. Based on the AIDS Clinical Trial Group (ACTG) symptom index, the mean number of symptoms that OCS respondents reported bothered them or bothered them a lot was 3.9 (out of 20); women reported more symptoms that bothered them than men (4.5 versus 3.7, respectively). With

respect to specific symptoms, the percentage of OCS respondents who indicated that fatigue, nervousness, pain or sadness bothered them or bothered them a lot ranged from one in five to one in three respondents. Women were more likely to report sadness than men (45 percent versus 31 percent, respectively).

### **A significant proportion of patients do not receive a viral load test soon after being diagnosed HIV-positive.**

Almost one in five women and men who were newly diagnosed with HIV had not had a first viral load test within three months of testing positive and one in fourteen women and one in ten men who were newly diagnosed with HIV had not had a viral load test within 12 months of testing positive. The mean number of days to a first viral load test among people who had newly tested positive for HIV was 65 days and the median was 36 days. Women had slightly longer mean and median times to their first viral load test than men.

### **About one out of five HIV-positive individuals in HIV care in Ontario did not undergo guideline-concordant viral load testing.**

According to clinical care guidelines, viral load testing should be performed every four months; less frequent testing (every six months) may be appropriate for patients who have reliable adherence, high CD4 counts and sustained virologic suppression.<sup>2</sup> Of the 9,410 people living with HIV who were identified as being in HIV care, 82 percent had two or more viral load tests in 2008. This did not vary by sex, but did vary somewhat by age and by public health region.

### **Women were less likely than men to have all their viral loads below the level of quantification.**

An indicator of treatment success is suppressed viral load. Among people living with HIV who had a viral load test in the latter half of 2007 and at least one in 2008, 63

percent had all their 2008 viral loads below the level of quantification. Women were less likely than men to have all their viral loads below the level of quantification (58 percent versus 64 percent). The sex difference is partially due to the younger age distribution among women as compared to men.

### **HIV admissions were most common among people living in low-income neighbourhoods.**

Between 2004/05 and 2006/07, there were 2,448 non-elective admissions that included an HIV diagnosis. Of these, 70 percent (1,713 admissions) identified HIV as contributing significantly to the length of stay. The number of admissions for which HIV contributed significantly to the length of stay varied by Local Health Integration Network (LHIN), age and neighbourhood income. Among women, the proportion of all non-elective admissions for which HIV contributed significantly to the length of stay was 0.8 per 1,000 admissions among women living in the lowest-income neighbourhoods versus 0.4 per 1,000 admissions among women living in the highest-income neighbourhoods. A similar pattern was seen for men.

### **The highest HIV-related mortality among women and men was experienced by those born in sub-Saharan Africa.**

There were 157 HIV-related deaths reported in 2006, for an HIV-related mortality rate of 1.3 per 100,000 population. The HIV-related mortality rate was higher among men than among women and varied by age and by country or region of birth. The highest mortality rate among women and men was experienced by those born in sub-Saharan Africa. Deaths among people living with HIV infection may be under-reported or miscoded and will not include deaths among HIV-infected people where the cause of death was not HIV.

## LIMITATIONS

We report on indicators from a wide variety of data sources, each with its own limitations. HIV prevalence and incidence are based on modelled rates due to under-reporting and the limitations of anonymous and non-nominal testing. While the models have high face validity and are routinely used for reporting,<sup>8</sup> they have not been rigorously validated against other data sources. Risk behaviours were measured using the Canadian Community Health Survey (CCHS) and the I-Track study. Both are based on self-report and are prone to social desirability biases. CCHS questions about condom use were only asked to individuals in a restricted age range, who reported multiple partners and was limited to condom use at their most recent sexual contact. This cannot fully reflect sexual networks, consistency of prevention behaviours or the full spectrum of risk. The I-Track study is based on a convenience sample and so the results are prone to sampling and recruitment biases. The Ontario Community-based HIV and AIDS Reporting Tool (OCHART) provides important, aggregate information on utilization of community-based HIV services but does not allow precise quantification of the number of individuals using services. For administrative data on hospitalizations, the HIV diagnostic codes we used have not been validated. Furthermore, because HIV is a rare condition in Ontario, even a highly specific diagnostic algorithm might still result in a large number of false positive, relative to true positive, individuals. Data on viral load could not be adjusted for clinical factors, as the public health laboratory database does not include clinical information and linked data are limited to a sub-sample of people living with HIV. Finally, the OCS provides a rich source of data but is prone to sampling and recruitment biases as well as misclassification biases. Individuals who are most marginalized might be the least well represented in the OCS. Ongoing efforts to increase participation by marginalized groups in the

OCS will be important for improving the generalizability of research findings. We have selected indicators where we judged that the bias from the source was likely to be minimal, but these limitations are important to consider when interpreting our results.

We have reported a comprehensive set of indicators of HIV treatment and prevention, but we did not include an assessment of the correlation among indicators. A recent study indicated that there were low correlations among eight measures of quality of care studied at 69 sites in 30 U.S. states, suggesting that quality as assessed by a small set of indicators cannot be generalized to include unmeasured indicators.<sup>120</sup> Future work should consider measuring a comprehensive set of indicators in a population to identify those patients for whom access or quality issues are particularly problematic.

The reported indicators do not provide detailed clinical information or insights into patients' experiences or the challenges of clinical decision making for clinicians and patients. Indeed, decision-making regarding HIV is often complex and requires careful considerations of trade-offs. For example, the decision to get tested requires a consideration of both the potential health benefits and privacy concerns. The decision to disclose one's status to others might entail a trade-off between increased social support and the risk of stigma and discrimination. The decision to initiate antiretroviral therapy is often a trade-off between lowering the risk of becoming ill or dying and the risk of incurring adverse events from treatment. Because of such complexities, it is important to interpret the indicators cautiously. For example, many patients might have a detectable viral load because they have made a deliberate and informed choice to defer initiation of antiretroviral therapy. Similarly, the indicators might not reflect potential harms. For example, a high rate

of adherence to HIV testing in pregnancy—while suggestive of a successful public health intervention—does not indicate the quality of informed consent associated with such testing and the associated ethical and human rights concerns.

Some previously collected indicators are less meaningful in the current treatment era. It is worthwhile considering how these data are collected. For example, diagnosis of an AIDS-defining illness today portends a very different prognosis than it did 15 years ago, before effective combination antiretroviral therapy was available. Thus, monitoring the number of individuals who diagnosed with AIDS says little about the future health of these individuals. In contrast,

monitoring the proportion of people whose first HIV-related health care visit is for an AIDS-defining illness (and similarly, the CD4 count at the first visit) is an important indicator as it reveals a very late presentation for care and treatment.

Similarly, monitoring all-cause mortality among people living with HIV is more important than monitoring HIV-specific or AIDS-related mortality, given that about half of all deaths among people who are HIV-positive are for causes unrelated to HIV infection. However, reporting all-cause mortality requires the identification of a cohort of people living with HIV and linkage with mortality data, which was not available for this study.

## WHAT CAN'T BE MEASURED

There were many important instances where we were unable to measure well-validated indicators due to data limitations. In some instances, data are not collected or are collected with insufficient detail to evaluate the indicator.

Population-level data on access to antiretroviral therapy are not available in Ontario. Access to antiretroviral therapy can be particularly challenging because patients receive these medications through many disparate mechanisms in Ontario. For example, patients can receive antiretrovirals through the Ontario Public Drugs Program (sometimes through Trillium), out-of-pocket payments, expanded access protocols, clinical trials, and informal distribution mechanisms. Furthermore, a single individual might access drugs using multiple mechanisms. Anecdotally, some individuals have trouble accessing Trillium, Ontario's catastrophic drug insurance program, due to high program deductibles.<sup>121</sup> Access to antiretrovirals, and the implications of gaps in coverage, is a priority area for future research.

Previous qualitative analyses suggest that HIV testing and treatment experiences among some women, particularly recent immigrants and Aboriginal women, raise issues of appropriate consent, risk of disclosure, potential loss of employment and risk to immigration status. It is not possible to determine the wider impact of ethnocultural group on testing as data on ethnicity are not systematically collected across health regions.

HIV and tuberculosis co-infection is a common problem worldwide but databases in Ontario do not include data to estimate the frequency of HIV testing in tuberculosis clinics or the prevalence of HIV among persons with tuberculosis. While summary numbers exist for the number of people who are diagnosed with both conditions, calculation of testing rates requires data on how frequently people are offered testing and how often they accept it. Similar issues exist for co-infection of HIV with syphilis, other sexually transmitted infections, and with hepatitis B and C.

Greater context regarding the funding of community-based HIV-services would enhance the evaluation framework. Important questions about the distribution and type of services remain, including: Who applies for funding? How is need assessed? Are projects matched to geographic areas where there is the greatest need? Are services well matched to women's needs? As well, it is important to determine to what extent geographic proximity to Toronto or other large urban areas affects service needs in the surrounding areas. Furthermore, we currently lack indicators on the quality of the services provided.

HIV-related indicators are not systematically collected in correctional facilities although this population is likely at high risk for infection and might have particularly challenging issues related to accessing HIV prevention and treatment while incarcerated. Gaps in antiretroviral care might be particularly frequent during incarceration and the time after release from prison has been suggested as a high-risk time for adverse health consequences.



## KEY MESSAGES

We examined broadly HIV prevention and care throughout Ontario, focusing on gender, socioeconomic status, ethnicity, country/region of birth, HIV-exposure category and geography where data were available. Considerable progress has been made in the last 15 years in the prevention of HIV transmission and in the treatment of people living with HIV. Yet these advances are not always delivered equitably. Difference in access to treatment, quality of care and prevention efforts are often related to the social determinants of health, suggesting the need for broad intersectoral action to improve health, such as with the education, legal and income support systems.

The HIV epidemic remains concentrated in Ontario's major urban centres, although people living with HIV reside in every LHIN. However, the nature of the epidemic varies across regions. Local planning will be important to address the divergent prevention and care needs of women and men, with particular attention to recent immigrants from HIV-endemic countries (who may arrive to Canada already infected or who may become infected after they immigrate), Aboriginal people, people who inject drugs and men who have sex with men.

HIV-infected people who are unaware of their HIV status are more likely to transmit the virus. Our findings extend previous analyses that suggest that many people in Ontario who are living with HIV remain unaware of their status and also reveal a second, less appreciated gap in care. Specifically, many people who know that they are HIV-positive do not receive guideline-concordant health care for their HIV infection on a regular basis. These important findings highlight the need to consider the way HIV testing and care is structured and delivered in Ontario.

The following six actions can help to accelerate progress in reducing the burden of HIV infection, improve health outcomes among women and men living with HIV, and reduce health inequities related to HIV infection.

### **More comprehensive data, and better data linkages are required to measure important quality indicators.**

- Ontario has excellent data to measure HIV-related indicators in some areas, due in part to centralized coordination of some important laboratory tests (including HIV diagnostic testing, HIV viral load testing and genotypic resistance testing) as well as the Laboratory Enhancement Program (which collects supplementary risk and test history data as well as incidence testing) at the Public Health Laboratory. Administrative health data are also available at the Institute for Clinical and Evaluative Sciences (ICES). However, there are significant gaps in data and important areas that cannot be measured at the population level.
- Understanding the context of HIV care is important for interpreting many quality indicators. Initiatives to link databases in Ontario, such as those linking OCS and the Public Health Laboratory to administrative data on physician visits, hospitalization and drug utilization have the potential to facilitate better measurement and monitoring of important clinical indicators for people receiving care. Further linkages between databases, including HIV testing data (when nominal testing has been performed) and private laboratory data (for CD4 count and other laboratory results) would greatly facilitate measurement of important indicators.
- More information is also needed about continuity of care for HIV positive IDUs and about care for IDUs co-infected with HIV and other blood borne diseases, in particular hepatitis C.

### **Targeted prevention efforts are needed for some groups, including Aboriginal people and older women.**

- Over 1,000 people each year are newly diagnosed with HIV infection and people from some groups, particularly Aboriginal women and men and older women, are



either diagnosed late or enter care late in the course of their infection. Strategies to promote HIV prevention, testing and access to care need to continue and targeted efforts directed at hard-to-reach groups would improve the health of Ontarians living with HIV and those at risk for HIV infection.

**HIV testing in pregnancy is high among women receiving prenatal care. Questions remain about women not receiving care and about the quality of consent.**

- HIV transmission from mother-to-child can be almost eliminated with antiretroviral therapy and obstetrical interventions. A surveillance system in Ontario provides real time data on HIV screening in pregnant women. The dramatic fall in the number of infants born with HIV infection in Ontario and the very high testing rates during pregnancy indicate important areas where coordinated intervention and clinical practice guidelines have changed care and improved health outcomes. Although only a few women decline testing during pregnancy, we do not have data to characterize who these women are or their reasons for not being tested. Future research might be able to retrospectively characterize women who decline testing.
- Similarly, we do not have comprehensive data on HIV prevalence among pregnant women who do not receive prenatal care, though these numbers are small. With the advent of new testing technologies, such as rapid point of care testing which can deliver a test result in minutes (compared to the conventional test which takes two weeks), there is a potential to increase testing rates prior to delivery. However, we do not know how many women would accept rapid point-of-care testing or what the potential yield of such testing would be in Ontario. Answers to these important questions are needed to further reduce, and eventually eliminate mother-to-child HIV transmission in the province.

- The impressive testing rates among pregnant women come with an important caveat. We do not have systematic data regarding the number of women who were tested without consent or for whom the quality of consent is suboptimal.
- The high testing rates among pregnant women indicate the successful implementation of a public health program. This program might serve as a model to increase testing rates among other groups, including those who are high risk yet have low testing rates.

**Prevention efforts among people who inject drugs seem to be effective but targeted interventions for women who inject drugs are needed.**

- Overall, the prevalence of HIV among IDUs remains at about five percent in Ontario, although the rates vary significantly across cities. Although this is a concerning absolute rate, it is relatively low compared to prevalence rates among IDUs internationally and elsewhere in Canada. Plausible explanations for this low rate include early and widespread adoption of needle and syringe exchange programs, a network of addiction and supportive services for IDUs, and the enhanced availability of drug substitution treatment for IDUs, specifically the expansion of methadone maintenance therapy (MMT) and the availability of low-threshold MMT (in which individuals are allowed to continue in MMT even if they continue to use drugs while in the program).
- Self-reported risky behaviours for women who inject drugs remain high, such as injection with used needles and drug paraphernalia. These findings suggest that women are at particularly high risk of acquiring HIV infection and targeted interventions for female IDUs might be beneficial.

- OCS data suggest that IDUs are diagnosed relatively early in the course of HIV infection in Ontario compared to other groups. Such early diagnosis has important benefits for both the individual (facilitating treatment) and for public health interventions (limiting transmission). Since these findings are based on a voluntary cohort, they are susceptible to selection bias and should be confirmed, if possible, using population-level data.

### **Important gaps in access to and quality of HIV care should be investigated.**

- Regular monitoring of HIV status is an important part of care for all people living with HIV, whether or not they are using antiretroviral medications. Viral load monitoring is a good proxy measure of receiving HIV-specific health care. Of those who had a viral load test in the latter half of 2007 one in five did not undergo at least two additional tests in the next year. These findings suggest that almost 20 percent of individuals living with HIV who are in care are not receiving guideline-concordant HIV care. Further analyses are required to identify the reasons for infrequent viral load testing among those who have presented to care.
- We observed a significant discrepancy between the number of people (over several years) who have tested HIV-positive in Ontario and the number who received regular, guideline-concordant, HIV-specific health care, based on viral load testing. Overall, 16,860 people were estimated to be alive and aware of their HIV-positive status as of the middle of 2007, of whom 10,930 (65 percent) received at least one viral load test during the year<sup>13</sup> and 9,410 (55 percent) received at least one test in the latter half of 2007. These findings suggest that

a large proportion of individuals who have received a positive HIV test are not having their infection regularly monitored. These estimates are consistent with findings from the U.S.<sup>14</sup> and from elsewhere in Canada.<sup>15</sup> Research to identify system and patient-level factors that contribute to loss to follow up and interventions to improve retention are priority areas for future research and programming.

### **Despite effective treatment, some people living with HIV experience many symptoms and reduced quality of life, particularly women, injection drug users and people with lower educational attainment.**

- The experience of living with HIV is not the same for all groups. As with other chronic diseases, we found higher rates of depressive symptoms among women living with HIV compared to men living with HIV.
- Individuals with a history of injection drug use had worse mental and physical health status than non-users and women fared worse than men. These findings suggest that people who have injected drugs, and particularly women, have unique health needs that may not be fully addressed.
- We also found worse mental and physical health status among individuals with lower educational attainment. These findings underscore the need for ongoing attention to social determinants both generally, to address the health needs of individuals from all socioeconomic strata, and specifically, to ensure effective and accessible physical and mental health rehabilitation services for people living with HIV.

# Appendix 11.1

## INDICATORS AND THEIR LINKS TO PROVINCIAL STRATEGIC OBJECTIVES

### APPENDIX 11.1 | HIV indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System<sup>^</sup>, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives\*

Indicator	Link(s) to OHQC attributes of a high-performing health system	Link(s) to MOHLTC strategic objectives
<b>Section 11A—Incidence, Prevalence and Risk Behaviours</b>		
Modelled HIV prevalence	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> <li>• Influence broader determinants of health</li> </ul>
Modelled HIV incidence	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> <li>• Influence broader determinants of health</li> </ul>
Reported AIDS cases	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> <li>• Influence broader determinants of health</li> </ul>
Condom use at last sexual intercourse	<ul style="list-style-type: none"> <li>• Equitable</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> </ul>
Needle and paraphernalia sharing among injection drug users	<ul style="list-style-type: none"> <li>• Equitable</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve health status of Ontarians</li> </ul>
<b>Section 11B—Community Services for HIV</b>		
Estimates of service funding to community-based HIV services	<ul style="list-style-type: none"> <li>• Appropriately resourced</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Increase productive use and appropriate distribution of resources across the system</li> <li>• Improve access to appropriate health services</li> </ul>

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# APPENDIX 11.1 | HIV indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System<sup>^</sup>, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives\*

Indicator	Link(s) to OHQC attributes of a high-performing health system	Link(s) to MOHLTC strategic objectives
<b>Section 11B—Community Services for HIV (continued)</b>		
Community-based HIV services and utilization in Ontario	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Appropriately resourced</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Increase equity of the health system</li> </ul>
<b>Section 11C—Clinical Care</b>		
Prenatal HIV screening	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> <li>• Focused on population health</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Interventions to prevent mother-to-child transmission of HIV in pregnant HIV-positive women	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Equitable</li> <li>• Focused on population health</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve healthy behaviours, health promotion and disease prevention</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Health-related quality of life among adults living with HIV	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centred</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
Symptom burden among adults living with HIV	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Patient-centred</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve health status of Ontarians</li> </ul>
CD4 count when entering clinical care	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical &amp; population health outcomes</li> </ul>

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## APPENDIX 11.1 | HIV indicators—Link(s) to Ontario Health Quality Council (OHQC) Attributes of a High-Performing Health System<sup>^</sup>, link(s) to Ministry of Health and Long-Term Care (MOHLTC) strategic objectives\*

Indicator	Link(s) to OHQC attributes of a high-performing health system	Link(s) to MOHLTC strategic objectives
<b>Section 11C—Clinical Care (continued)</b>		
Access to viral load testing: time to first viral load	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Safe</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve clinical and population health outcomes</li> <li>• Improve safety and effectiveness of health services</li> </ul>
Quality of care: two or more viral loads within 12 months	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Safe</li> <li>• Equitable</li> <li>• Appropriately resourced</li> </ul>	<ul style="list-style-type: none"> <li>• Improve access to appropriate health services</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> <li>• Improve clinical and population health outcomes</li> <li>• Increase equity of the health system</li> </ul>
Viral load below quantification among adults living with HIV	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Efficient</li> </ul>	<ul style="list-style-type: none"> <li>• Improve safety and effectiveness of health services</li> <li>• Improve chronic disease management</li> </ul>
<b>Section 11D—HIV Outcomes</b>		
HIV admissions	<ul style="list-style-type: none"> <li>• Accessible</li> <li>• Effective</li> <li>• Efficient</li> <li>• Equitable</li> <li>• Integrated</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical and population health outcomes</li> </ul>
Length of stay for HIV admissions	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Efficient</li> <li>• Safe</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical and population health outcomes</li> </ul>
HIV-related mortality	<ul style="list-style-type: none"> <li>• Effective</li> <li>• Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Improve chronic disease management</li> <li>• Improve safety and effectiveness of health services</li> <li>• Improve clinical and population health outcomes</li> </ul>

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# Appendix 11.2

## INDICATORS AND THEIR SOURCES

### APPENDIX 11.2 | HIV Indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 11A—Incidence, Prevalence and Risk Behaviours</b>		
Modelled HIV prevalence	<ul style="list-style-type: none"> <li>Report on HIV/AIDS in Ontario, 2006<sup>122</sup></li> </ul>	Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Statistics Canada and the Laboratory Enhancement Program (Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto)
Modelled HIV incidence	<ul style="list-style-type: none"> <li>Ontario Women's Health Status Report, 2002<sup>123</sup></li> <li>Report on HIV/AIDS in Ontario, 2006<sup>122</sup></li> </ul>	Public Health Laboratory, Ontario Agency for Health Protection and Promotion; Statistics Canada and the Laboratory Enhancement Program (Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto)
Reported AIDS cases	<ul style="list-style-type: none"> <li>Report on HIV/AIDS in Ontario, 2006<sup>122</sup></li> </ul>	Ontario Surveillance Program, Public Health Branch, Ministry of Health and Long-Term Care
Condom use at last sexual intercourse	<ul style="list-style-type: none"> <li>Position Statement on Condoms and HIV Prevention, 2004<sup>124</sup></li> <li>2004 Report on the global AIDS epidemic, 2004<sup>125</sup></li> </ul>	Canadian Community Health Survey, 2005 (Cycle 3.1) and 2007
Needle and paraphernalia sharing among injection drug users	<ul style="list-style-type: none"> <li>Policy and programming guide for HIV/AIDS prevention and care among injecting drug users, 2005<sup>66</sup></li> <li>I-Track, Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada, Phase I Report, 2006<sup>126</sup></li> </ul>	Enhanced Surveillance of Risk Behaviours among Injecting Drug Users in Canada (I-Track)

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**APPENDIX 11.2 | HIV Indicators—indicator source(s), data source(s)**

Indicator	Indicator source	Data source
<b>Section 11B—Community Services for HIV</b>		
Estimates of service funding to community-based HIV services	<ul style="list-style-type: none"> <li>The view from the front lines summary and preliminary analysis of data provided by community-based HIV/AIDS services in Ontario 2001/02 to 2005/06, 2007<sup>127</sup></li> </ul>	Ontario Community-based HIV and AIDS Reporting Tool
Community-based HIV services and utilization in Ontario	<ul style="list-style-type: none"> <li>The view from the front lines summary and preliminary analysis of data provided by community-based HIV/AIDS services in Ontario 2001/02 to 2005/06, 2007<sup>127</sup></li> </ul>	Ontario Community-based HIV and AIDS Reporting Tool
<b>Section 11C—Clinical Care</b>		
Prenatal HIV screening	<ul style="list-style-type: none"> <li>Report on HIV/AIDS in Ontario 2006<sup>122</sup></li> </ul>	Ontario prenatal testing and diagnostic databases; HIV Laboratory, Public Health Laboratory, Ontario Agency for Health Protection and Promotion (Model prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto)
Interventions to prevent mother-to-child transmission of HIV in pregnant HIV-positive women	<ul style="list-style-type: none"> <li>Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: towards universal access: recommendations for a public health approach, 2006<sup>128</sup></li> <li>Two-dose intrapartum/newborn nevirapine and standard antiretroviral therapy to reduce perinatal HIV transmission: A randomized trial, 2002<sup>129</sup></li> </ul>	Canadian Pediatric AIDS Research Group, perinatal HIV surveillance program
Health-related quality of life among adults living with HIV	<ul style="list-style-type: none"> <li>Quality of Care Indicators for HIV/AIDS, 2000<sup>130</sup></li> </ul>	Ontario HIV Treatment Network Cohort Study
Symptom burden among adults living with HIV	<ul style="list-style-type: none"> <li>Quality of care indicators for HIV/AIDS, 1998<sup>131</sup></li> </ul>	Ontario HIV Treatment Network Cohort Study
CD4 count when entering clinical care	<ul style="list-style-type: none"> <li>Quality of care indicators for HIV/AIDS, 1998<sup>131</sup></li> </ul>	Ontario HIV Treatment Network Cohort Study
Time to first viral load—access to viral load testing	<ul style="list-style-type: none"> <li>Identified by HIV working group</li> </ul>	Rank and colleagues, <sup>108</sup> using data from the Public Health Laboratory HIV testing and viral load databases.

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## APPENDIX 11.2 | HIV Indicators—indicator source(s), data source(s)

Indicator	Indicator source	Data source
<b>Section 11C—Clinical Care (continued)</b>		
Two or more viral loads within 12 months—quality of care	<ul style="list-style-type: none"> <li>Antiretroviral treatment of adult HIV infection: 2010 recommendations of the International AIDS Society-USA panel, 2010<sup>98</sup></li> <li>Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services, 2006<sup>99</sup></li> </ul>	Public Health Laboratory, Ontario Agency for Health Protection and Promotion (Prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto)
Viral load below quantification among adults living with HIV	<ul style="list-style-type: none"> <li>Quality of care indicators for HIV/AIDS, 1998<sup>131</sup></li> </ul>	Public Health Laboratory, Ontario Agency for Health Protection and Promotion (Prepared by the Ontario HIV Epidemiologic Monitoring Unit, University of Toronto)
<b>Section 11D—HIV Outcomes</b>		
HIV admissions	<ul style="list-style-type: none"> <li>Health, United States, 2006. With Chartbook on Trends in the Health of Americans, 2006<sup>132</sup></li> <li>Hospitalization for HIV/AIDS in Canada, Canadian Institute for Health Information (CIHI), poster presentation, 2006<sup>116</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database
Length of stay for HIV admissions	<ul style="list-style-type: none"> <li>Hospitalization for HIV/AIDS in Canada, Canadian Institute for Health Information (CIHI), poster presentation, 2006<sup>116</sup></li> </ul>	Canadian Institute for Health Information Discharge Abstract Database
HIV-related mortality	<ul style="list-style-type: none"> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>133</sup></li> <li>Public Health Research, Education and Development. Report on the Health Status of the Residents of Ontario, 2000<sup>134</sup></li> </ul>	Vital Statistics, Ontario Registrar General

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# Appendix 11.3

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

The indicators we report are the result of a rigorous selection process, which included an extensive literature review of peer-reviewed and grey literature (See Chapter 1 for a more detailed description of the indicator selection process). The review of the literature identified potential indicators for inclusion. The working group reviewed the indicators using the defined indicator selection criteria and prepared a final set of 38 indicators for review by a Technical Expert Panel (TEP). Indicators were then selected through a modified Delphi process by the TEP using a two step process—first through an online questionnaire and then at a face-to-face meeting on March 5<sup>th</sup>, 2008. The final chapter included 18 indicators including measures of population health, community services, clinical care and HIV-related outcomes (see [Appendix 11.1](#) for a complete list of indicators).

All the indicators are reported at the provincial level and were first stratified by sex. Depending on the data source, indicators were additionally stratified by HIV exposure category, income (household, personal or neighbourhood), educational attainment, employment status, age group, immigration status, ethnicity, country/region of origin, and geography—either Local Health Integration Network (LHIN) or public health region.

### 2. Datasets

#### 2A. Datasets—Survey or Research Data

##### Canadian Community Health Survey (CCHS)

The CCHS is a nationally representative cross-sectional survey of the Canadian community-dwelling population conducted every two years by Statistics Canada. The CCHS is offered in English and in French. To remove language as a barrier to conducting interviews,

each of the Statistics Canada Regional Offices recruited interviewers with a wide range of language competencies. When necessary, cases were transferred to an interviewer with the language competency needed to complete an interview. In addition, the survey questions were translated into the following languages: Chinese, Punjabi and Inuktitut. Chinese and Punjabi were the most common language barriers identified by the regional offices. The Inuktitut translation was used to facilitate collection in Nunavut. The survey is conducted via face-to-face interviews and covers material that alternates between a general overview of the health of Canadians (the x.1 cycle surveys) and more in-depth issues (the x.2 cycle surveys). In 2007, major changes were made to the CCHS design. Data are now collected on an ongoing basis with annual releases rather than every two years as was the case prior to 2007. As such, as of 2007, the naming convention has also changed to reflect the year of the survey rather than the cycle. Residents living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces and residents of certain remote regions are excluded from the survey. The Ontario share files for the survey were used for all analyses.

For the indicator of **condom use at last sexual encounter**, it was possible to use the combined CCHS, 2005 (Cycle 3.1) and 2007, limited to those aged 15-49, based on CCHS response criteria. The cycles were combined using a method developed by Statistics Canada<sup>135</sup> that adjusted the sample weights for each of the cycles by a function of their health region sample sizes. To use the combined cycles, it was necessary to assume that the two share files were independent, i.e. they contained no duplicate respondents as it would be difficult to identify duplicated and the probability of duplicate records is very low.

For the overall population and for the analysis stratified by sex, we assessed the relationship between the indicator and income, education, age, ethnicity and immigrant status (see Table 11.2 for more detail regarding variable categories). The studentized range test was used to assess the significance of differences among the rates. The standard errors of the rates and 95 percent confidence intervals were calculated using 500 bootstrap weights provided by Statistics Canada. In addition, relative rates were calculated for women-to-men, lowest-to-highest annual household income, lowest-to-highest education level and rural-to-urban residence.

Statistics Canada rules were followed in the reporting of estimates using the Ontario share file as follows:

- Estimates should not be reported if the unweighted sample is less than 10
- Estimates are adequate and can be reported if the coefficient of variation is 16.5 or less
- Estimates should be reported with caution if the coefficient of variation is between 16.6 and 33.3
- Estimates should be suppressed if the coefficient of variation is greater than 33.3

**Table 11.2. Stratifying variables for CCHS indicators**

Sex	
Female	
Male	
Age (years)	
4-level variable	
15-24	
25-34	
35-44	
45-49	
Household income	
4-level variable	
Lowest income	< \$15,000 if 1 or 2 people < \$20,000 if 3 or 4 people < \$30,000 if 5+ people
Lower middle income	\$15,000 to \$29,999 if 1 or 2 people \$20,000 to \$39,999 if 3 or 4 people \$30,000 to \$59,999 if 5+ people
Upper middle income	\$30,000 to \$59,999 if 1 or 2 people \$40,000 to \$79,999 if 3 or 4 people \$60,000 to \$79,999 if 5+ people
Highest income	≥ \$60,000 if 1 or 2 people ≥ \$80,000 if 3+ people

Education	
4-level variable	
Less than secondary school graduation	
Secondary school graduation	
At least some post-secondary school	
Bachelor's degree or higher	
Immigration	
4-level variable	
0-4 years of residency in Canada	
5-9 years of residency in Canada	
10+ years of residency in Canada	
Born in Canada	
Ethnicity	
6-level variable	
White	
Black	
East and Southeast Asian	Filipino, Japanese, Korean, Chinese, Southeast Asian
Arab, West and South Asian	South Asian, Arab, and West Asian
Other	Latin American, other racial or cultural origins, multiple racial origins
Aboriginal people	North American Indian, Métis or Inuit

### Public Health Laboratory, Ontario Agency for Health Protection and Promotion

The indicators of modelled **HIV prevalence, modelled HIV incidence, reported AIDS cases and HIV screening during pregnancy** are reported in the annual report on HIV/AIDS in Ontario.<sup>8</sup> Data were prepared by the Ontario HIV Epidemiologic Monitoring Unit (OHEMU) using data from the HIV serodiagnostic database, prenatal screening database and the laboratory enhancement study. A brief description of each indicator is presented below.

Serodiagnostic data from 1985 to 2008 were obtained from the HIV Laboratory, Public Health Laboratory. Cumulative incidence rates for HIV were calculated with the 2006 census population as the denominator. HIV incidence and prevalence were calculated by sex, age group, year of diagnosis and LHIN. The Public Health Division of the Ontario Ministry of Health and Long-Term Care (MOHLTC) provided data on AIDS cases diagnosed to December 31, 2006. The number of AIDS cases was calculated by sex, age at AIDS diagnosis, exposure category, and year of AIDS diagnosis. The date of diagnosis was defined as the earliest date of diagnosis of an AIDS indicator condition.

Data on prenatal testing (including HIV results) were extracted from Public Health Laboratory data (including Toronto and regional laboratories). For women who were included in the prenatal testing database (any woman in Ontario who underwent prenatal serologic testing) we determined whether HIV screening was carried out as part of their prenatal screening or through separate HIV diagnostic testing (using data from the HIV Laboratory). The unit of analysis is the pregnancy. Two or more tests carried out within 258 days of each other were considered to have occurred during the same pregnancy. Women were considered to have been tested for this analysis if they had been tested during the current pregnancy. For further details on these indicators, please see The Report on HIV/AIDS in Ontario in 2008 or [http://www.phs.utoronto.ca/ohemu/HIVupdate\\_overview.html](http://www.phs.utoronto.ca/ohemu/HIVupdate_overview.html).

Two clinical care indicators using viral load data were prepared by the OHEMU using data from the HIV serodiagnostic database and the HIV viral load testing database. Viral load test results are recorded in a central database managed by the Public Health Laboratory. For the indicator measuring quality of care for viral load testing: **two or more viral load tests within 12 months**, a cohort of people living with HIV who had a viral load test in the latter half of 2007 (June 30 to December 31, 2007) was established. The six-month interval was used to identify people living with HIV who were receiving HIV-specific care and resident in Ontario (n=9,410). This cohort was followed through 2008 to identify the proportion who had two or more viral load tests during this 12-month follow up period. We were not able to exclude people who migrated out of Ontario or who died during the follow up period. We were also not able to adjust for people who may have been privately tested or who have viral load testing as part of a randomized controlled trial.

The indicator that measured the percentage of people living with HIV who were in HIV-specific care for whom **all viral load results were below detectable limits** was measured in a cohort of people living with HIV who

had a viral load test completed in the latter half of 2007 (June 30 to December 31, 2007) and at least one in 2008 (n=8,861). We measured the percentage of people for whom all their viral load results in 2008 were undetectable. For this indicator, we could not adjust for treatment or other clinical factors and we did not adjust for the number of viral load tests performed.

The indicator of **time to first viral load: access to care** for people who have newly tested positive for HIV was developed and analysed by Rank and colleagues.<sup>108</sup> In Ontario, viral load test results are recorded in a central database managed by the Public Health Laboratory as are HIV serodiagnostic testing data. A cohort of individuals who had nominally tested HIV positive from June 30, 2005 to December 31, 2005 was followed for one year to determine the time to first viral load test and the proportion of people who had a viral load test within three months, between 3-6 months and between 6-12 months after testing positive. The sample was restricted to patients who tested for HIV nominally (with identifying information) so that they could be linked to the viral load data and followed to determine the time to first viral load. We were also not able to adjust for people who may have been privately tested or who have viral load testing as part of a randomized controlled trial.

### Enhanced Surveillance of Risk Behaviours Among Injection Drug Users in Canada (I-Track)

The I-Track study is a pan-Canadian surveillance study examining the HIV and hepatitis C risk behaviours and practices among people who inject drugs (IDU) in participating sites across Canada, including five Ontario sites: Toronto, Ottawa, Kingston, Thunder Bay and Sudbury. To participate in the study, individuals had to: have injected drugs for non-therapeutic reasons in the past six months; be able to communicate in either English or French (French was available in the Ottawa site only) and be able to provide informed consent. Participants were recruited through services for IDUs, including community-based agencies, needle exchange programs and through referral by peers. Participants

were paid an honorarium for participation. We report the **proportion of IDUs who report participating in injection risk behaviours**. The specific questions that were used for the analysis of injection risk behaviours included:

- Receipt of used needles: In the past 6 months when you injected drugs, did you use needles/syringes that had been used by someone else?
- Lending used needles: In the past 6 months did anyone else use needles/syringes that you had already used?
- Receipt of used paraphernalia (cookers, cotton or filter): In the past 6 months when you injected drugs, did you use other injection equipment that had been used by someone else?
- Lending of used paraphernalia (cookers, cotton or filter): In the past 6 months did anyone else use other injection equipment that you had already used?

The risk behaviours were each stratified by sex and then further stratified by:

- Knowledge of HIV status (HIV+, HIV-, unknown)
- Age group (16-19, 20-29, 30-39, 40-49, 50-65)
- Educational attainment (high school or less, more than high school)
- Ethnicity (Aboriginal ethnicity, other)
- Recruitment site (Toronto, Ottawa, Kingston, Sudbury, Thunder Bay)

### **Ontario Community-Based HIV and AIDS Reporting Tool (OCHART)**

Twice each year, the community-based HIV/AIDS programs funded by the AIDS Bureau, MOHLTC and the AIDS Community Action Program (ACAP) of the Public Health Agency of Canada (PHAC), complete the web-based OCHART, which gathers information on services provided, populations served and number of contacts. Agencies enter data into OCHART. OCHART is a relatively new reporting tool and the MOHLTC and PHAC are working with agencies to improve the

consistency and accuracy of the data. The data provide information on community-based programs; services provided and used and trends and client needs. The data and information collected through OCHART provide the program funders the information they need to:

- Account for use of public resources
- Review the range of services provided
- Identify emerging issues and trends
- Inform planning

Data from OCHART were used to inform estimates for two indicators reported in this chapter: **funding to community-based HIV services** and **community-based HIV services and utilization**. The data on funding was stratified by LHIN. The data on types of services provided and utilization were stratified by sex and then by type of service provided and population served. Data on services for injection drug users are reported as outreach services and in-service (on site) services.

### **Canadian Perinatal AIDS Research Group—Perinatal HIV Surveillance Program**

The Canadian Pediatric AIDS Research Group (CPARG) was formed in 1990 by a group of pediatricians involved in the care and research of HIV infected children. The group is affiliated with the Canadian HIV Trials Network (CTN). The objectives of CPARG are to undertake coordinated, collaborative research in HIV/AIDS in infected and exposed children, infected pregnant women, youth and affected families. The Canadian Perinatal HIV Surveillance Program (CPHSP) was initiated by CPARG in 1991. CPHSP includes regional representatives from 22 pediatric HIV, adult HIV and regional health authorities from all Canadian provinces and territories. The Ontario sites include: Toronto, Ottawa, Hamilton, Sudbury, Windsor, London and Kingston. The CPHSP data are submitted annually to PHAC forming the basis of the Canadian national perinatal HIV surveillance data and is published by them annually in the HIV and AIDS in Canada Surveillance

report. These data are used by the federal government to meet Canada's reporting obligations to the United Nations and World Health Organization.

Data were initially collected using Excel; since 2007, data have been collected through a web-based program. Data are collected retrospectively at each site from the children's health records. All eligible mother infant pairs are enrolled.

Inclusion criteria:

1. All children born in Canada to known HIV infected mothers that are followed at the participating sites
2. All HIV infected children who acquired HIV through mother-to child transmission and are receiving care at the participating sites
3. HIV uninfected siblings of children in the database are included only if they were born in Canada at a time after the mother acquired HIV infection

Exclusion criteria:

1. HIV infected children who contracted HIV by other means than perinatal transmission
2. HIV uninfected older siblings born outside Canada
3. HIV uninfected older siblings born prior to mother's HIV acquisition

For the indicator on **treatment of HIV infected pregnant women**, the findings were based on data collected on mother-infant pairs including: year of birth (of the infant); maternal age at delivery; maternal HIV exposure category, maternal ethnicity and treatment status during pregnancy as well as the HIV status of the infant.

## Ontario HIV Treatment Network (OHTN) Cohort Study (OCS)

The OCS is a community-governed, multi-site, research study that collects clinical and socio-behavioural information from voluntary participants who are living with HIV in Ontario and who have entered care. The study aims are to: understand the social, psychological and health context of people living with HIV in Ontario; understand issues related to health service utilization; understand issues related to mental health and addictions; examine HIV infection and treatment and its complications; and examine chronic diseases and conditions associated with HIV infection. Phase I participants who consented from 1995 to 2006 (retrospective and prospective clinical data collection only) were asked to re-consent in Phase II (2007 onwards) to include additional socio-behavioural data collection on these participants. Recruitment of new OCS participants continued in phase II.

The OCS currently collects data through repeat surveys of participants (core and extended questionnaires), clinical chart review, extractions from electronic medical records and data linkage of viral load, genotypic and other testing data from the Public Health Laboratory. Participants are recruited through HIV care providers and data are collected on their clinical care as well as the health status.

Indicators that were included in this chapter are listed below along with a mapping to questions from the OCS. Indicators were stratified by sex and then further stratified by household income, educational attainment, age group, ethnicity, employment status and HIV exposure category. For more details on the OCS, please go to [www.ohtncohortstudy.ca](http://www.ohtncohortstudy.ca).



Indicator	Variable	OCS Source
Health Related Quality of Life Index (SF12)	Physical health summary (component) score Mental health summary (component) score For participants who completed their first questionnaire between September 2007 and March 2010	Core survey
AIDS Clinical Trial Group (ACTG) symptom index	Overall symptom burden score and number of symptoms that are rated as bothering the respondent some or a lot Also specific symptoms (sadness; fatigue; pain; nervousness and anxiety) that the respondent rates as bothering them some or a lot For participants who completed their first extended questionnaire between October 2007 and March 2010	Extended survey
CD4 Count when Entering Clinical Care	Median CD4 cell count—first recorded for patients upon entering care for participants who entered care between 1985 and 2009 and completed their first questionnaire between September 2007 and March 2010	Clinical data

## 2B. Datasets—Administrative Data

### Integrated Public Health Information System (IPHIS)

Additional data on HIV infection were provided by the integrated Public Health Information System (IPHIS). Reported rates of HIV infection with reporting dates between 2006 and 2008 were provided. The IPHIS database is administered and supported by the Infectious Diseases Surveillance Section of the MOHLTC. The Surveillance Section collects information on all cases of reportable diseases in Ontario from public health units. These data were used to provide additional background on HIV incidence and prevalence in Ontario.

### Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

The CIHI-DAD contains information abstracted from hospital records. It includes patient-level data for acute and chronic care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. The main data elements of the CIHI-DAD at the Institute for Clinical Evaluative Sciences (ICES) are encrypted patient identifier, patient demographics (age, sex and geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay). Two indicators were measured using the CIHI-DAD: the **number of HIV hospitalizations** and **length of stay**

**for HIV hospitalizations.** We included all admissions among those aged 15 and older for three fiscal years (2004/05, 2005/06, 2006/07) that had an HIV diagnosis (ICD10 code B20, B21.0, B21.1, B21.2, B21.3, B21.7, B21.8, B21.9, B22.0, B22.1, B22.2, B22.7, B23.0 B23.1, B23.2, B23.8, B24, F02.4, Z21) in any field, excluding admissions related to childbirth (main service code=51). We also report on the number of HIV hospitalizations and length of stay for admissions where HIV was identified as being primarily responsible for the length of stay (dxtype 1 coded as HIV).

Analyses using the CIHI-DAD were conducted at the provincial level, by neighbourhood income quintile, age group and LHIN of patient residence. Where numbers were too small, results were either not reported or were aggregated. Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person equivalent (IPPE), which is a household size adjusted measure of household income based on 2006 census summary data at the dissemination area and using person-equivalents implied by the 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five

approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as proxy for overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilizations. Individual geographic information from ICES databases was used to define the best known postal code for each person on July 1 of each year (available from 1991 to 2004). Postal codes were then used to assign people to enumerations areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Enumeration areas and dissemination areas are small adjacent geographic areas, designated for collection of census data. Dissemination areas replaced enumeration areas in 2001 and have a population of 400–700 persons. The admissions and length of stay indicators were standardized to the study cohort using the indirect method.

### Vital Statistics—Ontario Registrar General

The Vital Statistics office of the Ontario Registrar General collects information on all births and deaths in Ontario. All **HIV-related deaths** occurring in 2006 that had an ICD10 code related to HIV disease (B20—B24) were included for this indicator. Since 2003, deaths are included if HIV is the immediate, antecedent or underlying cause of death. HIV-related mortality was stratified by sex and then further stratified by age group and country of birth. All countries in sub-Saharan Africa and the Caribbean were considered to be HIV-endemic to be consistent with the classification used in the Report on HIV/AIDS in Ontario in 2008.<sup>8</sup> This indicator was prepared by the OHEMU.

## REFERENCE LIST

- (1) Mocroft A, Ledergerber B, Katlama C, Kirk O, Reiss P, d'Arminio Monforte A, et al. Decline in the AIDS and death rates in the EuroSIDA study: an observational study. *Lancet* 2003;362(9377):22-29.
- (2) Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services, 2011:1-166. Available at <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>.
- (3) Connor EM, Sperling RS, Gelber R, Kiselev P, Scott G, O'Sullivan MJ, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1994;331(18):1173-1180.
- (4) Remis RS, King SM, Vernich L, Major C, Whittingham E. Epidemiologic modeling to evaluate prevention of mother-infant HIV transmission in Ontario. *J Acquir Immune Defic Syndr* 2003;34(2):221-230.
- (5) The Antiretroviral Therapy Cohort Collaboration. Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet* 2008;372(9635):293-9.
- (6) Quinn TC, Wawer MJ, Sewankambo N, Serwadda D, Li C, Wabwire-Mangen F, et al. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. *N Engl J Med* 2000;342(13):921-929.
- (7) Public Health Agency of Canada. HIV/AIDS Epi Updates, July 2010, Surveillance and Risk Assessment Division, Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada, 2010.
- (8) Remis RS, Swantee C, Liu J. Report on HIV/AIDS in Ontario 2008. Toronto, Canada: Ontario HIV Epidemiologic Monitoring Unit, University of Toronto, 2010:1-199.
- (9) Clark JP, Bierman AS. The POWER Study Framework Chapter 2. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (10) Shiller SK, Bierman AS. Introduction to the POWER Study Chapter 1. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (11) Joint United Nations Programme on HIV/AIDS (UNAIDS). Making condoms work for HIV prevention: cutting-edge perspectives. Geneva, Switzerland: UNAIDS, World Health Organization, 2004:1-32.
- (12) Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database Syst Rev* 2001(3):CD003255.
- (13) Remis R. personal communication, April 21, 2011.
- (14) Marks G, Gardner LI, Craw J, Crepaz N. Entry and retention in medical care among HIV-diagnosed persons: a meta-analysis. *AIDS* 2010;24(17):2665-2678.
- (15) Krentz HB, Worthington H, Gill MJ. Adverse Health Effects for Individuals who Move between HIV Care Centres. *J Acquir Immune Defic Syndr* 2011 Feb 21. [Epub ahead of print]
- (16) Ferrao V. Paid Work. Statistics Canada, 2010. Catalogue no. 89-503-X.
- (17) Marshall K. Converging gender roles. Perspectives on labour and income. Statistics Canada, 2006. Catalogue no. 7500-XIE 5-17.
- (18) Zukewich N. Work, parenthood and the experience of time scarcity. Days of our Lives series. Statistics Canada. Ottawa, 2003. Catalogue no. 89-584-XIE.
- (19) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of Illness. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.

- (20) Byrne CA, Resnick HS, Kilpatrick DG, Best CL, Saunders BE. The socioeconomic impact of interpersonal violence on women. *J Consult Clin Psychol* 1999;67(3):362-366.
- (21) Pavao J, Alvarez J, Baumrind N, Induni M, Kimerling R. Intimate partner violence and housing instability. *Am J Prev Med* 2007;32(2):143-146.
- (22) Greenfield SF, Trucco EM, McHugh RK, Lincoln M, Gallop RJ. The Women's Recovery Group Study: a Stage I trial of women-focused group therapy for substance use disorders versus mixed-gender group drug counseling. *Drug Alcohol Depend* 2007;90(1):39-47.
- (23) Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359(9314):1331-1336.
- (24) Kacanek D, Jacobson DL, Spiegelman D, Wanke C, Isaac R, Wilson IB. Incident depression symptoms are associated with poorer HAART adherence: a longitudinal analysis from the Nutrition for Healthy Living study. *J Acquir Immune Defic Syndr* 2010;53(2):266-272.
- (25) Tegger MK, Crane HM, Tapia KA, Uldall KK, Holte SE, Kitahata MM. The effect of mental illness, substance use, and treatment for depression on the initiation of highly active antiretroviral therapy among HIV-infected individuals. *AIDS Patient Care STDS* 2008;22(3):233-243.
- (26) Tsai AC, Weiser SD, Petersen ML, Ragland K, Kushel MB, Bangsberg DR. A marginal structural model to estimate the causal effect of antidepressant medication treatment on viral suppression among homeless and marginally housed persons with HIV. *Arch Gen Psychiatry* 2010;67(12):1282-90.
- (27) Myers HF, Wyatt GE, Loeb TB, Carmona JV, Warda U, Longshore D, et al. Severity of child sexual abuse, post-traumatic stress and risky sexual behaviors among HIV-positive women. *AIDS Behav* 2006;10(2):191-199.
- (28) Wyatt GE, Longshore D, Chin D, Carmona JV, Loeb TB, Myers HF, et al. The efficacy of an integrated risk reduction intervention for HIV-positive women with child sexual abuse histories. *AIDS Behav* 2004;8(4):453-462.
- (29) Singer M, Clair S. Syndemics and public health: reconceptualizing disease in bio-social context. *Med Anthropol Q* 2003;17(4):423-441.
- (30) Singer MC, Erickson PI, Badiane L, Diaz R, Ortiz D, Abraham T, et al. Syndemics, sex and the city: understanding sexually transmitted diseases in social and cultural context. *Soc Sci Med* 2006;63(8):2010-21.
- (31) McKinney MM, Marconi KM. Delivering HIV services to vulnerable populations: a review of CARE Act-funded research. *Public Health Rep* 2002;117(2):99-113.
- (32) Wood E, Montaner JS, Tyndall MW, Schechter MT, O'Shaughnessy MV, Hogg RS. Prevalence and correlates of untreated human immunodeficiency virus type 1 infection among persons who have died in the era of modern antiretroviral therapy. *J of Infect Dis* 2003;188(8):1164-1170.
- (33) Chu C, Selwyn PA. Current health disparities in HIV/AIDS. *The AIDS Reader* 2008;18(3):144-146, 152-158.
- (34) Anderson KH, Mitchell JM. Differential access in the receipt of antiretroviral drugs for the treatment of AIDS and its implications for survival. *Arch Intern Med* 2000;160(20):3114-31120.
- (35) Hellinger FJ, Encinosa WE. Antiretroviral therapy and health care utilization: a study of privately insured men and women with HIV disease. *Health Serv Res* 2004;39(4 Pt 1):949-967.
- (36) Yehia BR, Fleishman JA, Hicks PL, Ridore M, Moore RD, Gebo KA. Inpatient health services utilization among HIV-infected adult patients in care 2002-2007. *J Acquir Immune Defic Syndr* 2010;53(3):397-404.
- (37) Wood E, Li K, Palepu A, Marsh DC, Schechter MT, Hogg RS, et al. Sociodemographic disparities in access to addiction treatment among a cohort of Vancouver injection drug users. *Substance Use & Misuse* 2005;40(8):1153-1167.
- (38) Palepu A, Strathdee SA, Hogg RS, Anis AH, Rae S, Cornelisse PG, et al. The social determinants of emergency department and hospital use by injection drug users in Canada. *J Urban Health* 1999;76(4):409-418.

- (39) Davis WR, Deren S, Beardsley M, Wenston J, Tortu S. Gender differences and other factors associated with HIV testing in a national sample of active drug injectors. *AIDS Educ Prev* 1997;9(4):342-358.
- (40) Kilbourne AM, Andersen RM, Asch S, Nakazono T, Crystal S, Stein M, et al. Response to symptoms among a U.S. national probability sample of adults infected with human immunodeficiency virus. *Medical Care Res and Rev* 2002;59(1):36-58.
- (41) Box TL, Olsen M, Oddone EZ, Keitz SA. Healthcare access and utilization by patients infected with human immunodeficiency virus: does gender matter? *J Women's Health* 2003;12(4):391-397.
- (42) Kass N, Flynn C, Jacobson L, Chmiel JS, Bing EG. Effect of race on insurance coverage and health service use for HIV-infected gay men. *J Acquir Immune Defic Syndr* 1999;20(1):85-92.
- (43) Cronquist A, Edwards V, Galea S, Latka M, Vlahov D. Health care utilization among young adult injection drug users in Harlem, New York. *J Subst Abuse* 2001;13(1-2):17-27.
- (44) Gardner LI, Holmberg SD, Moore J, Arnsten JH, Mayer KH, Rompalo A, et al. Use of highly active antiretroviral therapy in HIV-infected women: impact of HIV specialist care. *J Acquir Immune Defic Syndr* 2002;29(1):69-75.
- (45) Bindman AB, Osmond D, Hecht FM, Lehman JS, Vranizan K, Keane D, et al. Multistate evaluation of anonymous HIV testing and access to medical care. Multistate Evaluation of Surveillance of HIV (MESH) Study Group. *J of Am Med Assoc* 1998;280(16):1416-1420.
- (46) Ebrahim SH, Anderson JE, Weidle P, Purcell DW. Race/ethnic disparities in HIV testing and knowledge about treatment for HIV/AIDS: United States, 2001. *AIDS Patient Care STDS* 2004;18(1):27-33.
- (47) Mosen DM, Wenger NS, Shapiro MF, Andersen RM, Cunningham WE. Is access to medical care associated with receipt of HIV testing and counselling? *AIDS Care* 1998;10(5):617-628.
- (48) Sullivan PS, Lansky A, Drake A, Investigators H-. Failure to return for HIV test results among persons at high risk for HIV infection: results from a multistate interview project. *J Acquir Immune Defic Syndr* 2004;35(5):511-518.
- (49) Cunningham WE, Hays RD, Ettl MK, Dixon WJ, Liu RC, Beck CK, et al. The prospective effect of access to medical care on health-related quality-of-life outcomes in patients with symptomatic HIV disease. *Med Care* 1998;36(3):295-306.
- (50) Cunningham WE, Hays RD, Williams KW, Beck KC, Dixon WJ, Shapiro MF. Access to medical care and health-related quality of life for low-income persons with symptomatic human immunodeficiency virus. *Med Care* 1995;33(7):739-754.
- (51) McLaughlin TJ, Soumerai SB, Weinrib D, Aupont O, Cotton D. The association between primary source of ambulatory care and access to and outcomes of treatment among AIDS patients. *Int J Qual Health Care* 1999;11(4):293-300.
- (52) Montgomery JP, Gillespie BW, Gentry AC, Mokotoff ED, Crane LR, James SA. Does access to health care impact survival time after diagnosis of AIDS? *AIDS Patient Care STDS* 2002;16(5):223-231.
- (53) Hogg RS, Schechter MT, Montaner JS, Goldstone I, Craib K, O'Shaughnessy MV. Impact of HIV infection and AIDS on death rates in British Columbia and Canada. *Can Med Ass Journal* 1994;150(5):711-717.
- (54) Katz MH, Hsu L, Lingo M, Woelffer G, Schwarcz SK. Impact of socioeconomic status on survival with AIDS. *Am J of Epi* 1998;148(3):282-291.
- (55) Rapiti E, Porta D, Forastiere F, Fusco D, Perucci CA. Socioeconomic status and survival of persons with AIDS before and after the introduction of highly active antiretroviral therapy. Lazio AIDS Surveillance Collaborative Group. *Epidemiology* 2000;11(5):496-501.
- (56) Wood E, Montaner JS, Chan K, Tyndall MW, Schechter MT, Bangsberg D, et al. Socioeconomic status, access to triple therapy, and survival from HIV-disease since 1996. *AIDS* 2002;16(15):2065-2072.

- (57) Kahn JG, Zhang X, Cross LT, Palacio H, Birkhead GS, Morin SF. Access to and use of HIV antiretroviral therapy: variation by race/ethnicity in two public insurance programs in the U.S. *Public Health Rep* 2002;117(3):252-262.
- (58) Keruly JC, Conviser R, Moore RD. Association of medical insurance and other factors with receipt of antiretroviral therapy. *Am J of Pub Health* 2002;92(5):852-857.
- (59) Graham NM, Jacobson LP, Kuo V, Chmiel JS, Morgenstern H, Zucconi SL. Access to therapy in the Multicenter AIDS Cohort Study, 1989-1992. *J of Clin Epidemiol* 1994;47(9):1003-1012.
- (60) Bing EG, Kilbourne AM, Brooks RA, Lazarus EF, Senak M. Protease inhibitor use among a community sample of people with HIV disease. *J Acquir Immune Defic Syndr* 1999;20(5):474-480.
- (61) Attia S, Egger M, Muller M, Zwahlen M, Low N. Sexual transmission of HIV according to viral load and antiretroviral therapy: systematic review and meta-analysis. *AIDS* 2009;23(11):1397-1404.
- (62) Bisailon LM. Human rights consequences of mandatory HIV screening policy of newcomers to Canada. *Health Hum Rights* 2010;12(2):119-134.
- (63) Bierman AS, Angus J, Ahmad F, Degani N, Vahabi M, Glazier RH, et al. Access to health care services. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto, Canada, 2009/10.
- (64) Booth RE, Watters JK, Chitwood DD. HIV risk-related sex behaviors among injection drug users, crack smokers, and injection drug users who smoke crack. *Am J Public Health* 1993;83(8):1144-1148.
- (65) Booth RE. Gender differences in high-risk sex behaviours among heterosexual drug injectors and crack smokers. *Am J Drug Alcohol Abuse* 1995;21(4):419-32.
- (66) Ball A, Beg M, Moeller M, Steen R, Weiler G. Policy and programming guide for HIV/AIDS prevention and care among injection drug users. In: de Zoysa I, O'Reilly K, editors. Geneva, Switzerland: World Health Organization, Department of HIV/AIDS, Treatment and Prevention Scale up, 2005:1-99.
- (67) Sylvestre DL, Zweben JE. Integrating HCV services for drug users: a model to improve engagement and outcomes. *Int J Drug Policy* 2007;18(5):406-410.
- (68) Ontario HIV Epidemiologic Monitoring Unit. Accessed: <http://www.phs.utoronto.ca/ohemu/mandate.html>. Toronto: Dalla Lana School of Public Health, University of Toronto, Ontario Ministry of Health and Long-Term Care, 2011.
- (69) Justice AC. HIV and aging: time for a new paradigm. *Curr HIV/AIDS Rep* 2010;7(2):69-76.
- (70) Scandlyn J. When AIDS became a chronic disease. *West J Med* 2000;172(2):130-133.
- (71) Epping-Jordan JE, Pruitt SD, Bengoa R, Wagner EH. Improving the quality of health care for chronic conditions. *Qual Saf Health Care* 2004;13(4):299-305.
- (72) Kellerman SE, Lehman JS, Lansky A, Stevens MR, Hecht FM, Bindman AB, et al. HIV testing within at-risk populations in the United States and the reasons for seeking or avoiding HIV testing. *J Acquir Immune Defic Syndr* 2002;31(2):202-210.
- (73) Johnson M, Phillips A, Wilkinson D. HIV infection. *Clin Evid* 2002(8):693-701.
- (74) Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database Syst Rev* 2002(1):CD003255.
- (75) Worthington C, Myers T. Factors underlying anxiety in HIV testing: risk perceptions, stigma, and the patient-provider power dynamic. *Qual Health Res* 2003;13(5):636-655.
- (76) Wolitski RJ, Pals SL, Kidder DP, Courtenay-Quirk C, Holtgrave DR. The effects of HIV stigma on health, disclosure of HIV status, and risk behavior of homeless and unstably housed persons living with HIV. *AIDS Behav* 2009;13(6):1222-1232.
- (77) Malcolm JA, Jr. HIV, public health, and politics. *Pa Med* 1998;101(3):6.
- (78) Castilla J, Del Romero J, Hernando V, Marinovich B, Garcia S, Rodriguez C. Effectiveness of highly active antiretroviral therapy in reducing heterosexual transmission of HIV. *J Acquir Immune Defic Syndr* 2005;40(1):96-101.



- (79) Constantine NT, Zink H. HIV testing technologies after two decades of evolution. *Indian J Med Res* 2005;121(4):519-538.
- (80) Centers for Disease Control and Prevention. 1993 Revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. *Morbidity and Mortality Weekly Report* 1992;41(RR-17):17.
- (81) Health Canada. Revision of the surveillance case definition for AIDS in Canada. *Can Commun Dis Rep* 1993;19(23):196-197.
- (82) Service Ontario. Health Protection and Promotion Act. Ontario Regulation 559/91. Specification of reportable diseases. [http://www.e-laws.gov.on.ca/html/regs/english/elaws\\_regs\\_910559\\_e.htm](http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_910559_e.htm), 2011.
- (83) Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS Report on the global AIDS epidemic 2010 at: [http://www.unaids.org/globalreport/Global\\_report.htm](http://www.unaids.org/globalreport/Global_report.htm), 2010.
- (84) Messeri PA, Abramson DM, Aidala AA, Lee F, Lee G. The impact of ancillary HIV services on engagement in medical care in New York City. *AIDS Care* 2002;14 Suppl 1:S15-29.
- (85) Conviser R, Pounds MB. The role of ancillary services in client-centred systems of care. *AIDS Care* 2002;14 Suppl 1:S119-31.
- (86) Katz MH, Cunningham WE, Mor V, Andersen RM, Kellogg T, Zierler S, et al. Prevalence and predictors of unmet need for supportive services among HIV-infected persons: impact of case management. *Med Care* 2000;38(1):58-69.
- (87) Halkitis PN, Kupprat SA, Mukherjee PP. Longitudinal associations between case management and supportive services use among black and Latina HIV-positive women in New York City. *J Women's Health* 2010;19(1):99-108.
- (88) Magnus M, Schmidt N, Kirkhart K, Schieffelin C, Fuchs N, Brown B, et al. Association between ancillary services and clinical and behavioral outcomes among HIV-infected women. *AIDS Patient Care STDS* 2001;15(3):137-145.
- (89) Cain R. Environmental change and organizational evolution: reconsidering the niche of community-based AIDS organizations. *AIDS Care* 1997;9(3):331-344.
- (90) Ndlovu U, Ion A, Carvalhal A. "My children and my home": the most recent and challenging stressors of HIV-positive women. *Arch Women's Ment Health* 2010;13(3):215-22.
- (91) Williams P, Narciso L, Browne G, Roberts J, Weir R, Gafni A. Characteristics of people living with HIV who use community-based services in Ontario, Canada: implications for service providers. *J Assoc Nurses AIDS Care* 2005;16(4):50-63.
- (92) Crook J, Browne G, Roberts J, Gafni A. Impact of support services provided by a community-based AIDS service organization on persons living with HIV/AIDS. *J Assoc Nurses AIDS Care* 2005;16(4):39-49.
- (93) AIDS Bureau; Ontario Ministry of Health and Long-Term Care; Public Health Agency of Canada. OCHART: The view from the front lines: fourth annual summary and analysis of data provided by community-based HIV/AIDS services in Ontario to the end of fiscal year 2008-09, 2010.
- (94) Althoff KN, Gange SJ, Klein MB, Brooks JT, Hogg RS, Bosch RJ, et al. Late presentation for human immunodeficiency virus care in the United States and Canada. *Clin Infect Dis* 2010;50(11):1512-1520.
- (95) Smith K, Tierney C, Daar E, Mollan K, Budhathoki C, Sax P, et al. Association of Race/Ethnicity and Sex on Outcomes in ACTG Study. Poster presentation. Available at: <http://www.retroconference.org/2011/Abstracts/41176.htm>. 18th Conference on Retroviruses and Opportunistic Infections. Boston, February 27 to March 2, 2011.
- (96) Nicastrì E, Leone S, Angeletti C, Palmisano L, Sarmati L, Chiesi A, et al. Sex issues in HIV-1-infected persons during highly active antiretroviral therapy: a systematic review. *J Antimicrob Chemother* 2007;60(4):724-732.
- (97) Jarrin I, Gekus R, Bhaskaran K, Prins M, Perez-Hoyos S, Muga R, et al. Gender differences in HIV progression to AIDS and death in industrialized countries: slower disease progression following HIV seroconversion in women. *Am J Epidemiol* 2008;168(5):532-540.



- (98) Thompson MA, Aberg JA, Cahn P, Montaner JS, Rizzardini G, Telenti A, et al. Antiretroviral treatment of adult HIV infection: 2010 recommendations of the International AIDS Society-USA panel. *J of Am Med Assoc* 2010;304(3):321-333.
- (99) Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents Department of Health and Human Services, 2006:1-122. Available at <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL000629.pdf>.
- (100) Remis RS, Guenter D, King S. Testing pregnant women in Canada for HIV. How are we doing? *Can Fam Physician* 2001;47:2193-5, 2199-202.
- (101) Ministry of Health and Long-Term Care. Prenatal HIV Screening Program, 2011. Available at [http://www.health.gov.on.ca/english/providers/program/hiv aids/prenatal/prenatal\\_mn.html](http://www.health.gov.on.ca/english/providers/program/hiv aids/prenatal/prenatal_mn.html)
- (102) World Health Organization. New guidance on prevention of mother-to-child transmission of HIV and infant feeding in the context of HIV. Available at: <http://www.who.int/hiv/pub/mtct/PMTCTfactsheet/en/index.html>, 2010.
- (103) Bitnun SA. Guidelines for the prevention of mother-to-child HIV transmission. Toronto: Hospital for Sick Children, Division of Infectious Diseases, 2011.
- (104) English K. Ontario women and HIV/AIDS: epidemiology and update on AIDS Bureau initiatives presented at the Ontario Women's Expert Advisory Committee Meeting: AIDS Bureau, Ministry of Health and Long-Term Care, 2010.
- (105) Ware JE, Kosinski M, Turner-Bowker D, Gandek B. *User's manual for the SF-12v2 Health Survey*. Lincoln, Rhode Island, 2002.
- (106) Ware J, Kosinski M, Bjorner J, Turner-Bowker D, Gandek B, Maruish M. *User's manual for the SF-36v2 health survey*. Lincoln, Rhode Island, 2007.
- (107) Mellors JW, Munoz A, Giorgi JV, Margolick JB, Tassoni CJ, Gupta P, et al. Plasma viral load and CD4+ lymphocytes as prognostic markers of HIV-1 infection. *Ann Intern Med* 1997;126(12):946-954.
- (108) Rank C, Remis RS, Swantee C, Wu K. Viral load uptake to evaluate HIV care in Ontario. *18th Annual Canadian Conference on HIV/AIDS Research, April 23-26, Vancouver, BC: Can J of Infect Dis* 20 (Suppl B):76B (Abstract P230), 2009.
- (109) Rachlis AR, Zarowny DP. Guidelines for antiretroviral therapy for HIV infection. Canadian HIV Trials Network Antiretroviral Working Group. *Can Med Assoc J* 1998;158(4):496-505.
- (110) Centers for Disease Control and Prevention. Update: trends in AIDS incidence, deaths, and prevalence-United States, 1996. *Morb Mortal Wkly Rep* 1997;46(8):165-173.
- (111) National Center for Health Statistics. Health, United States, 2009: with special feature on medical technology. Hyattsville, MD, 2009.
- (112) Crum-Cianflone NF, Grandits G, Echols S, Ganesan A, Landrum M, Weintrob A, et al. Trends and causes of hospitalizations among HIV-infected persons during the late HAART era: what is the impact of CD4 counts and HAART use? *J Acquir Immune Defic Syndr* 2010;54(3):248-57.
- (113) Buchacz K, Baker RK, Moorman AC, Richardson JT, Wood KC, Holmberg SD, et al. Rates of hospitalizations and associated diagnoses in a large multisite cohort of HIV patients in the United States, 1994-2005. *AIDS* 2008;22(11):1345-1354.
- (114) Floris-Moore M, Lo Y, Klein RS, Budner N, Gourevitch MN, Moskaleva G, et al. Gender and hospitalization patterns among HIV-infected drug users before and after the availability of highly active antiretroviral therapy. *J Acquir Immune Defic Syndr* 2003;34(3):331-337.
- (115) Paul S, Gilbert HM, Lande L, Vaamonde CM, Jacobs J, Malak S, et al. Impact of antiretroviral therapy on decreasing hospitalization rates of HIV-infected patients in 2001. *AIDS Res Hum Retroviruses* 2002;18(7):501-6.
- (116) Canadian Institute for Health Information. Hospitalization for HIV/AIDS in Canada, poster presentation. Toronto: Canadian Institute for Health Information (CIHI), 2006.

- (117) Hessel NA, Pipkin S, Schwarcz S, Cress RD, Bacchetti P, Scheer S. The impact of highly active antiretroviral therapy on non-AIDS-defining cancers among adults with AIDS. *Am J Epidemiol* 2007;165(10):1143-1153.
- (118) Fleishman JA, Hellinger FH. Recent trends in HIV-related inpatient admissions 1996-2000: A 7-state study. *J Acquir Immune Defic Syndr* 2003;34(1):102-110.
- (119) Brady MT, Oleske JM, Williams PL, Elgie C, Mofenson LM, Dankner WM, et al. Declines in mortality rates and changes in causes of death in HIV-1-infected children during the HAART era. *J Acquir Immune Defic Syndr* 2010;53(1):86-94.
- (120) Wilson IB, Landon BE, Marsden PV, Hirschhorn LR, McInnes K, Ding L, et al. Correlations among measures of quality in HIV care in the United States: cross sectional study. *BMJ* 2007;335(7629):1085.
- (121) Ministry of Health and Long Term Care. Ontario Drug Benefit: Trillium Drug Program. Available at: <http://www.health.gov.on.ca/english/public/pub/drugs/trillium.html>
- (122) Remis RS, Swantee C, Schiedel L, Liu J. Report on HIV/AIDS in Ontario 2006. Toronto, Canada: Ontario HIV Epidemiologic Monitoring Unit, University of Toronto, 2008.
- (123) The University Health Network Women's Health Program, The Centre For Research In Women's Health, The Institute For Clinical Evaluative Sciences. Ontario Women's Health Status Report, 2002.
- (124) Joint United Nations Programme on HIV/AIDS (UNAIDS). Position Statement on Condoms and HIV Prevention July 2004. Available at: [http://data.unaids.org/una-docs/condom-policy\\_jul04\\_en.pdf](http://data.unaids.org/una-docs/condom-policy_jul04_en.pdf)
- (125) Joint United Nations Programme on HIV/AIDS (UNAIDS). 2004 report on the global HIV/AIDS epidemic. Available at: [http://www.un.org.np/sites/default/files/report/tid\\_107/Global\\_Report\\_2004.pdf](http://www.un.org.np/sites/default/files/report/tid_107/Global_Report_2004.pdf)
- (126) Public Health Agency of Canada. Enhanced surveillance of risk behaviours among injecting drug users in Canada. Phase I Report, August 2006. Available at: <http://www.phac-aspc.gc.ca/i-track/sr-re-1/index-eng.php>: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control.
- (127) AIDS Bureau, Ministry of Health and Long-Term Care, Public Health Agency of Canada, Ontario Region. The view from the front lines summary and preliminary analysis of data provided by community-based HIV/AIDS services in Ontario 2001/02 to 2005/06. 2007.
- (128) World Health Organization. Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: towards universal access: recommendations for a public health approach. Geneva, Switzerland, 2006.
- (129) Dorenbaum A, Cunningham CK, Gelber RD, Culnane M, Mofenson L, Britto P, et al. Two-dose intrapartum/newborn nevirapine and standard antiretroviral therapy to reduce perinatal HIV transmission: A randomized trial. *J of Am Med Assoc* 2002; 288:189-198.
- (130) Wu AW, Gifford A, Asch S, Cohn SE, Bozzette SA, Yurk R. Quality-of-Care Indicators for HIV/AIDS. *Disease Management and Health Outcomes* 2000;7(6):315-330.
- (131) Wu A, Gifford A, Asch S. Quality of Care Indicators for HIV/AIDS. Discussion Paper for the Foundation for Accountability. Available at: <http://www.policyarchive.org/handle/10207/bitstreams/95532.pdf>. FACCT—The Foundation for Accountability. Portland, Oregon, 1998.
- (132) National Center for Health Statistics. Health, United States, 2006. With Chartbook on Trends in the Health of Americans. Available at: <http://www.cdc.gov/nchs/data/hs/hs06.pdf#097>. Hyattsville, MD, 2006.
- (133) Association of Public Health Epidemiologists in Ontario. Core Indicators for Public Health in Ontario. Available at: <http://www.apheo.ca/>.
- (134) Johnson I, Goettler F, Goral A, Leffley A, Lueske B, Lee-Han H, et al. Report on the health status of the residents of Ontario. Ontario: Public Health Research, Education & Development Program, February 2000.
- (135) Thomas S. Combining cycles of the Canadian Community Health Survey. *Proceedings of Statistics Canada Symposium 2006: Methodological Issues in Measuring Population Health*. Ottawa, 2006.

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Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# Older Women's Health

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## INSIDE

- Burden of Illness
- Chronic Disease Management
- Settings of Care for Older Adults



Project for an Ontario Women's Health Evidence-Based Report



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Improving Health and Promoting Health Equity in Ontario**

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# Executive Summary

## ISSUE

Aging is an important women's health issue. Canada's aging population is presenting unique challenges to the health system on multiple fronts.

Women comprise the majority of the older population and have different patterns of illness and health needs than men. In 2005, 13 percent of the Canadian population was aged 65 or older, and this number is projected to increase to more than 25 percent by 2056.<sup>1</sup> Older adults have a high burden of chronic disease and multiple chronic conditions requiring a patient-centred (rather than a disease-specific) approach to their care. Both social and biological factors result in important differences in the health and the health care needs of older women and men. Older women are more likely to have a greater burden of illness including multiple chronic conditions, more functional limitations, and a higher prevalence of disability than older men. Therefore, the mismatch between the way health and supportive care services are organized and the needs of older adults disproportionately impacts women.<sup>2</sup>

For over a century now, women in Canada have outlived men, though the difference in life expectancy between men and women is narrowing.<sup>3,4</sup> At the age of 65, the life expectancy of a woman is more than 21 years while that for a man is three years less at 18 years.<sup>3</sup> Not surprisingly, there are more women than men among our older adults, particularly among the oldest age groups.<sup>5</sup> Today's generation of older women, grew up in very different circumstances and had fewer opportunities than women growing up today. Currently, older women tend to have fewer financial resources, less education, fewer years experience in the workforce, and less experience managing family finances compared to older men.

Accordingly, today's older women may be less able to pay for supportive care and to access health services that are not publicly funded. Older women are more likely to live alone, and are more likely to be caregivers than men. As a result of these and other factors, older women are more likely to require formal home care and long-term care services.

The current health system was developed to meet acute care needs—not to provide coordinated patient-centred care for chronic conditions—and is ill-prepared to meet the growing demand of the aging population. Furthermore, health and community services tend to be fragmented and require integration and coordination to maximize effectiveness. Many different health care professionals are needed to provide effective care to older

### ABOUT THIS REPORT

**The report has three sections:**

- A. Burden of Illness
- B. Chronic Disease Management
- C. Settings of Care for Older Adults



adults, including primary and specialty physicians, nurses, physical therapists, social workers, and personal care workers. The current primary care delivery system often has challenges in meeting the needs of chronically ill older patients. Furthermore, many health care providers have little training in the care of older adults.<sup>6, 7</sup> Ontario has only a handful of geriatricians, the group of physicians who specialize in the care of frail older individuals. Accordingly, we will need to explore alternate models of care to meet the pending health care challenge of caring for this vulnerable group of individuals.

Aging is an issue that affects all of us, whether caring for loved ones or through our own personal experiences. Fortunately, there is much that can be done to help older adults remain active and independent as they age. There is a growing body of evidence for effective models of care for older adults with chronic illness, both to reduce risk and improve outcomes for those with chronic conditions. Performance measurement and reporting can play an important role in guiding and evaluating improvement efforts. To optimize outcomes, interventions need to be gender sensitive and specifically address the needs of those who are socioeconomically disadvantaged. In this report we provide evidence on the access, quality and outcomes of care for older women and men in Ontario, their health status, and how this varies by income and geography. In doing so, we identify multiple opportunities for improvement. Our findings can be used to inform priority setting, target interventions, and provide a baseline from which to monitor progress.

In Section A describes the **burden of illness** among Ontario's older women and men including: chronic disease (the prevalence of selected conditions, comorbidity, incidence of certain cancers), chronic disease risk factors (low income, health behaviours) and health and functional status (self-rated health, activity limitations, limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL), activities prevented by pain). Section B includes indicators of **chronic disease management**, including measures of specialized physician care and services, as well as health

outcomes (cause-specific rates of emergency department visits, hospital admissions, hospital readmissions, mortality, and low-trauma fracture rates). Section C takes a closer look at **settings of care of older adults**.

This section provides information on those receiving home care services and those residing in long-term care. We obtained information about those receiving home care services and explored a variety of indicators including use of home care services and unmet home care needs, as well as changes in functional status, inadequate pain control, prevalence of depressed mood, changes in cognitive impairment, and the prevalence of injuries among long-stay home care clients. In addition, we explored indicators of relevance to older women in long-term care facilities. These include emergency department visits, worsened functional status, prevalence of pain, worsened cognitive ability, new pressure ulcers, use of restraints and potentially inappropriate prescribing among long-term care residents.

## STUDY

The indicators that we report include selected indicators presented in previous POWER Study chapters, as well as new indicators on home care and long-term care. Bringing together and synthesizing findings from across POWER Study chapters allows us to paint a picture of the health needs of older women so as to inform needed changes in practice and policy. While the indicators of home care and long-term care are regularly reported by Health Quality Ontario (HQO), we build on HQO reports by incorporating a gender and equity analysis (see [the POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts and different experiences with health care which, together with differences in biology, contribute to observed gender differences in health. While these indicators provide a wealth of information, they are not comprehensive. Indicators do not exist for everything that is relevant to older women. Some key areas such as cognitive impairment, dementia, and informal caregiving are under developed.

The definition of old age is changing as life expectancy increases. Accordingly, we provide important information on those who are aged 80 and older—the vast majority of whom are women. Our work is novel in that we report rates and total numbers for each of our indicators. Even when rates of an event are similar between women and men (or in some cases higher in men than in women), the predominance of women in the older population means that more women than men in the population will experience the event. In order to emphasize this important point, we use variable column width graphs which show traditional rates, but use also illustrate the differences in the total numbers by varying the widths of the bars.

Data from several sources were used to produce this report (See [Appendix 1](#) for a complete list of indicators in this report and their data sources). These include: Statistics Canada's 2006 Census; the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1), 2005 (Cycle 3.1) and 2007–08; Ontario Health Insurance Plan (OHIP) data; the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); the National Ambulatory Care Reporting System (NACRS);

the Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB); the Ontario Diabetes Database (ODD); the Ontario Cancer Registry (OCR); the Cardiac Care Network (CCN); the Ontario Physician Human Resources Data Centre, Active Physician Registry; IntelliHEALTH; the Home Care Reporting System (HCRS); and the Continuing Care Reporting System (CCRS). The CCHS includes only the community-dwelling population; therefore, indicators based on CCHS data exclude older adults in long-term care homes. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter ([Appendix 1](#) of this report lists the original POWER chapter in which indicators were reported). See [Appendix 2](#) of this report for more detail on newly reported indicators.

Data were first stratified by sex and then further stratified by age, income and Local Health Integration Network (LHIN), as allowed by data availability and sample size. Age- or risk-adjustment was done where appropriate. If not otherwise stated, reported differences are statistically significant. [Appendix 2](#) provides a more detailed description of research methods.



## KEY FINDINGS

### **Women are disproportionately represented in the older population, and particularly among those who reside in long-term care and have unique needs.**

The majority of older people are women. The percentage of women is particularly high among those who are of advanced age and among those who are living in long-term care. In long-term care in Canada, the average age of residents is about 86 years and close to two-thirds of those living in this setting are women.<sup>8</sup>

Older women have unique health needs. In part, this is based on the fact that older women are more likely than men to have multiple chronic conditions (65 percent versus 58 percent). This difference in prevalence is magnified when we look at the total number of older adults who have multiple chronic conditions. The total number of women aged 80 and older reporting two or more chronic conditions is twice as high as the number of older men ([Exhibit A.4](#)). Low socioeconomic status is an important additional risk factor for chronic conditions and is associated with worse outcomes for these conditions. Older women are much more likely to have low incomes than older men. In Ontario, an estimated 288,576 women and 185,806 men aged 65 and older are living in lower-income households ([Exhibit A.8](#)).

Cancer is increasingly recognized as a chronic condition and cancer rates increase with age. Some cancers, like breast cancer, are primarily cancers of women ([Exhibit A.6](#)). Cancers such as colorectal and lung occur in both men and women and have traditionally been perceived as a more important problem for men. Unfortunately gender differences in lung cancer incidence have narrowed. This is due in part to the increased uptake of smoking among women. In addition, there is an increased risk of cancer among women who smoke compared to men who smoke. Further, because older women outnumber older men, the number of women who experience

these types of cancer is now close to or greater than the number of men ([Exhibit A.7](#)). Accordingly cancer, and in particular those cancers that have not traditionally been associated with older women, are important conditions for older women.

There is greater use of home care services by older women, both in terms of the rate of use and by the total number of women using these services ([Exhibit C.2](#)). This may reflect the complexity that results from having multiple chronic medical conditions. Having multiple chronic conditions may also predispose women to have functional impairments that can threaten their independence. Further, this need for formal caregiving may relate to older women being more likely to live alone and to have less access to informal caregiving support than men. Older women's increased likelihood of lower socioeconomic status may limit or prohibit hiring private caregiving. Even though more older women report that they used home care services than older men, women are also more likely to report unmet need for these services ([Exhibit C.6](#)). This difference was found in terms of the rates and total numbers of people who access these services. This trend was consistent in both the younger (aged 65–79) and older (aged 80 and older) age groups and in the lower- and higher-income groups.

### **Most older adults report health behaviours that increase their risk for developing chronic conditions or lead to worse health outcomes among those with existing conditions.**

An increased focus on prevention, both primary and secondary, is required if we are to improve quality of life for older adults. For those without chronic conditions, it is important to prevent the development of these conditions (primary prevention). For others who already have one or more chronic conditions, the goal should be to prevent these conditions from getting worse (secondary prevention) and to improve quality of life.

Being physically active, having a diet with adequate fruits and vegetable intake, and not smoking are three behaviours that people can adopt to modify, maintain, and improve their health. We found that more than half of all older adults reported being inactive (55 percent). Older women were more likely to be physically inactive than older men (60 percent versus 48 percent). Both women and men reported a diet that was inadequate in fruits and vegetables and nearly one in 10 older adults were smokers ([Exhibit A.10](#)). These behavioural risk factors which increase the risk of chronic conditions tend to be more common among lower-income individuals. Older women living in the lowest-income households were more likely to be physically inactive, report having inadequate fruit and vegetable intake or being a current smoker compared to wealthier women ([Exhibit A.11](#)). Inadequate physical activity and poor diet lead to being overweight or obese which is far too common among older women and men.

Although there are many changes individuals can make to improve their health, less than half of older adults (45 percent) reported that they took steps to improve their health in the past year. When steps were taken to improve health, the most common change reported was an increase in physical activity (41 percent). Women and men were equally likely to report making such a change. Among both women and men, the proportion who made such a change decreased with age ([Exhibit A.13](#)).

Maintaining good medical health also requires optimizing oral health. Good oral health is a prerequisite for good nutrition and poor oral health is associated with an increased risk of a number of chronic conditions. Close to half of older adults (45 percent) did not visit a dentist in the past 12 months. This percentage rose in the older age group to more than half (55 percent of women and 54 percent of men aged 80 and older) ([Exhibit A.20](#)). This is particularly

important because dental services are not funded within our health care system. Accordingly, access can be related to socioeconomic status.

### **Older women were more likely than men to report disability and chronic pain.**

Older women were more likely to have limitations in their instrumental activities of daily living (IADLs) or in their activities of daily living (ADLs) relative to older men ([Exhibit A.17](#)). The percentage of adults with functional limitations increased steadily with age. Among those aged 80 and older, nearly two-thirds of women and one-half of men reported IADL and/or ADL limitations ([Exhibit A.17](#)). Given that women are disproportionately represented in the older population, this translates into nearly twice as many older women with an IADL and/or ADL limitation as older men (370,123 women versus 189,233 men) ([Exhibit A.17](#)). Functional status is closely connected to chronic medical conditions and ultimately to the ability to live an independent life. Through prevention and effective chronic disease management, we may prolong the time that older women and men can live in an independent manner if they wish to remain in their homes. Maintaining functional independence is particularly important for older women who may be living alone. Loss of functional independence combined with less access to financial resources may mean that they may require an earlier move to long-term care.

Women were more likely to have their activities limited by pain than men (26 percent of women and 18 percent of men) ([Exhibit A.17](#)). Low-income women, women aged 80 and older, and those with chronic conditions were even more likely to report that their activities were limited by pain than their counterparts. More than one in three low-income women reported that their activities were limited by pain ([Exhibit A.19](#)). In addition, more than one in three women who reported

having a musculoskeletal condition also reported that their activities were limited by pain ([Exhibit A.18](#)). This is consistent with other reports that suggest women are more likely than men to experience painful conditions such as arthritis and are less likely to receive adequate pain control. Restrictions in functioning due to pain are important to identify because pain can be managed and functioning restored.

In home and long-term care settings, many people experience a decline in IADLs/ADLs or cognitive functioning that could be potentially prevented or slowed. Maintaining this function and good cognitive status is important to quality of life at all life stages. Thus, a focus on function and cognitive status is needed in all care settings.

**Much of the observed disability among older adults is due to chronic conditions.**

Where possible, we need to screen for chronic conditions and their risk factors so that preventive strategies can be initiated and these chronic conditions can be better managed. Diagnosis and treatment for selected conditions decreased with increasing age for both women and men ([Exhibits B.4, B.6, B.8](#)). Rates of coronary angiography referral after an AMI were lower in women than men. Bone mineral density testing rates were lower in men (among older adults who had a low-trauma fracture, 21 percent of women versus 16 percent of men received a BMD test within one year of their fracture) ([Exhibit B.8](#)). Medical oncology referral where rates were similar in women and men in both age groups ([Exhibit B.6](#)).

There is opportunity to improve chronic disease management through patient-centred interdisciplinary models of care and thus improve health and functional status, leading to improved quality of life. By identifying and treating conditions like osteoporosis, we can hopefully prevent fractures and some of the decline that is associated with these conditions.

**There were high rates of potentially avoidable hospital admissions for common chronic conditions (heart failure, chronic obstructive pulmonary disease, diabetes) among older women and men. These rates increased with age and were highest among those aged 80 and older.**

We documented high rates of admission for ambulatory care sensitive conditions that increased with age, with higher rates in men compared to women in both age groups ([Exhibit B.11](#)). Nevertheless, given the predominance of women in the older age groups, a similar number of women and men were hospitalized for these conditions. This situation may relate to a current system of care where management of chronic conditions in ambulatory settings may be suboptimal. Care coordination is a big concern in the current health system and fragmentation between different providers and different settings can result in poor patient outcomes. The high hospitalization rates suggest that current practices may not be effective. Optimal care for chronic conditions often benefits from the input of inter-professional teams with formal mechanisms for communication and care coordination. Opportunities to work across disciplines and across the primary care, home care, acute care, and long-term care sectors may lead to improved outcomes for older people and fewer hospitalizations for conditions that should be preventable.

**Among those receiving home care, there are opportunities to improve care for both women and men.**

An important goal of home care is to optimize independence and to decrease the rate of both physical and cognitive decline. Using the crude estimates, women were more likely than men to experience inadequate pain control (23 percent of women versus 19 percent of men) ([Exhibit C.10](#)), depressed mood (9.0 percent of women and 7.9 percent of men) ([Exhibit C.11](#)) and injuries (14 percent of women and 9 percent of men) ([Exhibit C.13](#)); while, men were more likely than women to experience a



new ADL impairment or one that failed to improve (43 percent of women versus 53 percent of men) ([Exhibit C.7](#)) or cognitive decline (51 percent of women versus 61 percent of men) ([Exhibit C.12](#)). These differences were eliminated with risk adjustment, indicating that women and men receiving home care differ in health status, but experience similar outcomes when these differences are taken into account. Therefore, gender-sensitive interventions may be needed to improve health outcomes in this setting. In all cases, the number of women who experienced these outcomes was far greater than the number of men, especially among those aged 80 and older.

**Among residents of long-term care, there were few gender differences on reported quality indicators after risk-adjustment.**

However, there were many opportunities to improve care for both women and men. The fact that the number of women in long-term care homes is far greater than the number of men makes these issues of particular concern for older women.

Emergency department transfers from long-term care were common. The rate of potentially preventable emergency department visits was higher for men relative to women (27 visits per 100 men versus 19 visits per 100 women) ([Exhibit C.15](#)). However, given that more women than men reside in long-term care nearly twice as many women had a potentially preventable emergency department visit (8,863 women compared to 4,767 men). Improved chronic disease management in long-term care could help prevent some of these emergency department visits. Rates of transfer to the emergency department or hospitalization for falls was similar between women and men (14 falls per 100 women and 13 falls per 100 men) but the number of hospital visits among women was more than double the number of visits among men (6,498 visits among women compared to 2,254 visits among men) ([Exhibit C.19](#)).

Antipsychotic drugs were prescribed to almost a third of residents aged 65 and older without a diagnosis of psychosis (33 percent of men versus 30 percent of women). Given that more women reside in long-term care, more than twice as many women were exposed to antipsychotic drugs without a diagnosis of psychosis (42,217 women compared to 17,708 men) ([Exhibit C.23](#)). This is somewhat surprising given that anecdotal reports suggest that men are more likely to receive antipsychotics because of perceptions about their greater tendency to exhibit aggressive or disruptive behaviours. Anti-anxiety or hypnotic drugs were prescribed to almost a quarter of residents with no indication of underlying psychotic condition. Women were slightly more likely to be prescribed one of these medications than men (24 percent of women versus 21 percent of men). Given the predominance of older women in long-term care this translates into three times as many women as men receiving these medications (34,261 women compared to 11,499 men) ([Exhibit C.24](#)).

In Ontario, nearly one in five long-term care residents were in daily physical restraints ([Exhibit C.22](#)). This represents a major opportunity for intervention for older women and men. Physical restraints have been linked to a number of serious problems including an increased risk of falls, behavioural problems, and even death. The fact that these rates continue to be so high in Ontario is cause for concern and points to the need for improved strategies to minimize (and hopefully eliminate) their use in long-term care.

Gender similarities were also observed for rates of ADL decline over a three-month period (32 percent of women versus 33 percent of men) ([Exhibit C.16](#)) and rates of cognitive decline (13 percent of women and 14 percent of men) ([Exhibit C.18](#)). Again, given the demographics, this represents far more women than men. While optimal rates of performance on these indicators are not known, a major goal of long-term care is to improve or prevent decline in physical and mental functioning when possible.

**We need to prepare the diverse health care workforce to meet the needs of the aging population.**

Many different health care professionals are needed to provide effective care to older adults including, geriatricians, primary and specialty physicians, nurses, physical therapists, social workers, and personal care workers. Many health care providers have little training in the care of older adults. Overall, there were only five geriatricians per 100,000 adults aged 65 and older in Ontario. This rate varied markedly across Local Health Integration Networks (LHINs), with some LHINs having only one geriatrician per 100,000 older adults ([Exhibit B.1](#)). These numbers provide a stark picture

of the lack of geriatric specialty care in the province of Ontario. This is one marker of the lack of attention that has been given to the area of aging. New models of interdisciplinary care will need to be developed and implemented that can work to maximize this valuable, but limited, resource. These include shared care models where geriatricians work in family health teams and with teams in the community, as well as telemedicine to provide access to consultations and specialty care. Further specialized training for family physicians, nurses, pharmacists, and other health care workers should be provided in the care of older people to improve the skills across disciplines.





## KEY MESSAGES

In this report we paint a picture of the health needs of older women and men, their use of health services, and the quality of care received and how this varies by age, socioeconomic status and where one lives. Older women and men experience a high burden of illness, may receive suboptimal care for chronic conditions, and receive care from multiple settings including home and long-term care. Older women comprise the majority of the older population and have unique needs. Thus, improving the care of older adults, and reducing their burden of illness will require special attention to the needs of older women. We identified a number of opportunities for improvement. The seven strategies below can help us accelerate progress.

### **Design health care delivery systems that account for the different health and social needs of older women and men, as well as their different overall numbers in the population.**

- Older women and men have different health, support, and social needs. Those differences need to be considered in care planning and policy development. This applies in the community and long-term care settings.
- Routine reporting of sex-disaggregated rates and total numbers would provide key information to form the basis for planning for the older population that has a different sex distribution than younger age groups. Both the rates and total numbers need to be reported when describing the health needs of older women and men. Even when the rates are similar between women and men, the predominance of older women in the population means that more women overall may be affected. The net result is that, in almost all cases, there are a greater number of women than men who require specific clinical care and health services.

### **Effective prevention and health promotion strategies to optimize health outcomes among older women need to be implemented as it is better to prevent than treat chronic conditions.**

- Prevention should begin when people are young and continue across the life course to improve population health and reduce the burden of chronic disease. A focus on prevention includes lifestyle changes such as increased physical activity, optimal nutritional intake, and smoking cessation—all of which can help older adults maintain their independence by preventing or slowing functional decline and preventing chronic conditions and their complications. Physical inactivity is more common in older women than in older men. Programs to promote physical activity need to develop activities that target the particular needs of older women.
- The value of both community-based and clinical approaches to prevention in different care settings has been well-documented. Coordination of both approaches is most likely to result in measurable changes in the health of older adults.

### **We need to address socioeconomic status as a barrier to good health across the life course and among older adults.**

- The social determinants of health result in an increased burden of illness by increasing the risk of developing chronic conditions, worsening health and functional status, and creating barriers to healthy lifestyles. Therefore, we need to foster healthy living and working conditions, educational opportunities and specifically address barriers low-income individuals face in making healthy lifestyle changes. Understanding and embracing the contribution of the broader determinants of health is an important foundational concept in providing care and services.

- Access to preventive dental care is important for maintaining health and nutrition. Dental care is an example of a service that is not universally accessible in our existing health care system. Those without private insurance or those with lower socioeconomic status may not be able to afford this service. Poor dentition may impact health and lead to reduced quality of life.

**A focus on improving quality of life and maintaining independence is a priority for older women and men.**

- Strategies are needed that focus on improving quality of life and functional status as disability and frailty are not the inevitable consequences of aging. For those with chronic conditions, common goals are to control symptoms, optimize functioning, and prevent decline. Evaluating health services for older people and determining the value of services should include an assessment of quality of life, functional outcomes, and patient/family satisfaction.
- Integrating population-based and clinical approaches can help reduce the risk of chronic disease and disability and optimize quality of life.

**Develop new integrated clinical care models to address the complex needs and heterogeneity of older adults.**

- We need to rethink our current models of clinical care so that we can better provide care to older women and men who have multiple chronic conditions and functional limitations. Goal setting and care planning should be driven from the perspective of the patient and their individualized priorities. For older adults with longstanding chronic conditions, cure is often not possible and therefore not always the goal.

- Clinical judgment—guided by experience and knowledge of age-related physiological change and the complex interaction of multiple diseases and medications—should temper the routine application of practice guidelines. Strategies need to be developed to support older adults in their decision making. The appropriate application of available treatments should incorporate many decision-making variables including available evidence for efficacy and safety in the context of factors specific to the individual patient and patient preference. Every person, regardless of age or sex, has the right to be treated as an autonomous individual with his or her own unique values, health concepts, and ways of making decisions.
- Age should not be a barrier to good care. Negative attitudes toward seniors in our society and health care system may be overt or subtle. Unrecognized clinician bias may result in a nihilistic perspective that denies the older patient potentially valuable therapy. When clinical circumstances are suitable, medical therapies and interventions of proven efficacy should not be denied on the basis of biologic age alone.
- Managing multiple coexisting chronic conditions demands innovative approaches to care that traditional models of care delivery were not designed to provide. Shared care models and integrated care teams that cross sector and organizational boundaries have been shown to improve health outcomes for seniors and achieve efficiencies in health service utilization. Inter-professional teamwork, as outlined in the Health Force Ontario, Inter-professional Care: Blueprint for Action,<sup>9</sup> is the care delivery method of choice in caring for frail seniors.<sup>10</sup>

- Strategies are required to reduce unnecessary emergency department visits through integration and coordination of services. Where possible, preventive measures should be instituted to manage conditions in the community or the long-term care setting before they become serious enough to require care in the emergency department or an acute care hospital. Health care resources need to target people in the ambulatory setting. Innovative models of care that are accessible to older women and men are required. Opportunities exist for the development of innovative models of care such as the Virtual Ward designed specifically to support vulnerable older adults.

**Increase the number of health care providers specialized in geriatric care and improve the competencies of all health care providers who work with older adults.**

- We have very few geriatric medicine specialists or other health professionals skilled in taking care of the geriatric population in Ontario and in Canada. The health care needs of seniors are often complex and require the services of inter-professional care teams, but specialized geriatric health human resources in Ontario are in scarce supply. The aging demography of Ontario's population will require both an increase in the number of geriatric medicine specialists and care providers across the province, as well as enhanced skills and knowledge distributed across all health disciplines in order to provide quality care to older people.
- Older people require the service of all facets of our health care system. Core competencies in recognizing and managing geriatric syndromes and diseases in older people must be distributed across health care professions and across the system's continuum.

Although models of specialized care are shown to be advantageous when caring for older people, it is not realistic—or necessarily desirable—for care of older people to be sequestered to special units or teams of care providers. Care providers across the system must share the responsibility of caring for older adults.

**Build the evidence-base to optimize care for older adults and enhance data capacity and reporting to guide improvement.**

- Clinical trials often have not included women, those of advanced age, or those who have multiple medical conditions or disabilities. Often clinical guidelines do not provide information on how to best care for older adults who have multiple chronic conditions. Guidelines on when to stop preventive medications such as cholesterol lowering drugs are not available. There is a need to prioritize research on the effectiveness of clinical management as well as models of care to improve care for older adults.
- Quality indicators, when reported, should be stratified by sex and age. Numbers of individuals affected as well as rates should also be routinely reported to capture need. There is a need for indicator development to reflect the complexity of care for older adults, and enhanced data capacity to better measure important domains of health and health care. Collection of patient reported outcomes can provide information on quality of life, functional status, and experiences with care. More detailed clinical data—as can be derived from electronic health records—can allow better assessment of appropriate care. Administrative data can be used to evaluate outcomes of drug treatment. Data on ethnicity would allow assessment of quality and outcomes of care among diverse populations.

# Introduction

Aging is an important women's health issue. Canada's aging population is presenting unique challenges to the health system on multiple fronts. Women comprise the majority of the older population and have different patterns of illness and health needs than men.

In 2005, 13 percent of the Canadian population was aged 65 or older, and this number is projected to increase to more than 25 percent by 2056.<sup>1</sup> Older adults have a high burden of chronic disease; almost 15 percent of older adults in Ontario have diabetes, over 20 percent have heart disease and almost half

## The report has three sections:

- Burden of Illness
- Chronic Disease Management
- Settings of Care for Older Adults

have some form of arthritis.<sup>2</sup> Furthermore, most older adults have two or more chronic conditions requiring a patient-centred rather than disease specific approach to their care.

Previous POWER Study chapters have focussed on all women and provided information on different age groups—this report adds value by providing an in depth look at older women. We report performance on three important categories of quality indicators that provide essential information on the burden of illness among older women and men, describe chronic disease management of common conditions, and also emphasize settings where many older adults receive care (home care and long-term care). We assess how performance on these indicators varies

by sex, age, income, and geography. In doing so, we identify multiple opportunities for improvement. Our findings can be used to inform priority setting, target interventions, and provide a baseline from which to monitor progress.

For over a century now, women in Canada have outlived men, though the difference in life expectancy between men and women is narrowing.<sup>3,4</sup> At the age of 65, the life expectancy of a woman is more than 21 years, while that for a man is 18 years.<sup>3</sup> Not surprisingly, there are more women than men among our older adults, particularly among the oldest age groups. In Ontario, the number of women and men between the ages of 65 and 70 is similar; but for each five-year age group beyond that, women increasingly outnumber men. By the age of 85, women outnumber men by nearly two to one.<sup>5</sup> Further, there are major differences in the number of women and men who are residents in long-term care. In long-term care homes in Canada, the average age of residents is about 86 years and close to two-thirds of those living in this setting are women.<sup>8</sup> Both social and biological factors have resulted in important differences in the health and the health care needs of older women and men.

We begin by examining the burden of illness among older adults. Older women are more likely to have multiple chronic conditions, functional limitations, and disability than older men. The current health system was

developed to meet acute care needs—not to provide coordinated patient-centred care for chronic conditions—and is ill-prepared to meet the growing demand of the aging population. Therefore, the mismatch between the way care is organized for health and supportive care services and the needs of older adults disproportionately impacts women.<sup>2</sup>

Next, we focus on chronic disease management for common conditions. Many different health care professionals are needed to provide effective care to older adults, including primary and specialty physicians, nurses, physical therapists, social workers, and personal care workers. Furthermore, many health care providers have little training in the care of older adults.<sup>6, 7</sup> Ontario has only a handful of geriatricians, the group of physicians who specialize in the care of frail older individuals. This may be a marker of the lack of attention that this area has received. Furthermore, the current primary care delivery system often has challenges in meeting the needs of chronically ill older patients. Accordingly, we will need to explore alternate models of care to meet the pending health care challenge of caring for this vulnerable group of individuals. Because older women and men have different social circumstances, different patterns of illness, and different needs, these models will need to be gender-sensitive to be effective.

Finally, we explore two settings of care—home care and long-term care—that provide critical services for older adults. Older women are more likely than men to require formal home care and long-term care services. This happens for several reasons. Older women are more likely than men to live alone.<sup>1</sup> Women tend to marry men a few years older and more often outlive their husbands. Following the loss of a spouse, women are also less likely to remarry than men. Further, caregiving has traditionally been seen as women's work meaning that men, even healthier ones, tend to provide less support to their wives than vice versa.<sup>11</sup> Even for

those women who continue to live with a partner, informal support is generally less available than it is for older men.<sup>12</sup> As a result of these and other factors older women are more likely to require formal care. This likely, in part, explains why the vast majority of older adults in long-term care are women.<sup>13, 14</sup>

Throughout each of these three sections we assess differences associated with sex, age, socioeconomic status, and geography. Where possible we provide the information on older adults compared to the younger age group. We recognize that the definition of old age is changing as life expectancy is increasing. Accordingly, while we provide information on those who are aged 65 and older, we provide important new information on those aged 80 and older. This older group is particularly important for this report on Older Women's Health because the vast majority of individuals in this older group are women. The need for prevention and health promotion is a priority among those aged 65 and older to prevent chronic conditions and functional decline. Ideally, prevention should occur across the life course, tailored to the needs and risks of different age groups.

Socioeconomic factors play an important role for older women. Older women, especially those living alone, tend to have fewer financial resources than older men.<sup>1, 15, 16</sup> Today's generation of older women, grew up in very different circumstances and had fewer opportunities than women growing up today. They had less access to educational opportunities, did not participate fully in the workforce, and those that did, made less money than their male counterparts, spent fewer years in the workforce, and were less likely to manage family finances.<sup>1, 17</sup> Accordingly, today's older women may have fewer resources, for example, to pay for supportive care and to access health services that are not publicly funded. Where an older woman lives influences factors that affect her health, what services are available, and the quality of care of those services. Access to needed services for low-income women also

varies depending on where she lives. Understanding these differences is key to targeting improvements.

Aging is an issue that affects all of us, whether caring for loved ones or through our own personal experiences. We all have an interest in creating communities and health services that foster active aging. Fortunately, there is much that can be done to help older adults remain active and independent as they age. Both population-based and clinical approaches to prevention and risk factor modification remain important as individuals age. We know that there are modifiable risk factors for chronic disease including decreased activity, poor nutrition, obesity, and smoking. It is important for individuals of all ages to take steps to reduce these risk factors. Many older women encounter a number of challenges to making these changes. There is a growing body of evidence for effective models of care for older adults with chronic illness both to reduce risk and improve outcomes for those with chronic conditions. Performance measurement and reporting can play an important role in guiding and evaluating improvement efforts. To optimize outcomes, interventions need to be gender sensitive and specifically address the needs of those who are socioeconomically disadvantaged.

This report is divided into three sections. In Section A, the **burden of illness** of Ontario's older women and men is profiled including: chronic disease (the prevalence of selected conditions, comorbidity, incidence of certain cancers), chronic disease risk factors (low income, health behaviours) and health and functional status (self-rated health, activity limitations, limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL), activities prevented by pain). Section B includes indicators of **chronic disease management**, including measures of specialized physician care and services, as well as health outcomes (cause-specific rates of emergency department visits, hospital admissions, hospital

readmissions, mortality, and low-trauma fracture rates). Section C takes a closer look at **settings of care of older adults**. This section provides information on those receiving home care services and those residing in long-term care. We obtained information about those receiving home care services and explored a variety of indicators including use of home care services and unmet home care needs, as well as changes in functional status, inadequate pain control, prevalence of depressed mood, changes in cognitive impairment, and the prevalence of injuries among long-stay home care clients. In addition, we applied a gender-focus to common quality indicators that are regularly reported for long-term care. These include emergency department visits, worsened functional status, prevalence of pain, worsened cognitive ability, new pressure ulcers, use of restraints and potentially inappropriate prescribing among long-term care residents.

Many of the indicators that we present here have been included in previous POWER Study chapters. In this report, we examine these indicators in depth from the lens of older women's health and provide new information on the most rapidly growing group of the older population, those aged 80 and older. Bringing together and synthesizing findings from across POWER Study chapters allows us to paint a picture of the health needs of older women so as to inform needed changes in practice and policy. Further, this report adds new information to the previous POWER chapters by including a section on settings of care where we focus on the very vulnerable group of older adults who receive home care services or who reside in long-term care facilities.

We used survey data to report use of home care services and administrative data to report emergency department (ED) visits among long-term care residents. All other indicators reported in the section examining settings of care for older adults needs were developed by interRAI, a collaborative international network of



researchers committed to improving health care for persons who are elderly, frail, or disabled.<sup>18, 19</sup> These indicators are regularly reported by Health Quality Ontario (HQO) (formally the Ontario Health Quality Council). We build on HQO reports by incorporating a gender and equity analysis ([see the POWER Study Framework, chapter 2](#)). This is important because women and men have different patterns of disease, disability and mortality. Women and men also have different social contexts and different experiences with health care which, together with differences in biology, contribute to observed gender differences in health. While these indicators provide a wealth of information they are not comprehensive. Indicators do not exist for everything that is relevant to older women. Some key areas such as cognitive impairment, dementia, and informal caregiving are under developed. This has been discussed in our section in the discussion on 'What can't be measured'.

Our work is novel in that we report rates and total numbers for each of our indicators. Distinguishing between rates and total numbers is very important to our understanding of differences between older women and men and for program and policy planning. Even when rates of an event are similar between men and women (or in some cases higher in men than in women), the predominance of women in the older population means that more women than men in the population will experience the event. This has important implications for service delivery. In order to emphasize this important point, we use variable column width graphs which show traditional rates, but also illustrate the differences in total numbers by varying the widths of the bars ([see 'How to read variable column width graphs' box below](#)).

Data from several sources were used to produce this report (See [Appendix 1](#) for a complete list of indicators in this report and their data sources). These include:

Statistics Canada's 2006 Census; the Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1), 2005 (Cycle 3.1) and 2007–08; Ontario Health Insurance Plan (OHIP) data; the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); the National Ambulatory Care Reporting System (NACRS); the Institute for Clinical Evaluative Sciences (ICES) Physician Database (IPDB); the Ontario Diabetes Database (ODD); the Ontario Cancer Registry (OCR); the Cardiac Care Network (CCN); the Ontario Physician Human Resources Data Centre, Active Physician Registry; IntelliHEALTH Ontario; the Home Care Reporting System (HCRS); and the Continuing Care Reporting System (CCRS). The CCHS includes only the community-dwelling population; therefore, indicators based on CCHS data exclude older adults in long-term care homes. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter ([Appendix 1](#) of this report lists the original POWER chapter in which indicators were reported). See [Appendix 2](#) of this report for more detail on newly reported indicators.

Data were first stratified by sex and then further stratified by age, annual household income and Local Health Integration Network (LHIN), as allowed by data availability and sample size. Age- or risk-adjustment was done where appropriate (see box on 'Interpreting crude and adjusted rates'). If not otherwise stated, reported differences are statistically significant. [Appendix 2](#) provides a more detailed description of research methods

This report provides a unique look at older women. This report provides key information to inform needed changes to our health care system if we are to better meet the needs of older women.

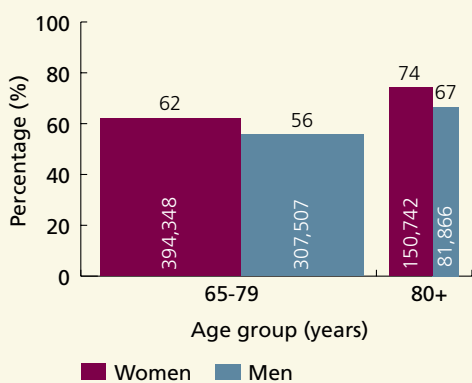


## HOW TO READ VARIABLE COLUMN WIDTH GRAPH

Because women have a longer life expectancy than men, women are disproportionately represented in older populations (particularly among the very old). Age and sex distributions also vary depending on whether the indicator is measured among the community-dwelling population, long-stay home care clients, or long-term care residents. For this reason, it is important to look at the total number of women and men affected by the indicators we report. To show these numbers, we use variable column width graphs to present the findings of many indicators in this report (See Examples A and B).

In variable width column graphs, the width of each bar reflects the relative proportion of the older population (aged 65+) represented by that bar. While the majority of community-dwelling older adults are younger (aged 65–79), the majority of long-stay home care clients and long-term care clients are older (aged 80+). These relative proportions are reflected in Example A and B below. In Example A—measured in community-dwelling adults—

**Example A: Percentage and number of community-dwelling adults aged 65 and older who reported having two or more chronic conditions, by sex and age group, in Ontario, 2005**



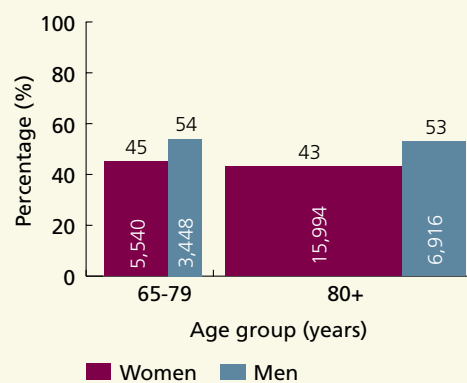
Percentage of the community-dwelling population aged 65+:

Age 65–79	Women	42%
	Men	37%
Age 80+	Women	13%
	Men	8%

the bars for the younger age group (aged 65–79) are wider than the bars in the older age group (aged 80+) because the younger age group represents a larger proportion of older adults. In Example B—measured in long-stay home care clients—the bars for the older age group are wider than the bars in the younger age group because the older age group represents a larger proportion of older adults. Similarly, in both graphs, the bars for women are wider than the bars for men because women represent a larger proportion of the population.

These types of graphs show both the percentages (depicted by the height of the bar) and the total numbers (number written inside of the bars) of women and men affected by the indicator. In Example A, you can see a slightly higher percentage of women aged 80+ reported two or more chronic conditions compared to similarly aged men (74 percent versus 67 percent, respectively); however, given that women make up a larger proportion of this age group, this translated into nearly twice as many women aged 80+ reported having two or more chronic conditions than men aged 80+ (150,742 women versus 81,866 men).

**Example B: Percentage and number of long-stay home care clients aged 65 and older with either a new ADL impairment or an ADL impairment that failed to improve by sex and age group, in Ontario, 2009/10**



Percentage of the long-stay home care clients aged 65+:

Age 65–79	Women	13%
	Men	9%
Age 80+	Women	59%
	Men	19%

POWER Study

## INTERPRETING CRUDE AND ADJUSTED RATES

In this report on Older Women's health, we present crude or unadjusted rates, as well as rates that have been age-standardized or risk-adjusted. Each type of rate provides unique information that is useful for different reasons. Below is a brief description of what these rates mean and how they should be interpreted.

**Crude or unadjusted rates** provide true and accurate information about the frequency of an event or health outcome in a population. These rates are useful in describing a population and provide important information for resource allocation and policy planning. However, when making comparisons between different groups, crude rates should be interpreted with caution because they do not take into account differences between groups.

**Age-standardized or age-adjusted rates** are useful when comparing two or more groups that have different age profiles. Many health indicators are closely related to age, with risk increasing or decreasing with age. Age-standardization involves using statistical techniques to remove the effect of age. While these rates are useful in making comparisons, they do not reflect the true rates of events or health outcomes within the groups.

**Risk-adjusted rates** use statistical techniques to take into account the effect of multiple factors that may differ between groups and can influence the outcome measure. Risk-adjusted rates are intended to allow for comparisons between groups that may have very different risk profiles. Note that risk-adjustment may not account for all factors that affect the health indicator. Again, while adjusted rates are useful in making comparisons, they do not reflect the true rates of events or health outcomes within the groups.

POWER Study

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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

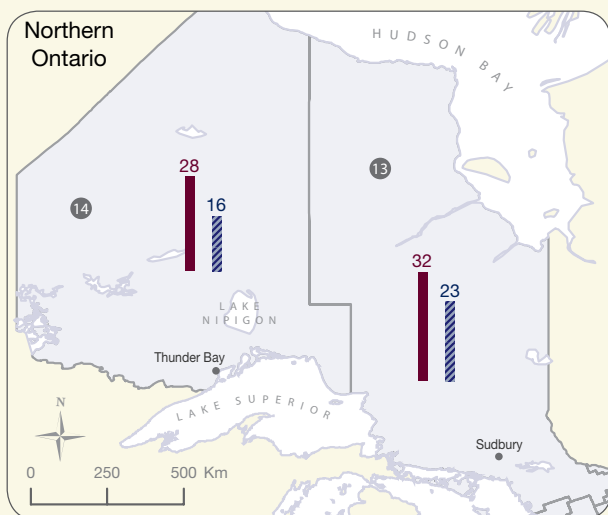
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

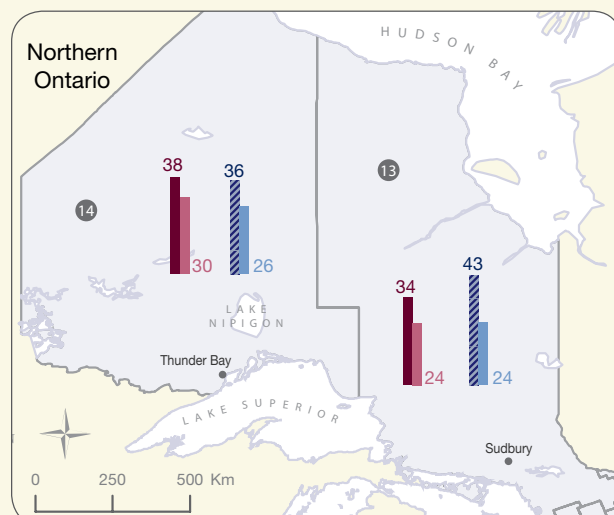
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

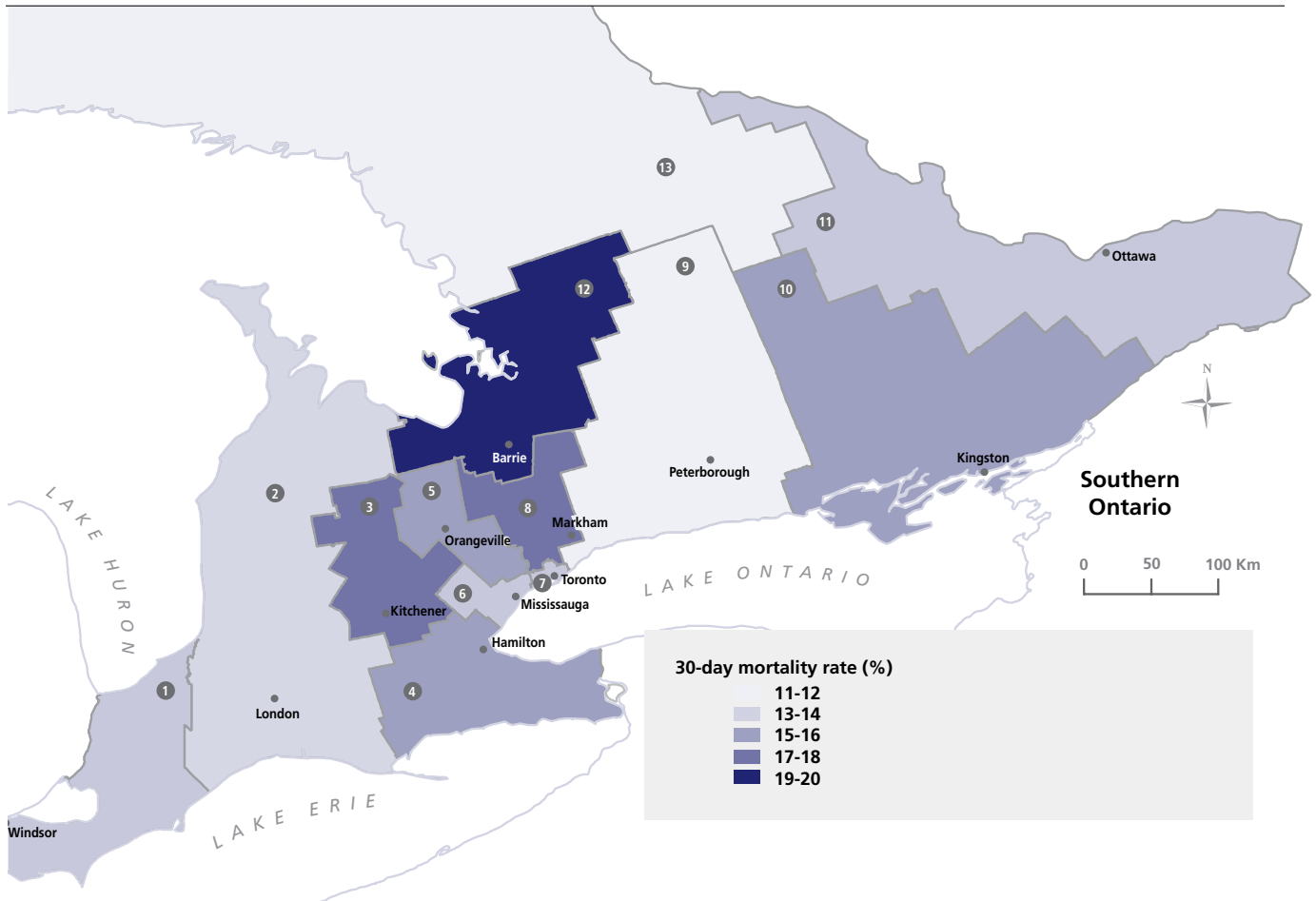


## CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**



# Section A

## *Burden of Illness*

### INTRODUCTION

In this section of the *Older Women's Health Report* we assess the burden of illness among older women.

Disability and frailty are not the inevitable consequences of old age and most people remain active and independent as they get older. For most people, maintaining physical health is key to ensuring good quality of life as they age. Older women generally outlive men, commonly managing multiple chronic illnesses that often affect their ability to carry out their desired activities while living in the community. This section examines indicators that provide insight into the burden of illness experienced by older women and men living in the community and explores opportunities for prevention.

Chronic conditions increase with age and are a particular concern for older women who make up the majority of individuals in the older age groups. First, we describe indicators that assess the prevalence of common chronic conditions experienced by older people including hypertension, arthritis, heart disease or stroke and diabetes. Older women are more likely than older men to report having multiple chronic conditions. Older adults who experience multiple chronic conditions encounter challenges having their needs met by our current health care system, which is based on specialty clinics that address single health conditions and primary care practitioners who may limit a visit to one complaint. More emphasis is required on developing integrated models of care that address multiple chronic conditions that are common in older people, particularly older women.

Cancer is increasingly recognized as a chronic condition. The prevalence of cancer increases with advancing age.

For women, rates of female-specific cancers—such as breast cancer—continue to increase with age. Cancers such as colorectal and lung cancer occur in both men and women and also increase in prevalence with age. Traditionally, these cancers have been more common in men than in women. Unfortunately, with increasing rates of smoking these differences are narrowing and rates in women are increasing. Lack of evidence in how to optimally manage cancer in the context of comorbidity and advanced age presents a challenge in the care of this group. In this section, we also report rates of cancer incidence in older adults.

Second, we report indicators assessing chronic disease risk factors (lower annual household income, health behaviours, and behavioural changes to improve health). Reducing the risk factors for chronic conditions can decrease the prevalence of chronic conditions and ultimately improved health. Many risk factors are not entirely under the individual's control. Where possible, strategies should be developed to reduce risks at the individual and the population level. While physical activity, high intake of fruit and vegetables, maintaining healthy weight and not smoking are all desired behaviours, there are cultural and socioeconomic barriers that may pose particular challenges for older women. Further, while taking steps to reduce risk is important in older age, strategies also need to be adopted to reduce these risk factors starting with girls and continuing across all ages.

Third, we discuss indicators that measure health and

functional status. While many older adults live active and healthy lives and report being in good health, there is considerable variability in the population. Being independent in activities of daily living is fundamental to being able to maintain independence in the community. Loss of functional status, which can lead to loss of independence, increases with age and is often preventable. Women often outlive their partners and therefore may be living alone as they get older. Loss of functional status is a particular issue for older women who live alone, have fewer financial resources, and have less access to informal caregiving to help them maintain their independence. In addition, functional status may be limited by pain. Given that arthritis is much more common in older women than men, indicators that measure activities limited by pain or discomfort are important for older women.

Finally, oral health is increasingly recognized as essential to maintaining health and adequate nutrition with age. Thus, access to dental services is very important for older adults. While we are fortunate to live in a country where we have universal health care, not all health services, particularly dental care, are covered. Some older adults have private health insurance for these services, but many do not, and then cost may become a barrier to access. Given that access to this type of preventive care may be related to socioeconomic status and being in the work force, older women may be further disadvantaged in this regard. This report explores this area using an indicator of use of dental services.

Differences associated with sex, age, income, and Local Health Integration Network (LHIN) were examined, where data were available and sample size allowed. The indicators in this section have previously been reported in other POWER Study chapters; here, we have re-examined and synthesized the findings specifically in relation to older women (aged 65 and older), examining differences between those who are under and over age 80. We do not include indicators of Alzheimer's disease and other dementias in this section, as they were not

reported in the POWER Study. Furthermore, there are many data limitations in assessing population prevalence of dementia. We were unable to report differences on these indicators associated with ethnicity because of small sample sizes in the population aged 65 and older in survey data, and the lack of information on ethnicity in administrative and registry data. As the Canadian population continues to become more ethnically diverse, this will become an increasingly important area of study.

We discuss differences in the burden of illness indicators between those under age 65 and older age groups. In the older age groups, we compare this information between women and men. Where possible, we also provide comparisons to those aged 80 and older. This section on burden of illness illustrates the importance of exploring both rates and total numbers. Given the predominance of older women in the population, we present both the rates and the total numbers of women and men with these conditions. In some cases where the rates are higher in men, the total numbers of women and men with these conditions are very similar. This again reflects the predominance of older women in the population.

The indicators included in this section on burden of illness are:

### **Chronic Disease**

- Prevalence of selected chronic conditions:
  - hypertension
  - arthritis
  - heart disease or stroke
  - diabetes
  - urinary incontinence
- Comorbidity (multiple chronic conditions)
- Incidence of certain types of cancer:
  - colorectal cancer
  - lung cancer
  - breast cancer
  - ovarian cancer
  - uterine cancer
  - cervical cancer

### Chronic Disease Risk Factors

- Lower annual household income
- Health behaviours
  - physical inactivity
  - inadequate fruit and vegetable intake
  - being overweight or obese
  - being a current smoking
- Behavioural changes to improve health

### Health and Functional Status

- Self-rated health
- Activity limitations
- Activities prevented by pain or discomfort
- Limitations in instrumental activities of daily living (IADL) and/or activities of daily living (ADL)

### Dental Care

- Did not visit a dentist in the past year

Most of the indicators in this section were assessed using various cycles of the Canadian Community Health Survey (CCHS). The CCHS includes only the community-dwelling population; therefore, indicators based on CCHS data exclude adults in long-term care homes. The prevalence of selected chronic conditions, comorbidity, lower annual household income, health behaviours that increase the risk of chronic diseases, self-rated health, activity limitations, IADL and/or ADL limitations, and dental care were all assessed using data from the CCHS, 2005 (Cycle 3.1). Data from CCHS, 2007–08 were used to assess the behavioural changes to improve health. Data from CCHS, 2000/01 (Cycle 1.1) were used to assess activity limitations due to pain or discomfort. The incidence of selected types of cancers was examined using data from the Ontario Cancer Registry. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter ([Appendix 1](#) of this report lists the original POWER chapter in which indicators were reported). See [Appendix 2](#) of this report for more detail on newly reported indicators.



## EXHIBITS AND FINDINGS

### CHRONIC DISEASE

#### PREVALENCE OF SELECTED CHRONIC CONDITIONS

**Indicator:** This indicator measures the prevalence of selected chronic conditions among community-dwelling older adults. Specifically, we examined the percentage of adults aged 65 and older who reported being diagnosed by a health professional with the following conditions:

- hypertension
- arthritis
- heart disease or stroke
- diabetes
- urinary incontinence

**Background:** The prevalence of chronic conditions increases with age, making chronic conditions a particularly important health issue for older adults. Across all age groups, women are more likely to have multiple chronic conditions than men.<sup>2</sup> Furthermore, there are gender differences in the prevalence of specific chronic diseases. For example women are more likely to have arthritis than men.<sup>20</sup> This is an important comorbidity that can impact on the management and control of other conditions. Women are also more likely than men to have urinary incontinence, a treatable condition that has large impact on quality of life.

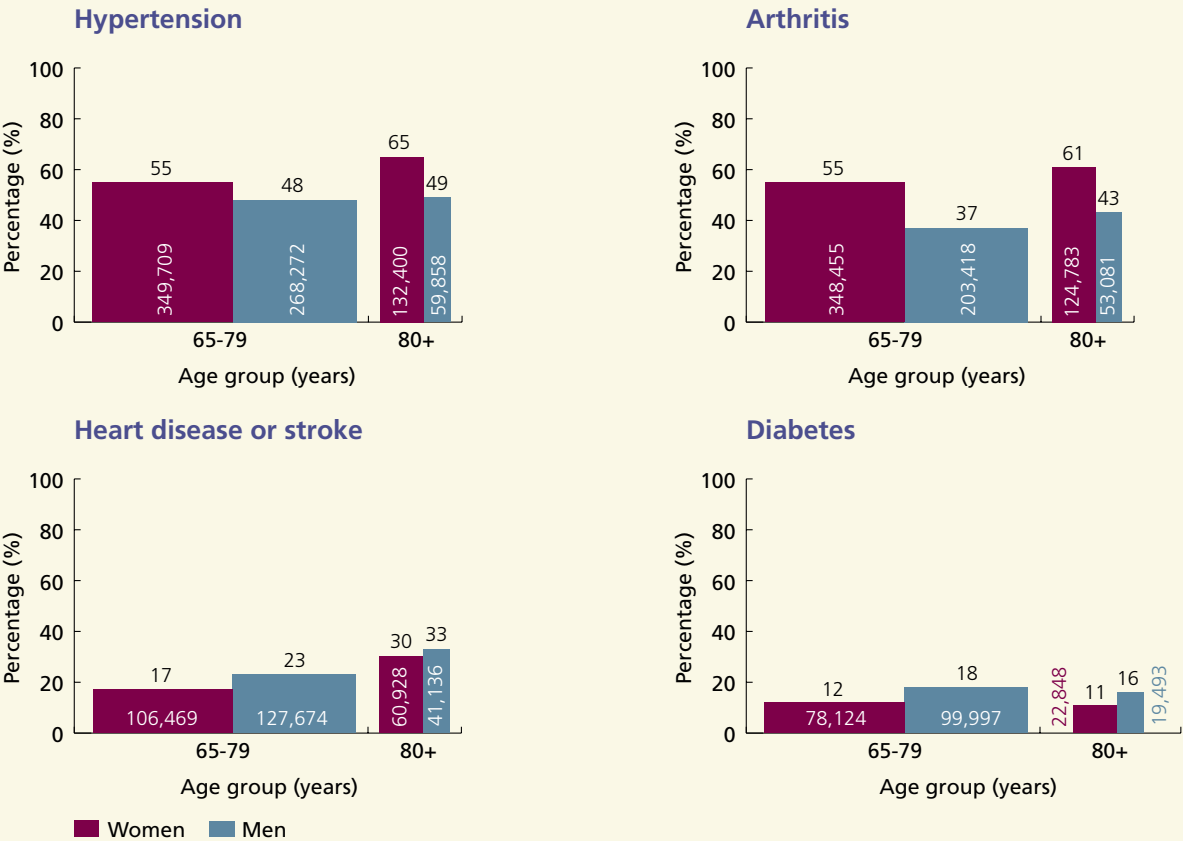
Chronic conditions and their associated complications are largely preventable. The causes of common chronic conditions are multi-factorial, but a large proportion of these conditions are preventable making prevention strategies critical. Health behaviours (e.g., nutrition, maintaining healthy weight, physical activity, and smoking), environmental exposures, and social and community factors associated with the development and worsening of these conditions are all modifiable. Older people, including those of advanced age, can improve their future health outcomes by taking active steps to modify their health behaviours.<sup>21–24</sup> Proper management of chronic conditions can prevent further complications.<sup>25–27</sup> Patient-centered delivery systems, involving the participation of both the patient and a proactive health care team, have been found to significantly improve the health of high-risk patients.<sup>27, 28</sup>

Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess the prevalence of these conditions among community-dwelling older adults (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail).

Note that estimates of diabetes prevalence that are based on self-report (as reported here) are known to be lower than estimates based on diagnoses contained in health care databases (as reported in [the POWER Study Diabetes chapter](#)).<sup>29</sup>

**Findings:** In 2005, 53 percent of Ontario's older adults (aged 65 and older) reported having hypertension, 48 percent reported having arthritis, 22 percent reported having heart disease or stroke, 15 percent reported having diabetes, and 11 percent reported having urinary incontinence. Compared to older men, older women reported higher prevalence of hypertension (58 percent of women versus 49 percent of men) and arthritis (56 percent of women versus 38 percent of men), but lower prevalence of heart disease and stroke (20 percent of women versus 25 percent of men) and diabetes (12 percent of women versus 18 percent of men); older women and men reported similar rates of urinary incontinence (13 percent of women and 10 percent of men).

**Exhibit A.1 |** Percentage and number of community-dwelling adults aged 65 and older who reported having selected chronic diseases, by sex and age group, in Ontario, 2005



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))



## Exhibit A.1 | Percentage and number of community-dwelling adults aged 65 and older who reported having selected chronic diseases, by sex and age group, in Ontario, 2005

(continued)

### FINDINGS

- Adults aged 65 and older were two to three times more likely to report having specific chronic conditions than younger adults (aged 25–64) (data not shown; see [the POWER Study Burden of Illness chapter](#)).
- Among older women, those aged 80 and older were more likely to report hypertension, arthritis, and heart disease or stroke compared to women aged 65–79; the prevalence of diabetes was similar between women aged 65–79 and those aged 80 and older.
- Among older men, those aged 80 and older were more likely to report having heart disease or stroke compared to men aged 65–79; however, the prevalence rates of hypertension, arthritis and diabetes were similar between men aged 65–79 and those aged 80 and older.
- In both age groups, older women were more likely than older men to report having hypertension or arthritis.
- In both age groups, women were less likely than men to report having diabetes, heart disease or stroke; however, given that women are disproportionately represented among older populations, the total number of women aged 80 and older reporting heart disease and stroke or diabetes were greater than the total number of men aged 80 and older (an estimated 60,928 women and 41,136 men reported having heart disease or stroke; an estimated 22,848 women and 19,493 men reported having diabetes).
- Given that women are disproportionately represented in older populations and have higher rates of hypertension and arthritis than men, the total numbers of Ontarian women aged 65 and older living with these conditions were very high—there were an estimated 482,109 older women reported having hypertension and an estimated 473,237 older women reported having arthritis.
- Urinary incontinence was reported by about one in 10 women and men aged 65 and older (rates of urinary incontinence from the CCHS are lower than those of other population health surveys which may be due to the way the question was asked)<sup>30</sup> (data not shown).
- Urinary incontinence was much higher among women and men aged 80 and older compared to those aged 65–79 (18 percent versus 11 percent among women and 19 versus 8 percent among men, respectively) (data not shown).
- Among those aged 65–79, women were somewhat more likely than men to report urinary incontinence. However, reported prevalence was similar among women and men aged 80 and older. The total number of women with urinary incontinence was much greater than the total number among men (an estimated 69,123 women versus 44,302 men aged 65–79; an estimated 35,820 women versus 23,011 men aged 80 and older) (data not shown).

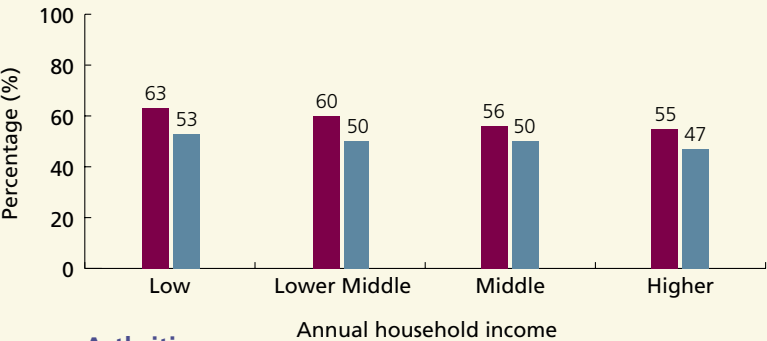
POWER Study

**Exhibit A.2 | Percentage of community-dwelling adults aged 65 and older who reported having selected chronic diseases, by sex and annual household income, in Ontario, 2005**

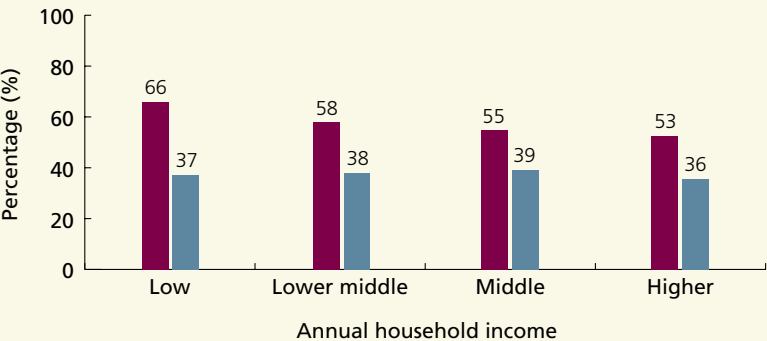
**FINDINGS**

- Older low-income women and men were more likely to report most of these conditions than those with higher incomes; however, some income differences were not statistically significant, possibly due to small sample sizes and limited power to detect differences.
- Among low-income women aged 65 and older, two in three reported having hypertension or arthritis, one in four reported having heart disease or stroke, and one in five reported having diabetes.
- Among low-income men aged 65 and older, one in two reported having hypertension, one in three reported having arthritis, nearly one in three reported having heart disease or stroke and one in five reported having diabetes.

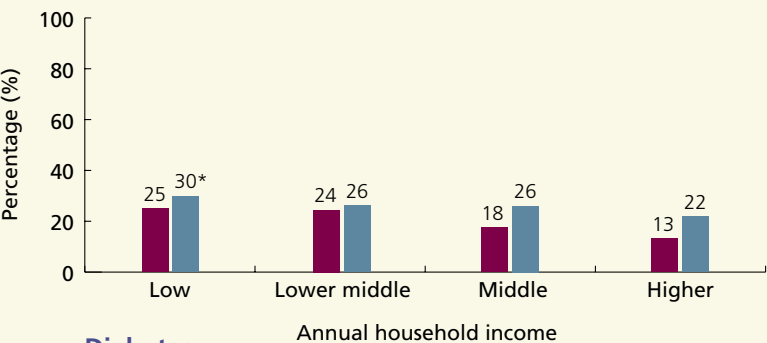
**Hypertension**



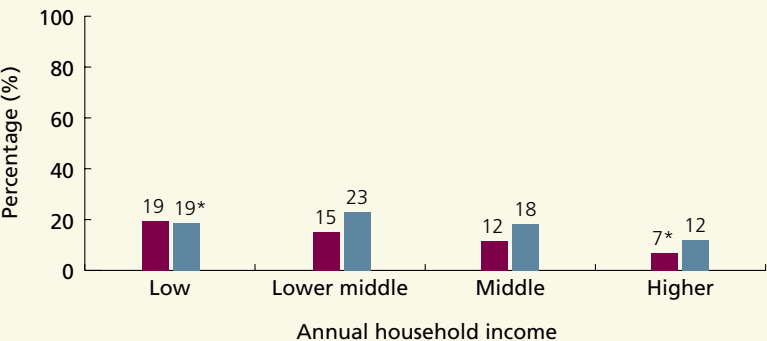
**Arthritis**



**Heart disease or stroke**



**Diabetes**

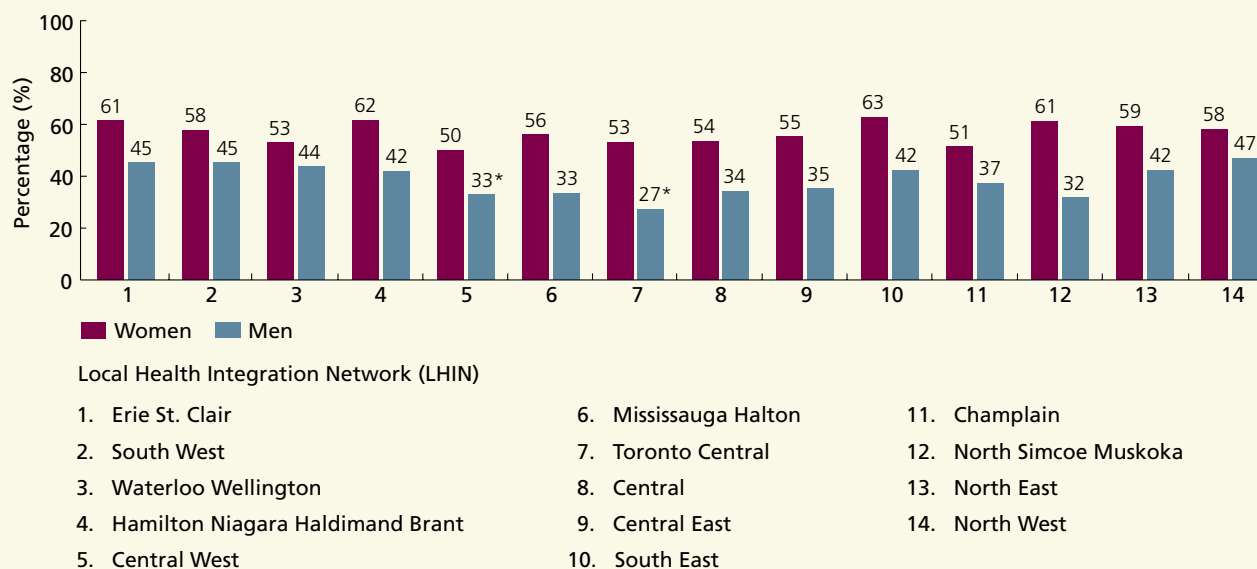


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

**NOTE:** See Appendix 2 for definitions of annual household income categories

### Exhibit A.3 | Percentage of community-dwelling adults aged 65 and older who reported having arthritis, by sex and Local Health Integration Network (LHIN), in Ontario, 2005



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

#### FINDINGS

- The percentage of older adults who reported having arthritis varied by LHIN, ranging from 41 percent (Toronto Central LHIN) to 54 percent (Erie St. Clair LHIN) (data not shown).
- The prevalence of arthritis ranged from 50 percent (Central West LHIN) to 63 percent (South East LHIN) among women and ranged from 27 percent (Toronto Central LHIN) to 47 percent (North West LHIN) among men. However, the variation across LHINs was not statistically significant when stratified by sex, possibly due to small sample size and limited power to detect differences.

POWER Study

## PREVALENCE OF COMORBIDITY (MULTIPLE CHRONIC CONDITIONS)

**Indicator:** This indicator measures the percentage of community-dwelling adults who reported having two or more chronic conditions (comorbidity) diagnosed by a health professional.

**Background:** The majority of older adults have multiple chronic conditions,<sup>2</sup> which greatly increases the complexity of their clinical management and has important implications for models of care delivery.<sup>31–33</sup> Older women are more likely than older men to have multiple chronic medical conditions.<sup>2, 34</sup> Additionally, older women are more likely than older men to be socioeconomically disadvantaged<sup>2</sup> and are thus more likely to encounter financial and non-financial barriers to needed care. Common risk factors are associated with the development of many chronic conditions such as heart disease, diabetes, and arthritis leading to the development of comorbid illnesses. Thus, prevention and health promotion can play an important role in reducing the population burden of comorbidity.

Currently, there are multiple barriers to delivering optimal care for older adults with multiple chronic conditions. There is a large mismatch between the way health care is organized and the needs of people with multiple chronic conditions. In addition, clinical practice guidelines primarily focus on guidelines for the management of single conditions.<sup>33, 35</sup> Condition-specific guidelines are often inadequate when treating patients with complex comorbidities, as clinicians need to balance competing needs of different conditions.<sup>33, 35</sup> Compounding this problem, women and older adults have not been adequately included in clinical trials of therapies so evidence regarding their effectiveness in older individuals is often limited.<sup>36–38</sup> As in the prevalence of specific conditions, the prevalence of multiple chronic conditions may be particularly underestimated in socioeconomically disadvantaged populations if they encounter barriers to care and thus are not diagnosed. This is a particular problem for older women who are more likely than older men to be in a disadvantaged socioeconomic group.<sup>2</sup> Further, older women are more likely than older men to be frail and to have dementia.<sup>39–41</sup> These factors present further complicate their care.

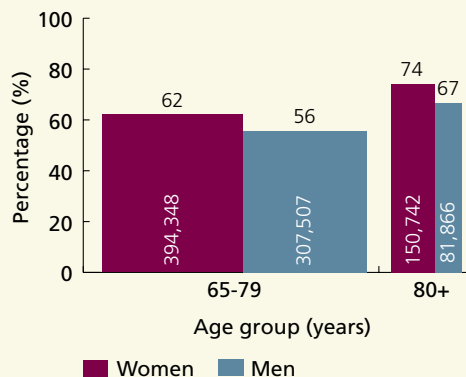
Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess whether community-dwelling older adults had more than one chronic condition. Chronic conditions included in this indicator were: Alzheimer's disease or other dementia; bowel disorders (Crohn's disease, ulcerative colitis, Irritable Bowel Syndrome or bowel incontinence); cancer (non-skin); diabetes; epilepsy; heart disease or stroke; high blood pressure; thyroid condition; urinary incontinence; arthritis, rheumatism, or back problems (excluding fibromyalgia); excluding fibromyalgia and arthritis; obstructive lung disease (asthma, chronic bronchitis, emphysema or chronic obstructive pulmonary disease); chronic fatigue syndrome or fibromyalgia (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail).

**Findings:** In 2005, 62 percent of Ontario's older adults (aged 65 and older) reported having two or more chronic conditions. Older women were more likely to report having two or more chronic conditions than older men (65 percent versus 58 percent, respectively).

## Exhibit A.4 | Percentage and number of community-dwelling adults aged 65 and older who reported having two or more chronic conditions, by sex and age group, in Ontario, 2005

### FINDINGS

- The prevalence of comorbidity was more than twice as high among women and men aged 65 and older compared to younger adults (25 percent among women and 18 percent among men aged 25–64) (data not shown for adults aged 25–64; see [the POWER Study Burden of Illness chapter](#)).
- Among older women and men, those aged 80 and older were more likely than those aged 65–79 to report having two or more chronic conditions (74 percent versus 62 percent, respectively, among women; 67 percent versus 56 percent, respectively, among men).
- In both age groups, women were more likely than men to report having two or more chronic conditions; however, given that women are disproportionately represented among older populations, the total number of women aged 80 and older reporting two or more chronic conditions was almost twice as high as the total number among men aged 80 and older (an estimated 150,742 women and 81,866 men).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

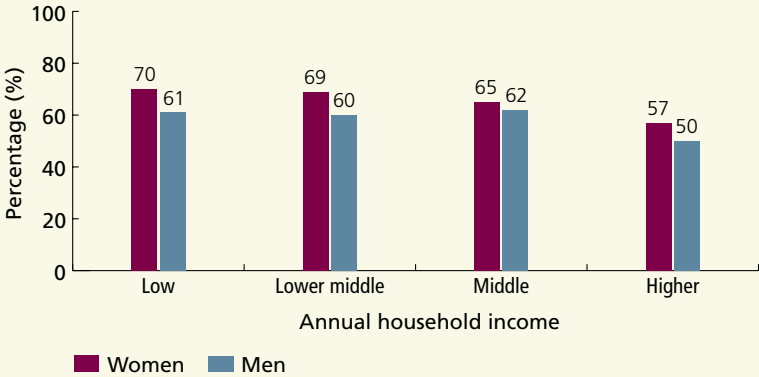
**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

POWER Study

**Exhibit A.5 |** Percentage of adults aged 65 and older who reported having two or more chronic conditions, by sex and annual household income, in Ontario, 2005

**FINDINGS**

- Among older adults, those living in low-income households were more likely to report having two or more chronic conditions than those living in the highest-income households.
- Seventy percent of low-income older women reported having two or more chronic conditions compared to 57 percent of higher-income older women.
- Sixty-one percent of low-income older men reported having two or more chronic conditions compared to 50 percent of higher-income older men.
- The percentage of older adults who reported two or more chronic conditions varied across Local Health Integration Networks (LHINs), ranging from 58 percent (Toronto Central and Central LHINs) to 75 percent (North Simcoe Muskoka LHIN) among women and from 51 percent (Toronto Central LHIN) to 68 percent (North East LHIN) among men; however, some estimates were imprecise, due to small sample size (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 2](#) for a description of annual household income categories

POWER Study

## CANCER INCIDENCE

**Indicator:** This indicator reports the incidence of new cancers among adults aged 65 and older per 100,000 population. The rates for colorectal and lung cancers are reported for men and women, while rates for breast, ovarian, uterine and cervical cancers are reported for women only.

**Background:** Age-related molecular and physiological changes increase the incidence of cancer in the older population.<sup>42</sup> The rapidly aging Canadian population coupled with increasing longevity further increases the number of older adults requiring cancer treatment.<sup>43, 44</sup> Lung and colorectal cancer are the two most common types of cancers affecting both women and men, while breast, ovarian, uterine and cervical cancers are the most common cancers which occur primarily in women.<sup>45</sup>

Although cancer incidence increases in older age, many cancer cases can be prevented through healthy lifestyles (physical activity, healthy diet, reducing alcohol and tobacco use), reduced environmental exposure to carcinogens, appropriate screening, and certain vaccinations. In fact, according to the Canadian Cancer Society, about half of all cancer cases can be prevented through healthy living and the implementation of healthy public policies.<sup>46</sup>

Many factors complicate the diagnosis, management and treatment of cancer in older adults, including comorbid conditions, functional disabilities, overmedication, and undernourishment.<sup>43, 47</sup> While these factors need to be considered, older patients can often be treated effectively, if treatments are carefully selected and appropriately provided.<sup>44</sup> However, older patients are substantially underrepresented in cancer treatment trials, resulting in insufficient evidence to guide clinical and therapeutic decisions for this population.<sup>43</sup>

To understand the burden of disease in the population, we looked at incidence and how it differs by sex, age, and income. Variation in incidence may reflect trends in risk factors or better in certain groups.

Incidence rates of these cancers were obtained from the Ontario Cancer Registry (OCR). The OCR includes all Ontario residents who have been diagnosed with cancer or have died from cancer (see [the POWER Study Cancer chapter](#), Appendix 4.3 for more detail).

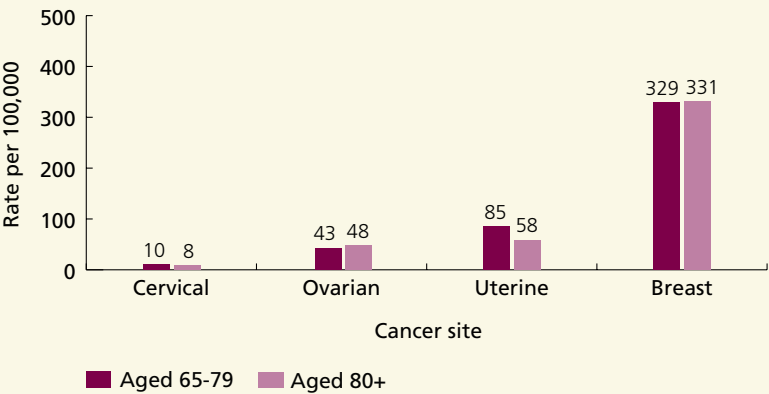
**Findings:** In Ontario in 2004/05, the incidence of breast cancer among older women was 330 per 100,000 women, 9.6 per 100,000 women for cervical cancer, 45 per 100,000 women for ovarian cancer and 77 per 100,000 women for uterine cancer. The incidence of lung cancer was 299 per 100,000 older adults (231 per 100,000 older women and 389 per 100,000 older men) and colorectal cancer was 289 per 100,000 older adults (247 per 100,000 older women and 343 per 100,000 older men). While rates of colorectal and lung cancer were lower in older women relative to men, the greater number of women in the population means that the total number of women and men newly diagnosed with these cancers were not that different (2,206 women and 2,368 men for colorectal cancer; 2,060 women and 2,681 men for lung cancer).



**Exhibit A.6 |** Incidence of cervical, ovarian, uterine and breast cancer per 100,000 women aged 65 and older, by age group, in Ontario, 2004/05

**FINDINGS**

- Incidence rates of ovarian, uterine and breast cancer were four to five times higher among women aged 65 and older compared to younger women (incidence of ovarian cancer: 9 per 100,000 women under age 65 versus 45 per 100,000 women aged 65 and older; incidence of uterine cancer: 15 per 100,000 women under age 65 versus 77 per 100,000 women aged 65 and older; incidence of breast cancer: 81 per 100,000 women under age 65 versus 330 per 100,000 women aged 65 and older).
- The incidence rates of cervical cancer were similar among women under and over age 65 (7 per 100,000 among women aged 65 and under) (data not shown; see [the POWER Study Cancer chapter](#)).
- Among older women, incidence rates of cervical, ovarian and breast cancer were similar between the younger (aged 65–79) and older (aged 80 and older) age groups; incidence rates of uterine cancer were higher among women aged 65–79 compared to those aged 80 and older.



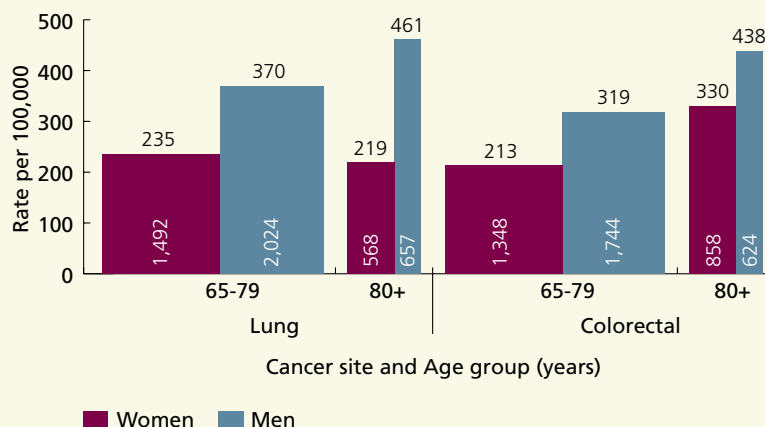
**DATA SOURCES:** Ontario Cancer Registry (OCR); Registered Persons Database (RPDB)

POWER Study

## Exhibit A.7 | Incidence per 100,000 population aged 65 and older (and number of incident cases) of lung and colorectal cancer, by sex and age group, in Ontario, 2004/05

### FINDINGS

- The incidence rates of lung and colorectal cancer was approximately 14 times higher among adults aged 65 and older compared to younger adults (among those under age 65, incidence of lung cancer was 20 per 100,000 women and 22 per 100,000 men and incidence of colorectal cancer was 17 per 100,000 women and 25 per 100,000 men) (data not shown; see the [POWER Study Cancer chapter](#)).
- Among older adults, the incidence of colorectal cancer was higher in women and men in the older age group than in those in the younger age group (330 per 100,000 women aged 80 and older versus 213 per 100,000 women aged 65–79; 438 per 100,000 men aged 80 and older versus 319 per 100,000 men aged 65–79).
- Among older adults, the incidence of lung cancer was higher among men in the older age group compared to the younger age group (461 per 100,000 men aged 80 and older versus 370 per 100,000 men aged 65–79); the incidence of lung cancer was similar among women in both age groups.
- Irrespective of age, older women had lower incidence rates of lung and colorectal cancer than older men.
- Despite these lower incidence rates, the total number of new cases of colorectal cancer among women aged 80 and older was greater than the total number among men aged 80 and older (858 women and 624 men) and the total number of new lung cancer cases were not very different between women and men aged 80 and older (568 women and 657 men).



**DATA SOURCES:** Ontario Cancer Registry (OCR); Registered Persons Database (RPDB)

**NOTE:** The width of each bar reflects the relative proportion of the older population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see 'How to read variable column width graphs' on page 17)

POWER Study

## CHRONIC DISEASE RISK FACTORS

### LOW INCOME

**Indicator:** This indicator measures the percentage of community-dwelling older adults (aged 65 and older) who reported living in lower-income households.

**Background:** Income is a measure of socioeconomic status and is an important social determinant of health. It is strongly associated with health and functional status and the risk of developing chronic conditions. This is a particularly important factor to consider for older women, as they are more likely than men to have lower socioeconomic status.<sup>2</sup> Further, lack of resources and outliving spouses may mean that older women are more likely to be transitioned to long-term care homes. However, with adequate home support or additional resources, many older women may be managed in the community in a less resource intensive manner.

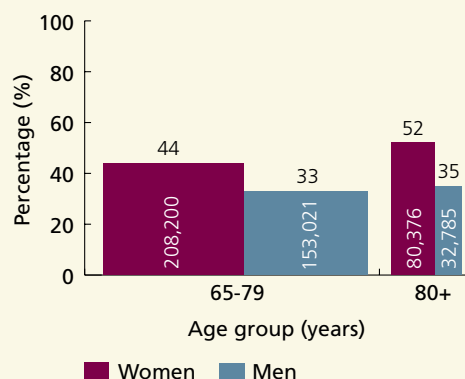
Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess this indicator among community-dwelling older adults. Lower-income was defined as the two lowest annual household income categories (see [Appendix 2](#) for definitions of these categories). The CCHS data do not assess wealth an important factor reflecting socioeconomic status among older adults.

**Findings:** Overall, 40 percent of older Ontarians (aged 65 and older) reported living in lower-income households in 2005. Older women were more likely to live in lower-income households than older men (46 percent versus 33 percent, respectively). Given that there are a greater number of older women than older men, many more women reported living in lower-income households than men (an estimated 288,576 women versus 185,806 men).

## Exhibit A.8 | Percentage and number of community-dwelling adults aged 65 and older who reported having lower annual household income,<sup>^</sup> by sex and age group, in Ontario, 2005

### FINDINGS

- The prevalence of low income was over twice as high among women and men aged 65 and older compared to younger adults (among those aged 25–64, 20 percent of women and 15 percent of men lived in low-income households) (data not shown; see [the POWER Study Burden of Illness chapter](#)).
- Among older adults, the prevalence of low income was higher among women in the older age group (aged 80 and older) compared to the younger age group (aged 65–79) (52 percent versus 44 percent respectively); the prevalence of low income among older men was similar in both age groups.
- In both age groups, women were more likely than men to live in lower-income households; given that women are disproportionately represented among older adults, there was an estimated 288,576 Ontario women aged 65 and older living in low-income households compared to 185,806 men.



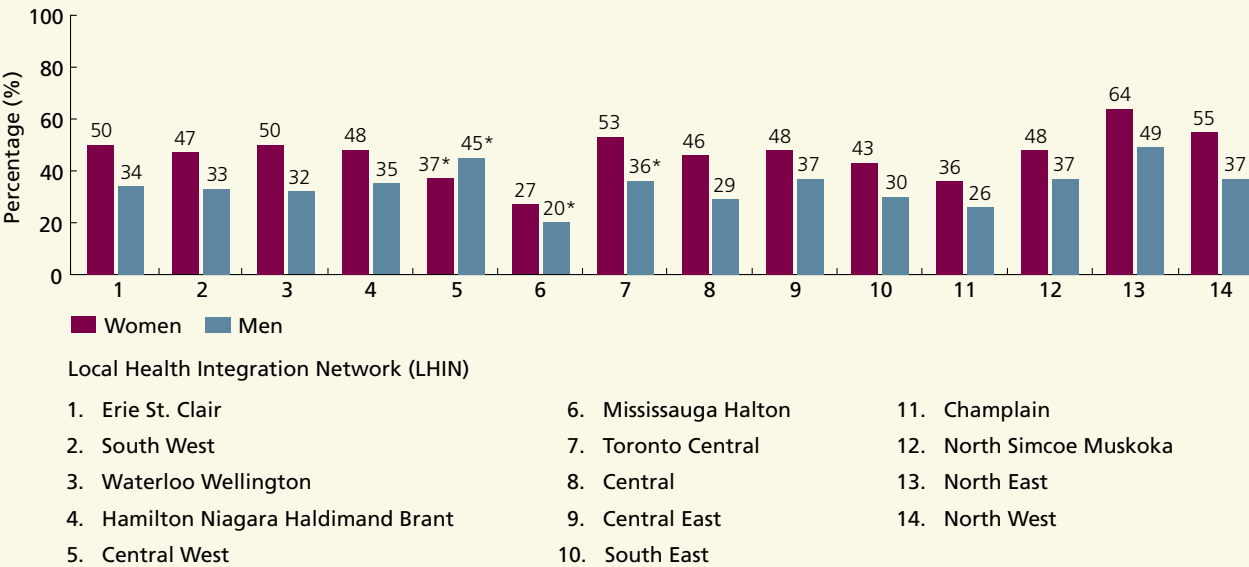
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Lower-income includes the two lowest annual household income categories; see [Appendix 2](#) for definitions of annual household income categories

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

POWER Study

**Exhibit A.9 |** Percentage of community-dwelling adults aged 65 and older who reported having lower annual household income,<sup>^</sup> by sex and Local Health Integration Network (LHIN), in Ontario, 2005



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)  
<sup>^</sup> Lower-income includes the two lowest annual household income categories; see [Appendix 2](#) for definitions of annual household income categories  
\* Interpret with caution due to high sampling variability

**FINDINGS**

- The percentage of older adults living in lower-income households varied across LHINs.
- Among women, the percentage living in lower-income households ranged from 27 percent in the Mississauga Halton LHIN to 64 percent in the North East LHIN.
- Among men, the percentage living in lower-income households ranged from 20 percent in the Mississauga Halton LHIN to 49 percent in the North East LHIN.

POWER Study

## HEALTH BEHAVIOURS THAT INCREASE THE RISK OF CHRONIC DISEASE

**Indicator:** This indicator measures the percentage of community-dwelling older adults who reported four major factors that increase the risk for chronic diseases and their associated complications: physical inactivity, inadequate fruit and vegetable intake, being overweight or obese and smoking.

**Background:** Inadequate physical activity, poor nutrition, being overweight or obese, and smoking are well-established risk factors for chronic conditions such as heart disease, stroke, diabetes, and cancer. Promoting a healthy lifestyle to prevent and manage chronic disease, as well as to improve quality of life, is important for people of all ages, including older adults.<sup>48–52</sup> Additionally, physical activity and strength training can maintain or improve functional status, preserve independence and prevent falls among older adults.<sup>22, 23</sup> These benefits can be achieved even in the frail elderly.<sup>24, 53</sup> As people age, physiological changes and reduced energy needs make balanced, nutrient-dense diets more important in maintaining adequate nutrition.<sup>51</sup> Adequate fruit and vegetable consumption may be hindered by social, physical, financial, or cognitive barriers that can prevent the elderly from buying, preparing, or consuming healthy foods.<sup>54, 55</sup>

Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess the prevalence of these risk factors for chronic disease among community-dwelling older adults (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail). Self-reported prevalence of being overweight or obese is particularly subject to measurement error as people may under or over-report their height and weight.<sup>56, 57</sup>

**Findings:** In Ontario in 2005, 55 percent of older adults (aged 65 and older) reported being physically inactive, 54 percent were overweight or obese, 9 percent reported being current smokers, and 49 percent reported having inadequate fruit and vegetable intake. Older women were more likely than older men to be physically inactive (60 percent versus 48 percent, respectively) but less likely to be overweight or obese (50 percent versus 59 percent, respectively) or to have inadequate fruit and vegetable intake (43 percent versus 55 percent, respectively). Smoking rates were similar among older women and men (9 percent and 10 percent, respectively).

**Exhibit A.10 |** Percentage and number of community-dwelling adults aged 65 and older who reported health behaviours that increase the risk of chronic diseases, by sex and age group, in Ontario, 2005

**FINDINGS**

- Among older adults, rates of physical inactivity increased with age; smoking rates and prevalence of being overweight or obese decreased with age; and rates of inadequate fruit and vegetable consumption were similar in both age groups.
- Across both age groups, older women were more likely than older men to report being physically inactive, but less likely to be overweight or obese or report inadequate fruit and vegetable intake (although sex differences in being overweight or obese were not statistically significant among adults aged 80 and older, possibly due small sample size and limited power to detect differences).
- There were no sex differences in smoking rates among older adults, irrespective of age group.
- In Ontario, women are disproportionately represented among older populations, particularly among the very old. Therefore, even though the percentage of older women who were overweight or obese or had inadequate fruit and vegetable intake was lower than the percentage among men, the number of women and men reporting these risk factors were similar among adults aged 65–79; among those aged 80 older, women with these risk factors outnumbered men by 30 to 40 percent.

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see 'How to read variable column width graphs' on page 17)

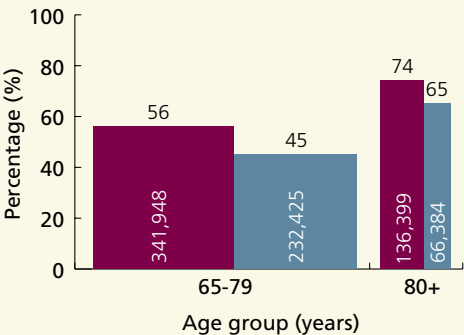
^ Physical Activity Index of < 1.5 cal/kg/day

† Daily consumption of less than five servings of fruits and vegetables

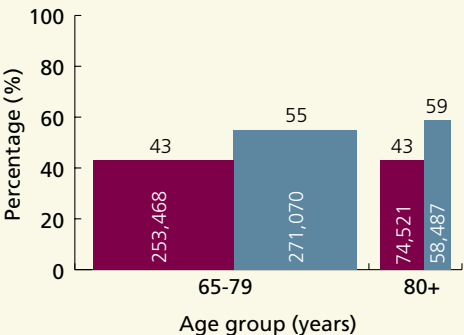
‡ Body Mass Index (BMI) ≥ 25, calculated from self-reported height and weight

¥ Current smokers (daily or occasional)

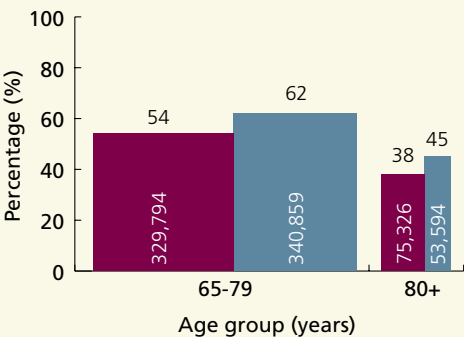
**Physical inactivity<sup>^</sup>**



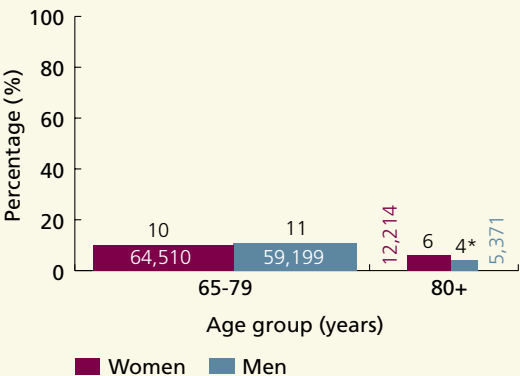
**Inadequate fruit and vegetable intake<sup>†</sup>**



**Overweight or obese<sup>‡</sup>**



**Current smoker<sup>¥</sup>**



POWER Study



## Exhibit A.11 | Percentage of community-dwelling adults aged 65 and older who reported health behaviours that increase the risk of chronic diseases, by sex and annual household income, in Ontario, 2005

### FINDINGS

- Among older women (aged 65 and older), the percentage who reported health behaviours that increase the risk of chronic disease varied by household income.
- Older women living in the low-income households were more likely to report being physically inactive, being a current smoker, and having inadequate fruit and vegetable intake compared to older women living in higher-income households. A similar pattern was observed in the percentage of older women who reported being overweight or obese, but the income difference was not statistically significant.
- Older men living in low-income households were more likely to report being physically inactive, compared to older men living in higher-income households. However, the percentage of older men who reported being overweight or obese, being a current smoker, or having inadequate fruit or vegetable intake did not vary by annual household income.

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 2](#) for definitions of annual household income categories

\* Interpret with caution due to high sampling variability

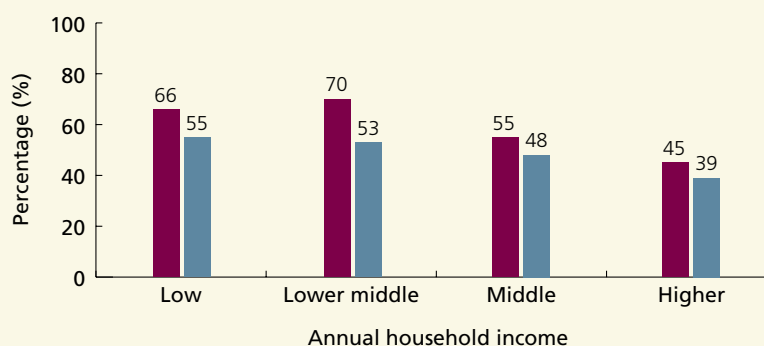
^ Physical Activity Index of < 1.5 cal/kg/day

† Daily consumption of less than five servings of fruits and vegetables

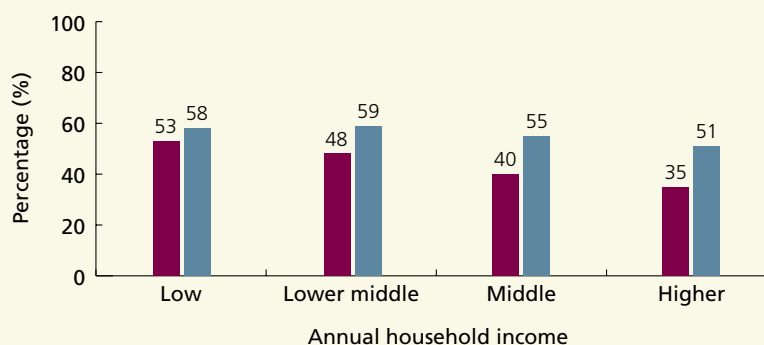
‡ Body Mass Index (BMI)  $\geq 25$ , calculated from self-reported height and weight

¥ Current smokers (daily or occasional)

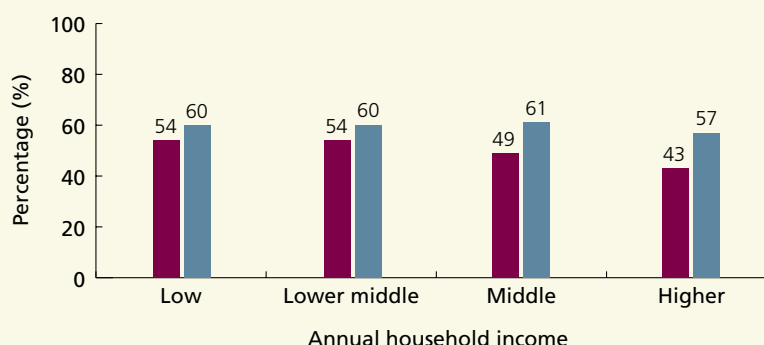
### Physical inactivity<sup>^</sup>



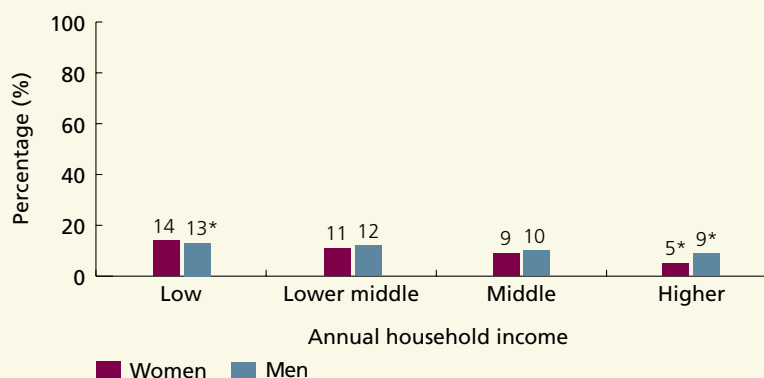
### Inadequate fruit and vegetable intake<sup>†</sup>



### Overweight or obese<sup>‡</sup>



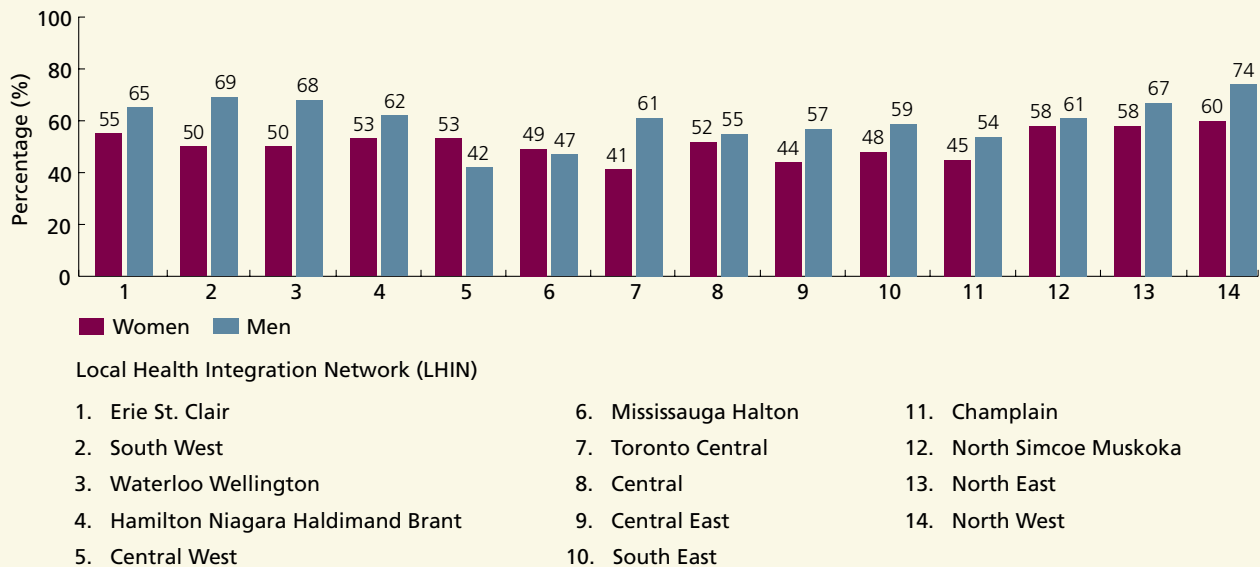
### Current smoker<sup>¥</sup>



POWER Study

■ Women ■ Men

**Exhibit A.12 |** Percentage of community-dwelling adults aged 65 and older who reported being overweight or obese,<sup>‡</sup> by sex and Local Health Integration Network (LHIN), in Ontario, 2005



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>‡</sup> Body Mass Index (BMI)  $\geq$  25, calculated from self-reported height and weight

**FINDINGS**

- The percentage of older adults who reported being overweight or obese varied across LHINs.
- Among older women, the prevalence of being overweight or obese ranged from 41 percent in the Toronto Central LHIN to 60 percent in the North West LHIN.
- Among older men, the prevalence of being overweight or obese ranged from 42 percent in the Central West LHIN to 74 percent in the North West LHIN.

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## CHANGES TO IMPROVE HEALTH

**Indicator:** This indicator measures the percentage of community-dwelling adults aged 65 and older who reported making positive lifestyle changes (for example, increased physical activity, weight loss, dietary changes, smoking cessation, reduced alcohol consumption, reduced stress or increased medical care) in the previous year to improve their health.

**Background:** A healthy lifestyle is important for people of all ages, including older adults. Lifestyle changes such as increasing physical activity, reducing stress, dietary modification and proper medical care, can prevent and manage chronic disease, as well as improve quality of life.<sup>48–52</sup> Older adults especially can benefit from making positive lifestyle changes. Exercise and physical activity can maintain or improve functional status, preserve independence and prevent falls among older adults.<sup>22, 23</sup> These benefits can be achieved even in the frail elderly.<sup>24, 53, 58</sup> Weight training in nursing home residents has been shown to improve functional status.<sup>53, 58</sup> Nutritional modifications among older adults, such as the reduction of sodium and fat intake, can contribute to better health and prevent obesity, diabetes and cardiovascular disease.<sup>49</sup>

Risk factor modification among those who have chronic conditions (secondary prevention) prevents adverse outcomes related to these diseases. For example, positive lifestyle changes can reduce the risk of acute events or worsening disease and extend overall survival in those with heart disease or who have had a stroke (secondary prevention).<sup>59</sup> Smoking cessation is an effective lifestyle modification intervention. In a randomized trial of an intensive smoking cessation intervention among smokers with acute cardiovascular disease, those patients that were assigned to the intervention had a four-fold decrease in all-cause mortality and a 44 percent reduction in all-cause readmissions at 24 months post-discharge.<sup>60</sup> Dietary modification, such as changing to a low-lipid diet, has been shown to decrease mortality among myocardial infarction patients by one-third during the three-year period following diagnosis.<sup>61</sup> Increased physical activity is another important change. In one study, 53 percent of patients with heart failure who participated in exercise training had significant and noticeable clinical improvement compared to 33 percent of those who did not receive any exercise training.<sup>62</sup>

Data from the Canadian Community Health Survey (CCHS), 2007–08 were used to assess this indicator among community-dwelling older adults. Survey respondents were asked, “In the past 12 months, did you do anything to improve your health?” Women and men were also asked to identify what they believed to have been the most important change they had made (see [Appendix 2](#) for more detail).

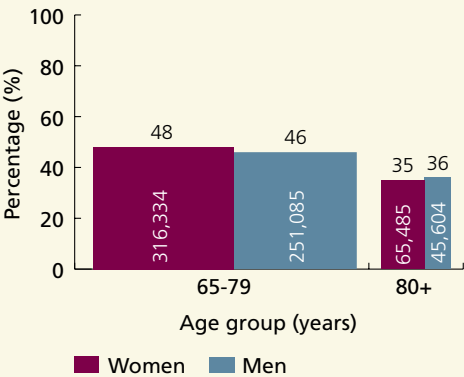
**Findings:** In Ontario, 45 percent of older adults (aged 65 and older) reported that they did something to improve their health in the previous year (46 percent of older women and 44 percent of older men).

In their own opinions, the most important changes that they had made included increasing physical activity (41 percent); receiving medical treatment (22 percent); making positive dietary changes (13 percent); weight loss (11 percent); taking vitamins (2 percent) and smoking cessation (2 percent). Similar rates were seen for both women and men. Given that there are a greater number of older women than older men, more women reported that they did something to improve their health in the previous year than men (an estimated 381,819 older women compared to 296,689 older men).

**Exhibit A.13 |** Percentage and number of community-dwelling adults aged 65 and older who reported that they did something to improve their health in the previous year, by sex and age group, in Ontario, 2007-08

**FINDINGS**

- The percentage of older women and men who reported that they did something to improve their health in the previous year was lower in the older age group (among women, 48 percent of those aged 65–79 versus 35 percent of those aged 80 and older; among men, 46 percent of those aged 65–79 versus 36 percent of those aged 80 and older).
- Irrespective of age, there were no sex differences in the percentage of older adults who reported that they did something to improve their health; given that women are disproportionately represented in older populations, the total number of women who did something to improve their health was greater than the total number among men (an estimated 316,334 women versus 251,085 men aged 65–79; an estimated 65,485 women versus 45,604 men aged 80 and older).
- The percentage of people who reported that they did something to improve their health in the previous year did not vary by annual household income or Local Health Integration Network (LHIN) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–08

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

POWER Study

## HEALTH AND FUNCTIONAL STATUS

### SELF-RATED HEALTH STATUS (GLOBAL HEALTH)

**Indicator:** This indicator measures the percentage of community-dwelling adults aged 65 and older who rated their health as fair or poor.

**Background:** Self-rated health—also referred to as global, self-reported or self-perceived health—is an indicator of how people rate their overall health status. It is a well-validated measure of health status and has been shown to have strong predictive relationships with numerous health outcomes including mortality, health care utilization and health care costs in diverse populations.<sup>63–65</sup>

The percentage of people reporting fair or poor health increases with age.<sup>66</sup> However, this is not inevitable and much can be done to prevent declining health with age. Increased attention to health promotion, chronic disease prevention and management, as well as the social determinants of health that increase the risk of poor health, will enable older adults to live longer healthier lives.<sup>67</sup>

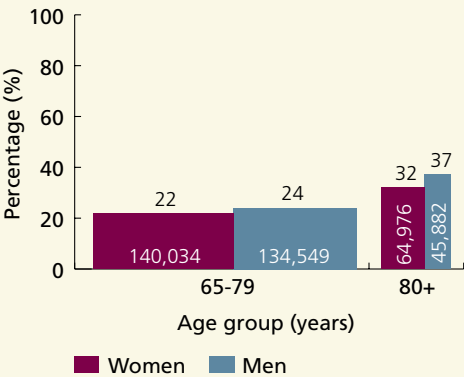
Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess this indicator among community-dwelling older adults (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail).

**Findings:** Overall, 25 percent of older adults (aged 65 and older) rated their health as fair or poor in 2005 (24 percent of women and 27 percent of men).

**Exhibit A.14 |** Percentage and number of community-dwelling adults aged 65 and older who reported their health as fair or poor, by sex and age group, in Ontario, 2005

**FINDINGS**

- The percentage of older adults (aged 65 and older) who rated their health as fair or poor was two to three times higher than the percentage of younger adults (among those aged 25–64: 10 percent of women and 9 percent of men rated their health as fair or poor) (data not shown; see [the POWER Study Burden of Illness chapter](#)).
- Among older adults, those in the older age group (aged 80 and older) were more likely to rate their health as fair or poor than those in the younger age group (aged 65–79) (32 percent versus 22 percent, respectively, among women; 37 percent versus 24 percent, respectively, among men).
- A similar proportion of older women and older men reported fair or poor health, irrespective of age group. However, given that women are overrepresented in older populations, the total number of women aged 80 and older reporting fair or poor health was much greater than the total number among men aged 80 and older (an estimated 64,976 women versus 45,882 men).
- Across both age groups a large majority of women and men reported good to excellent health (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

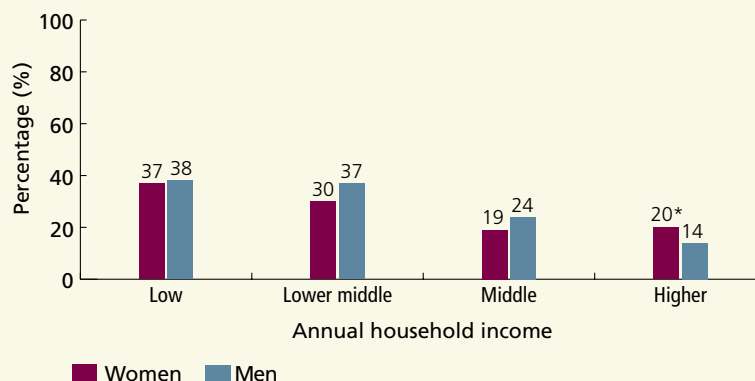
**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

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### Exhibit A.15 | Percentage of community-dwelling adults aged 65 and older who reported their health as fair or poor, by sex and annual household income, in Ontario, 2005

#### FINDINGS

- The percentage of older adults who rated their health as fair or poor was greater among women and men living in low-income households compared to those living in higher-income households.
- Over one-third of older adults living in low-income households rated their health as fair or poor (37 percent of low-income women and 38 percent of low-income men aged 65 and older).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 2](#) for definitions of annual household income categories

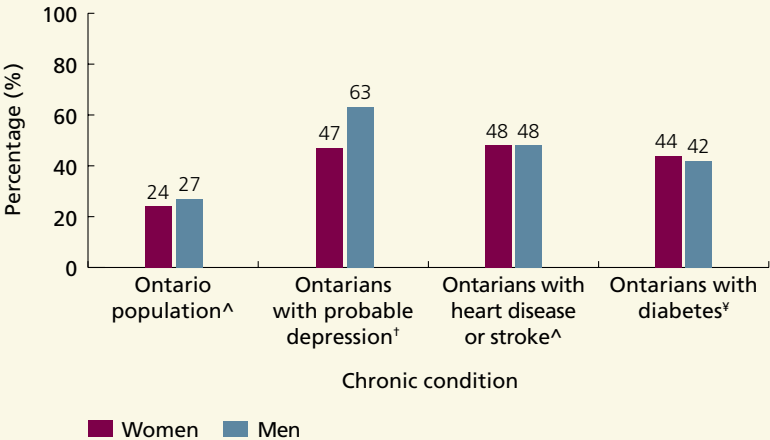
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**Exhibit A.16 |** Percentage of community-dwelling adults aged 65 and older who reported their health as fair or poor, by sex and chronic condition, in Ontario

**FINDINGS**

- The percentage of older adults who reported their health as fair or poor was higher among people who reported having a chronic condition. Over 40 percent of women and men who reported having heart disease or stroke or diabetes reporting having fair or poor health.
- Probable depression was also associated with worse self-reported health; 47 percent of women and 63 percent of men with probable depression reported fair or poor health (these estimates are imprecise due to small sample size).
- The percentage of older adults who reported being in fair or poor health varied across Local Health Integration Networks (LHINs) ranging from 20 percent (Champlain and South West LHINs) to 32 percent (North West LHIN) among women and from 17 percent (Toronto Central LHIN) to 39 percent (North West LHIN) among men (data not shown).



**DATA SOURCES:** <sup>^</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1); <sup>†</sup> Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); <sup>‡</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

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## FUNCTIONAL STATUS

**Indicator:** Three indicators were used to assess the functional status of community-dwelling older adults by measuring the percentage of adults aged 65 and older who reported that:

- their activities at home, school or work were limited due to a long-term physical or mental condition or health problem (activity limitations),
- they needed the assistance of another person to carry out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs),
- at least some of their activities were prevented due to pain or discomfort.

**Background:** Functional status, or an individual's ability to carry out their daily activities and the activities necessary to achieve their goals, is a product of overall physical and mental health.<sup>68</sup> Functional status is a marker of population health status and has an impact on quality of life. Poor functional status can reduce one's ability to live independently in the community, and may lead to in long-term care placement.

Limitations in IADLs represent difficulties in carrying out routine life activities (including meal preparation, running errands, light and heavy household work and money management) and are generally interpreted as an indicator of mild to moderate disability. Limitations in ADLs reflect difficulty in carrying out self-care activities (such as washing, dressing, eating, taking medications, moving about inside the house) and therefore represent a more severe disability. Most people who report ADL limitation will also have IADL limitations.

A goal of public health and clinical practice is to maintain or improve functioning and reduce the proportion of the population whose health limits their everyday activities. Prevention and chronic disease management can improve functional health outcomes in older populations and reduce the prevalence and severity of activity restrictions. There are effective pain management strategies that can reduce the frequency and severity of chronic pain, therefore reducing its impact on daily activities.<sup>69, 70</sup> Improvements on these indicators would represent improvements in functional status and quality of life.<sup>71</sup>

Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess these indicators among community-dwelling older adults (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail).

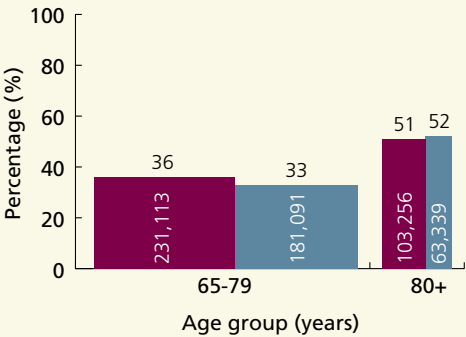
**Findings:** In 2005, 38 percent of older adults (aged 65 and older) reported having activity limitations (40 percent of older women and 36 percent of older men) and 37 percent reported limitations in carrying out IADLs and/or ADLs. Older women were more likely to report IADL and/or ADL limitations than older men (44 percent versus 28 percent, respectively). In 2000/01, 22 percent of older adults (aged 65 and older) reporting having activities that were prevented due to pain or discomfort, with older women being more likely than older men to report this limitation (25 percent versus 18 percent, respectively).

**Exhibit A.17 | Percentage and number of community-dwelling adults aged 65 and older who reported having functional limitations, by sex, type of functional limitation and age group, in Ontario**

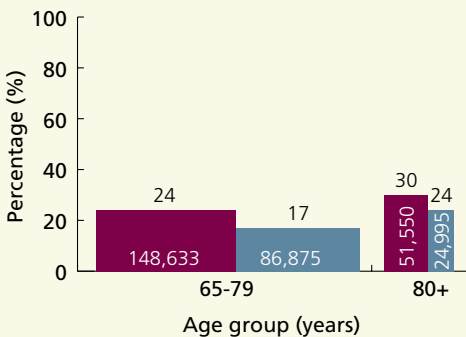
**FINDINGS**

- Among younger adults (aged 25–64), 24 percent of women and 21 percent of men reported activity limitations; 15 percent of women and 8 percent of men reported limitation in carrying out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs); and 14 percent of women and 11 percent of men reported activities prevented by pain (data not shown; see the [POWER Study Burden of Illness chapter](#)).
- The percentage of adults with functional limitations was greater in the older age groups, with nearly two-thirds of women aged 80 and older and over half of men aged 80 and older reporting IADL and/or ADL limitations.
- The majority of the IADL/ADL limitations were due to limitations in carrying out IADLs (32 percent of women and 17 percent of men aged 65–79 had an IADL limitation only; 48 percent of women and 40 percent of men aged 80 and older had an IADL limitation only), although a substantial proportion of older adults experienced difficulties carrying out ADLs (6 percent of women and 5 percent of men aged 65–79 had an ADL limitation; 16 percent of women and 15 percent of men aged 80 and older had an ADL limitation) (data not shown).
- Given that women are disproportionately represented in older populations and have more functional limitations than men, the total number of women aged 65 and older reporting functional limitations was nearly double the total number of similarly aged men reporting functional limitations (an estimated 334,369 women versus 244,430 men aged 65 and older reported activity limitation; an estimated 370,123 women versus 189,233 men aged 65 and older reported IADL and/or ADL limitations; and an estimated 200,184 women and 111,871 men aged 65 and older reported activities prevented due to pain).

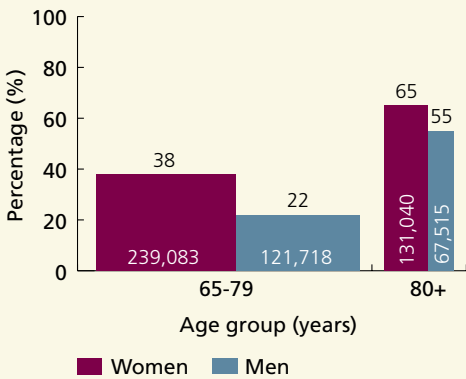
**Activity limitations<sup>^</sup>‡**



**Activities prevented due to pain or discomfort<sup>†</sup>**



**Limitations in IADL and/or ADL<sup>^</sup>**



**DATA SOURCES:** <sup>^</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1); <sup>†</sup> Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

‡ Activities at home, school or work have been limited due to a long-term physical condition, mental condition, or health problem

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see [How to read variable column width graphs](#) on page 17)

POWER Study

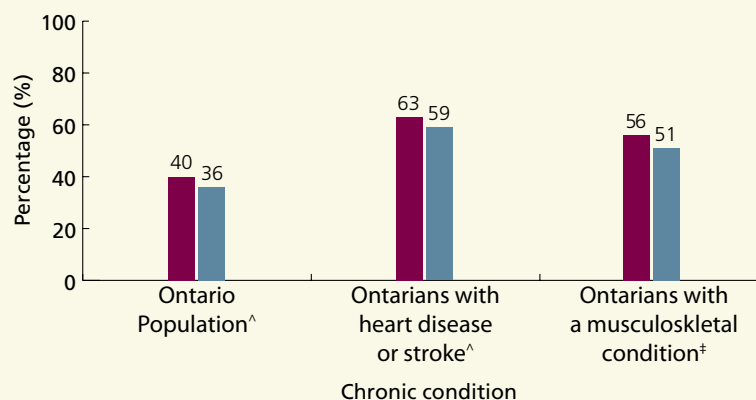
## Exhibit A.18 | Percentage of community-dwelling adults aged 65 and older who reported functional limitations, by sex and chronic condition, in Ontario

### FINDINGS

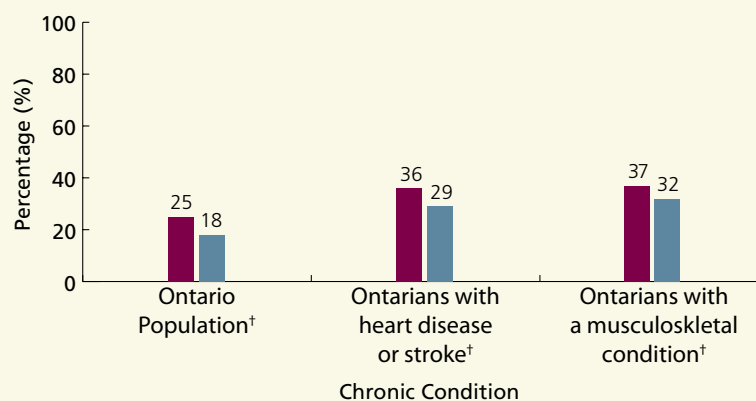
- The percentage of older adults who reported having functional limitations (activity limitations, limitations in instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs), activities prevented by pain) was higher among people who also reported having a chronic condition.
- Among Ontarians aged 65 and older, 38 percent reported activities limitations compared to 61 percent of those with heart disease or stroke and 54 percent among those with a musculoskeletal condition (data not shown).
- Women were somewhat more likely to report activity limitations than men. This sex difference was only statistically significant among those with a musculoskeletal condition.
- Overall, 22 percent of the older Ontario population reported that their activities were limited due to pain or discomfort compared to 33 percent of those with heart disease or stroke and 35 percent of those with a musculoskeletal condition (data not shown).
- Women were more likely than men to report that their activities were limited due to pain or discomfort (25 percent versus 18 percent).
- Overall, 37 percent of the Ontario population aged 65 and older reported limitations in IADLs and/or ADLs compared to 58 percent of those with heart disease or stroke, 47 percent of those with a musculoskeletal condition, and 50 percent of those with diabetes (data not shown).
- In both the general community-dwelling population and among those with specific health conditions, women were more likely than men to report limitations in carrying out IADLs and/or ADLs.

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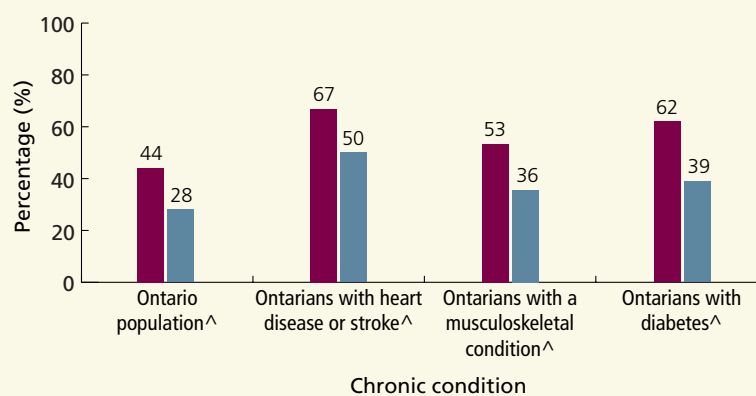
### Activity limitations<sup>¥</sup>



### Activities prevented due to pain or discomfort



### Limitations in IADLs and/or ADLs



■ Women ■ Men

**DATA SOURCES:** <sup>^</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1); <sup>‡</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007; <sup>†</sup> Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

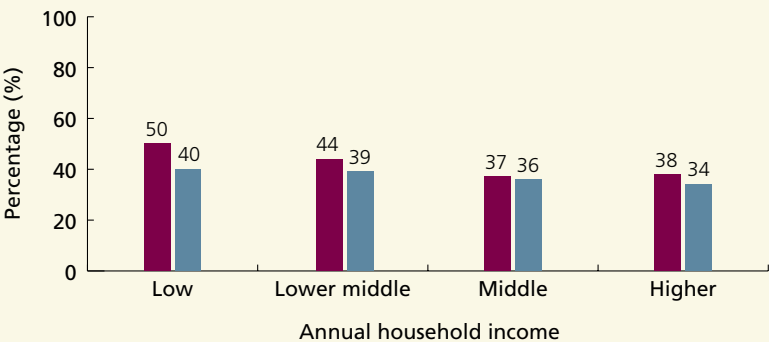
<sup>¥</sup> Activities at home, school or work have been limited due to a long-term physical condition, mental condition, or health problem

**Exhibit A.19 | Percentage of community-dwelling adults aged 65 and older who reported having functional limitations, by sex and annual household income, in Ontario**

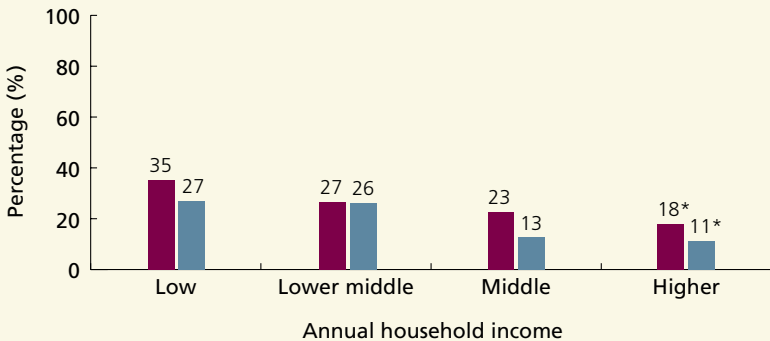
**FINDINGS**

- There was an income gradient in the percentage of older adults who reported functional limitations.
- Fifty percent of low-income older women reported activity limitations compared with 38 percent of higher-income older women. There was a similar pattern among older men; however, the income difference among men was not statistically significant.
- Thirty-five percent of older low-income women and 27 percent of older low-income men reported having pain or discomfort which prevented at least some of their activities.
- More than half of low-income women aged 65 and older reported IADL and/or ADL limitations.
- The percentage of older adults who reported activity limitations varied across Local Health Integration Networks (LHINs), ranging from 32 percent in the Central West LHIN to 43 percent in the Erie St. Clair LHIN (data not shown).
- The percentage of older adults who reported IADL and/or ADL limitations varied across LHINs, ranging from 27 percent in the Central West LHIN to 41 percent in the Central, South East and North East LHINs. These differences were not statistically significant when stratified by sex, possibly due to small sample size and limited power to detect differences (data not shown).

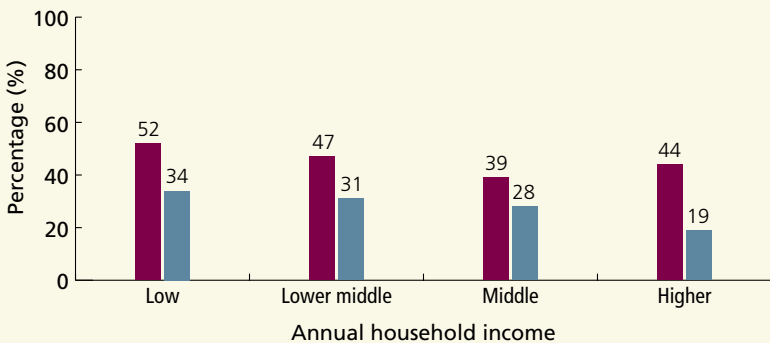
**Activities limitations<sup>^</sup>‡**



**Activities prevented due to pain or discomfort<sup>†</sup>**



**Limitations in carrying out IADL and/or ADL<sup>^</sup>**



■ Women ■ Men

**DATA SOURCES:** <sup>^</sup> Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1);

<sup>†</sup> Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

\* Interpret with caution due to high sampling variability

‡ Activities at home, school or work have been limited due to a long-term physical condition, mental condition, or health problem

**NOTE:** See [Appendix 2](#) for definitions of annual household income categories

## DENTAL CARE

**Indicator:** This indicator measures the percentage of community-dwelling adults aged 65 and older who did not visit a dentist in the past 12 months.

**Background:** Oral health is an essential component of general health. Poor oral health in older adults is associated with poor health outcomes, malnutrition, and chronic pain.<sup>72</sup> Age-related changes in the physiology of the teeth and mouth increase the risks of dental caries, periodontal disease and tooth loss.<sup>73, 74</sup> Teeth become less sensitive with age, increasing the risk of symptomatic dental disease. Preventive and routine dental care is therefore important in older adults. Given that dental services are not covered under Ontario's universal health care plan, those of lower socioeconomic status are at greatest risk for dental problem. The literature shows that the burden of oral diseases and associated complications are more likely to affect low-income adults and children, the elderly and certain ethnic groups.<sup>75, 76</sup>

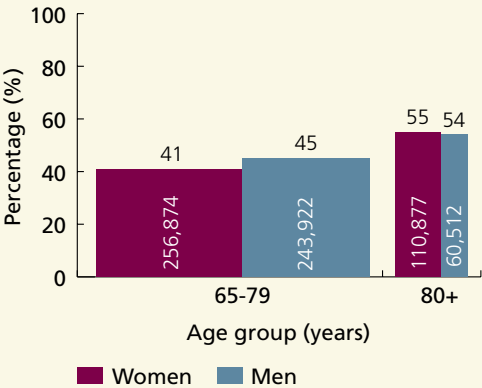
Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess dental visits among community-dwelling older adults (see [the POWER Study Access to Health Care Services chapter](#), Appendix 7.3 for more detail).

**Findings:** Overall in 2005, 45 percent of older adults in Ontario (aged 65 and older) did not visit a dentist in the past 12 months (45 percent of older women and 47 percent of older men). Given that there are a greater number of older women than older men, more women did not visit a dentist in the past 12 months than men (an estimated 367,752 women compared to 304,434 men).

**Exhibit A.20 | Percentage and number of community-dwelling adults aged 65 and older who did not visit a dentist in the past 12 months, by sex and age group, in Ontario, 2005**

**FINDINGS**

- The percentage of adults who had not seen a dentist in the past year was greater in older age groups.
- Among adults aged 25–64, 27 percent of women and 32 percent of men had not seen a dentist in the past year (data not shown; see [the POWER Study Access to Health Care Services chapter](#)).
- The percentage of adults who had not visited a dentist rose to 41 percent of women and 45 percent of men aged 65–79 and continued to rise to 55 percent of women and 54 percent of men aged 80 and older.
- In each age group, a similar proportion of women and men reported that they had not visited a dentist in the past 12 months; however, given that women are overrepresented in older populations, the total number of women who had not seen a dentist was greater than the total number of men (an estimated 256,874 women and 243,922 men aged 65–79; an estimated 110,877 women and 60,512 men aged 80 and older).
- A strong income gradient was observed in the percentage of Ontario adults (aged 25 and older) who had not seen a dentist in the previous 12 months, ranging from 20 percent of those living in higher-income households to 56 percent of those living in low-income households (data not shown; see [the POWER Study Access to Health Care Services chapter](#) for more detail).



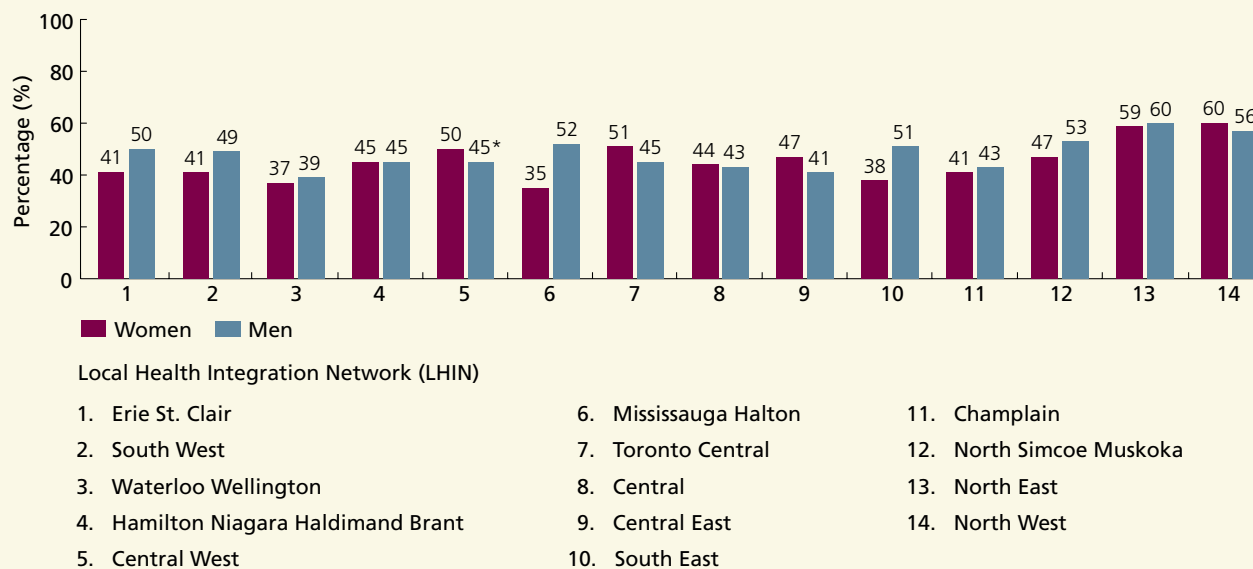
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

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**Exhibit A.21 | Percentage of community-dwelling adults aged 65 and older who did not visit a dentist in the past 12 months, by sex and Local Health Integration Network (LHIN), in Ontario, 2005**



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

### FINDINGS

- The percentage of older adults who had not visited a dentist in the past year varied across LHINs, ranging from 35 percent (Mississauga Halton LHIN) to 60 percent (North West LHIN) among women and from 39 percent (Waterloo Wellington LHIN) to 60 percent (North East LHIN) among men.

POWER Study

# Section A

## SUMMARY OF FINDINGS

In this section, we re-examined and synthesized a selection of quality indicators reported in previous POWER Study chapters to assess the burden of illness among older Ontarians living in the community and to explore opportunities for prevention. The indicators reported in this section include the prevalence of selected chronic conditions, comorbidity, incidence of certain types of cancer, chronic disease risk factors, health and functional status, and dental visits. The burden of illness increased with age. Older adults were more likely to report chronic conditions, comorbidity, being in fair or poor health and having limitations in functional status. Furthermore, many older adults reported health behaviours that increase the risk of developing chronic conditions or that can worsen pre-existing conditions. Among older adults, a large proportion of the burden of illness was carried by women. Older women were more likely than older men to have certain chronic conditions, comorbid conditions and functional limitations. Additionally, the greater number of women in the older population means that the total number of older women affected by disease and disability was often much greater than the total number of older men. Findings for the indicators reported in this section are summarized below.

### Prevalence of Selected Chronic Conditions

Adults aged 65 and older were two to three times more likely to report having specific chronic conditions than younger adults (aged 25–64), with the highest burden of illness in those aged 80 and older. Older women were more likely than older men to report having hypertension or arthritis. A smaller proportion of older women than men reported having diabetes, heart disease or stroke; however, among those aged 80 and older, the total number of women affected by these conditions was greater than the total number among men. Urinary incontinence was reported by about one in 10 women

and men aged 65 and older and was much higher among women and men aged 80 and older compared to those aged 65–79. Older low-income women and men were more likely to report most of these conditions than those with higher incomes. The percentage of older adults who reported having arthritis varied across Local Health Integration Network (LHINs).

### Prevalence of Comorbidity (Multiple Chronic Conditions)

The prevalence of comorbidity was more than twice as high among women and men aged 65 and older compared to younger adults, with the highest rates of comorbidity among those aged 80 and older. Older women were more likely to report multiple chronic conditions than older men (65 percent versus 58 percent, respectively); among those aged 80 and older, the total number of women reporting two or more chronic conditions was almost twice as high as the total number among men (an estimated 150,742 women and 81,866 men). Low-income older adults were more likely to report multiple chronic conditions than higher-income older adults. Rates of comorbidity also varied across LHINs.

### Cancer Incidence

Incidence rates of ovarian, uterine and breast cancer were four to five times higher among women aged 65 and older compared to younger women. Incidence rates of lung and colorectal cancer were approximately 14 times higher among adults aged 65 and older compared to younger adults. While older women had lower incidence rates of lung and colorectal cancer than older men (231 per 100,000 and 389 per 100,000, respectively for lung cancer; 247 per 100,000 and 343 per 100,000, respectively for colorectal cancer), the greater number of women in this population means

that the total number of older women and older men newly diagnosed with these cancers were not that different (2,206 women and 2,368 men for colorectal cancer; 2,060 women and 2,681 men for lung cancer).

### Low Income

Forty percent of older Ontarians (aged 65 and older) reported living in lower-income households, which was over two times greater than the percentage among younger adults. Older women were more likely to live in lower-income households than older men (46 percent versus 33 percent, respectively). Women aged 80 and older were particularly disadvantaged (52 percent reported living in lower-income households). The percentage of older adults living in lower-income households varied across LHINs.

### Health Behaviours that Increase the Risk of Chronic Disease

Older women were more likely than older men to be physically inactive (60 percent versus 48 percent, respectively) but less likely to be overweight or obese (50 percent versus 59 percent, respectively) or to have inadequate fruit and vegetable intake (43 percent versus 55 percent, respectively). Smoking rates were similar among older women and men (9 percent and 10 percent, respectively). Among older adults, rates of physical inactivity increased with advanced age; rates of smoking and being overweight or obese decreased with age; and rates of inadequate fruit and vegetable consumption were similar in both age groups. Older women living in the lowest-income households were more likely to report health behaviours that increase the risk of chronic conditions than those living in the highest-income neighbourhoods; lower-income older men were more likely to report physical inactivity than higher-income men. The percentage of older adults who reported being overweight or obese varied across LHINs.

### Changes to Improve Health

Forty-five percent of older adults (aged 65 and older) reported that they did something to improve their health in the previous year (46 percent of older women and 44 percent of older men). In their own opinions, the most important changes that they had made included increasing physical activity (41 percent); receiving medical treatment (22 percent); making positive dietary changes (13 percent); weight loss (11 percent); taking vitamins (2 percent) and smoking cessation (2 percent). The percentage of older women and men who reported that they did something to improve their health in the previous year decreased with age, but did not vary by sex, income or LHIN.

### Self-Rated Health Status (Global Health)

A large majority of older women and men reported good to excellent health; however, 25 percent of older adults (aged 65 and older) rated their health as fair or poor, with those aged 80 and older being most likely to report fair or poor health. Older adults were two to three times more likely to report fair or poor health than younger adults (under age 65). A similar proportion of older women and older men reported fair or poor health; however, among those aged 80 and older, the total number of women aged 80 and older reporting fair or poor health was much greater than the total number among men (an estimated 64,976 women versus 45,882 men). The percentage of older adults who reported their health as fair or poor varied by whether or not they reported having a chronic condition, household income, and LHIN. Over one-third of low-income older adults reported fair or poor health.

### Functional Status

Thirty-eight percent of older adults (aged 65 and older) reported having activity limitations, 37 percent reported limitations in carrying out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs) and 22 percent reporting having activities that were prevented due to pain or discomfort. Older women

were more likely than older men to report IADL and/or ADL limitations (44 percent versus 28 percent, respectively) and activities prevented due to pain (25 percent versus 18 percent, respectively). The total number of older women reporting each type of functional limitation was nearly double the total number of similarly aged men reporting functional limitations. The percentage of adults with functional limitations was greater in the oldest age group (aged 80 and older), with nearly two-thirds of women and over half of men reporting IADL and/or ADL limitations. Prevalence of functional limitations varied by whether or not they reported having a chronic condition, household income, and by LHIN. More than half of low-income women aged 65 and older reported IADL and/or ADL limitations.

### Dental Care

Forty-five percent of older Ontarians (aged 65 and older) did not visit a dentist in the past 12 months (45 percent of older women and 47 percent of older men). This translates into 367,752 older women and 304,434 older men who did not have a dentist visit in the past year. Women and men aged 80 and older were even less likely to have seen a dentist in the last year than those age 65–79; 55 percent of women and 54 percent of men aged 80 and older did not visit a dentist in the past year. This indicator also varied across LHINs.



# Section B

## *Chronic Disease Management*

### INTRODUCTION

Effective chronic disease management leads to reduced morbidity and mortality for the leading causes of death and disability.

There are unique challenges in optimizing chronic disease outcomes among older adults. As the population aged 80 and older is the fastest growing segment of the population, it is important that we not only have an understanding of the current practices and associated health outcomes in older patients overall, but in this high-risk group as well. We know that there are gaps in the delivery of best practice guidelines in all age groups, including the elderly. These gaps have been described for a variety of medical conditions including cardiovascular care,<sup>77</sup> osteoporosis,<sup>78</sup> cancer management, and the treatment of mental health disorders.<sup>79</sup>

Advances in medicine have successfully increased survival for many diseases. Diseases that were previously considered acute—such as heart disease and cancer—are now best managed under the model of chronic disease management. Disease-based, best practice guidelines are often based on younger adult patients with single disease diagnosis. Older patients rarely have a single diagnosis, so management based on best practice guidelines is more complex.<sup>35</sup> The available evidence is not always generalizable to older adults, especially those with multiple chronic conditions and/or frailty. Furthermore, attempts to apply multiple best practices guidelines in the same patient may present conflicting recommendations and the outcomes may paradoxically be deleterious for the older patient.<sup>33</sup>

This section examines performance on quality indicators for common chronic conditions, and gives us a sense of how widespread guideline application is among the

oldest segments of the population. We are, however, unable to explore the clinical context in which these diagnostic and therapeutic decisions are being made due to limitations of the available data. The older patient population is very heterogeneous in terms of disease burden, functional ability and psychosocial profile. Appropriate application of guidelines and sound clinical practice may be influenced by patient and family preference, competing therapeutic goals in the patient with multi-morbidity, and circumstances related to the broader determinants of health. As a result, older patients may not receive what may be considered the evidence-based practice for their chronic medical condition(s), but we are unable to ascertain whether this is appropriate or suboptimal quality of care for these patients. Age-related treatment bias on the part of the health care provider may also influence the likelihood of a patient receiving the recommended investigations or treatments. All of these factors influence the uptake of diagnostic and treatment opportunities reported in this section. However, these technical measures do not reflect the complex clinical issues inherent in the management of frail older patients. Therefore, our findings reflect patterns and outcomes of care, but more clinical information is needed to understand the extent to which these measures reflect underuse of effective interventions or informed choices and preferences in this population with complex health status and multi-morbidity. Furthermore, there are no well-established benchmarks for performance on many of these indicators that account for complexity and multi-morbidity.

Delivering quality care that is consistent with evidence-based best practice, specifically developed and evaluated for management of diseases in older patients, will yield benefits for the patient as well as the health care system. Guidelines are emerging that take into consideration the heterogeneity of the geriatric population, the inclusion of geriatric syndromes as relevant health outcomes and the need to prioritize and individualize clinical management in the context of clinical complexity.<sup>32, 80</sup> For the system, application of such care may lead to more efficient health service utilization, including reduced readmission rates, avoidable emergency department (ED) visits, and alternative level of care (ALC) days. For the patient, quality care that is holistic and emphasizes coordination may improve satisfaction and ultimately achieve better health outcomes. Integration of care, coordination and continuity are important factors in successful delivery of quality care to patients with complex needs. We did not have data that could address these critical elements of care delivery and these are areas on which future health system evaluation should focus. Providing effective and efficient care requires both patient-centred integrated models of care delivery and a health care workforce with clinical competency in geriatric care.

We therefore explored outcomes of relevance to the system as a whole—hospitalization rates, ED visit rates, and one-year mortality for a variety of conditions of relevance to older adults. A notable omission is the lack of outcome data related to dementia. Dementia is a significant source of morbidity in the older population and is an important variable to assess for health status. Assessment of dementia care requires clinical information not available in the administrative datasets used for this report.

In this section, we re-examine and synthesize a selection of quality indicators reported in previous POWER Study chapters to paint a picture of how care is currently being provided to older adults in Ontario. We report indicators of chronic disease management among older adults, including indicators related to the provision

of health care, specialty and diagnostic services, and health outcomes. Differences associated with sex, age, income, and Local Health Integration Network (LHIN) were examined, where data were available and sample size allowed. While these indicators provide a picture of current practices in Ontario, data limitations and the lack of evidence supporting best practices among frail older adults with complex conditions make it difficult to determine the extent to which older adults are receiving appropriate care. Nevertheless, we are able to identify areas that need attention as well as important areas for improvement, such as reduction in rates of avoidable hospitalizations and ED use.

The indicators include:

- Number of geriatricians

### Diagnosis and Treatment

- Physician care following a hospitalization for depression, acute myocardial infarction (AMI) or heart failure (HF)
- Type of physician providing in-hospital care for AMI or HF
- Angiography for AMI
- Referral to medical oncology among colon cancer and breast cancer patients
- Bone mineral density (BMD) testing following a low-trauma fracture

### Health Outcomes

- Hospital visits (ED visit or readmission) following a hospitalization for depression (within 30 days of discharge)
- Hospital admission rates for ambulatory care sensitive conditions
- Hospital visits (ED visits or admission) for hyperglycemia or hypoglycemia among people with diabetes
- ED visits following a hospital admission for HF (within 30 days and one year of discharge)
- Readmission rates among HF and stroke patients (within 30 days and one year of discharge)



- One-year mortality among HF, stroke, and hip fracture patients
- Hospitalization rate due to fall-related injury among seniors
- Low-trauma fracture rate

The indicators in this section were measured using administrative health care databases from hospitals and the Ontario Health Insurance Plan (OHIP). Some of the indicators also used disease-specific registries, such as the Ontario Cancer Registry (OCR), the Cardiac Care Network (CCN), or the Ontario Diabetes Database (ODD). The number

of geriatricians per 100,000 population aged 65 and older was measured using the Ontario Physician Human Resources Data Centre, Active Physician Registry and population estimates from IntelliHEALTH. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter ([Appendix 1](#) of this report lists the original POWER chapter in which indicators were reported). See [Appendix 2](#) of this report for more detail on newly reported indicators.





## EXHIBITS AND FINDINGS

### NUMBER OF GERIATRICIANS

**Indicator:** This indicator measures the number of geriatricians per 100,000 adults aged 65 and older.

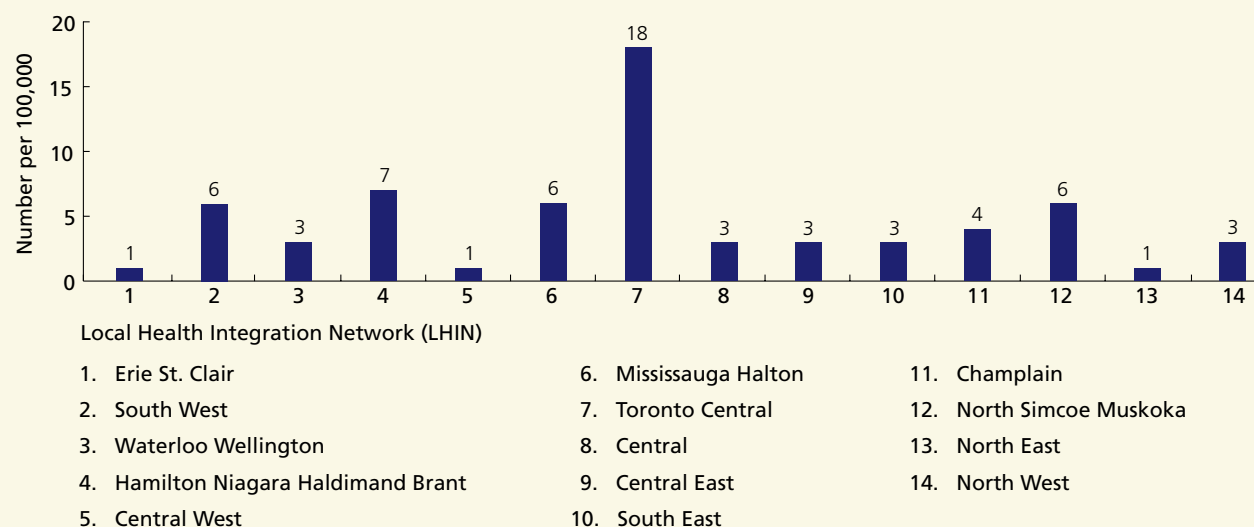
**Background:** Responding to the needs of an aging population will be one of the single most significant challenges facing our health system. Geriatric medicine is a subspecialty of internal medicine, recognized by the Royal College of Physicians and Surgeons of Canada. In 2006, there were only 62 geriatricians in Ontario, compared to the 194 indicated by the standards of the British Geriatrics Society and the 223 indicated by benchmarks arising from an Ontario Delphi Consensus Process.<sup>81, 82</sup>

This indicator is not intended to serve as a comprehensive inventory of geriatric services available to seniors in Ontario. Geriatricians represent one, critical component of the inter-professional teams that provide comprehensive geriatric assessment for frail seniors. Comprehensive geriatric assessment has been shown to reduce functional decline, institutionalization and mortality.<sup>83</sup>

The number of geriatricians reported in this indicator does not take into account physicians that are working part-time nor does it adjust for geriatricians that have a significant role in non-clinical areas such as research, education or administration. As such, the numbers reported may overestimate the number of geriatricians available to serve the clinical needs of the province's older population. The Ontario Physician Human Resources Data Centre, Active Physician Registry and population estimates from IntelliHEALTH were used to measure this indicator (see [Appendix 2](#) for more detail about this indicator).

**Findings:** In total, there were 94 geriatricians practicing in Ontario in 2009. This translates to five geriatricians for every 100,000 adults aged 65 and older.

### Exhibit B.1 | Number of geriatricians per 100,000 population aged 65 and older, by Local Health Integration Network (LHIN), in Ontario, 2009



**DATA SOURCES:** Ontario Physician Human Resources Data Centre, Active Physician Registry December 31, 2009; Ministry of Finance Population Estimates by LHIN, 2001–2009 Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario data extracted December 20, 2010

#### FINDINGS

- The number of geriatricians per 100,000 older adults varied across LHINs. For example, there was one geriatrician per 100,000 older adults in the Erie St. Clair, Central West, and North East LHINs and seven geriatricians per 100,000 older adults in the Hamilton Niagara Haldimand Brant LHIN.
- The Toronto Central LHIN had 18 geriatricians per 100,000 older adults; however, this may not be an accurate indication of access to geriatric specialist care, as several of these geriatricians are full-time researchers, educators, administrators or have part-time practices.

POWER Study

## DIAGNOSIS AND TREATMENT

### PHYSICIAN CARE FOLLOWING HOSPITALIZATION

**Indicator:** This indicator examines the percentage of older adults (aged 65 and older) hospitalized for depression who had a physician visit for depression within 30 days of discharge and the percentage of older adults hospitalized for an acute myocardial infarction (AMI) or heart failure (HF) who had a physician visit (general practitioner/family practitioner, internist, cardiologist, or geriatrician) within four weeks of discharge.

**Background:** Following hospital discharge, physician follow up care is important to ensure patients are being appropriately monitored and receiving ongoing medical attention.

**Depression** is a common mental health problem in older adults. It is associated with significant morbidity and widespread impact on functional ability, caregiver stress and higher risk of medical illness. While depression affects women at a higher rate than men, elderly men have the highest rate of suicide of all population subgroups.<sup>84</sup> Most depression is managed in the community. However, severe depression may require hospital admission. Post-discharge follow up care, including ongoing medical attention, is critical for people experiencing severe depression.<sup>85</sup> Recent work in Ontario found that 80 to 90 percent of clients in community mental health programs or provincial hospitals are on psychotropic medication and that compliance and symptom and medication management are important concerns for these individuals.<sup>86</sup>

Patients who have been hospitalized for **heart failure** need to be seen for follow up in the community after hospital discharge<sup>87</sup> to make sure that they are stable in the outpatient setting and to check their understanding of and compliance with treatment.

Patients who have been hospitalized with an **acute myocardial infarction** should be seen by a physician within four weeks of hospital discharge. This visit serves many important functions. At this visit the presence or absence of cardiovascular symptoms and functional status are assessed. Prescription medicines are reviewed to assess adherence and side effects and to optimize therapy if necessary. Discharge plans and secondary prevention strategies are reviewed and this visit provides an opportunity to assess the physical activity level and psychological status of the patient.<sup>88</sup>

Linked administrative databases were used to determine the percentage of patients hospitalized for depression, AMI, and HF who had a physician visit within 30 days or four weeks of discharge. Hospitalizations for AMI and HF were excluded if the patient was transferred from a long-term care home or if they were discharged to a long-term care home (see [the POWER Study Depression chapter](#), Appendix 5.3, and [the Cardiovascular Disease chapter](#), Appendix 6.3, for more detail).

**Findings:** In Ontario, among older adults (aged 65 and older) who were hospitalized for depression in 2005/06, 59 percent (60 percent of older women and 58 percent of older men) had a follow up physician visit for depression within 30 days of discharge.

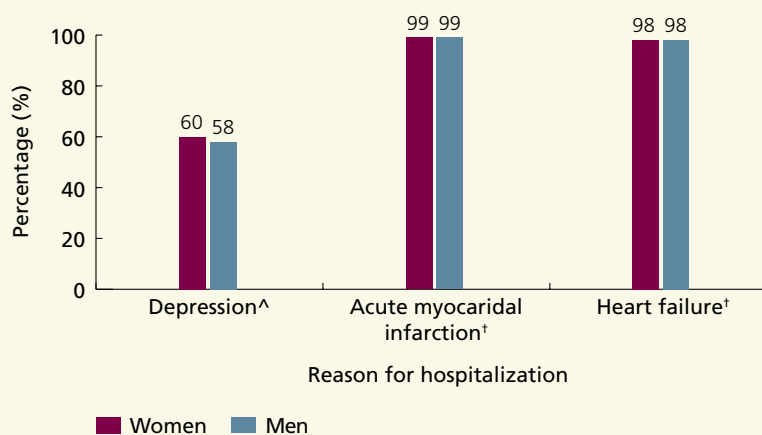
In the Ontario population of patients aged 65 and older who were discharged home from hospital after an admission for an AMI in 2005/06, 99 percent of women and men had seen a physician within four weeks of hospital discharge.

In the Ontario population of patients aged 65 and older admitted to hospital in 2005/06 for HF who were discharged home and who were alive one month later, 98 percent of women and men had seen a physician within four weeks of hospital discharge.

### Exhibit B.2 | Percentage of patients aged 65 and older admitted to hospital who had a physician visit within 30 days of discharge, by sex and reason for hospitalization, in Ontario, 2005/06

#### FINDINGS

- Sixty percent of women and 58 percent of men had a physician visit for depression within 30 days of a hospital admission for depression.
- Nearly all women and men who were hospitalized for an acute myocardial infarction (AMI) or for heart failure (HF) had a follow up physician visit within the recommended time frame (99 percent of AMI patients and 98 percent of HF patients).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> Physician visit for depression within 30 days of discharge among those discharged from hospital from Mar 1, 2005-Feb 28, 2006

<sup>†</sup> Physician visit within four weeks of discharge among those admitted to hospital in the 2005/06 fiscal year

POWER Study

## IN-HOSPITAL PHYSICIAN CARE FOR ACUTE MYOCARDIAL INFARCTION (AMI) AND HEART FAILURE (HF)

**Indicator:** This indicator identifies the type of physician(s) providing in-hospital care for patients aged 65 and older admitted for an acute myocardial infarction (AMI) or heart failure (HF).

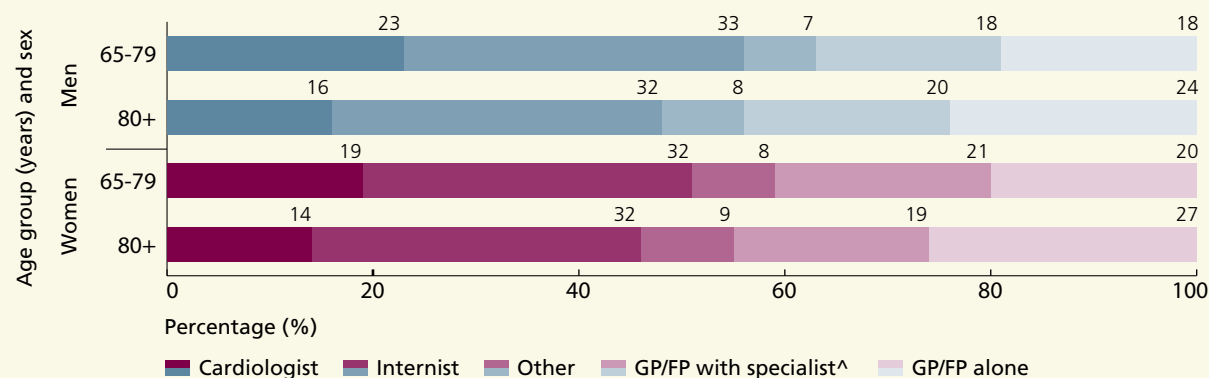
**Background:** Patients' quality of care and outcomes can vary by the type of physician providing care. Among AMI patients, hospital care by a cardiologist provides better access to guideline recommended diagnostic testing such as cardiac catheterization and interventions such as percutaneous coronary intervention, when indicated. In addition, cardiologists may have higher rates of use of guideline recommended medications. For heart failure, shared care between primary care providers and specialists improves outcomes. Care by a general cardiologist or HF specialist while in hospital for HF has been associated with improved quality of care and outcomes<sup>89</sup> and is a structural indicator of HF care.<sup>90</sup> Involvement of cardiologists (or specialists) in the care of hospitalized HF patients is associated with increased diagnostic testing and lower six-month readmission rates. Therefore, cardiology care may be associated with improved survival when compared to care by general practitioners/family physicians (GP/FP) alone.<sup>91</sup> The Canadian Cardiovascular Society<sup>92</sup> and the Cardiovascular Atlas<sup>89, 93</sup> have reported variations in care providers in-hospital based on patient age and sex; women and older patients were less likely to be under the care of specialists while in hospital.

The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify the most responsible physician providing care to AMI and HF patients while in hospital. Patients transferred from long-term care homes were excluded from these indicators (see [the POWER Study Cardiovascular Disease chapter](#), Appendix 6.3 for more detail).

**Findings:** In the Ontario population of patients aged 65 and older who were admitted to hospital in 2005/06 with a primary diagnosis of AMI, 32 percent had a cardiologist as their most responsible physician (31 percent of women and 33 percent of men), 34 percent were under the care of an internist or geriatrician (33 percent of women and 35 percent of men) and 28 percent were under the care of a GP/FP (31 percent of women and 26 percent of men). Approximately two-thirds of those under the care of a GP/FP received a specialist consultation by a cardiologist, internist or geriatrician. However, 10 percent of the older AMI patients admitted to hospital in Ontario were under the sole care of a GP/FP (11 percent of women and 9 percent of men).

In the Ontario population of patients aged 65 and older admitted to hospital in 2005/06 with a primary diagnosis of HF, 18 percent had a cardiologist, 32 percent had an internist and 42 percent had a GP/FP as their most responsible physician (including those who saw a GP/FP with specialist follow up). The remaining eight percent were seen by another type of physician while in hospital. Approximately 46 percent of those under the care of a GP/FP received a specialist consultation by a cardiologist or internist. However, 23 percent of the older HF patients admitted to hospital in Ontario were under the sole care of a GP/FP (24 percent of women and 21 percent of men).

### Exhibit B.3 | Type of physician providing in-hospital care to adults aged 65 and older hospitalized for heart failure (HF), by sex and age group, in Ontario, 2005/06



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

^ Specialist includes cardiologists and internists

GP/FP = general practitioner/family physician

#### FINDINGS

- The type of physician providing in-hospital care for AMI and HF patients varied by age among both women and men.
- In both age groups, women who had been hospitalized for HF were more likely than men to be treated by a GP/FP alone (20 percent of women and 18 percent of men aged 65–79; 27 percent of women and 24 percent of men aged 80 and older).
- Among older adults, HF patients aged 80 and older were less likely to have a cardiologist as their most responsible physician compared to those aged 65–79 (14 percent of women and 16 percent of men aged 80 and older compared to 19 percent of women and 23 percent of men aged 65–79). Conversely, they were more likely to be managed by a GP/FP alone.
- Similarly, among older adults, AMI patients aged 80 and older were less likely to have a cardiologist as their most responsible physician compared to those aged 65–79 (27 percent of women and 29 percent of men aged 80 and older compared to 35 percent of women and men aged 65–79) (data not shown).
- Compared to patients aged 45–64, HF and AMI patients aged 65 and older were less likely to have a cardiologist as their most responsible physician while in hospital (44 percent versus 32 percent, respectively for AMI patients; 27 percent versus 18 percent, respectively for HF patients) and more likely to have been under the sole care of a GP/FP (5 percent versus 10 percent, respectively for AMI patients; 16 percent versus 23 percent, respectively for HF patients) (data not shown).

POWER Study

## ANGIOGRAPHY FOR ACUTE MYOCARDIAL INFARCTION (AMI)

**Indicator:** This indicator measures the percentage of patients aged 65 and older admitted to hospital for acute myocardial infarction (AMI) who underwent or were referred for coronary angiography within three months of hospital discharge.

**Background:** Cardiac catheterization (angiography) is indicated as an important component of patient management after an AMI. Angiography provides an image of the coronary arteries and shows where there are blockages and the severity of these blockages. This information is used to identify patients who may benefit from revascularization using percutaneous coronary interventions or coronary artery bypass graft surgery. When these data were collected, cardiac catheterization post-AMI was the gold standard of care and was a quality indicator.<sup>94</sup> More recent evidence suggests that there may be a role for risk stratification with stress testing post-AMI, prior to catheterization.<sup>95</sup> Nevertheless, for many post-AMI patients, catheterization is still recommended and many of those undergoing risk stratification with stress tests will require angiography.

Among older patients with acute coronary syndromes, the presentation is more likely to be atypical than in younger patients. These atypical symptoms may include exertional fatigue or dyspnea, confusion or falls, instead of chest pain and diaphoresis. Pre-existing abnormalities on electrocardiogram may further exacerbate the diagnostic challenge of acute coronary syndromes (ACS) in older adults. Both of these factors may contribute to the delay in presentation for medical attention and the initiation of guideline based treatment for ACS. Risk stratification is known to be paradoxically biased against older patients despite their higher level of risk.<sup>96</sup> From the GRACE risk model for post discharge six month mortality, age alone accounts for the majority of the prognostic information in the model.<sup>97</sup> Despite this older patients are 20 percent less likely to receive early invasive management for every 10 years over age 65.<sup>98</sup>

This indicator was measured using data from the Cardiac Care Network (CCN) and the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD). Patients admitted from long-term care homes were excluded from this indicator (see [the POWER Study Cardiovascular Disease chapter](#), Appendix 6.3 for more detail).

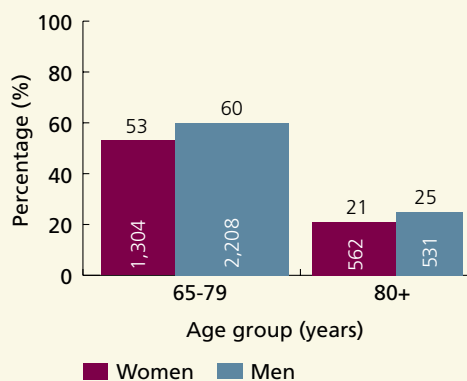
**Findings:** In Ontario, among older adults (aged 65 and older) who had been admitted to hospital in 2005/06 with a primary diagnosis of AMI, 42 percent either underwent coronary angiography in hospital or were referred for the test within three months of discharge. Older women were less likely to receive or be referred for coronary angiography than men (36 percent versus 47 percent, respectively).



**Exhibit B.4 |** Percentage and number of adults aged 65 and older admitted to hospital with an acute myocardial infarction (AMI) who underwent or were referred for coronary angiography<sup>^</sup> within three months of discharge, by sex and age group, in Ontario, 2005/06

### FINDINGS

- Coronary angiography rates were lower in the older age groups.
- Approximately four in five AMI patients aged 45–64 (79 percent) underwent or were referred for coronary angiography within three months of discharge (data not shown; see the [POWER Study Cardiovascular Disease chapter](#)).
- The angiography rate declined to 57 percent of patients aged 65–79 and to less than one-quarter (22 percent) in patients aged 80 and older (data not shown).
- In both older age groups, a smaller percentage of older women than older men underwent or were referred for coronary angiography after an AMI.



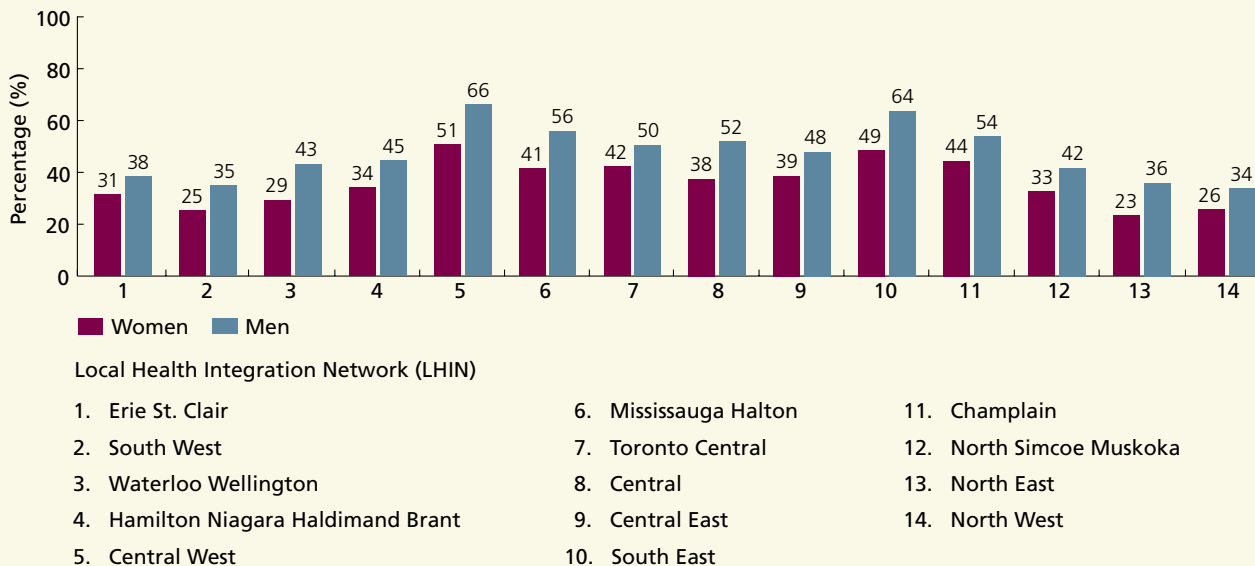
**DATA SOURCES:** Cardiac Care Network (CCN); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

<sup>^</sup> Angiography was measured as in-hospital procedures performed prior to hospital discharge or referral within three months of discharge

**NOTE:** Column widths reflect the ratio of women to men who were admitted to hospital with an acute myocardial infarction (based on the indicator's denominator; for more detail see '[How to read variable column width graphs](#)' on page 17)

POWER Study

**Exhibit B.5 |** Percentage of adults aged 65 and older admitted to hospital with an acute myocardial infarction (AMI) who underwent or were referred for coronary angiography^ within three months of discharge, by sex and Local Health Integration Network (LHIN), in Ontario, 2005/06



**DATA SOURCES:** Cardiac Care Network (CCN); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

^ Angiography was measured as in-hospital procedures performed prior to hospital discharge or referral within three months of discharge

**FINDINGS**

- The percentage of older AMI patients who underwent or were referred for coronary angiography varied across LHINs, ranging from 23 percent (North East LHIN) to 51 percent (Central West LHIN) among women and from 34 percent (North West LHIN) to 66 percent (Central West LHIN) among men.

POWER Study

## REFERRAL TO MEDICAL ONCOLOGY

**Indicator:** These two indicators measure consultations with a medical oncologist among cancer patients. Specifically, we examine the percentage of:

- colon cancer patients who had a consultation to consider adjuvant chemotherapy with a medical oncologist in the four months following surgery,
- breast cancer patients seen by a medical oncologist in the three months following diagnosis.

**Background:** There is a role for systemic therapy (either hormonal treatment or chemotherapy) in most women with breast cancer and adjuvant chemotherapy is routinely recommended in all stage 3 colon cancer patients and high-risk, stage 2 patients. Since medical oncologists usually prescribe hormonal treatment and chemotherapy, “referral to a medical oncologist” is the first step toward ensuring appropriate care. For this indicator, we used consultation as a proxy for referral, assuming all referred patients were seen. Also, since detailed staging data are not available in Ontario, all patients with colon cancer who had surgery and no evidence of distant disease were considered eligible. Therefore, we may somewhat underestimate true referral rates.

In older patients, many factors should be considered when making a decision whether to pursue chemotherapy. The presence of other comorbid conditions, functional abilities and available social support of the patient are important variables that may affect a patient’s ability to tolerate a course of chemotherapy. These indicators measure only the rate of referral to a medical oncologist, not whether the decision was appropriate or not.

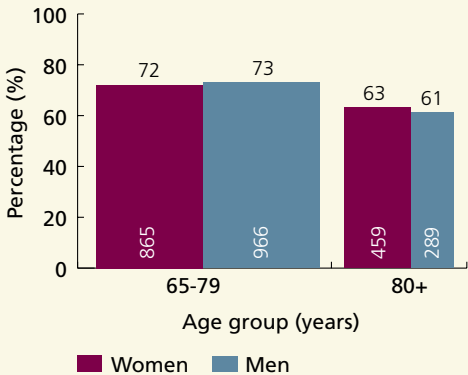
The Ontario Cancer Registry (OCR) was used to identify people who were diagnosed with breast or colon cancer. Medical oncologist referrals were determined using Ontario Health Insurance Plan (OHIP) billing data and the ICES Physician Database (IPDB) (see [the POWER Study Cancer chapter](#), Appendix 4.3 for more detail).

**Findings:** Overall in Ontario, 69 percent of older adults (aged 65 and older) diagnosed with colon cancer in 2002/03 or 2003/04 had a consultation with a medical oncologist in the four months following surgery (69 percent of older women and 70 percent of older men). Fifty-nine percent of older women (aged 65 and older) diagnosed with breast cancer in 2003/04 or 2004/05 had a consultation with a medical oncologist in the three months following diagnosis.

**Exhibit B.6 |** Percentage and number of patients aged 65 and older with colon cancer who had a consultation with a medical oncologist in the four months following surgery, by sex and age group, in Ontario, 2002/03 to 2003/04

**FINDINGS**

- Colon cancer patients in the oldest age group were less likely to have a consultation with a medical oncologist.
- Seventy-two percent of women and 73 percent of men aged 65–79 had a consultation compared to 63 percent of women and 61 percent of men aged 80 and older.
- Among younger colon cancer patients (under age 65), 78 percent of women and 76 percent of men had a consultation with a medical oncologist (data not shown; see [the POWER Study Cancer chapter](#)).
- The proportion of older breast cancer patients who had a consultation with a medical oncologist also decreased in the older age groups (72 percent among women under age 65; 63 percent among women aged 65–79; and 48 percent among women aged 80 and older) (data not shown; see [the POWER Study Cancer chapter](#)).

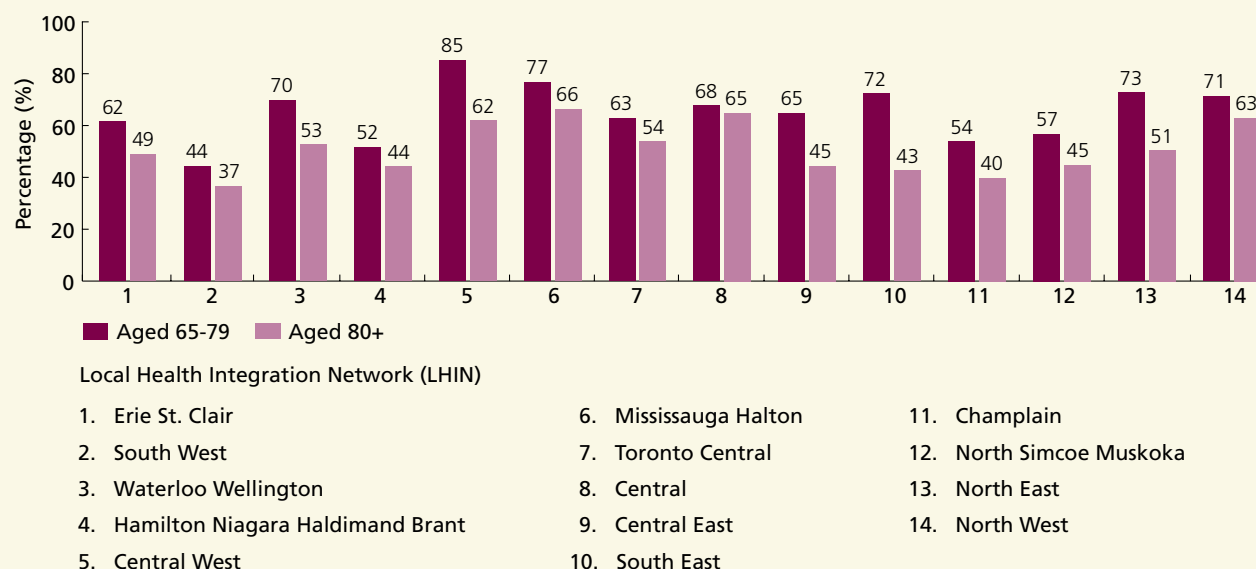


**DATA SOURCES:** Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP); Registered Persons Database (RPDB); ICES Physician Database (IPDB)

**NOTE:** The width of each bar reflects the relative proportion of the older colon cancer patients (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see '[How to read variable column width graphs](#)' on page 17)

POWER Study

**Exhibit B.7 |** Percentage of breast cancer patients aged 65 and older who had a consultation with a medical oncologist within three months of diagnosis, by age group and Local Health Integration Network (LHIN), in Ontario, 2003/04 to 2004/05



**DATA SOURCES:** Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB)

### FINDINGS

- The proportion of older breast cancer patients who had a consultation with a medical oncologist varied across LHINs, ranging from 44 percent (South West LHIN) to 85 percent (Central West LHIN) among women aged 65–79 and from 37 percent (South West LHIN) to 66 percent (Mississauga Halton LHIN) among women aged 80 and older.

POWER Study

## BONE MINERAL DENSITY (BMD) TESTING FOLLOWING LOW-TRAUMA FRACTURE

**Indicator:** This indicator measures the percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year of discharge after having a low-trauma fracture.

**Background:** Osteoporosis increases the risk for fractures. Because people who suffer a fracture are at an increased risk of additional fractures and are more likely to have osteoporosis, this measure assesses how well the health system manages people at high risk for a second fracture. Guidelines recommend BMD testing following a low-trauma fracture to provide an assessment of bone mass which is used to make treatment recommendations.<sup>99</sup>

Osteoporosis is a common metabolic bone disorder among older people, associated with significant morbidity and mortality. In addition, osteoporosis can result in significant functional limitations and reduced quality of life.

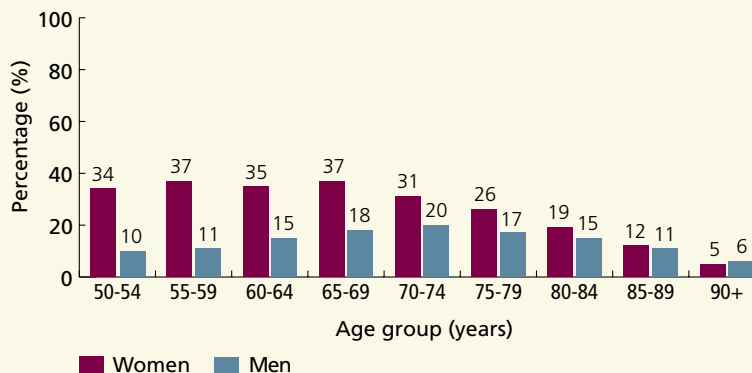
Data from the Ontario Health Insurance Plan (OHIP) were used to assess BMD testing in patients who had been identified as having a low-trauma fracture (see low-trauma fracture rate indicator on page 99). Adults were excluded from the sample if they had undergone a BMD test within the 12 month period prior to their fracture or if they had died within twelve months after their fracture. Due to a lack of drug data on those under age 65, we were unable to exclude those who were already receiving pharmacologic therapy for osteoporosis, which may influence estimates (see [the POWER Study Musculoskeletal Conditions chapter](#), Appendix 8.3 for more detail).

**Findings:** In Ontario, in 2007/08, 23 percent of adults aged 50 and older who had a low-trauma fracture received a BMD test within one year post-discharge following their fracture. Women were twice as likely to receive a BMD test as men (26 percent versus 13 percent, respectively).

## Exhibit B.8 | Percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex and age group, in Ontario, 2007/08

### FINDINGS

- Across all age groups, the majority of women and men did not undergo BMD testing after a low-trauma fracture.
- The percentage of women who received a BMD test within one year after having a low-trauma fracture decreased after age 70; while 34–37 percent of women aged 50–69 underwent BMD testing after a low-trauma fracture, this declined to 19 percent of women aged 80–84 and only five percent of women aged 90 and older.
- The percentage of men who underwent BMD testing after a low-trauma fracture increased with age until the 70–74 age group (20 percent) and then declined.
- With the exception of those aged 85 and older, women were more likely than men to receive a BMD test after a low-trauma fracture. Women aged 50–59 were more than three times as likely to be tested as similarly aged men.
- Women and men living in lower-income neighbourhoods were less likely to undergo BMD testing after a low-trauma fracture (24 percent of women and 12 percent of men) than those living in higher-income neighbourhoods (28 percent of women and 15 percent of men), however, the differences were small (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP)

<sup>^</sup> The sample is limited to adults who had a low-trauma fracture (fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm) who were alive one year post discharge and who had not had a BMD within twelve months prior to their fracture.

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**Exhibit B.9 |** Age-standardized percentage of adults aged 50 and older who received a bone mineral density (BMD) test within one year post-discharge after a low-trauma fracture,<sup>^</sup> by sex, neighbourhood income quintile and Local Health Integration Network (LHIN), in Ontario, 2007/08

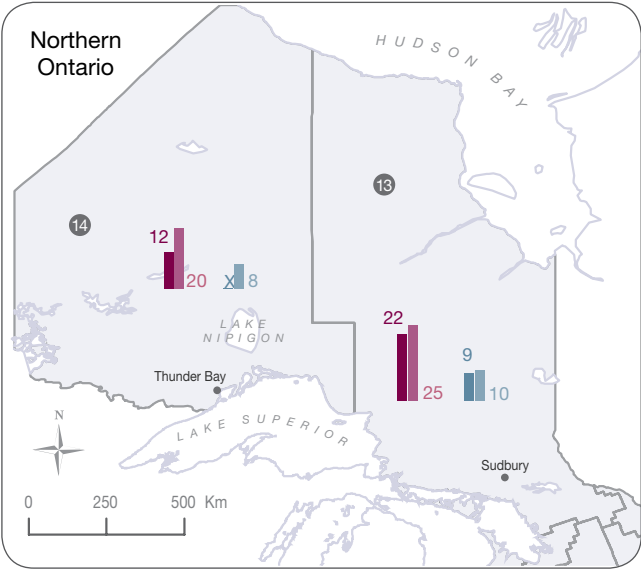
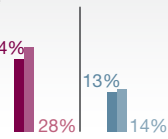
**FINDINGS**

- The percentage of adults who received a BMD test after a low-trauma fracture varied across LHINs.
- The percentage who received a BMD test after a low-trauma fracture ranged from 12 percent (North West LHIN) to 31 percent (North Simcoe Muskoka LHIN) among women living in lower-income neighbourhoods and from 19 percent (Erie St. Clair LHIN) to 32 percent (Toronto Central LHIN) among women living in higher-income neighbourhoods.
- The percentage who received a BMD test after a low-trauma fracture among men ranged from six percent (South East LHIN) to 18 percent (Hamilton Niagara Haldimand Brant LHINs) among men living in lower-income neighbourhoods and from six percent (Erie St. Clair LHIN) to 22 percent (Waterloo Wellington LHIN) among men living in higher-income neighbourhoods.

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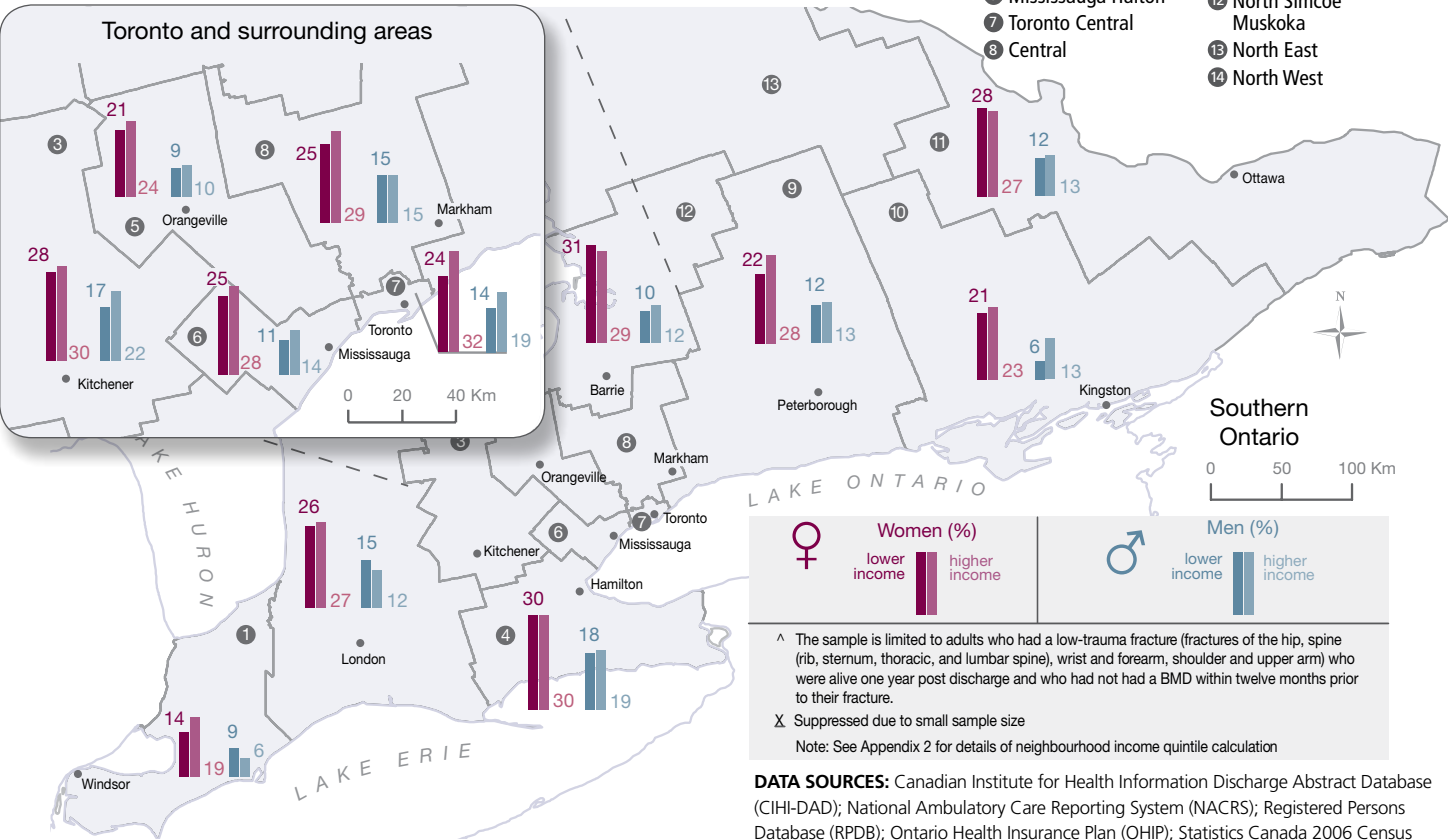
**Overall Ontario**

In Ontario, 24 percent of women living in lower-income neighbourhoods, 28 percent of women living in higher-income neighbourhoods, 13 percent of men living in lower-income neighbourhoods and 14 percent of men living in higher-income neighbourhoods aged 50 and older received a bone mineral density (BMD) test within a year of having a low-trauma fracture.



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census

## HEALTH OUTCOMES

### HOSPITAL VISITS FOLLOWING A HOSPITALIZATION FOR DEPRESSION

**Indicator:** These two indicators examine hospital visits in the 30 days following a hospitalization for depression. Specifically, we examine the percentage of older adults (aged 65 and older) who were hospitalized for depression who:

- had an emergency department (ED) visit (but were not readmitted) for any reason within 30 days of being discharged,
- were readmitted to hospital for depression within 30 days of being discharged.

**Background:** The role of inpatient care in mental health is to stabilize individuals experiencing acute episodes of illness so they can be discharged to community-based services and supports. ED visits or readmission to hospital shortly after a previous inpatient stay suggest problems in the continuity of care.<sup>100</sup> It may indicate poor discharge planning, a lack of appropriate community supports or poor integration with community services. Older adults, in particular, often receive care from multiple providers in multiple settings of care such that fragmentation of care with resultant lack of coordination increases the risk of adverse health outcomes.

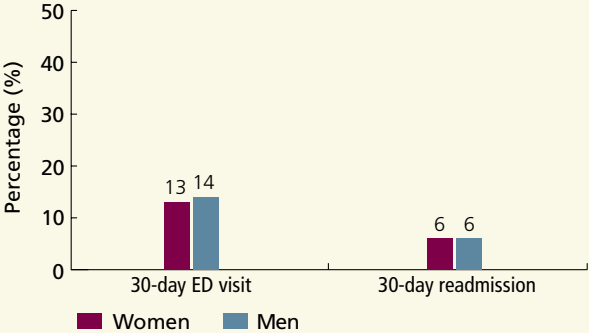
The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify adults aged 65 and older who were hospitalized for depression and discharged between March 1, 2005 and February 28, 2006. Thirty-day readmission rates included readmissions to the same or a different hospital, but transfers between hospitals were not included. Discharge records were linked to the National Ambulatory Care Reporting System (NACRS) to measure ED visits within 30 days of discharge (see [the POWER Study Depression chapter](#), Appendix 5.3 for more detail).

**Findings:** In Ontario, among older adults (aged 65 and older) who were hospitalized for depression, 13 percent (13 percent of older women and 14 percent of older men) were seen in an ED within 30 days of discharge (but were not readmitted at that time), and 6 percent (6 percent of older women and 6 percent of older men) were readmitted to hospital for depression within 30 days of discharge.

**Exhibit B.10** | Percentage of patients aged 65 and older admitted to hospital for depression who had an emergency department (ED) visit for any reason or a readmission for depression within 30 days of discharge, by sex, in Ontario, 2005/06<sup>^</sup>

**FINDINGS**

- Ontarians aged 65 and older were less likely than those under age 65 to be seen in an ED in the 30 days following a hospital stay for depression (13 percent versus 18 percent, respectively) (data not shown).
- Rates of readmission to hospital within 30 days of discharge were similar for those under and over age 65 (data not shown).
- Among older adults who were hospitalized for depression, the proportions of women and men who had an ED visit or readmission within 30 days of discharge were similar. However, given that older women are more likely than older men to be hospitalized for depression, more women than men had an ED visit or readmission within 30 days of discharge (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> People who were discharged from hospital from Mar 1, 2005-Feb 28, 2006

**NOTE:** The width of each bar reflects the relative proportion of the older adults admitted to hospital for depression (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see ‘[How to read variable column width graphs](#)’ on page 17)

POWER Study

## HOSPITAL ADMISSION RATES FOR AMBULATORY CARE SENSITIVE CONDITIONS (ACSC)

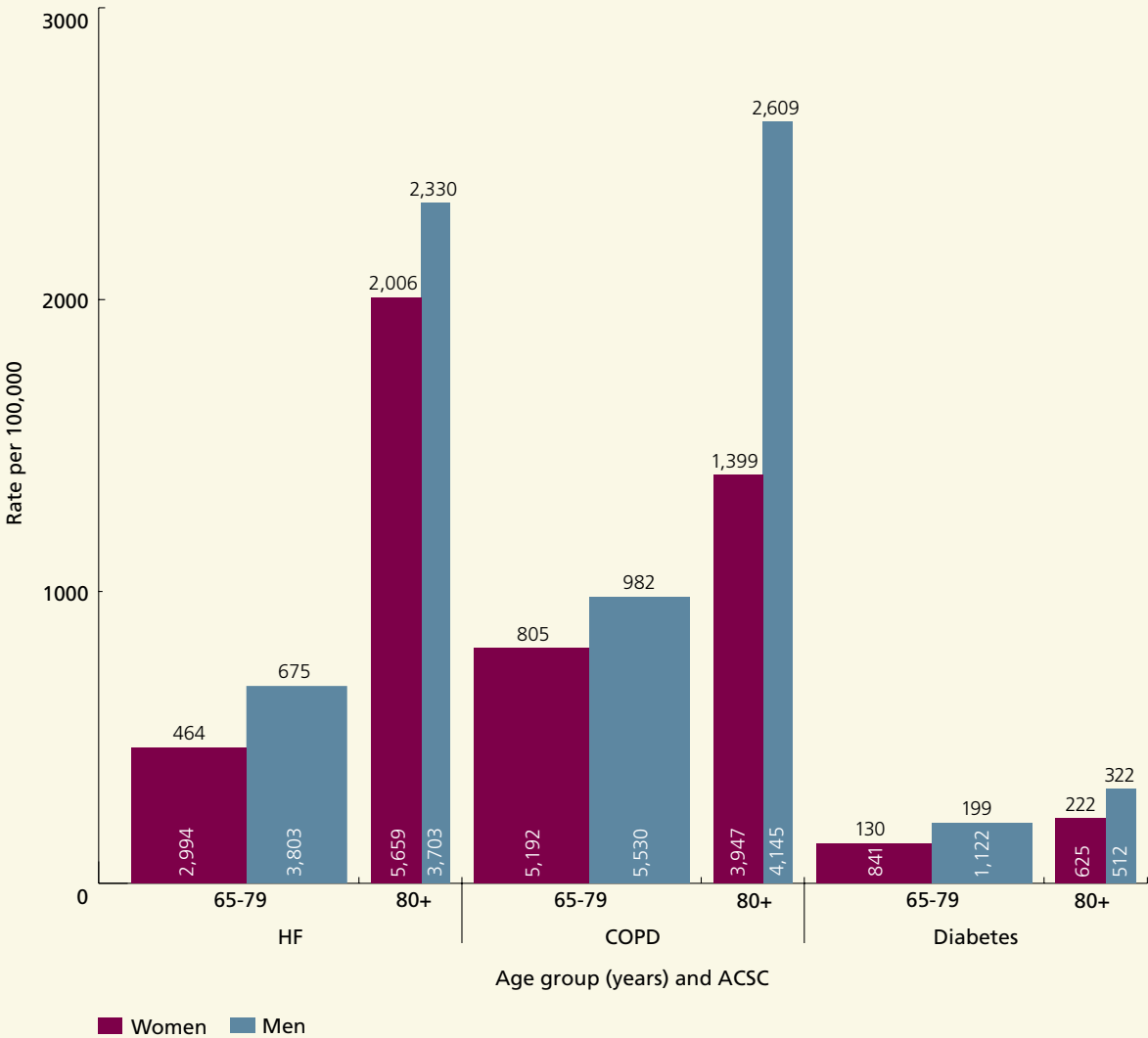
**Indicator:** This indicator measures the rates of acute care hospitalizations per 100,000 adults aged 65 and older for conditions (heart failure (HF), chronic obstructive pulmonary disease (COPD), and diabetes) where effective ambulatory care can prevent or reduce the need for admission to hospital.

**Background:** Hospitalization rates for ambulatory care sensitive conditions (ACSC) are used as an indicator of impaired access to or suboptimal quality of ambulatory care.<sup>101</sup> While it is not possible to eliminate all hospitalizations for these conditions, many of these hospitalizations could potentially be avoided. Each condition that is examined is responsive to primary prevention, early diagnosis and chronic disease management including patient self-management and care coordination.<sup>101, 102</sup> Better management and monitoring of these conditions reduces the occurrence of acute complications (e.g., decompensated HF, uncontrolled blood sugar in patients with diabetes).<sup>101, 103, 104</sup> Thus, optimal, timely and effective primary health care should reduce the rates of potentially avoidable hospitalizations. There are well-documented differences in hospital admission rates for ACSCs associated with sex and socioeconomic status.<sup>105</sup>

Hospital admission rates for ACSCs were based on most responsible diagnosis and excluded patients with ACSCs who were admitted for elective procedures or surgery (see [the POWER Study Access to Health Care Services chapter](#), Appendix 7.3 for more detail).

**Findings:** Among older adults (aged 65 and older), the hospitalization rates for ACSCs in 2006/07 were 980 per 100,000 adults for HF (933 per 100,000 women and 1,040 per 100,000 men); 1,141 per 100,000 adults for COPD (986 per 100,000 women and 1,340 per 100,000 men); 188 per 100,000 adults for diabetes (158 per 100,000 women and 226 per 100,000 men). Hospitalization rates for these ACSCs were lower among older women than men.

**Exhibit B.11** | Rates of hospitalization for ambulatory care sensitive conditions (ACSC) per 100,000 adults aged 65 and older (and total number of hospitalizations), by sex and age group, in Ontario, 2006/07



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** The width of each bar reflects the relative proportion of the older population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

HF = heart failure

COPD = chronic obstructive pulmonary disease

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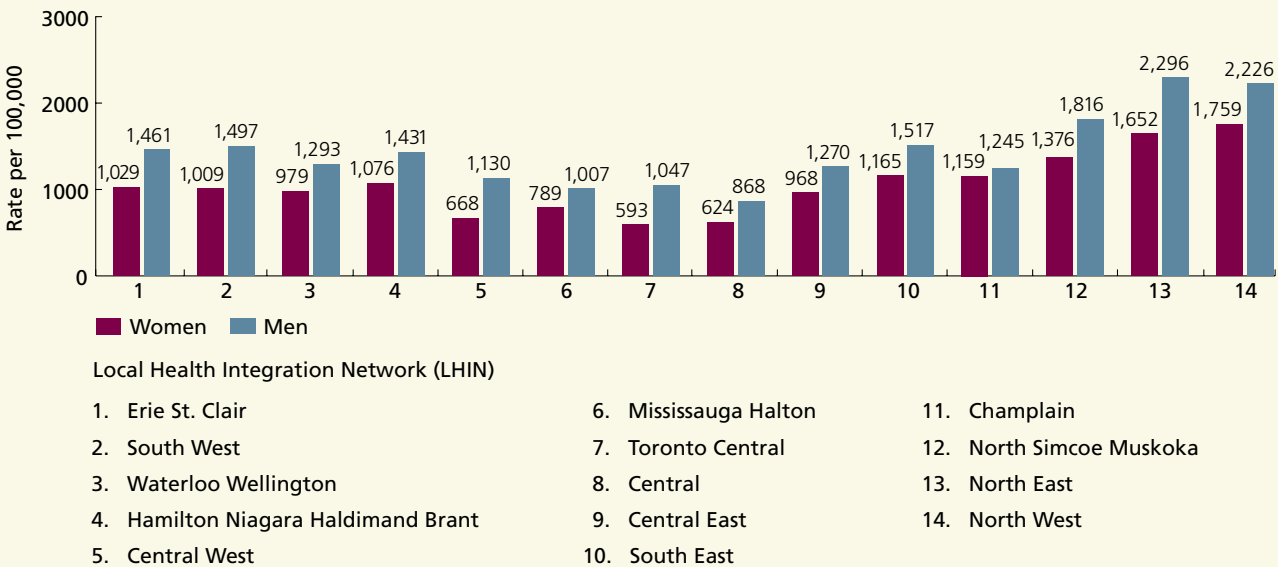
**Exhibit B.11** | Rates of hospitalization for ambulatory care sensitive conditions (ACSC) per 100,000 adults aged 65 and older (and total number of hospitalizations), by sex and age group, in Ontario, 2006/07  
(continued)

**FINDINGS**

- Hospitalization rates for all three ACSCs increased with age for both women and men.
- Among older adults, hospitalization rates for ACSCs increased considerably between those aged 65–79 and those aged 80 and older (563 per 100,000 to 2,123 per 100,000 for HF; 887 per 100,000 to 1,835 per 100,000 for COPD; 162 per 100,000 to 258 per 100,000 for diabetes) (data not shown).
- Compared to adults aged 45–64, hospitalization rates among those aged 80 and older were over 25 times greater for HF, 13 times greater for COPD, and almost four times greater for diabetes; hospitalization rates for these ACSCs were much lower among adults aged 25–44 (data not shown; see [the POWER Study Access to Health Care Services chapter](#)).
- A large proportion hospitalizations for ACSCs were among older adults (85 percent of all HF hospitalizations, 79 percent of all COPD hospitalizations and 45 percent of all diabetes hospitalizations were among adults aged 65 and older; 50 percent of all HF hospitalizations, 34 percent of all COPD hospitalizations and 17 percent of all diabetes hospitalizations were among adults aged 80 and older) (data not shown; see [the POWER Study Access to Health Care Services chapter](#)).
- The hospitalization rates for ACSCs were lower among older women than among older men, irrespective of age group. However, given that there are a greater number of older women than older men in Ontario, the total number of women who were hospitalized for HF was greater than the total number of hospitalized men; the total number of women who were hospitalized for COPD and diabetes were similar to the total number of hospitalized men.

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**Exhibit B.12** | Hospitalizations for chronic obstructive pulmonary disease (COPD) per 100,000 adults aged 65 and older, by sex and Local Health Integration Network (LHIN), in Ontario, 2006/07



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**FINDINGS**

- There was considerable variation across LHINs in the rate of hospitalizations for the reported ambulatory care sensitive conditions (ACSCs).
- The rates of hospitalization for COPD ranged from 593 per 100,000 (Toronto Central LHIN) to 1,759 per 100,000 (North West LHIN) among older women and from 868 per 100,000 (Central LHIN) to 2,296 per 100,000 among older men (North East LHIN).
- The rates of hospitalization for HF ranged from 748 per 100,000 (South East LHIN) to 1,311 per 100,000 (North West LHIN) among older women and from 754 per 100,000 (Central West LHIN) to 1,405 per 100,000 (Erie St. Clair LHIN) among older men (data not shown).
- The rate of hospitalizations for diabetes ranged from 121 per 100,000 (Mississauga Halton LHIN) to 267 per 100,000 (North East LHIN) among older women and from 175 per 100,000 (Toronto Central LHIN) to 415 per 100,000 (North West LHIN) among older men (data not shown).

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## EMERGENCY DEPARTMENT VISITS AND HOSPITAL ADMISSIONS FOR HYPERGLYCEMIA OR HYPOGLYCEMIA AMONG PEOPLE WITH DIABETES

**Indicator:** This indicator measures the number of adults aged 65 and older with diabetes per 100,000 who had at least one hospital visit (emergency department (ED) visit or hospitalization) for hyperglycemia or hypoglycemia over a one-year period.

**Background:** Severe hyperglycemia (high blood glucose) and hypoglycemia (low blood glucose) are potentially life-threatening conditions that can be prevented with good outpatient care. Poor glucose control, particularly in the setting of acute illness, can lead to hyperglycemic states—diabetic ketoacidosis or hyperosmolar coma—which constitute a medical emergency. While tight glucose control can improve long-term outcomes for people with diabetes, running levels close to the normal range increases the risk of developing severe hypoglycemia—a state of low glucose that can lead to loss of consciousness.<sup>106, 107</sup> In many cases, these episodes can be averted through patient education to ensure early recognition, self-monitoring of blood glucose and by avoiding errors in management. Access to outpatient care appears to be a key factor influencing admission rates for hyper- and hypoglycemia.<sup>108, 109</sup> Diabetes education programs have also been shown to reduce rates of these admissions.<sup>110</sup>

Guidelines for diabetes care have been developed based on evidence derived from studies on selected patient populations. Goals of diabetes management may need to be adjusted in older patients based on the presence of comorbid conditions, functional abilities and life expectancy.<sup>32</sup>

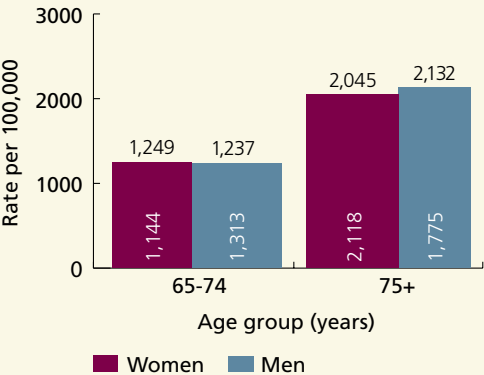
The Ontario Diabetes Database (ODD) was used to identify adults with diabetes as of March 31, 2006. Data from the Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS) were used to measure the number of people with diabetes who had at least one hospital visit (emergency department visit or hospitalization) for hyper or hypoglycemia in the 2006/07 fiscal year. Only the first visit per patient was counted during the year so the total number and rate of hospital visits is in fact higher because individuals (particularly those who are poorly controlled, encounter barriers to effective care or who have limited knowledge of self-management skills) may have multiple hospital visits over the course of a year. NACRS does not capture episodes of severe hypoglycemia that are only treated by emergency medical services in the field (i.e., do not lead to an emergency department visit). Conversely, in some regions, family practitioners may see patients in the emergency department for mild hyper- or hypoglycemia, or other aspects of diabetes management, thus inflating rates in some LHINs (see [the POWER Study Diabetes chapter](#), Appendix 9.3 for more detail).

**Findings:** In Ontario, among adults aged 65 and older with diabetes, the rate of hospital visits (emergency department visit or hospitalization) for hyperglycemia or hypoglycemia was 1,651 per 100,000 people with diabetes in 2006/07 (1,672 per 100,000 older women versus 1,630 per 100,000 older men).

**Exhibit B.13** | Number of adults aged 65 and older with diabetes per 100,000 who had at least one hospital visit<sup>^</sup> for hyperglycemia or hypoglycemia (and total number with at least one hospital visit), by sex and age group, in Ontario, 2006/07

**FINDINGS**

- Among older adults with diabetes, those aged 75 and older were more likely to have had at least one hospital visit for hyper- or hypoglycemia than those aged 65–74 (2,045 per 100,000 women aged 75 and older versus 1,249 per 100,000 women aged 65–74; 2,132 per 100,000 men aged 75 and older versus 1,237 per 100,000 men aged 65–74).
- While there were no sex differences in hospital visit rates among the older age groups, the total number of women aged 75 and older who had at least one hospital visit for hyper- or hypoglycemia was greater than the total number among men (2,118 versus 1,775, respectively).



**DATA SOURCES:** Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> Emergency department visit or hospital admission

**NOTE:** The width of each bar reflects the relative proportion of older adults with diabetes (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see ‘How to read variable column width graphs’ on page 17)

POWER Study

## EMERGENCY DEPARTMENT VISITS AMONG HEART FAILURE PATIENTS

**Indicator:** This outcome indicator measures the percentage of patients aged 65 and older admitted to hospital for heart failure (HF) who visited an emergency department (ED) within 30 days and within one year of hospital discharge.

**Background:** ED visits after a hospital discharge may be a marker of suboptimal outpatient management in HF and may be preventable with access to effective primary care and ambulatory specialty care. Discharge planning and care coordination can reduce ED visit rates after hospital discharge.<sup>111</sup> There is evidence in the literature for models of care transition that can significantly reduce readmission rates in older patients admitted with heart failure. Most older patients with HF have multiple chronic conditions so that a patient-centred approach to care that addresses their multi-morbidity and complexity is needed.

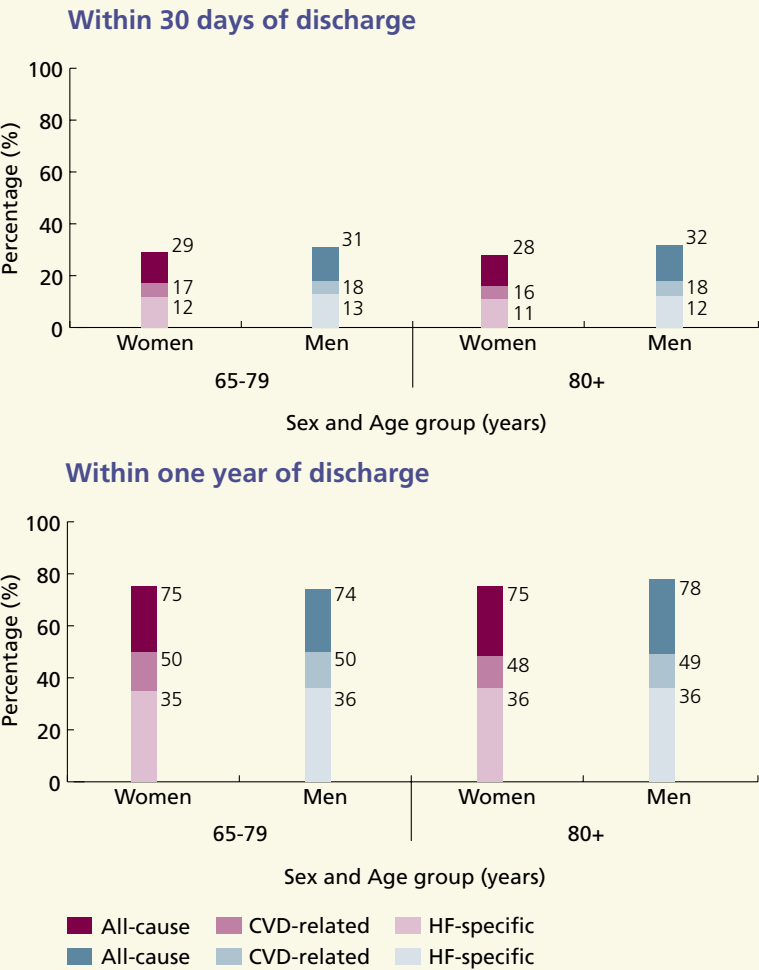
The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify adults aged 65 and older who were hospitalized for heart failure. Discharge records were linked to the National Ambulatory Care Reporting System (NACRS) to measure ED visits within 30 days and one year of discharge. Only the first ED visit per patient was counted in an effort to measure any ED utilization post-discharge. Patients transferred from long-term care homes were excluded from this indicator (see [the POWER Study Cardiovascular Disease chapter](#), Appendix 6.3 for more detail).

**Findings:** In the Ontario population of patients aged 65 and older who were discharged alive from hospital in 2005/06 with a primary diagnosis of HF, 30 percent had been seen in an ED at least once within 30 days of discharge (29 percent of women and 32 percent of men) and 75 percent has been seen in an ED at least once within one year of discharge (75 percent of women and 76 percent of men). Over one-third of ED visits within 30 days of discharge and nearly half of ED visits within one year of discharge were related to HF (based on the first ED visit by a patient).

**Exhibit B.14** | Percentage of heart failure (HF) patients aged 65 and older who were seen in an emergency department (ED), by sex, age group, and reason for visit, in Ontario, 2005/06

**FINDINGS**

- The percentage of HF patients aged 65 and older who were seen in an ED within 30 days or one year of discharge did not vary by sex or age.
- Among those aged 65–79, the total number of men who had an ED visit was greater than the total number of women (726 women versus 968 men within 30 days; 1,849 women versus 2,292 men within one year). However, among those aged 80 and older, this pattern was reversed—the total number of women aged 80 and older who had an ED visit was greater than the total number of men aged 80 and older (1,038 women versus 807 men within 30 days; 2,757 women versus 1,979 men within one year) (data not shown).
- Among older women and older men, 43 percent of ED visits within 30 days and 35 percent of ED visits within one year were for non-CVD related causes (data not shown).
- The percentage of HF patients aged 65 and older who were seen in an ED for any reason varied across Local Health Integration Networks (LHINs), ranging from 22 percent (Waterloo Wellington LHIN to 34 percent (North Simcoe Muskoka LHIN) among women and from 25 percent (Waterloo Wellington LHIN) to 36 percent (South East LHIN) among men (data not shown).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

**NOTE:** HF specific visits are part of CVD-related visits. All-cause visits represent all ED visits including CVD-related visits  
CVD = cardiovascular disease; HF = heart failure

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## READMISSION RATES AMONG HEART FAILURE AND STROKE PATIENTS

**Indicator:** These outcome indicators measures the percentage of patients aged 65 and older who had a non-elective readmission within 30 days and within one year following hospital discharge after:

- being admitted to hospital for heart failure (HF),
- being admitted to hospital for stroke or transient ischemic attack (TIA).

**Background:** Hospital readmissions can reflect the clinical care provided in hospital, in the community, as well as self-management and other factors. HF patients have high non-elective (unplanned) readmission rates, with up to 50 percent of HF patients being readmitted to hospital for any cause within one year.<sup>112</sup> As an ambulatory care sensitive condition, many HF admissions can be prevented with coordinated care and guideline concordant disease management in primary and specialty care outside of hospital, and as such, readmissions may be an indication of suboptimal care in transition from hospital to home or in outpatient settings. Likewise, guideline concordant management of acute stroke can reduce readmission rates.<sup>113</sup> Care management strategies that address comorbid conditions common in these patients can further reduce hospitalization rates.

The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify patients aged 65 and older discharged from hospital alive after an admission for heart failure or stroke or TIA in 2005/06 and to identify readmissions within 30 days and one year of discharge. All-cause readmissions, readmissions related to cardiovascular disease (CVD) (including stroke, acute myocardial infarction, heart failure and unstable angina), and stroke- or heart failure-specific readmissions are reported separately. Patients admitted from long-term care homes were excluded from these indicators. Both of these indicators were risk-adjusted (see [the POWER Study Cardiovascular Disease chapter](#), Appendix 6.3 for more detail).

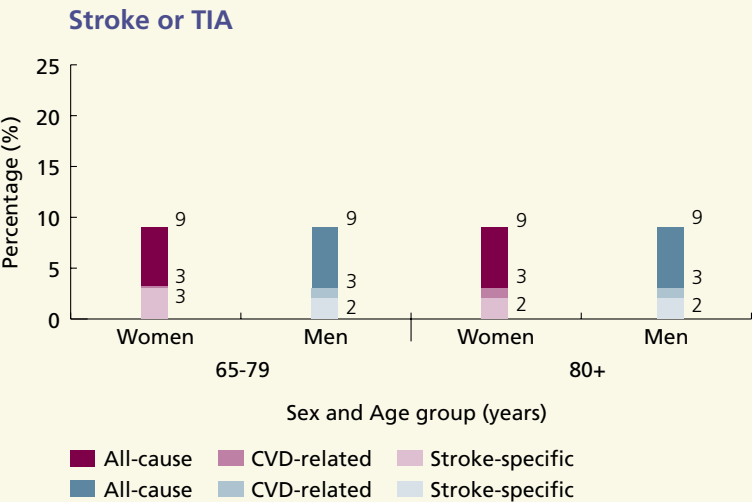
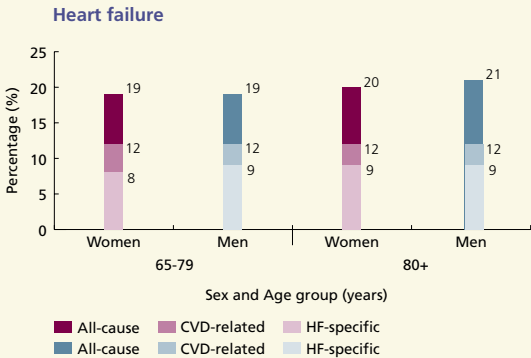
**Findings:** After risk adjustment among patients aged 65 and older who were admitted to hospital in 2005/06 for HF and discharged alive, 19 percent of patients aged 65–79 (19 percent of women and 19 percent of men) and 21 percent of patients aged 80 and older (20 percent of women and 21 percent of men) had at least one non-elective readmission within 30 days of discharge. The rates of readmission within one year of discharge were substantially higher—57 percent of patients aged 65–79 (57 percent of women and 58 percent of men) and 62 percent of patients aged 80 and older (61 percent of women and 63 percent of men).

After risk adjustment among patients aged 65 and older who were admitted to hospital in 2005/06 with a primary diagnosis of stroke or TIA and discharged alive, 9 percent of patients aged 65–79 (9 percent of women and 9 percent of men) and 9 percent of patients aged 80 and older (9 percent of women and 10 percent of men) had at least one non-elective readmission within 30 days of discharge. The rates of readmission within one year of discharge were substantially higher—16 percent of patients aged 65–79 (16 percent of women and 16 percent of men) and 18 percent of patients aged 80 and older (17 percent of women and 19 percent of men).

**Exhibit B.15** | Risk-adjusted percentage of heart failure (HF) and stroke or transient ischemic attack (TIA) patients aged 65 and older who were readmitted to hospital within 30 days of discharge, by sex, age group and reason for admission, in Ontario, 2005/06

**FINDINGS**

- After adjusting for risk, the percentage of HF and stroke or TIA patients aged 65 and older who were readmitted to hospital within 30 days of discharge did not vary by sex or age.
- Among those aged 65–79, the total number of men who were readmitted within 30 days following a hospitalization for HF was greater than the total number of women (467 women versus 614 men readmitted for HF); for stroke and TIA this difference was small (220 women versus 247 men readmitted for stroke or TIA). However, among those 80 and older, this pattern was reversed—the total number of women aged 80 and older who were readmitted within 30 days following a hospitalization for HF or stroke or TIA was greater than the total number of men aged 80 and older (727 women versus 542 men readmitted for HF; 275 women versus 171 men readmitted for stroke or TIA) (data not shown).
- Among older women and older men, 39 percent of 30-day readmissions among heart failure patients and two-thirds of 30-day readmissions among stroke or TIA patients were for non-CVD related causes (data not shown).
- There was variation across Local Health Integration Networks (LHINs) in rates of all-cause 30-day readmission for heart failure (data not shown).



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** HF-specific and stroke-specific readmissions are part of CVD-related readmissions. All-cause represents all readmissions including CVD-related readmissions.

CVD = cardiovascular disease

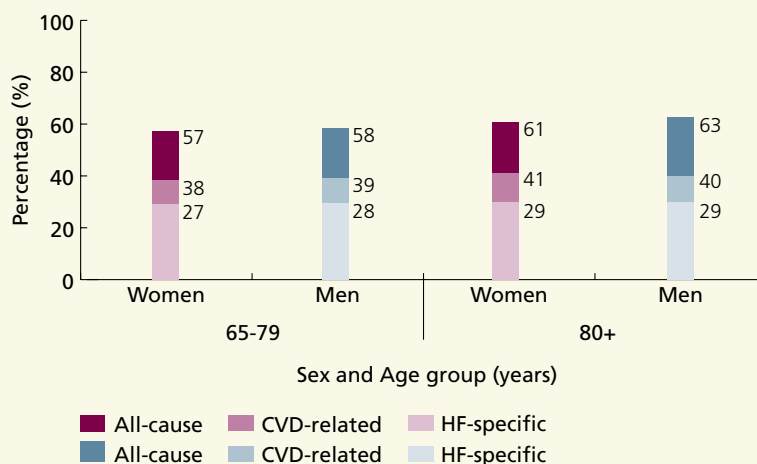
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## Exhibit B.16 | Risk-adjusted percentage of heart failure (HF) and stroke or transient ischemic attack (TIA) patients aged 65 and older who were readmitted to hospital within one year of discharge, by sex, age group and reason for admission, in Ontario, 2005/06

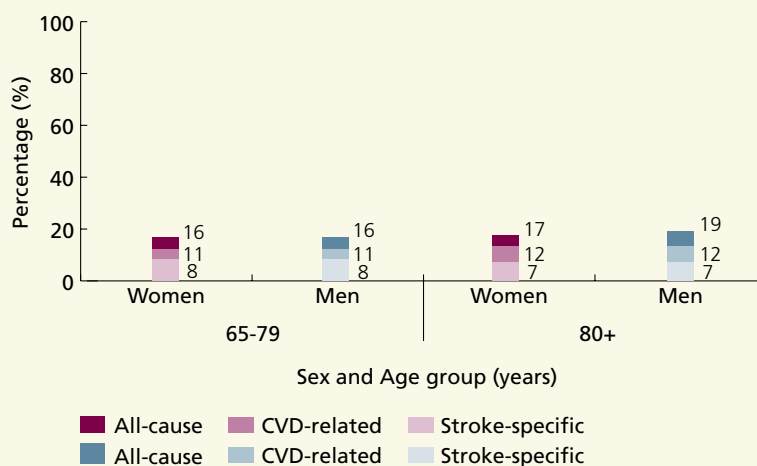
### FINDINGS

- Among patients hospitalized for heart failure, women and men aged 80 and older were more likely to be readmitted within one year of discharge than women and men aged 65–79 (61 percent versus 57 percent, respectively, among women; 63 percent versus 58 percent, respectively, among men).
- Among patients hospitalized for stroke or TIA, men aged 80 and older were more likely to be readmitted within one year of discharge than men aged 65–79 (19 percent versus 16 percent, respectively); one-year readmission rates did not vary by age among women aged 65 and older who had been hospitalized for stroke or TIA.
- Irrespective of age group, one-year readmission rates did not vary by sex among older heart failure, stroke or TIA patients.
- Among those aged 65–79, the total number of men who were readmitted within one year following a hospitalization for HF was greater than the total number of readmitted women (1,431 women versus 1,786 men readmitted for HF); for stroke or TIA this difference was small (404 women versus 436 men readmitted for stroke or TIA). However, among those aged 80 and older, this pattern was reversed—the total number of women aged 80 and older who were readmitted within one year following a hospitalization for HF or stroke or TIA was greater than the total number of men aged 80 and older (2,233 women versus 1,592 men readmitted among HF patients; 554 women versus 336 men readmitted among stroke or TIA patients) (data not shown).
- Among older women and older men, about one-third of one-year readmissions among heart failure and stroke or TIA patients were for non-CVD related causes (34 percent of HF admissions and 32 percent of stroke or TIA admissions) (data not shown).
- There was minimal variation across Local Health Integration Networks (LHINs) in rates of all-cause one-year readmissions for heart failure (data not shown).

### Heart failure



### Stroke and TIA



**DATA SOURCE:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

**NOTE:** HF-specific and stroke-specific readmissions are part of CVD-related readmissions. All-cause represents all readmissions including CVD-related readmissions.

CVD = cardiovascular disease



## ONE-YEAR MORTALITY AMONG HEART FAILURE (HF), STROKE OR TRANSIENT ISCHEMIC ATTACK (TIA), AND HIP FRACTURE PATIENTS

**Indicator:** These indicators examine the percentage of adults aged 65 and older who died within one year of:

- a hospital admission for heart failure (HF),
- a hospital admission for stroke or transient ischemic attack (TIA),
- being treated in hospital for a hip fracture.

**Background:** **Heart failure** is associated with significant mortality, with one Canadian study estimating one-year mortality rates to be approximately 30 percent.<sup>114</sup> Mortality varies by age, sex, and region within Canada.<sup>115, 116</sup> Mortality for people with HF depends on acute treatment of disease and chronic disease management to prevent disease progression and complications. One-year mortality is an important indicator of the quality of HF care and is considered to be potentially modifiable by improvements in the structure and process of HF care.

Mortality following **acute stroke** has been identified as an indicator of quality of care. In theory, better processes of care may reduce both short-term and long-term mortality following stroke.<sup>117</sup> Although some studies have suggested lower one-year stroke mortality in women compared to men, other reports have found no sex differences in survival after stroke onset.<sup>117</sup>

There is a high prevalence of **hip fractures** among seniors, particularly for women; the lifetime risk is 18 percent in women and 6 percent in men.<sup>118, 119</sup> Of all fall-related fractures, hip fractures cause the greatest number of deaths and lead to the most severe health problems and reduced quality of life.<sup>120</sup>

The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to identify adults aged 65 and older who were hospitalized for HF, stroke or TIA, or hip fracture. For each of these groups, the Registered Persons Database (RPDB) was used to determine the percentage that died within one year of hospitalization or hip fracture. Mortality rates among HF patients excluded people who were transferred from long-term care homes; mortality rates among hip fracture patients excluded people in long-term care within two weeks prior to their hip fracture. Mortality rates for stroke and heart failure patients were risk-adjusted (see [the POWER Study Cardiovascular Disease chapter](#), Appendix 6.3, and [the Musculoskeletal Conditions chapter](#), Appendix 8.3 for more detail)

**Findings:** In Ontario, among older adults (aged 65 and older) who had been admitted to hospital in 2005/06 with a primary diagnosis of HF and after adjusting for risk, 30 percent of patients aged 65–79 (29 percent of women and 32 percent of men) and 45 percent of patients aged 80 and older (42 percent of women and 48 percent of men) died within one year of hospitalization.

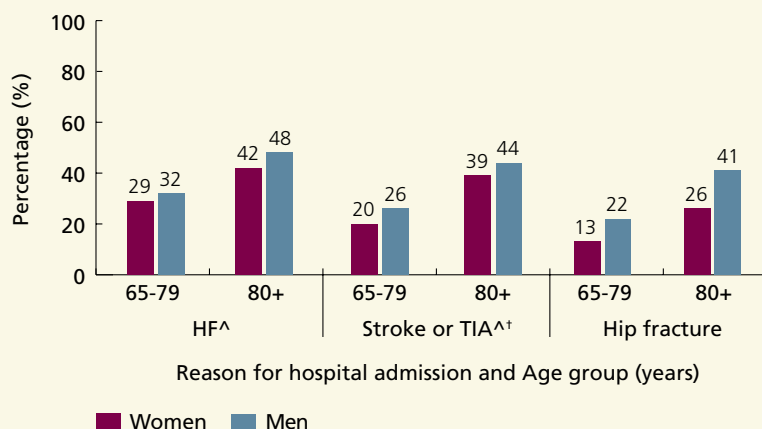
Among older adults admitted to hospital in 2005/06 with a primary diagnosis of stroke or TIA, the risk-adjusted one-year mortality rate was 23 percent among patients aged 65–79 (20 percent of women and 26 percent of men) and 41 percent among patients aged 80 and older (39 percent of women and 44 percent of men).

Among older adults who were admitted to hospital in 2007/08 for treatment of a hip fracture, 25 percent of patients aged 65 and older died within one year of their hip fracture (22 percent of older women and 33 percent of older men). The one-year mortality rate was 16 percent among patients aged 65–79 (13 percent of women and 22 percent of men) and 29 percent among patients aged 80 and older (26 percent of women and 41 percent of men).

### Exhibit B.17 | One-year mortality (percentage) among adults aged 65 and older following a hospital admission for heart failure (HF), stroke or transient ischemic attack (TIA), or hip fracture, by sex and age group, in Ontario, 2005/06

#### FINDINGS

- Not surprisingly, one-year mortality following a hospital admission for HF, stroke or TIA, or hip fracture was higher in the oldest age group.
- Among older adults (aged 65 and older), men had higher one-year mortality rates following a hospital admission for HF, stroke or TIA, or hip fracture compared to women.
- However, given that women are disproportionately represented in older populations, the total number of women aged 80 and older who died within one year following a hospitalization for HF, stroke or TIA, or hip fracture was greater than the total number of men aged 80 and older died within one year of being hospitalized for HF; 1,589 women and 909 men aged 80 and older died within one year of being hospitalized for stroke or TIA; 1,289 women and 569 men aged 80 and older died within one year of hip fracture).



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Registered Persons Database (RPDB)

<sup>^</sup> Rates were risk-adjusted (see the [POWER Study Cardiovascular Disease chapter](#), Appendix 6.3 for more detail)

<sup>†</sup> Includes patients who were seen in an emergency department (ED) in addition to those admitted to hospital

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## HOSPITALIZATION RATE DUE TO FALL-RELATED INJURY AMONG SENIORS

**Indicator:** This indicator measures the rate of fall-related hospitalization for older adults in Ontario.

**Background:** Falls are the leading cause of injury-related hospitalizations for seniors in Canada.<sup>121</sup> Fall-related injuries represent a significant health problem, as the consequences of fall injuries are far-reaching and result in many long-term disabilities and health problems. These injuries can also result in loss of independence or lead to institutionalization. Almost half of seniors who fall experience a minor injury, and five percent to 25 percent suffer a serious injury such as a fracture.<sup>122, 123</sup> Of all fall-related fractures, hip fractures cause the greatest number of deaths and lead to the most severe health problems and reduced quality of life. In fact, falls cause more than 90 percent of all hip fractures in seniors and 20 percent die within a year of the fracture.<sup>124</sup> There are effective public health and clinical interventions for reducing the rates of falls in seniors.

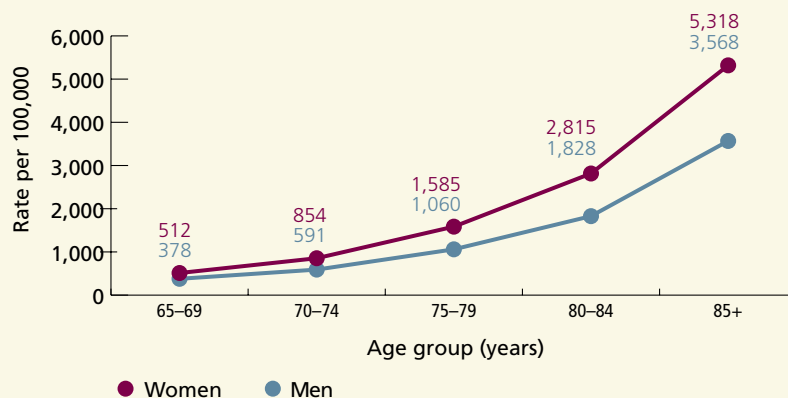
The Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) was used to examine the rate of fall-related hospitalization (see [the POWER Study Burden of Illness chapter](#), Appendix 3.3 for more detail).

**Findings:** Overall, there were 23,923 fall-related hospitalizations in adults aged 65 and older in 2005/06 (16,692 in women and 7,231 in men). The rate of fall-related hospitalization in that year was 1,483 per 100,000 adults aged 65 and older (1,837 per 100,000 women and 1,026 per 100,000 men).

### Exhibit B.18 | Rate of fall-related hospitalizations per 100,000 adults aged 65 and older, by sex and age group, in Ontario, 2005/06

#### FINDINGS

- The number of fall-related hospitalizations increased with age for both women and men, with the highest rates observed among those aged 80 and older.
- Across all age groups, older women were more likely to be admitted to a hospital for a fall-related injury than older men.
- Given that women are disproportionately represented in older populations—particularly in the oldest population—the total number of hospitalizations among women admitted for a fall-related injury was over twice as high as the total number among men in those aged 65 and older (16,692 women and 7,231 men aged 65 and older) and over three times as high among those aged 85 and older (6,558 women and 2,024 men aged 85 and older) (data not shown).



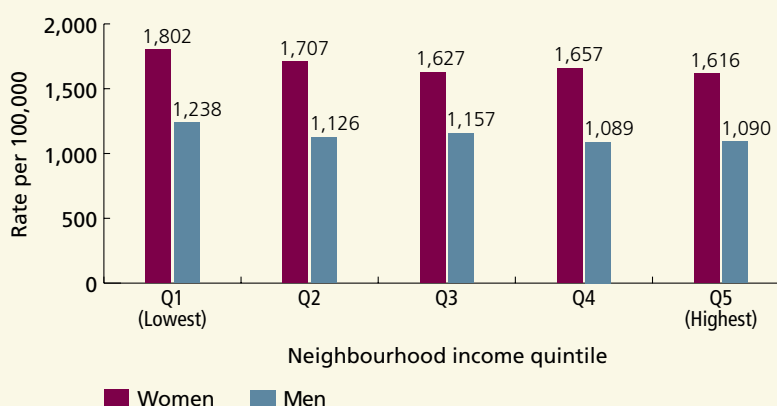
**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

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### Exhibit B.19 | Age-standardized rate of fall-related hospitalizations per 100,000 adults aged 65 and older, by sex and neighbourhood income quintile, in Ontario, 2005/06

#### FINDINGS

- Irrespective of neighbourhood income quintile, older women were approximately 50 percent more likely than older men to be admitted to a hospital for a fall-related injury.
- Women and men living in the lowest income neighbourhoods were more likely to have a fall-related hospitalization than women and men living in the highest-income neighbourhoods, but the differences associated with neighbourhood income were not large.

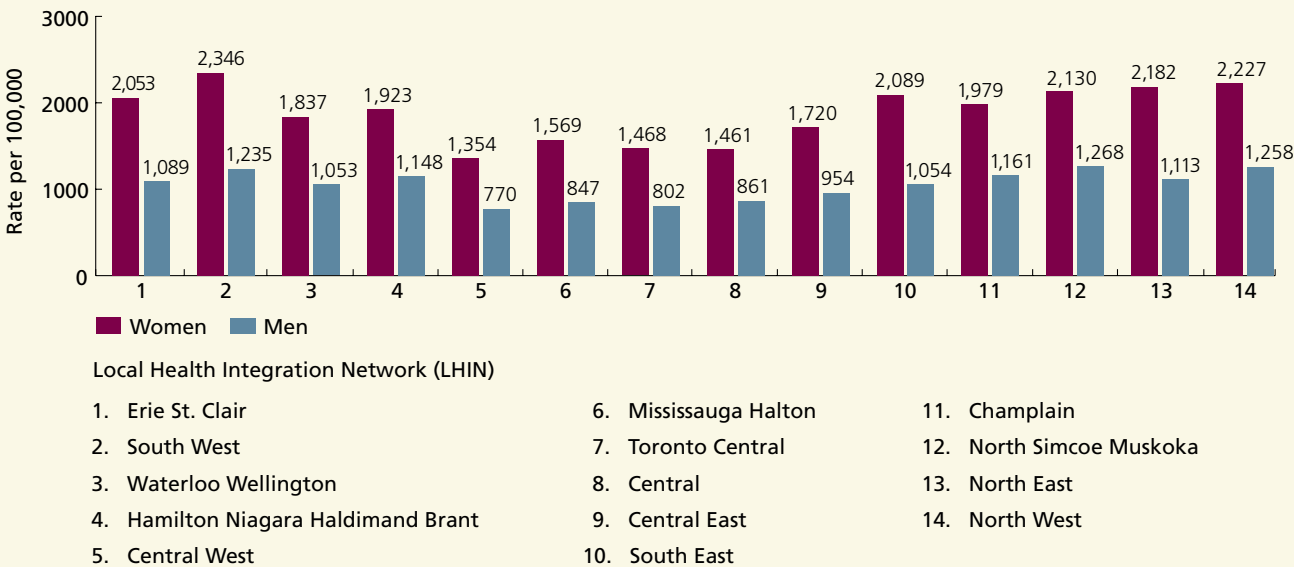


**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

**NOTE:** See [Appendix 2](#) for details about neighbourhood income quintile calculation

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**Exhibit B.20** | Rate of fall-related hospitalizations per 100,000 adults aged 65 and older, by sex and Local Health Integration Network (LHIN), in Ontario, 2005/06



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

**FINDINGS**

- Across all LHINs, older women had a higher rate of fall-related hospitalizations than older men.
- Rates of fall-related hospitalizations among adults aged 65 and older varied considerably across LHINs, ranging from 1,354 per 100,000 (Central West LHIN) to 2,346 per 100,000 (South West LHIN) among women and from 770 per 100,000 (Central West LHIN) to 1,268 per 100,000 (North Simcoe Muskoka LHIN).
- Rates of fall-related hospitalizations among adults aged 80 and older were higher and also varied considerably across LHINs, ranging from 3,144 per 100,000 (Toronto Central LHIN) to 5,042 per 100,000 (North Simcoe Muskoka LHIN) among women and from 1,835 per 100,000 (Toronto Central LHIN) to 3,189 per 100,000 (North Simcoe Muskoka LHIN) (data not shown).

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## LOW-TRAUMA FRACTURE RATE

**Indicator:** This indicator measures the low-trauma fracture rate (per 10,000) among adults aged 50 and older during the fiscal year 2007/08. Low-trauma fractures include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm that have a high probability of being due to osteoporosis.

**Background:** Osteoporosis is an increasingly common health concern that, while much more common in women, affects both women and men. Osteoporosis is characterized by increased risk for fractures following minimal trauma. People who sustain a low-trauma fracture—defined as a fracture resulting from a fall from a height no higher than standing level—have a greater risk of a subsequent fracture than those who have not experienced a low-trauma fracture.<sup>125</sup> They constitute a high-risk group and are candidates for secondary prevention, including further assessment to identify and ameliorate risk factors for osteoporotic fracture (e.g., low bone mineral density, recurrent falls, and some medications).<sup>99</sup>

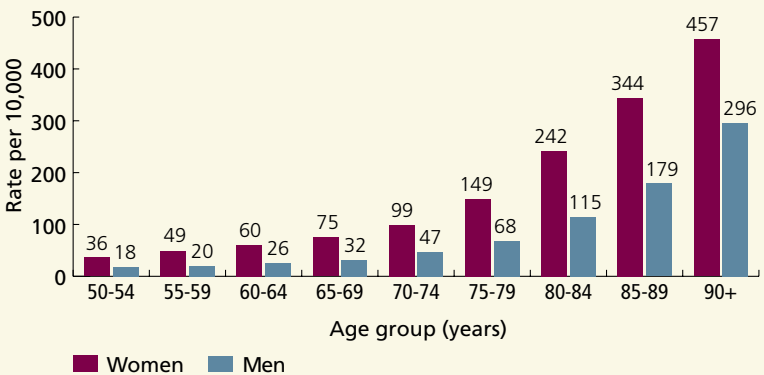
Data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) and the National Ambulatory Care Reporting System (NACRS) were used to identify people with one of the selected fractures as the most responsible diagnosis (CIHI-DAD) or one of the first three diagnoses (NACRS). Records were included if they also contained an external cause of injury code indicative of fracture due to a minor fall. Patients were excluded if they had epilepsy, malignant neoplasm or multiple myeloma diagnosed within two years prior to their fracture (see [the POWER Study Musculoskeletal Conditions chapter](#), Appendix 8.3 for more detail).

**Findings:** In 2007/08, among Ontario adults aged 50 and older, the rate of low-trauma fractures was 71 per 10,000 adults. Women were more likely than men to suffer a low-trauma fracture (91 per 10,000 women versus 44 per 10,000 men). In terms of total numbers, this translates into nearly three times as many women experiencing a low-trauma fracture as men (20,198 women compared to 7,159 men).

**Exhibit B.21 | Low-trauma fracture<sup>^</sup> rate (per 10,000) among adults aged 50 and older, by sex and age group, in Ontario, 2007/08**

**FINDINGS**

- Across all age groups, women experienced higher low-trauma fracture rates than men.
- Among women, low-trauma fracture rates increased dramatically with age, from 36 per 10,000 women aged 50–54 to 457 per 10,000 women aged 90 and older.
- The age pattern was similar among men, ranging from 18 per 10,000 men aged 50–54 to 296 per 10,000 men aged 90 and older.
- Rates of low trauma fracture among adults aged 50 and older varied across Local Health Integration Networks (LHINs), ranging from 75 per 10,000 (Central West LHIN) to 115 per 10,000 (South West LHIN) among women and from 29 per 10,000 (Central West LHIN) to 46 per 10,000 (North West LHIN) among men (data not shown).
- Overall, the low-trauma fracture rate decreased with increasing neighbourhood income. The rate was 76 per 10,000 for adults living in the lowest-income neighbourhoods and 70 per 10,000 for adults living in the highest-income neighbourhoods (data not shown).
- The rate of low-trauma fractures among men living in the lowest-income neighbourhoods was higher than the rate among men living in higher-income neighbourhoods. While the variation among women was significant, the differences were small.



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS)

<sup>^</sup> Low-trauma fractures likely due to osteoporosis include fractures of the hip, spine (rib, sternum, thoracic, and lumbar spine), wrist and forearm, shoulder and upper arm

POWER Study



# Section B

## SUMMARY OF FINDINGS

In this section, we re-examined and synthesized a selection of indicators reported in previous POWER Study chapters to paint a picture of how care is currently being provided to older adults in Ontario. This section examined performance on quality indicators for common chronic conditions. These technical indicators do not reflect the complex clinical issues inherent in the management of frail older patients. Therefore, our findings reflect patterns and outcomes of care, but more clinical information is needed to understand the extent to which these measures reflect underuse of effective interventions or informed choices and preferences in this population with complex health status and multi-morbidity. Findings for the indicators reported in this section are summarized below.

### Number of Geriatricians

In 2009, there were 94 geriatricians in Ontario. This translates to five geriatricians for every 100,000 adults aged 65 and older in Ontario. The number of geriatricians per 100,000 older adults varied across the Local Health Integration Networks (LHINs), with several LHINs having only one geriatrician per 100,000 older adults. Some of these geriatricians have other professional responsibilities such as administration, teaching, and research, and we do not report the number of full-time equivalent (FTE) geriatricians. Thus, the number of FTE geriatricians providing direct geriatric care will be even less than the numbers reported.

### Physician Care Following Hospitalization for Depression, Acute Myocardial Infarction or Heart Failure

While nearly all women and men aged 65 and older who were hospitalized for an acute myocardial infarction (AMI) or for heart failure (HF) had a follow up physician

visit within four weeks of hospital discharge (99 percent of AMI patients and 98 percent of HF patients), only 59 percent of older adults hospitalized for depression had a follow up physician visit for depression within 30 days of discharge.

### Type of Physician Providing In-Hospital Care for Acute Myocardial Infarction or Heart Failure

Nearly a quarter of older patients with HF (23 percent) and 10 percent of older AMI patients were under the sole care of a general practitioner or family physician (GP/FP) while in hospital. Age and sex were both related to the type of in-hospital physician care received. Older women were more likely to be under the sole care of a GP/FP than older men. Older HF and AMI patients (particularly those aged 80 and older) were less likely to have a cardiologist as their most responsible physician while in hospital and more likely to have been under the sole care of a GP/FP.

### Angiography for Acute Myocardial Infarction

Forty-two percent of adults admitted to hospital for an AMI either underwent or were referred for coronary angiography within three months. Older women were less likely than older men to receive or be referred for this test (36 percent versus 47 percent, respectively). Coronary angiography rates declined significantly in the older age groups (79 percent of those aged 45–64, 57 percent of those aged 65–79 and 22 percent of those aged 80 and older). This indicator varied across LHINs. More clinical detail would be needed to assess the appropriateness of these patterns of care. Lower rates of testing among those in the oldest age groups may reflect either underuse or appropriate clinical decision making due to health status and competing risks.

### **Referral to Medical Oncology Among Colon Cancer and Breast Cancer Patients**

Sixty-nine percent of older colon cancer patients had a consultation with a medical oncologist in the four months following surgery and 59 percent of older breast cancer patients had a consultation with a medical oncologist in the three months following diagnosis. For both colon cancer and breast cancer, the proportion of patients who had a consultation with a medical oncologist decreased with age. The proportion of older breast cancer patients who had a consultation with a medical oncologist varied across LHINs.

### **Bone Mineral Density Testing Following Low-Trauma Fracture**

The majority of both women and men did not undergo bone mineral density (BMD) testing after a low-trauma fracture—only 23 percent of adults who had suffered a low-trauma fracture likely due to osteoporosis underwent BMD testing. Women were more likely to be tested than men (26 percent versus 13 percent, respectively). Testing rates varied by neighbourhood income, age, and LHIN. The percentage of women who underwent BMD testing after a low-trauma fracture decreased with age—from almost four in ten women aged 50–69 to less than one in five women aged 80–84 and one in twenty women aged 90 and older. Lower rates of testing among those in the oldest age groups may reflect either underuse or appropriate clinical decision making due to health status and competing risks. While testing rates were lower among men, the pattern was similar.

### **Hospital Visits Following a Hospitalization for Depression**

Among adults aged 65 and older who were hospitalized for depression, 13 percent were seen in an emergency department (ED) within 30 days of discharge and six percent were readmitted to hospital for depression within 30 days of discharge. The proportions of older adults

who had an ED visit or readmission within 30 days of discharge were similar for women and men; however, the total number of older women who had an ED visit or readmission within 30 days of discharge was greater than the total number among older men.

### **Hospital Admission Rates for Ambulatory Care Sensitive Conditions**

Among older adults, 980 per 100,000 adults aged 65 and older were hospitalized for HF, 1,141 per 100,000 were hospitalized for chronic obstructive pulmonary disease (COPD), and 188 per 100,000 were hospitalized for diabetes. Hospitalization rates for these ambulatory care sensitive conditions (ACSCs) were lower among older women than men; however, the total numbers of women who were hospitalized for these conditions were similar to or greater than the total number of hospitalizations among men. Hospitalization rates for these ACSCs increased with age and varied considerably across LHINs.

### **Hospital Visits for Hyperglycemia or Hypoglycemia Among People with Diabetes**

Among adults aged 65 and older with diabetes, the rate of hospital visits (ED visit or hospitalization) for either hyperglycemia or hypoglycemia was 1,651 per 100,000 people. This rate did not vary by sex, but rates were higher in the older age group (aged 75 and older).

### **Emergency Department Visits Following a Hospital Admission for Heart Failure**

Nearly one-third (30 percent) of people who were admitted to hospital for HF were seen in an ED within 30 days of hospital discharge and three-quarters (75 percent) had an ED visit within one year. Over one-third of ED visits within 30 days of discharge and nearly half of ED visits within one year of discharge were related to HF (based on the first ED visit by a patient). The percentage of patients with an ED visit within 30 days or one year of discharge did not vary by sex or age, but did vary across LHINs. Among those aged 65–79,

the total number of men who had an ED visit was greater than the total number of women. However, among those aged 80 and older, this pattern was reversed—the total number of women who had an ED visit was greater than the total number men.

### **Risk-Adjusted Readmission Rates Among HF and Stroke Patients**

After adjusting for risk, the percentage of HF and stroke or transient ischemic attack (TIA) patients aged 65 and older who were readmitted to hospital within 30 days or one year of discharge did not vary by sex. Thirty-day readmission rates did not vary across age groups. However, there were age differences in most of the one-year readmission rates, with those aged 80 and older generally having higher rates; the only exception was for one-year readmission rates for stroke or TIA among women, which did not vary by age. These indicators varied across LHINs. A high proportion of readmissions among older adults were for non-cardiovascular related causes. Nearly 40 percent of 30-day readmissions among heart failure patients and two-thirds of 30-day readmissions among stroke or TIA patients were for non-cardiovascular related causes. About one-third of one-year readmissions among heart failure and stroke or TIA patients were for non-cardiovascular related causes.

### **One-Year Mortality Among Heart Failure, Stroke or Transient Ischemic Attack, and Hip Fracture Patients**

Not surprisingly, one-year mortality following a hospital admission for HF, stroke or TIA, or hip fracture was highest in the oldest age group. Among older adults, men had higher one-year mortality rates following a hospital admission for HF stroke or TIA, or hip fracture compared to women.

### **Fall-Related Hospitalizations**

There were 23,923 fall-related hospitalizations in adults aged 65 and older in 2005/06 (1,483 falls per 100,000 adults aged 65 and older). The number of fall-related hospitalizations increased with age, for both women and men, with the highest rates observed among individuals aged 80 and older. Older women were approximately 50 percent more likely than older men to be admitted to a hospital for a fall-related injury. Women and men living in the lowest-income neighbourhoods were somewhat more likely to have a fall-related hospitalization than women and men living in the highest income neighbourhoods.. The rate of fall-related hospitalizations varied across LHINs.

### **Low-Trauma Fracture Rate**

The rate of low-trauma fractures for adults aged 50 and older was 71 per 10,000 adults. Women were more than twice as likely as men to suffer a low-trauma fracture (91 per 10,000 women versus 44 per 10,000 men). This pattern persisted across age groups, neighbourhood income and LHIN. Fracture rates varied by neighbourhood income, age, and LHIN. Fracture rates decreased as neighbourhood income increased, but the differences were small. Fracture rates increased dramatically with age.

## Section C

# *Settings of Care for Older Adults: Home Care and Long-Term Care*

### INTRODUCTION

Many older adults require little support to live actively and independently, but those that are medically complex and frail may require additional services to promote and maintain their health and functioning.

This can often include a mix of social support and health care services, and can be provided in a variety of settings including an individual's home, community-based supportive housing, and long-term institutional-based care. The setting where older adults age and receive care has important implications for their health status, autonomy and quality of life.<sup>126</sup>

Two particularly important sectors of the health care system are examined in this report as they provide essential support to aging Ontarians. Home care services are provided to individuals that need assistance from visiting health professionals (such as nurses, physiotherapists, occupational therapists, social workers, speech-language pathologists and dieticians), or help with personal care (such as personal hygiene, dressing and assistance with eating) or homemaking. Long-term care homes provide care to older adults who are no longer able to live independently in their own homes, and who require 24-hour nursing or personal care, support and/or supervision. Within each sector, care goals focus on providing the appropriate support to optimize independence, improve quality of life, and manage complex health issues. When appropriately targeted, these services should also prevent the need for unnecessary hospital visits and other complications.<sup>127</sup>

In Ontario, the introduction of standardized clinical assessment tools, known as the Resident Assessment Instrument for Home Care and the Resident Assessment Instrument for Long-Term Care,<sup>128, 129</sup> now allows for the reporting of quality measures in each sector and can contribute to enhanced public reporting. Health Quality Ontario (HQO) publicly reports previously validated indicators of home care and long-term care that assess important aspects and outcomes of care such as pressure ulcers and medication management. In addition, HQO is leading a program (Residents First) aimed at improving quality of care and performance on these measures in Ontario long-term care homes. In addition, the Integrated Client Care Project (ICCP) is focused on improving quality and outcomes of care in home care settings in partnership with the Community Care Access Centres (CCACs) for select groups of complex patients. Adherence to clinical practice guidelines in these settings can improve patient outcomes and prevent adverse events. To date, sex differences in care patterns within the home care and long-term care sectors have not been examined in detail. As described previously in this report, older women have different needs than older men with respect to social supports and disease burden which

might lead to different challenges in providing care. In this section, we examine selected indicators related to these two settings.

In this section, we report on indicators relevant to two settings of care for older adults: home care and long-term care homes. For indicators related to home care services, we report differences associated with sex, age, income and LHIN, where data are available and sample size allows. For indicators related to long-term care, we report differences associated with sex, age and LHIN, where data are available and sample size allows.

The indicators include:

### Home Care

- Use of home care services
- Unmet home care needs
- New activity of daily living (ADL) impairment or an ADL impairment that failed to improve
- Poorly controlled pain
- Prevalence of depressed mood
- New cognitive impairment or a cognitive impairment that failed to improve
- Prevalence of injury

### Long-Term Care

- Rate of potentially preventable emergency department (ED) visits
- Worsened self-performance of activities of daily living (ADLs)
- Prevalence of pain
- Worsened cognitive ability
- Rate of falls resulting in ED visits or inpatient hospitalization
- New pressure ulcers
- Daily physical restraints
- Prevalence of antipsychotic use
- Prevalence of anti-anxiety drugs or sedative/hypnotic use

Use of home care services and unmet home care needs among Ontario's older adults were assessed using data from the Canadian Community Health Survey (CCHS), 2007–08. All other indicators related to home care were measured among long-stay home care clients using data from the Home Care Reporting System (HCRS). The rate of potentially preventable ED visits and the rate of falls resulting in ED visits among long-term care residents were calculated using health care administrative database, including the Ontario Health Insurance Plan (OHIP) database, the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD), and the National Ambulatory Care Reporting System (NACRS). All other indicators related to long-term care were measured using data from the Continuing Care Reporting System (CCRS). See [Appendix 2](#) for more detail.



## EXHIBITS AND FINDINGS

### HOME CARE

#### USE OF HOME CARE SERVICES

**Indicator:** This indicator measures the percentage of Ontario adults aged 65 and older who reported that they received home care services in the past year. We report this indicator by the source of funding for the home care service (government-funded service or non-government-funded service). We also report the type of service received.

**Background:** Home care can be thought of as any health or supportive care service provided to a person in her or his own home. Home care encompasses a range of services from nursing treatments, such as wound care, to assistance with everyday tasks, such as meal preparation; home care services are provided on either a short-term basis to address a remediable problem or on a longer-term basis for functional support. For many older adults, home care services are an important component of maintaining independence in their own home as functional abilities decline. In Ontario, formal home care services are funded through two primary mechanisms—government (government-funded) and private pay (non-government-funded). Government-funded home care services are provided through the Community Care Access Centres (CCACs) and the service type and amount are determined by a case manager's assessment of the older adult's needs. Non-government-funded services are provided by private home care agencies; since these services are often paid out-of-pocket, older adults and their families decide on the types and amount of services required.

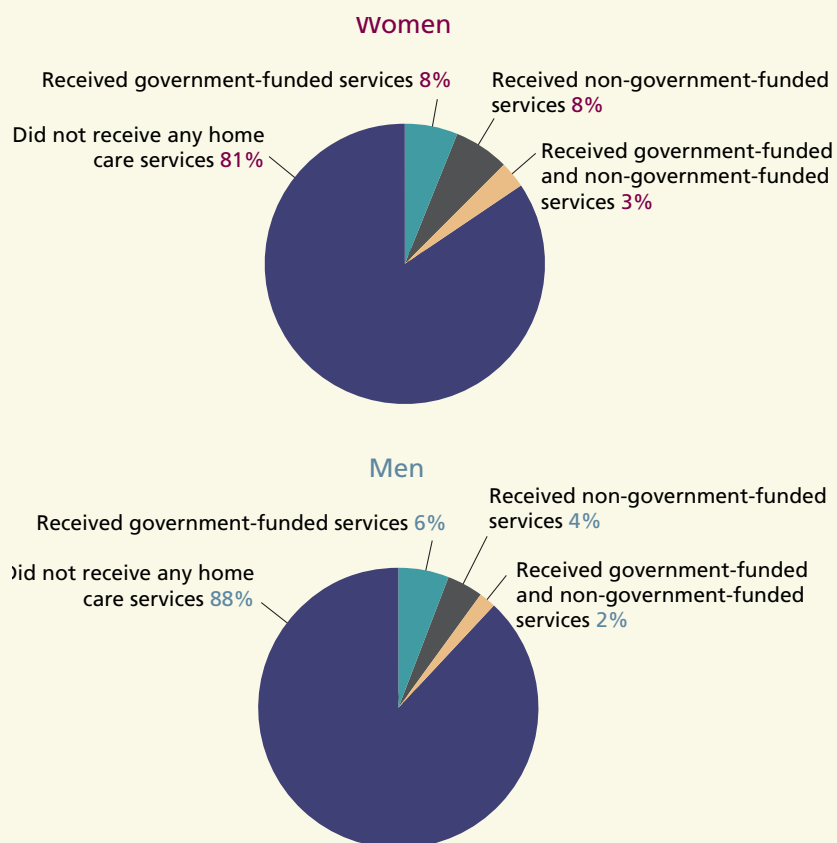
Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess this indicator among community-dwelling older adults (see [Appendix 2](#) for more detail).

**Findings:** In Ontario, 16 percent of adults aged 65 and older reported receiving any home care services (government- or non-government-funded). Older women were more likely to report receiving home care services than older men (19 percent of older women versus 12 percent of older men)—this represents an estimated 167,227 women and 85,844 men.

## Exhibit C.1 | Percentage of adults aged 65 and older who reported receiving home care services in the past year, by sex and funding source, in Ontario, 2007-08

### FINDINGS

- Among older women, eight percent reported receiving only government-funded services, eight percent reported receiving only non-government-funded services, and three percent reported receiving a combination of both government-funded and non-government-funded services. Among women who reported that they had received home care services, less than half reported receiving only government-funded services.
- Older men reported somewhat different rates of usage, with six percent receiving only government-funded services, four percent receiving only non-government-funded services, and two percent receiving a combination of both. Among men who reported receiving any home care services, approximately half reported receiving only government-funded services.

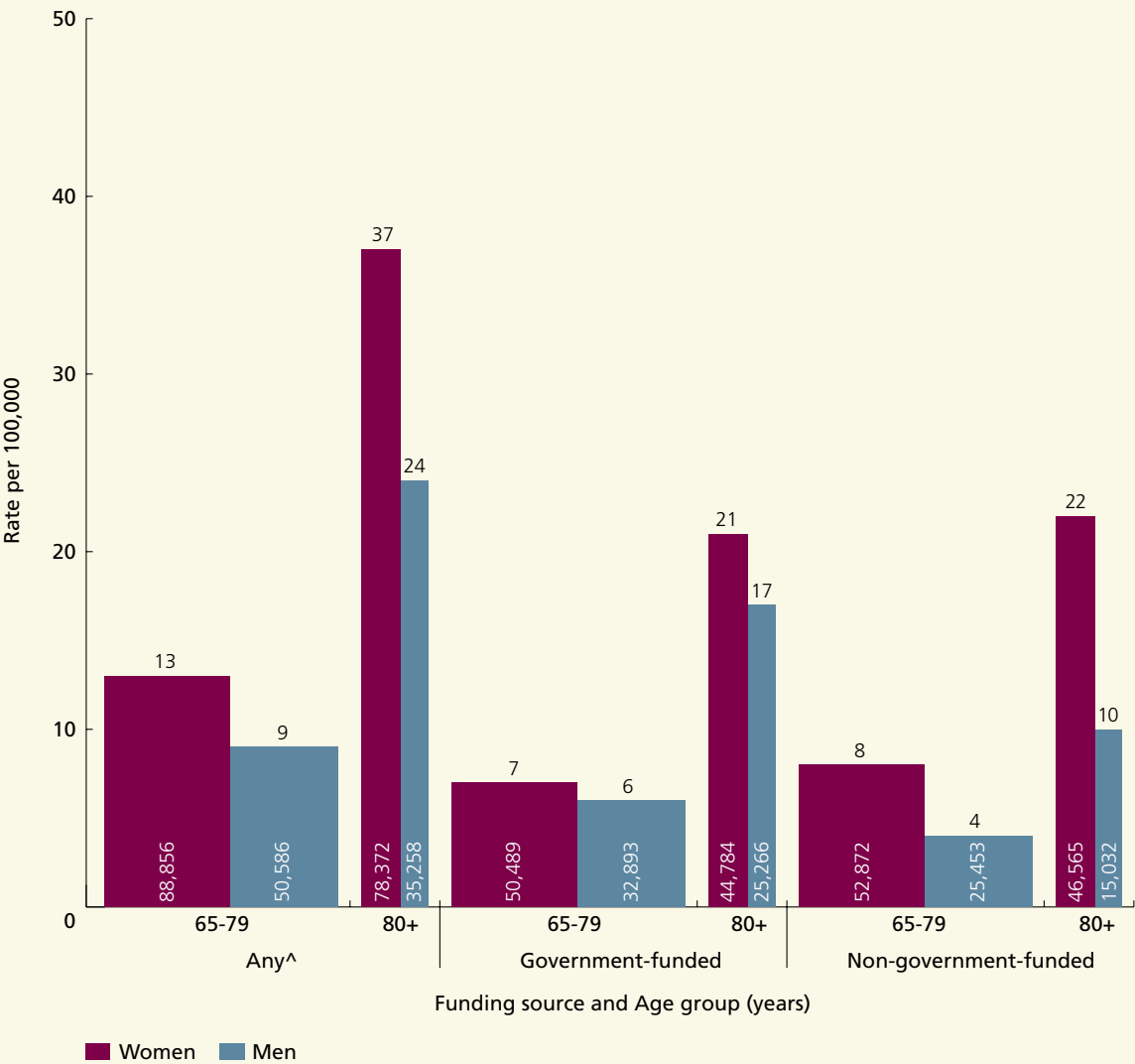


DATA SOURCE: Canadian Community Health Survey (CCHS), 2007-08

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**Exhibit C.2** | Percentage and number of adults aged 65 and older who reported receiving home care services in the past year, by sex, age group, and funding source, in Ontario, 2007-08



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007-08

^ includes both government- and non-government-funded home care services

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

POWER Study

**Exhibit C.2 |** Percentage and number of adults aged 65 and older who reported receiving home care services in the past year, by sex, age group, and funding source, in Ontario, 2007-08  
(continued)

**FINDINGS**

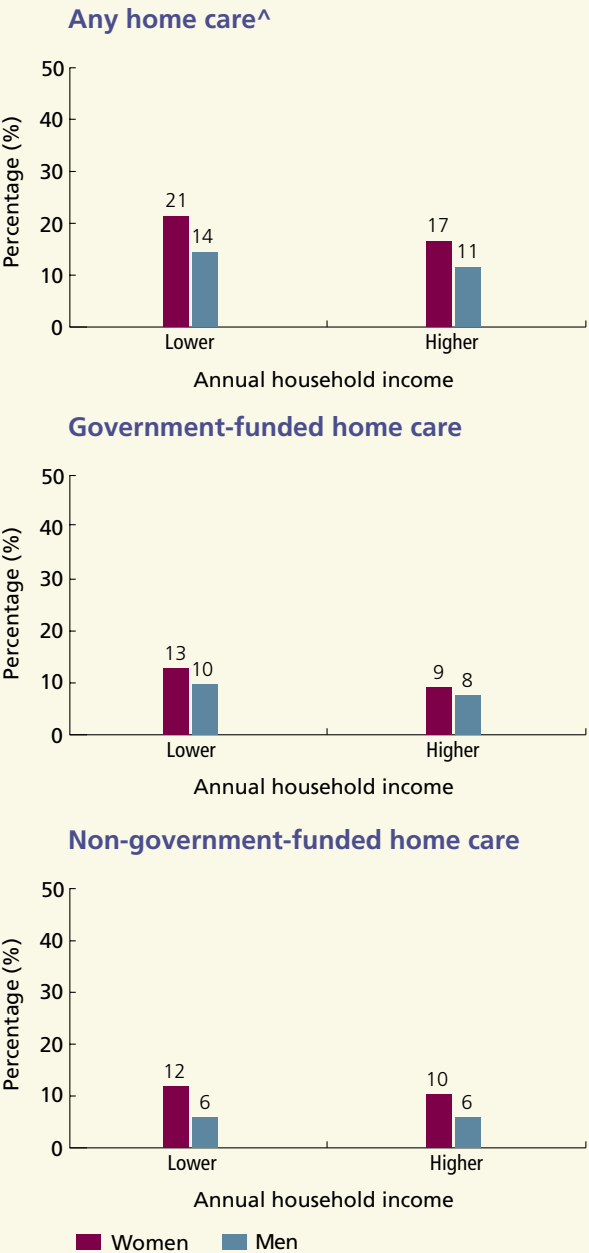
- The percentage of older adults who reported receiving home care services was more than double among those aged 80 and older as compared to those aged 65–79. This was observed in both women and men for both the government-funded and non-government-funded home care services.
- The percentage of women who reported receiving home care services in the past year was consistently higher than the percentage of men who reported receiving home care services in the same period.
- Although this sex difference was observed in both those aged 65–79 and those aged 80 and older, it was greater among the oldest age group. Among those aged 65–79, 13 percent of women reported receiving any home care service compared to nine percent of men; whereas, among those aged 80 and older, 37 percent of women reported receiving any home care service compared to 24 percent of men. The larger sex difference in the oldest age group was also observed among those who reported receiving government-funded and non-government-funded services but appeared to be larger among the latter.
- Given that women are disproportionately represented among older populations, the total number of women aged 80 and older who reported receiving home care services in the past year was over twice as high as the total number of men aged 80 and older (an estimated 78,372 women compared to 35,258 men).

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**Exhibit C.3 |** Age-standardized percentage of adults aged 65 and older who reported receiving home care services in the past year, by sex, annual household income, and funding source, in Ontario, 2007-08

**FINDINGS**

- Women were more likely than men to receive any home care services in both lower- and higher-income households.
- After adjusting for age, lower-income adults were more likely to receive home care services than those with higher incomes (21 percent of lower-income women versus 17 percent of higher-income women; 14 percent of lower-income men versus 11 percent of higher-income men). This likely reflects poorer health status, and thus greater need, among those with lower incomes.

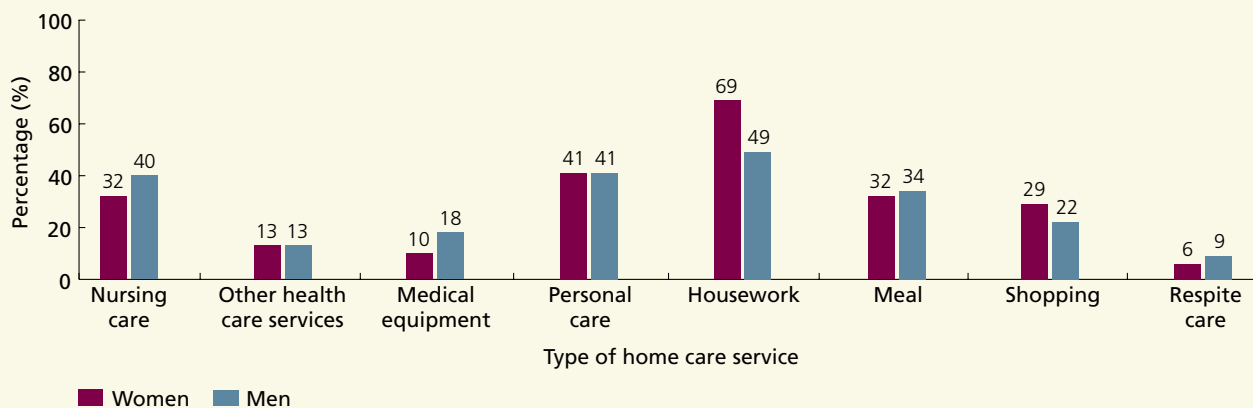


**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007-08

<sup>^</sup> includes both government- and non-government-funded home care services

**NOTE:** See [Appendix 2](#) for definitions of annual household income categories

**Exhibit C.4 |** Percentage of home care recipients aged 65 and older who reported receiving each type of service<sup>^</sup> in the past year, by sex, in Ontario, 2007-08



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007-08

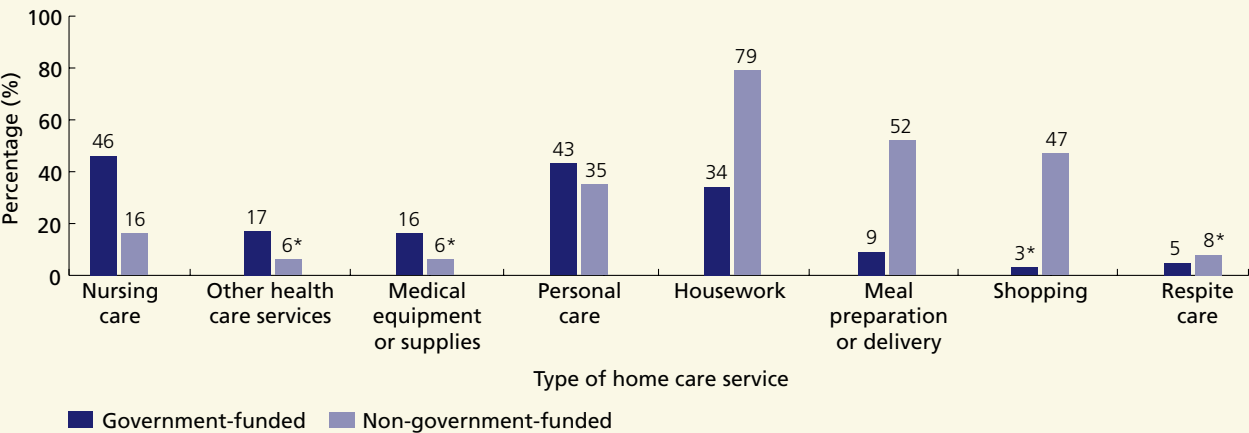
<sup>^</sup> includes both government- and non-government-funded home care services

#### FINDINGS

- Among older women and men, the most common types of home care services received were housework (69 percent of women and 49 percent of men), personal care (41 percent of women and 41 percent of men), nursing care (32 percent of women and 40 percent of men) and meal preparation or delivery (32 percent of women and 34 percent of men).
- Although we have seen that older women were more likely than men to use home care services, there were fewer sex differences in the types of care received.

POWER Study

**Exhibit C.5 |** Percentage of home care recipients aged 65 and older who reported receiving each type of service in the past year, by funding source, in Ontario, 2007-08



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007-08

\* Interpret with caution due to high sampling variability

**FINDINGS**

- There were reported differences in the types of services received from government-funded and non-government-funded sources.
- Medical services—such as nursing care, other health care services, and medical equipment or supplies—were more often received from government-funded sources. Supportive care services—such as housework, meal preparation or delivery, and shopping—were more often received from non-government-funded sources.

POWER Study

## UNMET HOME CARE NEEDS

**Indicator:** This indicator measures the percentage of adults aged 65 and older who reported that there was a time in the past year when they needed home care services but did not receive them.

**Background:** Older adults may experience both short-term and longer-term needs for home care services which can result from acute medical changes and/or on-going functional decline. Timely access to home care services to meet those needs are integral to helping to maintain older adults' independence in their own homes. Without timely access to appropriate home care services, older adults may be at increased risk for hospitalization and/or admission to long-term care.<sup>130</sup>

Self-reported data from the Canadian Community Health Survey (CCHS) were used to assess this indicator among all community-dwelling older adults (see [Appendix 2](#) for more detail). This indicator was not limited to people receiving home care services. Most older adults living in the community do not require home care services and therefore will not report unmet need. We do not assess unmet need among those receiving home care services, who have greater need and therefore may be more likely to have their needs unmet. It is also possible that these patterns differ for women and men. In addition, this indicator takes into account all home care services—including government-funded and privately purchased services—and would not capture financial burden experienced by those who are purchasing services to meet their needs.

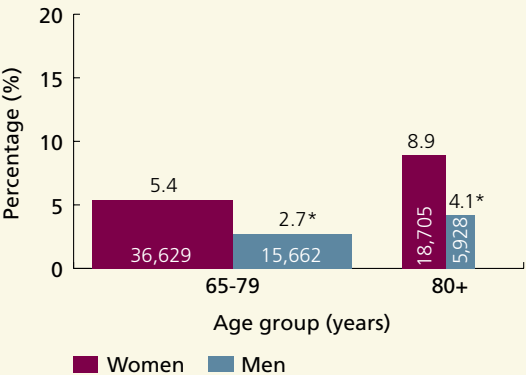
**Finding:** In Ontario, 4.8 percent of older adults (aged 65 and older) reported that there was a time in the past year when they needed home care services but did not receive them. Older women were more likely to report an unmet need than older men (6.3 percent versus 3.0 percent, respectively).

The top three most reported unmet home care needs were for help with housework (62 percent), personal care (30 percent), and meal preparation or delivery (29 percent). This was similar for women and men, but a greater percentage of women reported they experienced unmet need for each type of service than men.

**Exhibit C.6 |** Percentage and number of adults aged 65 and older who reported that there was a time in the past year when they needed home care services but did not receive them, by sex and age group, in Ontario, 2007-08

**FINDINGS**

- A greater percentage of both women and men aged 80 and older reported having unmet home care needs than did those aged 65-79; the age difference among men was not statistically significant, possibly due to small sample size and limited power to detect differences.
- In both age groups, the percentage of women who reported having unmet home care needs was double the percentage of men who reported having unmet needs. The total number of women reporting unmet home care needs was more than two times greater than the total number of men among those aged 65-79 and more than three times greater among those aged 80 and older (an estimated 36,629 women versus 15,662 men aged 65-79; 18,705 women versus 5,928 men aged 80 and older).
- Adults living in lower-income households were more likely to report unmet home care needs than those living in higher-income households (after adjusting for age, 8.0 percent of lower-income women versus 4.8 percent of higher-income women; 6.4 percent of lower-income men versus 1.8 percent of higher-income men, though the estimates for men should be interpreted with caution due to high sampling variability) (data not shown).
- After adjusting for age, women living in higher-income households were 2.7 times more likely to have unmet needs compared to men living in higher-income households. Sex differences were not statistically significant among those living in lower-income households (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007-08

\* Interpret with caution due to high sampling variability

**NOTE:** The width of each bar reflects the relative proportion of the older community-dwelling population (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs' on page 17](#))

POWER Study



## NEW ADL (ACTIVITY OF DAILY LIVING) IMPAIRMENT OR AN ADL IMPAIRMENT THAT FAILED TO IMPROVE

**Indicator:** This indicator measures the percentage of long-stay home care clients aged 65 and older with a new ADL impairment or an ADL impairment that failed to improve between the previous and most recent assessment.

**Background:** Activities of daily living (ADLs) are a set of everyday tasks which are required for personal self-care and independent living. Examples of ADLs include eating, dressing, bathing and personal hygiene.<sup>131, 132</sup> Older adults often experience limitations in their ability to perform ADLs because of declining health or cognitive functioning. When an older person experiences a decline in her or his ability to perform ADLs that is not compensated through rehabilitative or supportive services, it increases the risk of hospital service use, placement in a long-term care home and mortality.<sup>131</sup> Thus, maintaining and preserving an individual's ability to perform ADLs is important in allowing one to live independently and remain at home. An important goal of home care is to deliver services to help older adults maintain their functional status and independence for as long as possible.<sup>133</sup> Changes in the ability to perform ADLs can be compensated through physical therapy, occupational therapy, and other services designed to maximize functional independence.

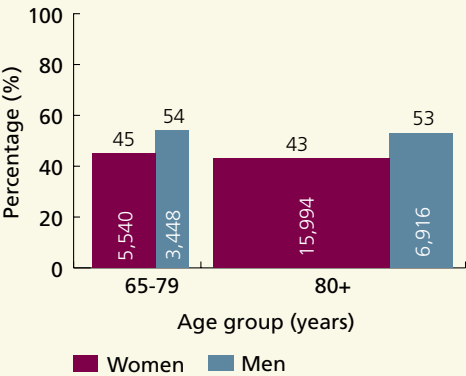
Data from the Home Care Reporting System (HCRS) were used to measure this indicator among older adults receiving long-stay government-funded home care services. A validated scale (the ADL long form embedded in the Resident Assessment Instrument – Home Care (RAI-HC)) was used to assess self-performance of the following activities (based on the three days prior to the most recent assessment): eating, dressing, toilet use, personal hygiene, mobility in bed, transfer, and locomotion inside the home.<sup>134, 135</sup> End-of-life clients were excluded because they are expected to have different functional outcomes. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for difficulty in transfer and cognitive impairment (see [Appendix 2](#) for more detail).

**Findings:** In Ontario, 46 percent of older adults (aged 65 and older) who were receiving home care services had a new ADL impairment or an ADL impairment that failed to improve. Older men were more likely than older women to have new impairment or old impairment that did not improve (53 percent versus 43 percent, respectively). Given that more women use home care services than men, twice as many women as men experienced a new ADL impairment or an ADL impairment that failed to improve (21,534 women compared to 10,364 men).

**Exhibit C.7 |** Percentage and number of long-stay home care clients aged 65 and older with either a new ADL impairment or an ADL impairment that failed to improve, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Overall, across both age groups, a similar proportion of home care clients experienced a new ADL impairment or an ADL impairment that failed to improve (48 percent aged 65–79 versus 46 percent 80 and older) (data not shown).
- Within each age group, a higher percentage of men than women experienced a new ADL impairment or an ADL impairment that failed to improve.
- However, the total number of women reporting a new ADL impairment or an ADL impairment that failed to improve was much greater than the total number among men (5,540 women versus 3,448 men aged 65-79; 15,994 women versus 6,916 men aged 80 and older).



**DATA SOURCE:** Home Care Reporting System (HCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-stay home care clients (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

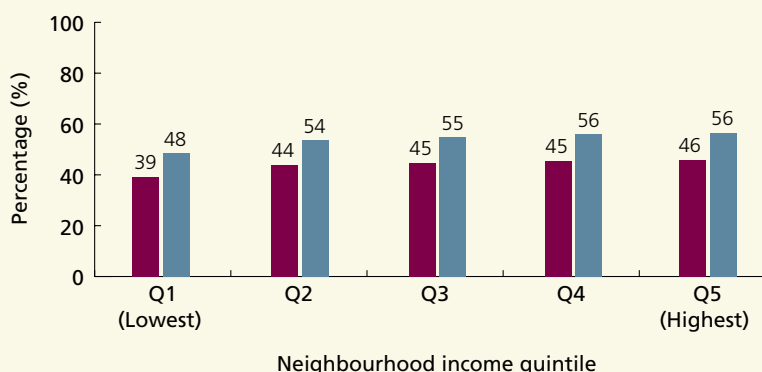
ADL = activity of daily living

POWER Study

## Exhibit C.8 | Percentage of long-stay home care clients aged 65 and older with either a new ADL impairment or an ADL impairment that failed to improve, by sex and neighbourhood income quintile, in Ontario, 2009/10

### FINDINGS

- Older women and men living in the lowest-income neighbourhoods were less likely than those living in the highest-income neighbourhoods to experience a new ADL impairment or one that failed to improve (39 percent versus 46 percent among women; 48 percent versus 56 percent among men).
- Across all neighbourhood income quintiles, a higher percentage of men than women had a new ADL impairment or an ADL impairment that failed to improve; however, within each neighbourhood income quintile the total number of women with a new ADL impairment or an ADL impairment that failed to improve was two times greater than the total number among men (data not shown).
- After risk adjustment, a similar percentage of older adults experienced a new ADL impairment or an ADL impairment that failed to improve, irrespective of neighbourhood income or sex; this may be because men receiving home care services are sicker than women receiving these services, as well as baseline differences in health status associated with income (data not shown).



■ Women ■ Men

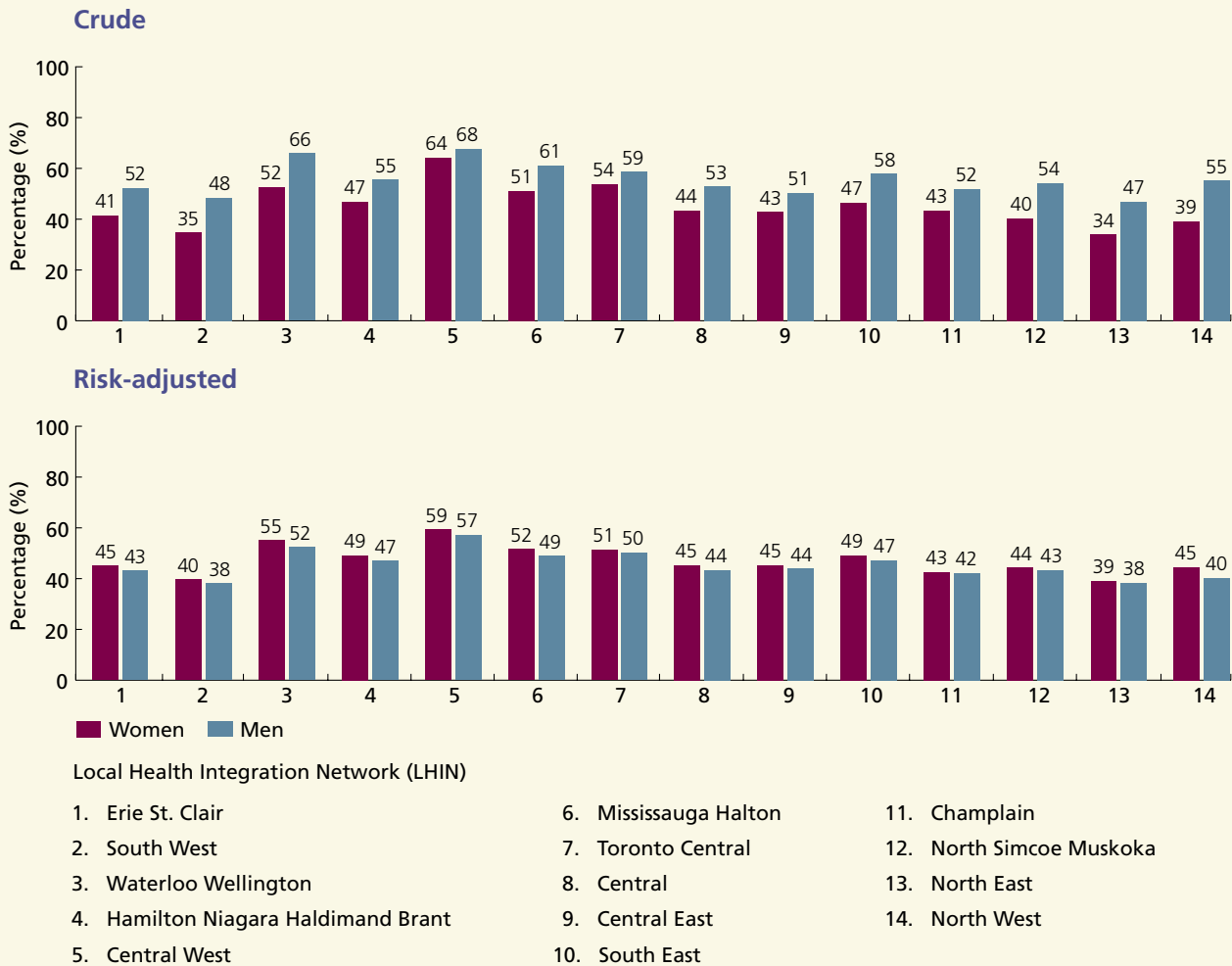
**DATA SOURCES:** Home Care Reporting System (HCRS); Statistics Canada's 2006 Census

**NOTE:** See [Appendix 2](#) for details about neighbourhood income quintile calculation

ADL = activity of daily living

POWER Study

**Exhibit C.9 |** Crude and risk-adjusted^ percentage of long-stay home care clients aged 65 and older with either a new ADL impairment or an ADL impairment that failed to improve, by sex and Local Health Integration Network (LHIN), in Ontario, 2009/10



**DATA SOURCE:** Home Care Reporting System (HCRS)

^ Risk-adjustment accounted for difficulty in transfer and cognitive impairment  
ADL = activity of daily living

**FINDINGS**

- The unadjusted percentage of long-stay home care clients aged 65 and older who had a new ADL impairment or an ADL impairment that failed to improve varied across LHINs, with a 1.9-fold variation (34 to 64 percent) among women and 1.4-fold variation (47 to 68 percent) among men.
- Across LHINs, the percentage of men who experienced a new ADL impairment or an ADL impairment that failed to improve was larger than the percentage of women; however, in each LHIN the total number of women with a new ADL impairment or one that failed to improve was about two times greater than the total number among men (data not shown).
- After risk adjustment, the pattern across LHINs remained similar, but the sex differences disappeared.

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## POORLY CONTROLLED PAIN

**Indicator:** This indicator measures the percentage of long-stay home care clients aged 65 and older with reported or documented pain who reported inadequate pain control.

**Background:** Chronic pain is common in older adults but often goes unrecognized and under-treated.<sup>136</sup> Problems with recognition and under-treatment have been attributed to erroneous beliefs that pain is a natural part of aging—among both older patients and health care providers—as well as difficulty in assessing pain among older adults with impaired cognitive functioning. Inadequate and improper pain management limits functional ability, impairs quality of life and causes emotional distress.<sup>136–138</sup> In older adults with cognitive impairment, inadequately controlled pain has also been linked to increased behavioural problems.<sup>139</sup> In addition, poorly controlled pain is associated with increased risk of caregiver burden, admission to long-term care and physician referrals.<sup>137</sup> All health care providers who care for older adults, including physicians and home care providers, should have the skills to assess for pain so that proper management can be achieved.<sup>136</sup>

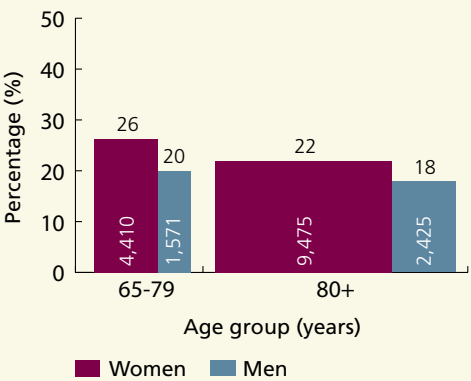
Data from the Home Care Reporting System (HCRS) were used to measure this indicator among older adults receiving long-stay government-funded home care services. We measured the percentage of clients who reported any pain or showed evidence of pain (based on the three days prior to the assessment date) who felt that medications did not adequately control their pain. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for cognitive impairment (see [Appendix 2](#) for more detail).

**Findings:** In Ontario, 22 percent of older home care clients (aged 65 and older) with reported or documented pain reported inadequate pain control. Older women were more likely than older men to have inadequate pain control (23 percent versus 19 percent, respectively). Given that more women use home care services than men, well over three times as many women reported inadequate pain control compared to men (13,885 women compared to 3,996 men).

**Exhibit C.10 |** Percentage and number of long-stay home care clients aged 65 and older with pain who had inadequate pain control, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Long-stay home care clients aged 65–79 were more likely to report inadequate pain control compared to clients aged 80 and older (24 percent versus 21 percent, respectively) (data not shown). Age differences were more pronounced among women than among men.
- In each age group, a higher percentage of women than men reported inadequate pain control; the total number of women reporting inadequate pain control was nearly three to four times greater than the total number of men (4,410 women versus 1,571 men aged 65–79; 9,475 women versus 2,425 men aged 80 and older).
- The percentage of long-stay home care clients with inadequate pain control did not vary by neighbourhood income (data not shown).
- The percentage of home care clients aged 65 and older who had inadequate pain control varied across Local Health Integration Networks (LHINs), with a 1.3-fold variation among women (19 to 25 percent) and men (16 to 21 percent) (data not shown).
- Across all neighbourhood income quintiles and LHINs, the percentage of women reporting inadequate pain control was greater than the percentage of men. After adjusting for risk, the pattern across neighbourhood income quintiles and LHINs remained similar, however, the sex differences disappeared (data not shown).



**DATA SOURCE:** Home Care Reporting System (HCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-stay home care clients (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

POWER Study

## PREVALENCE OF DEPRESSED MOOD

**Indicator:** This indicator measures the percentage of long-stay home care clients aged 65 and older with depressed mood.

**Background:** Depression is a serious mental illness that severely impacts on a person's quality of life and ability to care for her- or himself. The cause of depression is multi-factorial and can include biological, social, and environmental contributors. Although many of the factors that may contribute to depression, such as worsening health, loss of a spouse, or changing social roles, are more common in older adults, depression is not a natural consequence of age. In older adults, depression can, and should be, appropriately treated to improve overall quality of life. Symptoms of depression can include profound sadness, changes in appetite, and worsened physical symptoms. In older adults, depression has been associated with medical morbidity, impairment in ADLs and IADLs, pain, increased caregiver stress and long-term care placement.<sup>140–142</sup> Home care clients who exhibit symptoms of depression should be referred to appropriate psychiatric services for full assessment and treatment, if necessary.

Data from the Home Care Reporting System (HCRS) were used to measure this indicator among older adults receiving long-stay government-funded home care services. Depressed mood was defined as a feeling of sadness or being depressed AND having at least two symptoms of functional depression (based on the three days prior to the assessment date). For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for self-rated health; flare up of recurrent or chronic problem; caregiver distress, anger or depression; and age (see [Appendix 2](#) for more detail).

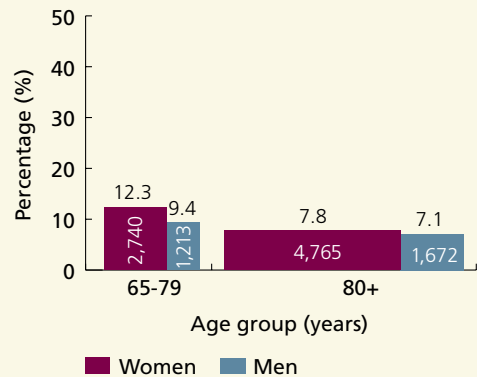
**Finding:** In Ontario, 8.7 percent of long-stay home care clients aged 65 and older had a depressed mood (9.0 percent of women and 7.9 percent of men). Given that more women use home care services than men, more than twice as many women experienced a depressed mood compared to men (7,505 women compared to 2,885 men).



**Exhibit C.11** | Percentage and number of long-stay home care clients aged 65 and older with depressed mood,<sup>^</sup> by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Long-stay home care clients aged 65–79 were more likely to experience a depressed mood compared to clients aged 80 and older (11.2 percent versus 7.6 percent, respectively) (data not shown).
- In the younger age group (aged 65–79), a higher percentage of women than men experienced a depressed mood; in the older age group, a similar percentage of women and men experienced a depressed mood.
- However, the total number of women with a depressed mood was two to three times greater than the total number of men with a depressed mood (2,740 women versus 1,213 men aged 65–79; 4,765 women versus 1,672 men aged 80 and older).
- The percentage of long-stay home care clients with a depressed mood did not vary by neighbourhood income (data not shown).
- The percentage of home care clients aged 65 and older who experienced a depressed mood varied greatly across Local Health Integration Networks (LHINs), with a 3.0-fold variation (4.7 to 14.2 percent) among women and 2.7-fold variation (4.6 to 12.3 percent) among men (data not shown).
- The patterns across neighbourhood income quintiles and LHINs remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Home Care Reporting System (HCRS)

<sup>^</sup> Depressed mood is defined as a sad mood on most recent assessment and at least two symptoms of functional depression (based on the three days prior to the assessment date)

**NOTE:** The width of each bar reflects the relative proportion of the long-stay home care clients (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

POWER Study

## NEW COGNITIVE IMPAIRMENT OR A COGNITIVE IMPAIRMENT THAT FAILED TO IMPROVE

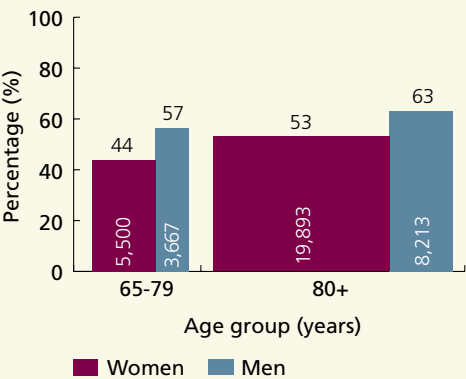
**Indicator:** This indicator measures the percentage of long-stay home care clients aged 65 and older with a new cognitive impairment or a cognitive impairment that failed to improve between the previous and most recent assessment.

**Background:** The prevalence of cognitive impairment increases sharply with age.<sup>143–145</sup> Cognitive impairment can include symptoms such as deterioration in language, memory and thinking abilities.<sup>146–148</sup> Cognitive impairment can have a profound effect on quality of life and people with cognitive impairments tend to have worse functional abilities.<sup>149</sup> Cognitive impairment has also been found to be associated with worse health status and increased mortality rate. People with cognitive impairments usually experience declining cognitive function over time that can result in even greater functional impairment and isolation. Despite the fact that there is no “cure” for cognitive impairment, many things can be done to help slow the decline; this can include the use of certain medications, certain activities to stimulate cognitive function, and on-going social integration. Home care services should be able to identify the need for these types of interventions and support their implementation when necessary. By slowing cognitive decline, home care can help keep the elderly at home and maintain independence.

Data from the Home Care Reporting System (HCRS) were used to measure this indicator among older adults receiving long-stay government-funded home care services. Cognitive impairments were assessed using a validated cognitive performance scale (based on the three days prior to the assessment date).<sup>135, 150</sup> For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for diagnosis of dementia, bowel incontinence and age (see [Appendix 2](#) for more detail).

**Finding:** In Ontario, 54 percent of long-stay home care clients aged 65 and older had a new cognitive impairment or a cognitive impairment that failed to improve between the previous and most recent assessment. Older men were more likely than older women to have a new cognitive impairment or one that failed to improve (61 percent versus 51 percent, respectively). Given that more women use home care services than men, more than twice as many women had a new cognitive impairment or a cognitive impairment that failed to improve compared to men (25,393 women compared to 11,880 men).

**Exhibit C.12** | Percentage and number of long-stay home care clients aged 65 and older with a new cognitive impairment or a cognitive impairment that failed to improve between the previous and most recent assessment, by sex and age group, in Ontario, 2009/10



**DATA SOURCE:** Home Care Reporting System (HCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-stay home care clients (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

**FINDINGS**

- Long-stay home care clients aged 80 and older were more likely to experience a new cognitive impairment or a cognitive impairment that failed to improve than clients aged 65–79 (56 percent versus 48 percent, respectively) (data not shown).
- In each age group, a higher percentage of men than women experienced a new cognitive impairment or a cognitive impairment that failed to improve. However, after adjusting for risk among home care clients, a similar proportion of older women and older men had a new cognitive impairment or one that failed to improve (data not shown).
- The total number of women experiencing a new cognitive impairment or one that failed to improve was much greater than the total number of men (5,500 women versus 3,667 men aged 65–79; 19,893 women versus 8,213 men aged 80 and older).
- Among long-stay home care clients aged 65 and older, those living in the highest-income neighbourhoods were more likely than those living in the lowest-income neighbourhoods to experience a new cognitive impairment or one that failed to improve (56 percent versus 48 percent among women; 64 percent versus 58 percent among men) (data not shown).
- After adjusting for risk, home care clients living in lower-income neighbourhoods were more likely to report a new cognitive impairment or one that failed to improve compared to those living in higher-income neighbourhoods, although these differences were small (54 percent versus 51 percent, respectively among women; 52 percent versus 50 percent, respectively among men) (data not shown).
- The percentage of long-stay home care clients aged 65 and older who reported a new cognitive impairment or a cognitive impairment that failed to improve varied somewhat across Local Health Integration Networks (LHINs), with a 1.6-fold variation (41 to 66 percent) among women and 1.3-fold variation (55 to 71 percent) among men. The pattern across LHINs remained the same after adjusting for risk (data not shown).

POWER Study

## PREVALENCE OF INJURY

**Indicator:** This indicator measures the percentage of long-stay home care clients aged 65 and older who had fractures, second or third degree burns or unexplained injuries observed at the time of assessment.

**Background:** Injuries are common in older adults; in fact, they are the second most common reason why older adults visit the emergency department.<sup>151–153</sup> Falls are the most common cause of injury in this age group and account for as many as 48 percent of injuries that are treated in emergency departments.<sup>154</sup> Factors that contribute to injuries include: home environment, home care client complexity, communication problems and skill level of the home care provider.<sup>155</sup> Injuries due to safety hazards in the home result in emergency room visits, hospital admissions and premature nursing home placement.<sup>151, 153</sup> Most importantly, many injuries are preventable.<sup>151</sup> Proper training in safety assessment in home care providers can prevent injuries in home care clients and decrease the profound consequences of these injuries.

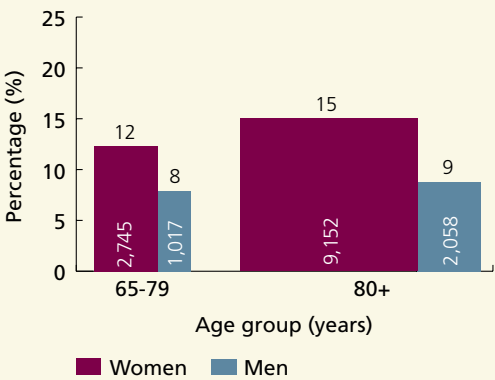
Data from the Home Care Reporting System (HCRS) were used to measure this indicator among older adults receiving long-stay government-funded home care services. Injuries included in this indicator were fractures, second or third degree burns or unexplained injuries that were observed at the time of the assessment. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for clients who limit going outdoors due to fear of falling and have a diagnosis of osteoporosis (see [Appendix 2](#) for more detail).

**Finding:** In Ontario, 13 percent of long-stay home care clients aged 65 and older had injuries. Older women were more likely than older men to have had an injury (14 percent versus 9 percent, respectively). Given that more women use home care services than men, almost four times as many women had an injury compared to men (11,897 women compared to 3,075 men).

**Exhibit C.13** | Percentage and number of long-stay home care clients aged 65 and older who had any injuries,<sup>^</sup> by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Long-stay home care clients aged 80 and older were slightly more likely to have any injuries compared to clients aged 65–79 (13 percent versus 11 percent, respectively) (data not shown).
- In each age group, a higher percentage of women than men had any injuries.
- The total number of women with injuries was much greater than the total number of men (2,745 women versus 1,017 men aged 65–79; 9,152 women versus 2,058 men aged 80 and older).
- Before risk adjustment, older women were more likely than older men to have any injuries; however, after adjusting for risk, older men were slightly more likely than older women to have been injured, although this difference was small (after adjusting for risk, 17 percent of men and 14 percent of women aged 65 and older had an injury) (data not shown).
- The percentage of long-stay home care clients who had any injuries at the time of their last assessment did not vary by neighbourhood income; this pattern did not change after adjusting for risk (data not shown).



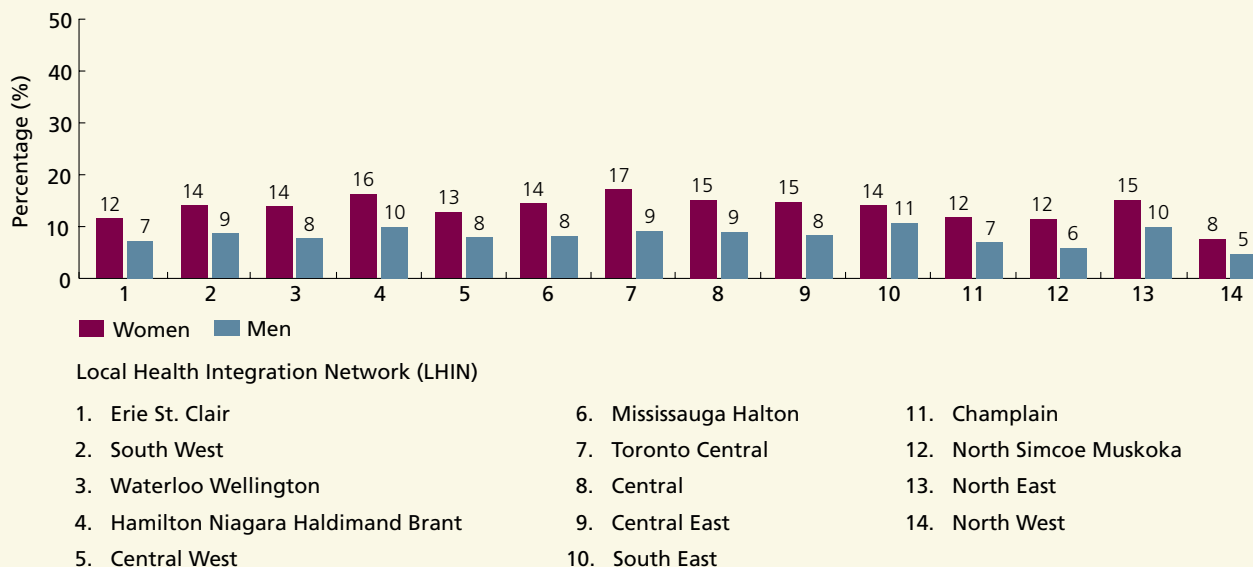
**DATA SOURCE:** Home Care Reporting System (HCRS)

<sup>^</sup> Injuries were defined as fractures, second or third degree burns or unexplained injuries

**NOTE:** The width of each bar reflects the relative proportion of the long-stay home care clients (aged 65+) represented by that bar (based on the indicator’s denominator; for more detail see [‘How to read variable column width graphs’ on page 17](#))

POWER Study

### Exhibit C.14 | Percentage of long-stay home care clients aged 65 and older who had any injuries,<sup>^</sup> by sex and Local Health Integration Network (LHIN), in Ontario, 2009/10



**DATA SOURCE:** Home Care Reporting System (HCRS)

<sup>^</sup> Injuries were defined as fractures, second or third degree burns or unexplained injuries

#### FINDINGS

- The percentage of long-stay home care clients aged 65 and older who had any injuries at the time of assessment varied across LHINs, with a 2.1-fold variation (8 to 17 percent) among women and 2.2-fold variation (5 to 11 percent) among men.
- In all LHINs, the percentage of women with an injury was larger than the percentage among men.
- After adjusting for risk, the sex patterns across LHINs reversed, with older men being slightly more likely than older women to have injuries; however, these sex differences were small (data not shown).

POWER Study

## LONG-TERM CARE

### RATE OF POTENTIALLY PREVENTABLE EMERGENCY DEPARTMENT VISITS

**Indicator:** This indicator measures the number of potentially preventable emergency department (ED) visits per 100 long-term care residents (aged 65 and older) per year. Potentially preventable ED visits are defined as visits for reasons that may have been prevented if an underlying condition had been managed earlier.

**Background:** When a resident is injured or acutely ill, a visit to the ED is usually the most appropriate course of action. For certain medical conditions, the best care is attentive primary care to prevent flare-ups or exacerbations which can result in an ED visit. These are known as “ambulatory care sensitive” or “potentially preventable” conditions; this means that the resident has a medical condition (either a chronic condition or infection) that if not properly treated early might result in the need for an ED visit or hospitalization. Examples of these conditions include diabetes, heart failure, chronic obstructive pulmonary disease, pneumonia, and urinary tract infections—all of which are common in the long-term care population.<sup>156</sup>

Ontario's quality improvement organization, Health Quality Ontario (HQO), recognizes the following strategies as important for reducing the occurrence of ED visits for potentially preventable conditions: “ensuring there are physicians or nurse practitioners available to assess a resident in the home; finding specialists that staff can call for advice on how to handle a problem; better training for staff on how to spot and respond to warning signs of a worsening medical condition sooner; and educating families about the risks of emergency department transfers.”<sup>157</sup>

Using linked administrative databases, we assessed the number of potentially preventable ED visits per 100 long-term care residents per year. For this indicator, we report crude and age-standardized rates (see [Appendix 2](#) for more detail).

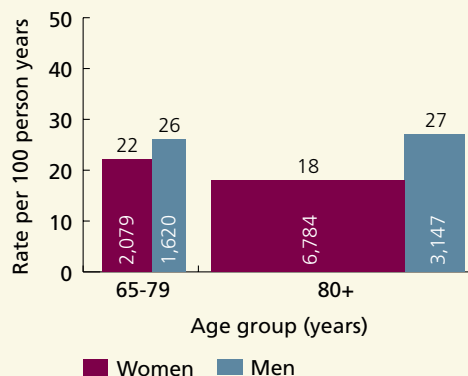
**Finding:** In Ontario in 2009/10, the rate of potentially preventable ED visits among long-term care residents aged 65 and older was 21 per 100 long-term care residents per year. Men had higher rates of potentially preventable ED visits compared to women (27 ED visits per 100 men per year versus 19 ED visits per 100 women per year). Given that more women reside in long-term care homes than men, there were nearly twice as many potentially preventable ED visits among women than among men (8,863 ED visit among women compared to 4,767 ED visits among men).



### Exhibit C.15 | Number of potentially preventable emergency department (ED) visits for every 100 long-term care residents aged 65 and older per year and the total number of ED visits, by sex and age group, in Ontario, 2009/10

#### FINDINGS

- There was little difference in the rate of potentially preventable ED visits between those aged 65–79 and those aged 80 and older.
- In each age group, the rate of potentially preventable ED visits was higher among men than among women (22 visits per 100 women versus 26 visits per 100 men aged 65–79; 18 visits per 100 women versus 27 visits per 100 men aged 80 and older).
- However, the total number of potentially preventable ED visits among women was greater than the total number among men (2,079 visits among women versus 1,620 visits among men aged 65–79; 6,784 visits among women versus 3,147 visits among men aged 80 and older).
- The rates of potentially preventable ED visits among long-term care residents aged 65 and older varied across Local Health Integration Networks (LHINs), with a 2.1-fold variation (11 to 23 percent) among women and 1.6-fold variation (20 to 32 percent) among men (data not shown).
- In all LHINs, men consistently had a higher rate of potentially preventable ED visits than women (data not shown).
- Differences across LHINs and sex persisted after adjusting for age (data not shown).



**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); National Ambulatory Care Reporting System (NACRS); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

**NOTE:** The width of each bar reflects the relative proportion of person-years among long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs' on page 17](#))

POWER Study

## WORSENERD SELF-PERFORMANCE OF ADLS (ACTIVITIES OF DAILY LIVING)

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older whose self-performance of activities of daily living (ADLs) worsened since their last assessment.

**Background:** ADLs are a set of everyday tasks which are required for personal self-care and independent living. Examples of ADLs include eating, dressing, bathing and personal hygiene.<sup>131, 132</sup> When an older person experiences a decline in her or his ability to perform ADLs that is not compensated through rehabilitative or supportive services, it increases the risk of hospital service use and mortality.<sup>131</sup> Changes in the ability to perform ADLs can be compensated through physical therapy, occupational therapy, and other services designed to maximize functional independence.

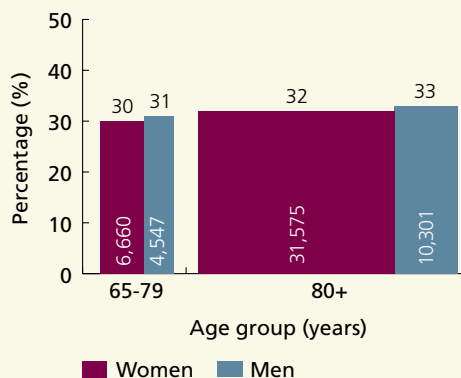
Data from the Continuing Care Reporting System (CCRS) were used to measure this indicator. A validated scale (the ADL long form embedded in the Resident Assessment Instrument – Minimum Data Set (RAI-MDS)) was used to assess self-performance of the following activities: eating, dressing, toilet use, personal hygiene, bed mobility, transfer, and locomotion on the unit.<sup>134</sup> End-of-life and comatose residents were excluded because they were expected to have different functional outcomes. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling adjusting for Case Mix Index at the facility level and difficulty in transfer, locomotion, and Personal Severity Index at the individual-level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 32 percent of long-term care residents aged 65 and older had worsening ADL self-performance (32 percent of women and 33 percent of men). Given that more women reside in long-term care homes than men, over twice as many women had worsening ADL self-performance than men (38,235 women compared to 14,848 men).

## Exhibit C.16 | Percentage and number of long-term care residents aged 65 and older whose ADL self-performance worsened, by sex and age group, in Ontario, 2009/10

### FINDINGS

- Long-term care residents aged 65–79 were equally likely to experience worsened ADL self-performance as residents aged 80 and older (30 percent versus 32 percent, respectively) (data not shown).
- Although a similar proportion of women and men experienced worsening ADL self-performance, the total number of women with worsened ADL self-performance was much greater than the total number of men (6,660 women versus 4,547 men aged 65–79; 31,575 women versus 10,301 men aged 80 and older).
- The percentage of long-term care residents aged 65 and older with worsened ADL self-performance varied across Local Health Integration Networks (LHINs), with a 1.4-fold variation among women (26 to 36 percent) and among men (27 to 38 percent) (data not shown).
- Across LHINs, a similar proportion of women and men in long-term care homes had worsening ADL self-performance; the patterns across LHINs and sex remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see '[How to read variable column width graphs](#)' on page 17)

ADL = activity of daily living

POWER Study

## PREVALENCE OF PAIN

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older with pain.

**Background:** Chronic pain is common in older adults but often goes unrecognized and under-treated.<sup>136</sup> Problems with recognition and under-treatment have been attributed to erroneous beliefs that pain is a natural part of aging—among both older patients and health care providers—as well as difficulty in assessing pain among older adults with impaired cognitive functioning. Inadequate and improper pain management limits functional ability, impairs quality of life and causes emotional distress.<sup>136–138</sup> In older adults with cognitive impairment, inadequately controlled pain has also been linked to increased behavioural problems.<sup>158</sup> In addition, poorly controlled pain is associated with increased risk of caregiver burden, admission to long-term care and physician referrals.<sup>137</sup> All health care providers who care for older adults, including physicians and staff in long-term care homes, should have the skills to assess for pain so that proper management can be achieved.<sup>136</sup> There are evidence-based guidelines for pain management in older adults that, if adhered to, can reduce pain.<sup>159, 160</sup> Multiple strategies may be effective, including exercise, physiotherapy, and medication.

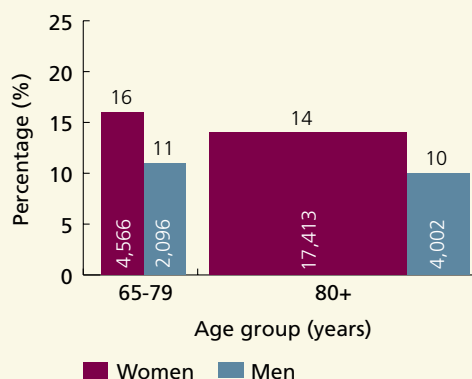
Data from the Continuing Care Reporting System (CCRS) were used to measure the percentage of long-term care residents aged 65 and older with moderate pain at least daily or horrible/excruciating pain at any frequency on their most recent assessment (based on the seven days prior to their most recent assessment). For this indicator, we report crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling adjusting for Depression Rating Scale at the facility level and for Cognitive Performance Scale and long-term memory problems at the individual level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 13 percent of long-term care residents aged 65 and older experienced pain. Women were more likely than men to have pain (14 percent versus 11 percent, respectively). Given that more women reside in long-term care homes than men, over three times as many women experienced pain as men (21,979 women compared to 6,098 men).

### Exhibit C.17 | Percentage and number of long-term care residents aged 65 and older with pain, by sex and age group, in Ontario, 2009/10

#### FINDINGS

- Long-term care residents aged 65–79 were equally as likely to have pain as residents aged 80 and older (14 percent versus 13 percent, respectively) (data not shown).
- In both age groups, a higher percentage of women experienced pain compared to men.
- The total number of women experiencing pain was over two times greater than men among those aged 65–79 (4,566 women versus 2,096 men) and over four times greater than men among those aged 80 and older (17,413 women versus 4,002 men).
- The percentage of long-term care residents aged 65 and older with pain varied across Local Health Integration Networks (LHINs), with a 2.6-fold variation (8 to 21 percent) among women and 2.7-fold variation (6 to 16 percent) among men (data not shown).
- The patterns across LHINs and sex remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs' on page 17](#))

POWER Study

## WORSENERD COGNITIVE ABILITY

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older whose cognitive ability worsened since their last assessment.

**Background:** The prevalence of cognitive impairment increases sharply with age.<sup>143–145</sup> Cognitive impairment can include symptoms such as deterioration in language, memory and thinking abilities.<sup>146–148</sup> Cognitive impairment can have a profound effect on quality of life and people with cognitive impairments tend to have worse functional abilities.<sup>149</sup> Cognitive impairment has also been found to be associated with worse health status and increased mortality. People with cognitive impairments usually experience declining cognitive function over time, which can result in even greater functional impairment and isolation. Despite the fact that there is no “cure” for cognitive impairment, many things can be done to help slow the decline; this can include the use of certain medications, certain activities to stimulate cognitive function, and on-going social integration.

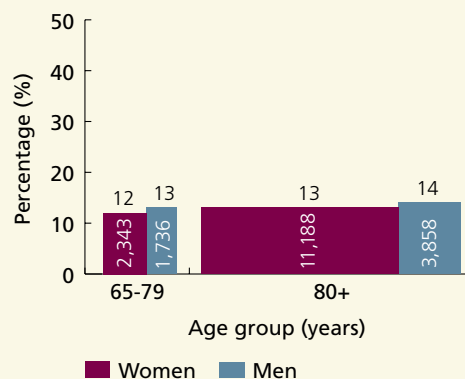
Data from the Continuing Care Reporting System (CCRS) were used to measure this indicator. A validated scale (the Cognitive Performance Scale (CPS)) was used to assess residents' cognitive status based on items assessing short-term memory, ability to make daily decisions, expressive communication, a late-loss activity of daily living (eating) and whether the resident was comatose.<sup>150</sup> End-of-life and comatose residents were excluded, as were residents who had a maximum CPS score on their prior assessment (i.e., whose cognitive ability could not worsen). For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for Case Mix Index at the facility level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 13 percent of long-term care residents aged 65 and older had a decline in their cognitive ability (13 percent of women and 14 percent of men). Given that more women reside in long-term care homes than men, over twice as many women had a decline in their cognitive ability than men (13,531 women compared to 5,594 men).

## Exhibit C.18 | Percentage and number of long-term care residents aged 65 and older whose cognitive ability worsened, by sex and age group, in Ontario, 2009/10

### FINDINGS

- Irrespective of age, a similar proportion of long-term care residents experienced worsened cognitive ability (13 percent of those aged 65–79 and 13 percent of those aged 80 and older) (data not shown).
- In both age groups, a similar proportion of women and men experienced a decline in cognitive ability; however, the total number of women whose cognitive ability worsened was much greater than the total number of men (2,343 women versus 1,736 men aged 65–79; 11,188 women versus 3,858 men aged 80 and older).
- The percentage of long-term care residents aged 65 and older whose cognitive ability worsened varied across Local Health Integration Network (LHINs), with a 1.7-fold variation (9 to 15 percent) among women and 1.5-fold variation (11 to 16 percent) among men; the patterns across LHINs and sex remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see '[How to read variable column width graphs](#)' on page 17)

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## RATE OF FALLS RESULTING IN EMERGENCY DEPARTMENT VISITS OR INPATIENT HOSPITALIZATION

**Indicator:** This indicator measures the number of falls resulting in an emergency department (ED) visit or inpatient hospitalization per 100 long-term care residents (aged 65 and older) per year.

**Background:** Falls continue to be one of the most important issues for long-term care residents. The consequences of falls in this group can be serious, including fractures, long-term hospitalizations, and even death. There are numerous risk factors for falls and these risk factors can be attributed either to characteristics of the resident or to characteristics of the resident's environment. Resident risk factors include certain medical conditions that affect balance, physical weakness, certain medications, and vision problems. Environmental risk factors include things like slippery floors, poor lighting, trip hazards like loose rugs, and long distances between seating options. As complicated as fall risk management may seem, there are many options to reduce the risk of falls and prevent the occurrence of serious injuries. Some fall risk management strategies include frequent medication review to reduce the use of medications known to cause falls, physical therapy to improve strength and balance, and environmental assessments to reduce the trip hazards and other remediable factors.<sup>161–164</sup>

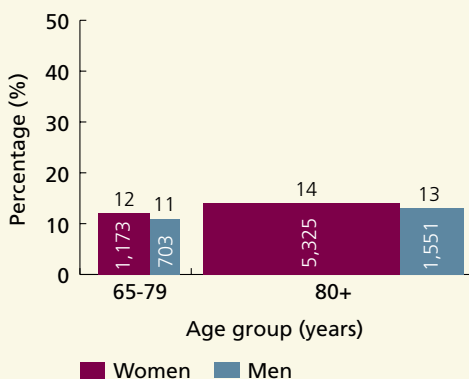
Using linked administrative databases, we assessed the number of falls resulting in an emergency department (ED) visit or inpatient hospitalization per 100 long-term care residents (aged 65 and older) per year. For this indicator, we report crude and age-standardized rates (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, the rate of falls among long-term care residents aged 65 and older resulting in an ED visit or inpatient hospitalization was 14 falls per 100 long-term care residents (14 falls per 100 women and 13 falls per 100 men). Given that more women reside in long-term care homes than men, there were over twice as many falls that resulted in an ED visit or hospitalization among women than among men (6,498 falls among women compared to 2,254 falls among men).

**Exhibit C.19** | Number of falls that resulted in a hospital visit<sup>^</sup> for every 100 long-term care residents aged 65 and older per year and the total number of falls that resulted in a hospital visit, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- The rate of falls resulting in a hospital visit did not vary between those aged 65–79 and those aged 80 and older.
- Although the rate of falls resulting in a hospital visit were similar between women and men, the total number of falls that resulted in a hospital visit was much greater among women than among men (1,173 falls among women versus 703 falls among men aged 65–79; 5,325 falls among women versus 1,551 falls among men aged 80 and older)



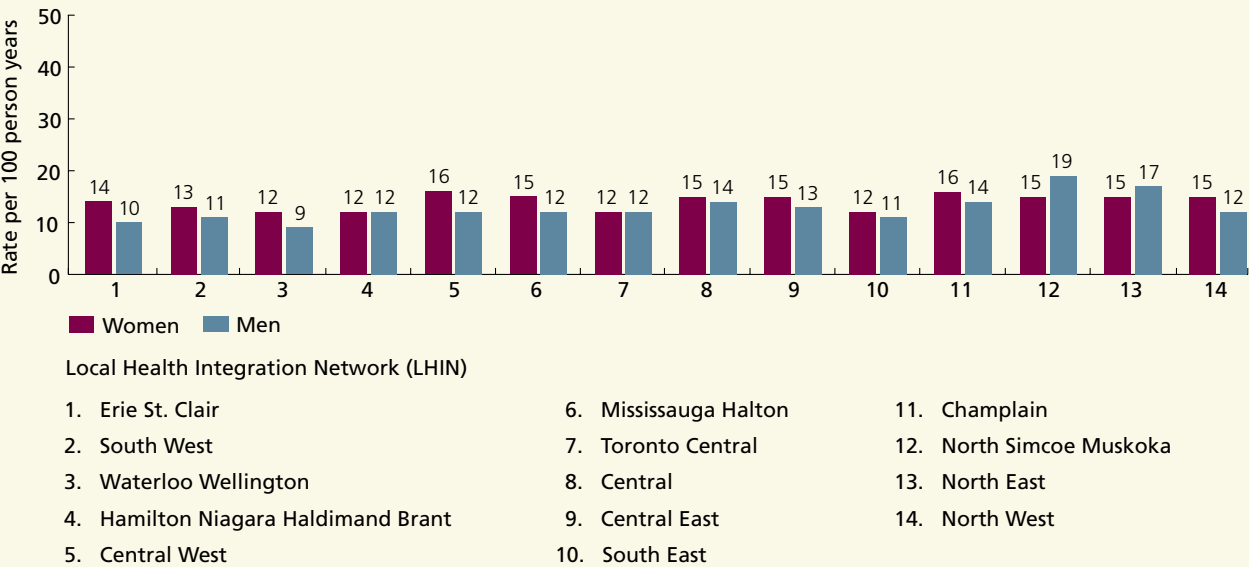
**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); National Ambulatory Care Reporting System (NACRS); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

<sup>^</sup> Emergency department visit or hospital admission

**NOTE:** The width of each bar reflects the relative proportion of person-years among long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see '[How to read variable column width graphs](#)' on page 17)

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**Exhibit C.20** | Number of falls that resulted in a hospital visit<sup>^</sup> for every 100 long-term care residents aged 65 and older per year, by sex and Local Health Integration Network (LHIN), in Ontario, 2009/10



**DATA SOURCE:** Ontario Health Insurance Plan (OHIP); National Ambulatory Care Reporting System (NACRS); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB)

<sup>^</sup> Emergency department visit or hospital admission

**FINDINGS**

- The rate of falls resulting in a hospital visit among long-term care residents aged 65 and older showed some variation across LHINs, with a 1.3-fold variation (12 to 16 falls per 100 person-years) among women and 2.1-fold variation (9 to 19 per 100 person-years) among men.
- The patterns across LHINs remained the same after adjusting for age (data not shown).

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## NEW PRESSURE ULCERS

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older who had a newly occurring pressure ulcer at stage 2 to 4.

**Background:** A pressure ulcer is the breakdown of skin and other tissues due to prolonged pressure or shearing force. Pressure ulcers most commonly occur over bony points of the body including the heels, sacrum, hips, and shoulders. A number of factors can increase a resident's risk for pressure ulcer development, including loss of sensation, incontinence, nutritional deficits, and lack of mobility. Pressure ulcers can be extremely painful and are prone to other complications such as infection. Once a pressure ulcer appears, it can be very difficult to treat and often takes a long time to heal. Because of the time, effort, and cost for healing and the impact on a resident's quality of life, pressure ulcer prevention is an important quality issue. Pressure ulcer prevention includes strategies such as ensuring that the skin stays clean and dry, the use of special pressure-reducing pads for wheelchairs and beds, and frequent re-positioning of residents who are unable to do so independently.<sup>163, 165, 166</sup>

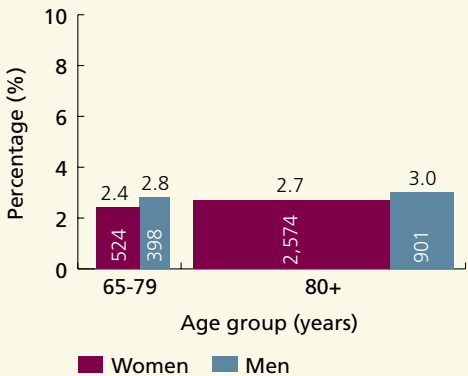
Data from the Continuing Care Reporting System (CCRS) were used to calculate the percentage of long-term care residents aged 65 and older who had a pressure ulcer at stages 2 to 4 on their most recent assessment but did not have a pressure ulcer on their previous assessment. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling, adjusting for Case Mix Index at the facility level and for Personal Severity Index, toilet use, and RUG cognitive impairment at the individual level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 2.7 percent of long-term care residents aged 65 and older had a newly occurring pressure ulcer (stage 2 or higher) (2.6 percent of women and 3.0 percent of men). Given that more women reside in long-term care homes than men, over twice as many women had a newly occurring pressure ulcer than men (3,098 women compared to 1,299 men).

**Exhibit C.21** | Percentage and number of long-term care residents who had a newly occurring pressure ulcer at stage 2 to 4, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- There was little difference in the incidence of new pressure ulcers between those aged 65–79 and those aged 80 and older.
- Although the incidence of pressure ulcers was similar between women and men, the total number of women with a new pressure ulcer was much greater than the total number among men (524 women versus 398 men aged 65–79; 2,574 women versus 901 men aged 80 and older).
- The percentage of long-term care residents aged 65 and older who had a newly occurring pressure ulcer varied somewhat across Local Health Integration Networks (LHINs), ranging from 2.2 to 3.3 percent among women and from 2.5 to 4.1 percent among men (data not shown). The patterns across LHINs remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

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## DAILY PHYSICAL RESTRAINTS

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older in daily physical restraints in the seven days prior to the most recent assessment.

**Background:** A physical restraint is defined as any device that prevents a person's free movement and which she or he cannot easily remove. In the long-term care setting, physical restraints can include lap belts, wrist or ankle restraints, and bedrails. For many years, physical restraints were used in long-term care because it was believed that they helped prevent falls. Ample research has since shown that physical restraints, including bed rails, can actually lead to severe injuries including death.<sup>167, 168</sup> Others have shown that physically restraining residents can lead to worsened behavioural outcomes including increased confusion and agitation. It has now been well-established that long-term care homes with less physical restraint use do not have worse fall or behaviour outcomes than those with more physical restraint use.<sup>163, 169</sup>

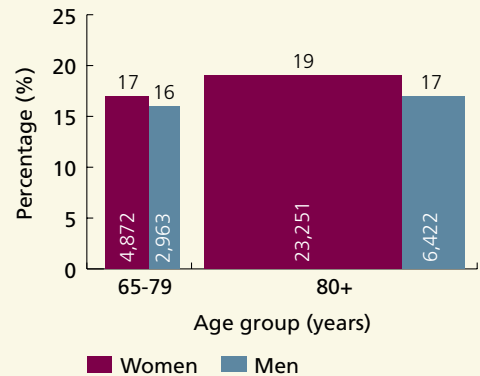
Data from the Continuing Care Reporting System (CCRS) were used to measure this indicator. Physical restraints were defined as trunk restraint, limb restraint or a chair that prevents rising. Residents who were comatose or quadriplegic were excluded. For this indicator, we report crude and risk-adjusted rates. Risk-adjustment accounted for self-performance of activities of daily living (ADLs) (based on the ADL Long Form) at the facility level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 18 percent of long-term care residents aged 65 and older were in daily physical restraints (19 percent of women and 17 percent of men). Given that more women reside in long-term care homes than men, three times as many women were in daily physical restraints compared to men (28,123 women compared to 9,385 men).

**Exhibit C.22** | Percentage and number of long-term care residents aged 65 and older in daily physical restraints, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- There was no difference in the percentage of long-term care residents who experienced daily physical restraints by age group.
- Although there was little difference in the percentage of women and men who were in daily physical restraints, the total number of women in daily physical restraints was much greater than the total number among men (4,872 women versus 2,963 men aged 65–79; 23,251 women versus 6,422 men aged 80 and older).
- There was substantial variation across Local Health Integration Networks (LHINs) in the percentage of residents in daily physical restraints, with a 2.5-fold variation (10 to 25 percent) among women and 2.7-fold variation (9 to 24 percent) among men. The patterns across LHINs remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

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## PREVALENCE OF ANTIPSYCHOTIC USE

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older who received antipsychotic medication without indication for an underlying psychotic condition. This indicator was based on medication use in the seven days prior to their most recent assessment.

**Background:** An important quality issue in long-term care is the widespread use of antipsychotic drugs, which are prescribed primarily to manage the behavioural and psychosocial symptoms of dementia. Use of these drugs in this way should occur only when absolutely necessary. The use of antipsychotics in the absence of clear clinical indication is often considered suboptimal care<sup>170–173</sup> because residents of long-term care homes are particularly vulnerable to adverse events associated with these therapies<sup>174</sup> such as falls, stroke and sudden death. The safety issues associated with antipsychotics continue to be highlighted in research studies.<sup>175–179</sup>

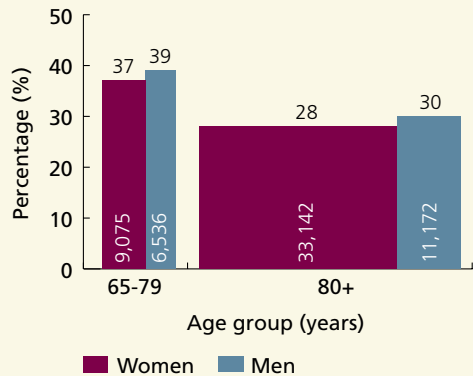
Data from the Continuing Care Reporting System (CCRS) were used to measure this indicator. End-of-life residents and residents with schizophrenia, Huntington's chorea, or hallucinations were excluded from this indicator. This indicator includes antipsychotic medications given to the resident by any route or in any setting. We report crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling, adjusting for Case Mix Index at the facility level and for motor agitation, moderate/impaired decision-making problem, long-term memory problem, Cognitive Performance Scale, and combination Alzheimer's disease or other dementia at the individual level (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 31 percent of long-term care residents aged 65 and older were on antipsychotics without a diagnosis of psychosis. A slightly higher proportion of men were on antipsychotic drugs without a diagnosis of psychosis compared to women (33 percent versus 30 percent, respectively). Given that more women reside in long-term care homes than men, over twice as many women were exposed to antipsychotic drugs compared to men (42,217 women compared to 17,708 men).

**Exhibit C.23** | Percentage and number of long-term care residents aged 65 and older on antipsychotics without a diagnosis of psychosis, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Long-term care residents aged 65–79 were more likely to be on antipsychotics without a diagnosis of psychosis than residents aged 80 and older (38 percent versus 29 percent, respectively) (data not shown).
- Although there was little difference in the percentage of women and men on antipsychotics without a diagnosis of psychosis, the total number of women receiving antipsychotics without a diagnosis of psychosis was much greater than the total number among men (9,075 women versus 6,536 men aged 65–79; 33,142 women versus 11,172 men aged 80 and older).
- The percentage of long-term care residents aged 65 and older who were on antipsychotics without a diagnosis of psychosis varied minimally across Local Health Integration Networks (LHINs), with a 1.3-fold variation among women (25 to 32 percent) and among men (28 to 36 percent). The patterns across LHINs remained the same after adjusting for risk (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

POWER Study

## PREVALENCE OF ANTI-ANXIETY DRUGS OR SEDATIVE/HYPNOTIC USE

**Indicator:** This indicator measures the percentage of long-term care residents aged 65 and older who received anti-anxiety drugs or sedative/hypnotic medication without indication of an underlying psychotic condition. This indicator was based on medication use in the seven days prior to their most recent assessment.

**Background:** Anti-anxiety and hypnotic drugs, such as benzodiazepines, are a class of psychoactive medications that are prescribed in the long-term care setting for anxiety and sleep disorders. Examination of their use is important because they are commonly used and are associated with serious adverse events including risk of falls, patient confusion and dependence.<sup>180–183</sup>

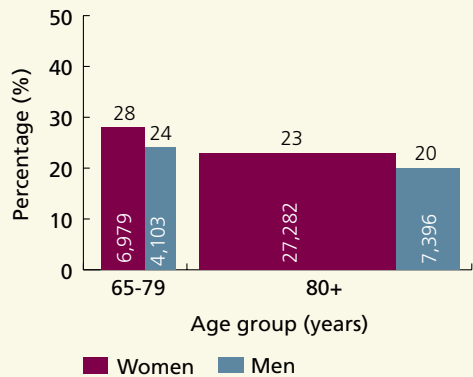
Data from the Continuing Care Reporting System (CCRS) were used to measure this indicator. End-of-life residents and residents with schizophrenia, Huntington's chorea, or hallucinations were excluded from this indicator. This indicator includes medications given to the resident by any route or in any setting. We report crude rates (see [Appendix 2](#) for more detail).

**Finding:** In Ontario in 2009/10, 23 percent of long-term care residents aged 65 and older (with no indication of an underlying psychotic condition) were prescribed an anti-anxiety or hypnotic drug. Women were slightly more likely to be inappropriately prescribed anti-anxiety or hypnotic drugs than men (24 percent versus 21 percent, respectively). Given that more women reside in long-term care homes than men, this translated into three times as many women being prescribed an anti-anxiety or hypnotic drug than men (34,261 women compared to 11,499 men).

**Exhibit C.24** | Percentage and number of long-term care residents aged 65 and older who were prescribed anti-anxiety or hypnotic drugs without indication of an underlying psychotic condition, by sex and age group, in Ontario, 2009/10

**FINDINGS**

- Long-term care residents aged 65–79 were more likely to be prescribed anti-anxiety or hypnotic drugs than residents aged 80 and older (26 percent versus 22 percent, respectively) (data not shown).
- In both age groups, a slightly higher percentage of women were prescribed anti-anxiety or hypnotic drugs (in the absence of indication) compared to men. The total number of women on anti-anxiety or hypnotic drugs was much greater than the total number among men (6,979 women versus 4,103 men aged 65–79; 27,282 women versus 7,396 men aged 80 and older).
- The percentage of long-term care residents aged 65 and older who were prescribed anti-anxiety or hypnotic drugs varied across Local Health Integration Networks (LHINs), with a 1.7-fold variation among women (18 to 31 percent) and among men (16 to 27 percent) (data not shown).



**DATA SOURCE:** Continuing Care Reporting System (CCRS)

**NOTE:** The width of each bar reflects the relative proportion of the long-term care residents (aged 65+) represented by that bar (based on the indicator's denominator; for more detail see ['How to read variable column width graphs'](#) on page 17)

POWER Study

# Section C

## SUMMARY OF FINDINGS

This section reports on indicators relevant to two settings of care for older adults: home care and long-term care. We assessed the use of home care services and unmet home care needs among older adults. We also examined indicators of health outcomes and care among long-stay home care clients and long-term care residents. The number of women receiving home care and living in long-term care homes is far greater than the number of men. While there were sex differences in the health outcomes among long-stay home care clients, these differences were generally eliminated with risk adjustment, indicating that women and men receiving home care differ in health status, but experience similar outcomes when these differences are taken into account. Among residents of long-term care, there were few gender differences on reported quality indicators after risk adjustment. However, in both settings, there were many opportunities to improve care for both women and men.

### Home Care

#### Use of home care services

In Ontario, 16 percent of adults aged 65 and older reported receiving any home care services. Older women were more likely to report receiving home care services than older men (19 percent of older women versus 12 percent of older men)—this represents an estimated 167,227 women and 85,844 men. Women and men in the oldest age group (aged 80 and older) were more than twice as likely to report receiving home care services compared to those aged 65–79. Lower-income older adults were slightly more likely to receive home care services compared to those with higher incomes. While older women were more likely than men to use home care services, there were fewer sex differences in the types of care received. Medical services were mostly

received from government-funded sources, while supportive care services were more often received from non-government-funded sources.

#### Unmet home care needs

In Ontario, 4.8 percent of older adults reported that there was a time in the past year when they needed home care services but did not receive them. Older women were more likely to report an unmet need than older men (6.3 percent versus 3.0 percent, respectively). Adults in the oldest age group (aged 80 and older) and those living in lower-income households were most likely to report unmet home care needs. The top three most reported unmet home care needs were for help with housework, personal care and meal preparation or delivery.

#### New activity of daily living (ADL) impairment or an ADL impairment that failed to improve

Forty-six percent of older long-stay home care clients had a new ADL impairment or an ADL impairment that failed to improve. Although older men were more likely than older women to have new impairment or old impairment that did not improve, this sex difference disappeared after adjusting for risk. However, the total number of women reporting a new ADL impairment or an ADL impairment that failed to improve was more than double the total number among men. This indicator did not vary by age. After adjusting for risk, this indicator did not vary by neighbourhood income, but did vary across Local Health Integration Networks (LHINs)

#### Poorly controlled pain

In Ontario, 22 percent of older long-stay home care clients with pain had inadequate pain control. While older women were more likely than older men to have inadequate pain control, this sex difference disappeared

after adjusting for risk. However, well over three times as many women reported inadequate pain control compared to men. Long-stay home care clients aged 65–79 were more likely to report inadequate pain control compared to clients aged 80 and older. The percentage of home care clients with inadequate pain control did not vary by neighbourhood income but did vary across LHINs.

### **Prevalence of depressed mood**

Among older long-stay home care clients, 8.7 percent had a depressed mood. Prevalence of depressed mood was higher among those aged 65–79 compared to those aged 80 and older (11.2 percent versus 7.6 percent, respectively). Women were more likely than men to have a depressed mood in the younger age group (12.3 percent versus 9.4 percent, respectively), but there were no sex differences in the older age group. However, the total number of women with a depressed mood was approximately two to three times more than the total number among men. Prevalence of depressed mood did not vary by neighbourhood income, but did vary across LHINs.

### **New cognitive impairment or a cognitive impairment that failed to improve**

Over half (54 percent) of long-stay home care clients aged 65 and older had a new cognitive impairment or a cognitive impairment that failed to improve between the previous and most recent assessment. While, older men were more likely than older women to have a new cognitive impairment or one that failed to improve, this sex difference disappeared after adjusting for risk. However, the total number of women experiencing a new cognitive impairment or one that failed to improve was more than double the total number among men. The percentage of older long-stay home care clients with a new cognitive impairment or one that failed to improve was greater in the oldest age group (aged 80 and older). After adjusting for risk, the percentage of home care clients with a new cognitive impairment or one that failed to improve was slightly higher among home care

clients living in lower-income neighborhoods compared to those living in higher-income neighbourhoods and varied across LHINs.

### **Prevalence of injury**

Among long-stay home care clients aged 65 and older, 13 percent had an injury at the time of their last assessment. Before risk adjustment, older women were more likely than older men to have any injuries; however, after adjusting for risk, older men were slightly more likely than older women to have been injured. Given that more women use home care services than men, almost four times as many women had an injury compared to men. The prevalence of injury was slightly higher in the oldest age group (13 percent among those aged 80 and older versus 11 percent of those aged 65–79). This indicator did not vary by neighbourhood income, but did vary across LHINs.

### **Long-Term Care**

#### **Rate of potentially preventable emergency department (ED) visits**

The rate of potentially preventable ED visits among long-term care residents aged 65 and older was 21 per 100 long-term care residents per year. A higher proportion of men had a potentially preventable ED visit compared to women (27 ED visits per 100 men per year versus 19 ED visits per 100 women per year). Given that more women reside in long-term care homes than men, nearly twice as many women had a potentially preventable ED visit than men. There was little difference in the rate of potentially preventable ED visits between age groups, but rates did vary across LHINs.

#### **Worsened self-performance of activities of daily living (ADLs)**

Nearly one-third (32 percent) of long-term care residents aged 65 and older had worsening ADL self-performance. A similar proportion of women and men had worsening ADL self-performance; however, over twice as many

women had worsening ADL self-performance than men. This indicator did not vary by age group, but did vary across LHINs.

### **Prevalence of pain**

Thirteen percent of long-term care residents aged 65 and older experienced pain. Women were more likely than men to have pain (14 percent versus 11 percent, respectively); over three times as many women experienced pain as men. This indicator did not vary by age group, but the prevalence of pain did vary across LHINs.

### **Worsened cognitive ability**

Thirteen percent of long-term care residents aged 65 and older had a decline in their cognitive ability. Although a similar proportion of women and men experienced a decline in cognitive ability, the total number of women whose cognitive ability worsened was more than double the total number among men. The percentage of residents whose cognitive ability worsened did not vary by age group, but did vary across LHINs.

### **Rate of falls resulting in emergency department (ED) visits or inpatient hospitalization**

The rate of falls among long-term care residents aged 65 and older resulting in an ED visit or inpatient hospitalization was 14 falls per 100 long-term care residents per year. This rate did not vary by sex or age group, but did vary across LHINs. Although this rate was similar among women and men, given that more women reside in long-term care homes than men, there were over twice as many falls that resulted in an ED visit or hospitalization among women than among men.

### **New pressure ulcers**

Among long-term care residents aged 65 and older, 2.7 percent had a newly occurring pressure ulcer at stage 2 or higher. This indicator did not vary by sex or age group, but did vary across LHINs. Although the percentage of residents with new pressure ulcers was similar between

women and men, the total number of women with a new pressure ulcer was more than double the total number among men.

### **Daily physical restraints**

Nearly one in five (18 percent) long-term care residents aged 65 and older were in daily physical restraints. Use of daily physical restraints did not vary by sex or age group, but did vary across LHINs. Although a similar percentage of women and men were in daily physical restraints, the total number of women in daily restraints was nearly three times greater than the total number among men.

### **Prevalence of antipsychotic use**

Nearly one-third (31 percent) of long-term care residents aged 65 and older were on antipsychotics without a diagnosis of psychosis. Although a slightly higher proportion of men were on antipsychotic drugs without a diagnosis of psychosis compared to women (33 percent versus 30 percent, respectively), the total number of women exposed to antipsychotic drugs was more than double the total number among men. Younger residents (aged 65–79) were more likely to be on antipsychotics without a diagnosis of psychosis than older residents (38 percent versus 29 percent, respectively). This indicator varied across LHINs.

### **Prevalence of anti-anxiety drugs or sedative/hypnotic use**

Nearly a quarter (23 percent) of long-term care residents aged 65 and older were prescribed an anti-anxiety or hypnotic drug without an indication of an underlying psychotic condition. Women were slightly more likely to be inappropriately prescribed anti-anxiety or hypnotic drugs than men (24 percent versus 21 percent, respectively). However, this translated into three times as many women being prescribed an anti-anxiety or hypnotic drug as men. Younger residents (aged 65–79) were more likely to be prescribed an anti-anxiety or hypnotic drug than older residents (26 percent versus 22 percent, respectively). This indicator varied across LHINs.



# Discussion

In this report we paint a picture of older women's health in Ontario. We examined the differences in health status, quality and outcomes of health care and health system use between women and men with a particular emphasis on those in the oldest age groups.

Where available, we compared older to younger women and evaluated how income and geographic location impact health. Further, this report describes those living in the community, with and without community supports, as well as those residing in long-term care. We contribute critical new information by assessing gender differences in measures of care provided in the home through Community Care Access Centres (CCACs) and in long-term care. These are areas for which data sources are relatively new and we are now able to access valuable information. Little is known about differences between women and men in quality and outcomes of care in home care and long-term care. Furthermore, many major reports on aging have not focused on the unique needs and vulnerabilities of older women. There is enormous opportunity to improve the care of older adults in general, and older women in particular, by better understanding these differences.

We highlight the critical need to consider not only rates but also the total number of women and men who are affected when we are evaluating indicators. This is important because older women make up the majority of the older population, particularly those in the oldest age groups and those residing in long-term care. The total number of people who might experience a health condition or require a particular service is important to know in our planning of health care and services to meet the needs of older adults. In looking at differences

between older women and men, we also identified the needs of older men and gaps in their care that must be addressed.

We identified many opportunities for intervention to prevent chronic conditions and promote active aging. We also identified opportunities to improve outcomes for those with chronic conditions living in the community and in long-term care. While questions arise from this report and further exploration is required to fully understand the factors contributing to the burden of illness and outcomes for care of older women, our report underscores that there is much that we now know and there is much that we can now do.

Given the heterogeneity of the older population, it may not be feasible to establish a single benchmark for some of the clinical indicators examined in this report. From the available data, it is not possible to ascertain whether the trends identified reflect appropriate care decisions that reflect quality of life decision making and in some cases palliative care decisions, or if we are identifying in some cases a systematic age bias in care. Respecting autonomy, self determination, and the right to make decisions to accept or forgo treatments should guide clinical encounters—regardless of the patient's sex or age. Likewise, we do not always know what the optimal performance should be on some of the home care and long-term care indicators.

## KEY FINDINGS

### **Women are disproportionately represented in the older population, and particularly among those who reside in long-term care and have unique needs.**

The majority of older people are women. The percentage of women is particularly high among those who are of advanced age and among those who are living in long-term care. In long-term care in Canada, the average age of residents is about 86 years and close to two-thirds of those living in this setting are women.<sup>8</sup>

Older women have unique health needs. In part, this is based on the fact that older women are more likely than men to have multiple chronic conditions (65 percent versus 58 percent). This difference in prevalence is magnified when we look at the total number of older adults who have multiple chronic conditions. The total number of women aged 80 and older reporting two or more chronic conditions is twice as high as the number of older men. Low socioeconomic status is an important additional risk factor for chronic conditions and is associated with worse outcomes for these conditions. Older women are much more likely to have low incomes than older men. In Ontario, an estimated 288,576 women and 185,806 men aged 65 and older are living in lower-income households.

Cancer is increasingly recognized as a chronic condition and cancer rates increase with age. Some cancers, like breast cancer, are primarily cancers of women. Cancers such as colorectal and lung occur in both men and women and have traditionally been perceived as a more important problem for men. Unfortunately, gender differences in lung cancer incidence have narrowed. This is due in part to the increased uptake of smoking among women. In addition, there is an increased risk of cancer among women who smoke compared to men who smoke. Further, because older women outnumber older men, the number of women who experience these types of

cancer is now close to or greater than the number of men. Accordingly cancer, and in particular those cancers that have not traditionally been associated with older women, are important conditions for older women.

There is greater use of home care services by older women, both in terms of the rate of use and the total number of women using these services. This may reflect the complexity that results from having multiple chronic medical conditions. Having multiple chronic conditions may also predispose women to have functional impairments that can threaten their independence. Further, this need for formal caregiving may relate to older women being more likely to live alone and to have less access to informal caregiving support than men. Older women's increased likelihood of lower socioeconomic status may limit or prohibit hiring private caregiving. Even though more older women report that they used home care services than older men, women are also more likely to report unmet need for these services. This difference was found in terms of the rates and total numbers of people who access these services. This trend was consistent in both the younger (aged 65–79) and older (aged 80 and older) age groups and in the lower- and higher-income groups.

### **Most older adults report health behaviours that increase their risk for developing chronic conditions or lead to worse health outcomes among those with existing conditions.**

An increased focus on prevention, both primary and secondary, is required if we are to improve quality of life for older adults. For those without chronic conditions, it is important to prevent the development of these conditions (primary prevention). For others who already have one or more chronic conditions, the goal should be to prevent these conditions from getting worse (secondary prevention) and to improve quality of life.

Being physically active, having a diet with adequate fruit and vegetable intake, and not smoking are three behaviours that people can adopt to modify, maintain, and improve their health. We found that more than half of all older adults reported being inactive (55 percent). Older women were more likely to be physically inactive than older men (60 percent versus 48 percent). Both women and men reported a diet that was inadequate in fruits and vegetables and nearly one in 10 older adults were smokers. These behavioural risk factors which increase the risk of chronic conditions tend to be more common among lower-income individuals. Older women living in the lowest-income households were more likely to be physically inactive, report having inadequate fruit and vegetable intake or being a current smoker compared to wealthier women. Inadequate physical activity and poor diet lead to being overweight or obese which is far too common among older women and men.

Although there are many changes individuals can make to improve their health, less than half of older adults (45 percent) reported that they took steps to improve their health in the past year. When steps were taken to improve health, the most common change reported was an increase in physical activity (41 percent). Women and men were equally likely to report making such a change. Among both women and men, the proportion who made such a change, decreased with age.

Maintaining good medical health also requires optimizing oral health. Good oral health is a prerequisite for good nutrition and poor oral health is associated with an increased risk of a number of chronic conditions. Close to half of older adults (45 percent) did not visit a dentist in the past 12 months. This percentage rose in the older age group to more than half (55 percent of women and 54 percent of men aged 80 and older). This is particularly important because dental services are not funded within our health care system. Accordingly, access can be related to socioeconomic status.

### **Older women were more likely than men to report disability and chronic pain.**

Older women were more likely to have limitations in their instrumental activities of daily living (IADLs) or in their activities of daily living (ADLs) relative to older men. The percentage of adults with functional limitations increased steadily with age. Among those aged 80 and older, nearly two-thirds of women and one-half of men reported IADL and/or ADL limitations. Given that women are disproportionately represented in the older population, this translates into nearly twice as many older women with an IADL and/or ADL limitation as older men (370,123 women versus 189,233 men). Functional status is closely connected to chronic medical conditions and ultimately to the ability to live an independent life. Through prevention and effective chronic disease management, we may prolong the time that older women and men can live in an independent manner if they wish to remain in their homes. Maintaining functional independence is particularly important for older women who may be living alone. Loss of functional independence combined with less access to financial resources may mean that they may require an earlier move to long-term care.

Women were more likely to have their activities limited by pain than men (26 percent of women and 18 percent of men). Low-income women, women aged 80 and older, and those with chronic conditions were even more likely to report that their activities were limited by pain than their counterparts. More than one in three low-income women reported that their activities were limited by pain. In addition, more than one in three women who reported having a musculoskeletal condition also reported that their activities were limited by pain. This is consistent with other reports that suggest women are more likely than men to experience painful conditions such as arthritis and are less likely to receive adequate pain control. Restrictions in functioning due to pain are important to identify because pain can be managed and functioning restored.

In home and long-term care settings, many people experience a decline in IADLs/ADLs or cognitive functioning that could be potentially prevented or slowed. Maintaining this function and good cognitive status is important to quality of life at all life stages. Thus, a focus on function and cognitive status is needed in all care settings.

**Much of the observed disability among older adults is due to chronic conditions.**

Where possible, we need to screen for chronic conditions and their risk factors so that preventive strategies can be initiated and these chronic conditions can be better managed. Diagnosis and treatment for selected conditions decreased with increasing age for both women and men. Rates of coronary angiography referral after an AMI were lower in women than men. Bone mineral density testing rates were lower in men (among older adults who had a low-trauma fracture, 21 percent of women versus 16 percent of men received a BMD test within one year of their fracture). Medical oncology referral rates were similar in women and men in both age groups.

There is opportunity to improve chronic disease management through patient-centred interdisciplinary models of care and thus improve health and functional status, leading to improved quality of life. By identifying and treating conditions like osteoporosis, we can hopefully prevent fractures and some of the decline that is associated with these conditions.

**There were high rates of potentially avoidable hospital admissions for common chronic conditions (heart failure, chronic obstructive pulmonary disease, diabetes) among older women and men. These rates increased with age and were highest among those aged 80 and older.**

We documented high rates of admission for ambulatory care sensitive conditions that increased with age, with higher rates in men compared to women in both age groups. Nevertheless, given the predominance of women

in the older age groups, a similar number of women and men were hospitalized for these conditions. This situation may relate to a current system of care where management of chronic conditions in ambulatory settings may be suboptimal. Care coordination is a big concern in the current health system and fragmentation between different providers and different settings can result in poor patient outcomes. The high hospitalization rates suggest that current practices may not be effective. Optimal care for chronic conditions often benefits from the input of inter-professional teams with formal mechanisms for communication and care coordination. Opportunities to work across disciplines and across the primary care, home care, acute care, and long-term care sectors may lead to improved outcomes for older people and fewer hospitalizations for conditions that should be preventable.

**Among those receiving home care, there are opportunities to improve care for both women and men.**

An important goal of home care is to optimize independence and to decrease the rate of both physical and cognitive decline. Using the crude estimates, women were more likely than men to experience inadequate pain control (23 percent of women versus 19 percent of men), depressed mood (9.0 percent of women and 7.9 percent of men) and injuries (14 percent of women and 9 percent of men); while men were more likely than women to experience a new ADL impairment or one that failed to improve (43 percent of women versus 53 percent of men) or cognitive decline (51 percent of women versus 61 percent of men). These differences were eliminated with risk adjustment, indicating that women and men receiving home care differ in health status, but experience similar outcomes when these differences are taken into account. Therefore, gender-sensitive interventions may be needed to improve health outcomes in this setting. In all cases, the number of women who experienced these outcomes was far greater than the number of men, especially among those aged 80 and older.

**Among residents of long-term care, there were few gender differences on reported quality indicators after risk-adjustment.**

However, there were many opportunities to improve care for both women and men. The fact that the number of women in long-term care homes is far greater than the number of men makes these issues of particular concern for older women.

Emergency department transfers from long-term care were common. The rate of potentially preventable emergency department visits was higher for men relative to women (27 visits per 100 men versus 19 visits per 100 women). However, given that more women than men reside in long-term care, nearly twice as many women had a potentially preventable emergency department visit (8,863 women compared to 4,767 men). Improved chronic disease management in long-term care could help prevent some of these emergency department visits. Rates of transfer to the emergency department or hospitalization for falls was similar between women and men (14 falls per 100 women and 13 falls per 100 men) but the number of hospital visits among women was more than double the number of visits among men (6,498 visits among women compared to 2,254 visits among men).

Antipsychotic drugs were prescribed to almost a third of residents aged 65 and older without a diagnosis of psychosis (33 percent of men versus 30 percent of women). Given that more women reside in long-term care, more than twice as many women were exposed to antipsychotic drugs without a diagnosis of psychosis. (42,217 women compared to 17,708 men). This is somewhat surprising given that anecdotal reports suggest that men are more likely to receive antipsychotics because of perceptions about their greater tendency to exhibit aggressive or disruptive behaviours. Anti-anxiety or hypnotic drugs were prescribed to almost a quarter of

residents with no indication of underlying psychotic condition. Women were slightly more likely to be prescribed one of these medications than men (24 percent of women versus 21 percent of men). Given the predominance of older women in long-term care, this translates into three times as many women as men receiving these medications (34,261 women compared to 11,499 men).

In Ontario, nearly one in five long-term care residents were in daily physical restraints. This represents a major opportunity for intervention for older women and men. Physical restraints have been linked to a number of serious problems including an increased risk of falls, behavioural problems, and even death. The fact that these rates continue to be so high in Ontario is cause for concern and points to the need for improved strategies to minimize (and hopefully eliminate) their use in long-term care.

Gender similarities were also observed for rates of ADL decline over a three-month period (32 percent of women versus 33 percent of men) and rates of cognitive decline (13 percent of women and 14 percent of men). Again, given the demographics, this represents far more women than men. While optimal rates of performance on these indicators are not known, a major goal of long-term care is to improve or prevent decline in physical and mental functioning when possible.

**We need to prepare the diverse health care workforce to meet the needs of the aging population.**

Many different health care professionals are needed to provide effective care to older adults including, geriatricians, primary and specialty physicians, nurses, physical therapists, social workers, and personal care workers. Many health care providers have little training in the care of older adults. Overall, there were only five geriatricians per 100,000 adults aged 65 and older in Ontario. This rate varied markedly across Local Health



Integration Networks (LHINs), with some LHINs having only one geriatrician per 100,000 older adults. These numbers provide a stark picture of the lack of geriatric specialty care in the province of Ontario. This is one marker of the lack of attention that has been given to the area of aging. New models of interdisciplinary care will need to be developed and implemented that can work to maximize this valuable, but limited, resource. These

include shared care models where geriatricians work in family health teams and with teams in the community, as well as telemedicine to provide access to consultations and specialty care. Further specialized training for family physicians, nurses, pharmacists, and other health care workers should be provided in the care of older people to improve the skills across disciplines.



## LIMITATIONS

This study highlights selected health challenges for older Ontario women. In constructing this report, we drew on existing data sources. We discuss known limitations with this approach and also identify areas where improved data are needed.

This study was conducted using secondary data sources that include administrative, disease registry, and survey data. These data were collected for other purposes, but provide insight into the workings of the health system due to their population-based coverage. While these data are broad, they are generally not “deep”.<sup>184</sup> Specifically, these data lack clinical details about why some individuals received certain treatment patterns and others did not. This is especially relevant to the older population, where guidelines are considered, but multiple other factors influence appropriate decision making including multi-morbidity, life expectancy, and quality of life. Most of the indicators reported here were drawn from prior POWER reports and more detail on their specific limitations can be found in these reports.

Home care services and long-term care homes are two of several fundamental supports for older women. They are particularly important because older women use more home care and long-term care resources than older men. Older women comprise the majority of residents in long-term care.<sup>8</sup> We used survey data to report use of home care services and administrative data to report ED visit among long-term care residents. All other indicators reported in the section examining settings of care for older adults were developed by interRAI<sup>18, 19, 185</sup> and, in Ontario, are regularly reported by Health Quality Ontario (HQO). In our analyses, we extend the findings from HQO reports by incorporating a gender and equity analysis. While the Resident Assessment Instrument (RAI) data are an exciting new provincial resource, there are some limitations. The home care indicators only cover long-stay clients of

CCAC-provided services. This means that there are no data on short-stay clients, such as those who receive services for post-acute care or rehabilitative reasons. As well, it also means that we completely lack data on services received outside of the CCAC system—these data do not cover any services that are paid for out-of-pocket.

Survey data, such as the Canadian Community Health Survey (CCHS), were also used in this report and survey data can present their own challenges. For example, CCHS data are based on self-report. While these are widely used for reporting the prevalence of health conditions in Canada and considered to be well-validated, they are subject to reporting error and bias. Some indicators are more subject to measurement error than others. For example, the overweight and obesity indicator is subject to measurement error as people may over- or under-report their height and weight. Measures of service use may be particularly prone to error in reporting as some participants may be unaware of who was providing the service (e.g., was a home care visit provided by the province or was it paid for out-of-pocket by a family member) or whether tests were done within the specified timeframe. In other circumstances, important questions may not be asked. The measure of disability we used was the proportion of the population who needed the assistance of another person to carry out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs). This does not assess the degree to which this assistance is received, so we cannot assess unmet need for this supportive care.

For both administrative and survey data, another limitation is the timeliness of the data on which the study estimates are based. It often takes time to collect and prepare data for research purposes and this can introduce a time lag for reporting purposes.



## WHAT CAN'T BE MEASURED

We have identified important areas which we would have liked to examine, but could not, because province-wide, population-based data do not exist or are limited. In particular, dementia is known to pose a heavier burden on older women both as they develop the dementia themselves and as they serve as primary caregivers for a spouse with dementia.<sup>186, 187</sup> Currently, work is needed to develop measures of dementia care that can be assessed using secondary data sources. In the future, richer clinical data from electronic health records may provide a richer source of data to assess dementia care and other common conditions in the geriatric population. Furthermore, most indicators reported assess single diseases and/or single care settings and do not reflect the complexity of older adults who move through the health system with multiple comorbidities. More work is needed to develop datasets and indicators that capture and allow us to assess this complexity. Mental health is an important area to examine in the context of older women but we had limited information available on this topic. As the population ages, reliable data on who is providing care to older women (and their spouses) is pivotal as often family members, or the older women themselves, shoulder much of the burden. We did not examine the health or well-being of caregivers in the current report but this is another

important area of research. We have not included ethnicity in our analyses because the sample size of older women from different ethnic groups was insufficient in the survey data and ethnicity is not currently captured in administrative data. This is a critical area of study for Ontario as we now live in a multicultural environment and the older population is increasingly diverse.

In addition, care for an aging population will require an increased focus on hospice and palliative care services as well as a shift from a curative, medical model to one that incorporates end-of-life planning and symptom control. We do not include indicators of end-of-life care in our report because population-based data are limited. This is a critical gap because routine conversations in health care settings are recommended to discuss and plan for living with illness and preparing for the end of life. Important issues to discuss include: when to consider not living independently, when to consider not driving, and end of life decision-making. Health care professionals should engage in these conversations with patients in order to develop goals and priorities for care. Ideally, these conversations should occur routinely in primary care. Improved data that capture these issues and indicators that assess the quality of these dimensions of care require further development.

## KEY MESSAGES

In this report we paint a picture of the health needs of older women and men, their use of health services, and the quality of care received and how this varies by age, socioeconomic status and where one lives. Older women and men experience a high burden of illness, may receive suboptimal care for chronic conditions, and receive care from multiple settings including home and long-term care. Older women comprise the majority of the older population and have unique needs. Thus, improving the care of older adults, and reducing their burden of illness will require special attention to the needs of older women. We identified a number of opportunities for improvement. The seven strategies below can help us accelerate progress.

### **Design health care delivery systems that account for the different health and social needs of older women and men, as well as their different overall numbers in the population.**

- Older women and men have different health, support, and social needs. Those differences need to be considered in care planning and policy development. This applies in the community and long-term care settings.
- Routine reporting of sex-disaggregated rates and total numbers would provide key information to form the basis for planning for the older population that has a different sex distribution than younger age groups. Both the rates and total numbers need to be reported when describing the health needs of older women and men. Even when the rates are similar between women and men, the predominance of older women means that more women overall may be affected in the population. The net result is that, in almost all cases, there are a greater number of women than men who require specific clinical care and health services.

### **Effective prevention and health promotion strategies to optimize health outcomes among older women need to be implemented as it is better to prevent than treat chronic conditions.**

- Prevention should begin when people are young and continue across the life course to improve population health and reduce the burden of chronic disease. A focus on prevention includes lifestyle changes such as increased physical activity, optimal nutritional intake, and smoking cessation—all of which can help older adults maintain their independence by preventing or slowing functional decline and preventing chronic conditions and their complications. Physical inactivity is more common in older women than in older men. Programs to promote physical activity need to develop activities that target the particular needs of older women.
- The value of both community-based and clinical approaches to prevention in different care settings has been well-documented. Coordination of both approaches is most likely to result in measurable changes in the health of older adults.

### **We need to address socioeconomic status as a barrier to good health across the life course and among older adults.**

- The social determinants of health result in an increased burden of illness by increasing the risk of developing chronic conditions, worsening health and functional status, and creating barriers to healthy lifestyles. Therefore, we need to foster healthy living and working conditions, educational opportunities and specifically address barriers low-income individuals face in making healthy lifestyle changes. Understanding and embracing the contribution of the broader determinants of health is an important foundational concept in providing care and services.

- Access to preventive dental care is important for maintaining health and nutrition. Dental care is an example of a service that is not universally accessible in our existing health care system. Those without private insurance or those with lower socioeconomic status may not be able to afford this service. Poor dentition may impact health and lead to reduced quality of life.

**A focus on improving quality of life and maintaining independence is a priority for older women and men.**

- Strategies are needed that focus on improving quality of life and functional status as disability and frailty are not the inevitable consequences of aging. For those with chronic conditions, common goals are to control symptoms, optimize functioning, and prevent decline. Evaluating health services for older people and determining the value of services should include an assessment of quality of life, functional outcomes, and patient/family satisfaction.
- Integrating population-based and clinical approaches can help reduce the risk of chronic disease and disability and optimize quality of life.

**Develop new integrated clinical care models to address the complex needs and heterogeneity of older adults.**

- We need to rethink our current models of clinical care so that we can better provide care to older women and men who have multiple chronic conditions and functional limitations. Goal setting and care planning should be driven from the perspective of the patient and their individualized priorities. For older adults with longstanding chronic conditions, cure is often not possible and therefore not always the goal.

- Clinical judgement—guided by experience and knowledge of age-related physiological change and the complex interaction of multiple diseases and medications—should temper the routine application of practice guidelines. Strategies need to be developed to support older adults in their decision making. The appropriate application of available treatments should incorporate many decision-making variables including available evidence for efficacy and safety in the context of factors specific to the individual patient and patient preference. Every person, regardless of age or sex, has the right to be treated as an autonomous individual with his or her own unique values, health concepts, and ways of making decisions.
- Age should not be a barrier to good care. Negative attitudes toward seniors in our society and health care system may be overt or subtle. Unrecognized clinician bias may result in a nihilistic perspective that denies the older patient potentially valuable therapy. When clinical circumstances are suitable, medical therapies and interventions of proven efficacy should not be denied on the basis of biologic age alone.
- Managing multiple coexisting chronic conditions demands innovative approaches to care that traditional models of care delivery were not designed to provide. Shared care models and integrated care teams that cross sector and organizational boundaries have been shown to improve health outcomes for seniors and achieve efficiencies in health service utilization. Inter-professional teamwork, as outlined in the Health Force Ontario, Inter-professional Care: Blueprint for Action,<sup>9</sup> is the care delivery method of choice in caring for frail seniors.<sup>10</sup>
- Strategies are required to reduce unnecessary emergency department visits through integration and coordination of services. Where possible, preventive measures should

be instituted to manage conditions in the community or the long-term care setting before they become serious enough to require care in the emergency department or an acute care hospital. Health care resources need to target people in the ambulatory setting. Innovative models of care that are accessible to older women and men are required. Opportunities exist for the development of innovative models of care such as the Virtual Ward designed specifically to support vulnerable older adults.

**Increase the number of health care providers specialized in geriatric care and improve the competencies of all health care providers who work with older adults.**

- We have very few geriatric medicine specialists or other health professionals skilled in taking care of the geriatric population in Ontario and in Canada. The health care needs of seniors are often complex and require the services of inter-professional care teams, but specialized geriatric health human resources in Ontario are in scarce supply. The aging demography of Ontario's population will require both an increase in the number of geriatric medicine specialists and care providers across the province, as well as enhanced skills and knowledge distributed across all health disciplines in order to provide quality care to older people.
- Older people require the service of all facets of our health care system. Core competencies in recognizing and managing geriatric syndromes and diseases in older people must be distributed across health care professions and across the system's continuum. Although models of specialized care are shown to be advantageous when

caring for older people, it is not realistic—or necessarily desirable—for care of older people to be sequestered to special units or teams of care providers. Care providers across the system must share the responsibility of caring for older adults.

**Build the evidence-base to optimize care for older adults and enhance data capacity and reporting to guide improvement.**

- Clinical trials often have not included women, those of advanced age, or those who have multiple medical conditions or disabilities. Often clinical guidelines do not provide information on how to best care for older adults who have multiple chronic conditions. Guidelines on when to stop preventive medications such as cholesterol lowering drugs are not available. There is a need to prioritize research on the effectiveness of clinical management as well as models of care to improve care for older adults.
- Quality indicators, when reported, should be stratified by sex and age. Numbers of individuals affected as well as rates should also be routinely reported to capture need. There is a need for indicator development to reflect the complexity of care for older adults, and enhanced data capacity to better measure important domains of health and health care. Collection of patient reported outcomes can provide information on quality of life, functional status, and experiences with care. More detailed clinical data—as can be derived from electronic health records—can allow better assessment of appropriate care. Administrative data can be used to evaluate outcomes of drug treatment. Data on ethnicity would allow assessment of quality and outcomes of care among diverse populations.

# Appendix 1

## INDICATORS AND THEIR SOURCES

### APPENDIX 1 | New Indicators

Indicator	Indicator source	Data source
<b>Section A—Burden of Illness</b>		
Changes to improve health	<ul style="list-style-type: none"> <li>Bierman et al. POWER Study Cardiovascular Disease, chapter 6, 2009.<sup>188</sup></li> </ul>	Canadian Community Health Survey, 2007-08
<b>Section B—Chronic Disease Management</b>		
Number of geriatricians	<ul style="list-style-type: none"> <li>Patterson C et al. Geriatric medicine in Ontario: manpower predictions based on a delphi consensus survey. Ann Roy Coll Physic, 1992<sup>82</sup></li> </ul>	Ontario Physician Human Resources Data Centre, Active Physician Registry December 31, 2009; Ministry of Finance Population Estimates by LHIN, 2001-2009 Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario data extracted December 20, 2010
<b>Section C—Settings of Care for Older Adults</b>		
Use of home care services	<ul style="list-style-type: none"> <li>Rotermann M. Seniors' health care use. Health Rep, 2005<sup>189</sup></li> </ul>	Canadian Community Health Survey, 2007-08
Unmet home care needs	<ul style="list-style-type: none"> <li>Bronskill et al. Aging in Ontario: an ICES chartbook of health service use by older adults, 2010<sup>5</sup></li> </ul>	Canadian Community Health Survey, 2007-08
New ADL (Activity of Daily Living) impairment and/or ADL impairment that failed to improve among long-stay home care clients	<ul style="list-style-type: none"> <li>interRAI Home Care Quality Indicators (HCQIs) for MDS-HC Version 2.0, 2001<sup>190</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Home Care Reporting System
Poorly controlled pain among long-stay home care clients	<ul style="list-style-type: none"> <li>interRAI Home Care Quality Indicators (HCQIs) for MDS-HC Version 2.0, 2001<sup>190</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Home Care Reporting System

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## APPENDIX 1 | New Indicators

Indicator	Indicator source	Data source
<b>Section C—Settings of Care for Older Adults (continued)</b>		
Prevalence of depressed mood among long-stay home care clients	<ul style="list-style-type: none"> <li>interRAI Home Care Quality Indicators (HCQIs) for MDS-HC Version 2.0, 2001<sup>190</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Home Care Reporting System
New cognitive impairment or a cognitive impairment that failed to improve among long-stay home care clients	<ul style="list-style-type: none"> <li>interRAI Home Care Quality Indicators (HCQIs) for MDS-HC Version 2.0, 2001<sup>190</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Home Care Reporting System
Prevalence of injury among long-stay home care clients	<ul style="list-style-type: none"> <li>interRAI Home Care Quality Indicators (HCQIs) for MDS-HC Version 2.0, 2001<sup>190</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Home Care Reporting System
Rate of potentially preventable emergency department (ED) visits among long-term care residents	<ul style="list-style-type: none"> <li>Gruneir A et al. Frequency and pattern of emergency department visits by long-term care residents—a population-based study. J Am Geriatr Soc, 2010<sup>192</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Ontario Health Insurance Plan; National Ambulatory Care Reporting System; Canadian Institute for Health Information Discharge Abstract Database; Registered Persons Database
Worsened self-performance of ADLs (Activities of Daily Living) among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System

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**APPENDIX 1 | New Indicators**

Indicator	Indicator source	Data source
<b>Section C—Settings of Care for Older Adults (continued)</b>		
Prevalence of pain among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> </ul>	Continuing Care Reporting System
Worsened cognitive ability among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System
Rate of falls resulting in hospital visits among long-term care residents	<ul style="list-style-type: none"> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Ontario Health Insurance Plan (OHIP); National Ambulatory Care Reporting System; Canadian Institute for Health Information Discharge Abstract Database; Registered Persons Database
New pressure ulcers among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System
Daily physical restraints among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System

POWER Study



## APPENDIX 1 | New Indicators

Indicator	Indicator source	Data source
<b>Section C—Settings of Care for Older Adults (continued)</b>		
Prevalence of antipsychotic use among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011. Supplement: 2010 Quality Indicators<sup>193</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System
Prevalence of anti-anxiety drugs or sedative/hypnotic use among long-term care residents	<ul style="list-style-type: none"> <li>Canadian Institute for Health Information. Continuing Care Reporting System RAI-MDS 2.0 Output Specifications, 2010-2011<sup>194</sup></li> <li>Health Quality Ontario. Quality monitor: 2011 report on Ontario's health system<sup>191</sup></li> </ul>	Continuing Care Reporting System

POWER Study

## APPENDIX 1 | Indicators Reported in Previous POWER Study Chapters

Indicator	POWER Study chapter that the indicator was previously reported in:
<b>Section A—Burden of Illness</b>	
Prevalence of selected chronic conditions (hypertension, arthritis, heart disease or stroke, diabetes, urinary incontinence)	<a href="#">Burden of Illness, chapter 3</a>
Prevalence of comorbidity (multiple chronic conditions)	<a href="#">Burden of Illness, chapter 3</a>
Incidence of certain types of cancer (colorectal, lung, breast, ovarian, uterine, cervical)	<a href="#">Cancer, chapter 4</a>
Lower annual household income	<a href="#">Burden of Illness, chapter 3</a>
Health behaviours that increase the risk of chronic disease (physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, smoking)	<a href="#">Burden of Illness, chapter 3</a>
Self-rated health status	<a href="#">Burden of Illness, chapter 3</a>

POWER Study

**APPENDIX 1 | Indicators Reported in Previous POWER Study Chapters**

Indicator	POWER Study chapter that the indicator was previously reported in:
<b>Section A—Burden of Illness (continued)</b>	
Functional status <ul style="list-style-type: none"> <li>• Activity limitations</li> <li>• Activities prevented by pain or discomfort</li> <li>• Limitations in instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs)</li> </ul>	<a href="#">Burden of Illness, chapter 3</a>
Did not visit a dentist in the past year	<a href="#">Access to Health Care Services, chapter 7</a>
<b>Section B—Chronic Disease Management</b>	
Physician care following a hospitalization for depression, acute myocardial infarction or heart failure	<a href="#">Depression, chapter 5</a> <a href="#">Cardiovascular Disease, chapter 6</a>
Type of physician providing in-hospital care for acute myocardial infarction and heart failure	<a href="#">Cardiovascular Disease, chapter 6</a>
Angiography for acute myocardial infarction	<a href="#">Cardiovascular Disease, chapter 6</a>
Bone mineral density testing following low-trauma fracture	<a href="#">Musculoskeletal Conditions, chapter 8</a>
Hospital visits following a hospitalization for depression	<a href="#">Depression, chapter 5</a>
Hospital admission rates for ambulatory cares sensitive conditions	<a href="#">Access to Health Care Services, chapter 7</a>
Hospital visits for hyperglycemia or hypoglycemia among people with diabetes	<a href="#">Diabetes, chapter 9</a>
Emergency department visits following a hospitalization for heart failure	<a href="#">Cardiovascular Disease, chapter 6</a>
Readmission rates among heart failure and stroke patients	<a href="#">Cardiovascular Disease, chapter 6</a>
One-year mortality among heart failure, stroke and hip fracture patients	<a href="#">Cardiovascular Disease, chapter 6</a> <a href="#">Musculoskeletal Conditions, chapter 8</a>
Hospitalization rate due to fall-related injury	<a href="#">Burden of Illness, chapter 3</a>
Low-trauma fracture rate	<a href="#">Musculoskeletal Conditions, chapter 8</a>

# Appendix 2

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

The indicators reported by the POWER Study were the result of a rigorous selection process, which included an extensive literature review of peer-reviewed and grey literature (see [chapter 1, Introduction to the POWER Study](#)).<sup>195</sup> The review of literature identified indicators that were reviewed by the chapter working groups using defined indicator selection criteria (see [the POWER Study Framework, chapter 2](#)).<sup>196</sup> Final lists of potential indicators were prepared for review by Technical Expert Panels (TEPs). Indicators were then selected through a modified Delphi process by the TEPs using a two step process—first through an online questionnaire and then at a face-to-face meeting.<sup>197</sup>

This report focuses specifically on Older Women's Health. The working group for this report reviewed previous POWER Study chapters and selected indicators relevant to older women's health from across prior chapters. These indicators were re-examined and synthesized in order to paint a picture of the health of older adults in Ontario and the care that is currently being provided to them. The working group identified two settings of care important to older adults—home care and long-term care—that had not been a focus of prior POWER Study chapters. Health Quality Ontario (HQP) regularly reports validated indicators of home care and long-term care; however, they do not stratify these indicators by sex or income. The working group selected a subset of these indicators to examine in this report, building on HQO reports by incorporating a gender and equity analysis (see [the POWER Study Framework, chapter 2](#)).

All the indicators were reported at the provincial level and at the Local Health Integration Network (LHIN) level when sample size allowed. At the provincial level, these indicators were first stratified by sex, and then further stratified by age and income, as allowed by sample size

and data availability. At the LHIN level, indicators were stratified by sex and then by income, as allowed by sample size and data availability. Age- or risk-adjustment was done where appropriate. In addition to rates, we also report the numerators for each indicator, in order to show the total number of affected women and men.

This appendix provides information on newly reported indicators. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter ([Appendix 1](#) of this Report lists the original POWER chapter in which indicators were reported).

### 2. Datasets—Survey

#### Canadian Community Health Survey (CCHS)

The CCHS is a nationally representative, cross-sectional survey of the Canadian community-dwelling population conducted every two years by Statistics Canada. The CCHS is offered in English and in French. To remove language as a barrier to conducting interviews, each of the Statistics Canada Regional Offices recruits interviewers with a wide range of language competencies. When necessary, cases are transferred to an interviewer with the language competency needed to complete an interview. In addition, the survey questions are translated into the following languages: Chinese, Punjabi and Inuktitut. Chinese and Punjabi were the most common language barriers identified by the regional offices. The Inuktitut translation was used to facilitate collection in Nunavut. The survey is conducted via face-to-face interviews and covers material that alternates between a general overview of the health of Canadians (the x.1 cycle surveys) and more in-depth issues (the x.2 cycle surveys). In 2007, major changes were made to the CCHS design. Data are

now collected on an ongoing basis with annual releases rather than every two years, as was the case prior to 2007. As such, as of 2007, the naming convention changed to reflect the year of the survey rather than the cycle. Residents living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces and residents of certain remote regions are excluded from the survey. The Ontario share files for the survey were used for all analyses.

For the overall population and for women and men we assessed the relationship between the indicators reported in this chapter and income, age, and LHIN, where sample size allows. Indicators based on CCHS data were stratified by annual household income, a variable derived by Statistics Canada that accounts for total household income and household size (see Table 1 for more detail regarding variable categories). The studentized range test was used to assess the significance of differences in the rates. The standard errors and 95 percent confidence intervals were calculated using 500 bootstrap weights provided by Statistics Canada.

Statistics Canada rules were followed in the reporting of estimates using the Ontario share file as follows:

- Estimates should not be reported if the unweighted sample is less than 10 (or less than 30 for data from CCHS 2000/01 (Cycle 1.1))
  - Estimates are adequate and can be reported if the coefficient of variation is 16.5 or less
  - Estimates should be reported with caution if the coefficient of variation is between 16.6 and 33.3
  - Estimates should be suppressed if the coefficient of variation is greater than 33.3
- The results based on CCHS data should be interpreted with the following limitations in mind:
- The survey relies on self-report and voluntary participation of randomly selected participants, and thus the data reflect individuals' interpretation of questions and how they perceive their own health. Hence, results may be an under- or over-estimation of the prevalence of some conditions.
  - The CCHS does not survey Aboriginal people living on reserves, institutionalized individuals, people in the armed forces, or people with certain language restrictions (i.e., do not speak one of the languages that the survey was translated to). While the findings pertain to a large proportion of Ontarians (those living in households), they may be biased if the group not surveyed have significantly different need or utilization rates.
  - The CCHS survey sampling strategy is based on health regions and thus may not be fully representative of the LHINs and in some cases there is inadequate sample size for some measures for some LHINs. This prevents comparative analysis at the LHIN level for some indicators.

**Table 1. Stratifying variables for CCHS indicators**

<b>Sex</b>
Female
Male
<b>Age (years)</b>
65–79
80+

Household income	
4-level variable	
Lowest income	< \$15,000 if 1 or 2 people < \$20,000 if 3 or 4 people < \$30,000 if 5+ people
Lower middle income	\$15,000 to \$29,999 if 1 or 2 people \$20,000 to \$39,999 if 3 or 4 people \$30,000 to \$59,999 if 5+ people
Upper middle income	\$30,000 to \$59,999 if 1 or 2 people \$40,000 to \$79,999 if 3 or 4 people \$60,000 to \$79,999 if 5+ people
Highest income	≥ \$60,000 if 1 or 2 people ≥ \$80,000 if 3+ people
Household income	
2-level variable	
Lower income (Lowest / Lower Middle)	< \$30,000 if 1 or 2 people < \$40,000 if 3 or 4 people < \$60,000 if 5+ people
Higher income (Upper Middle / Highest)	≥ \$30,000 if 1 or 2 people ≥ \$40,000 if 3 or 4 people ≥ \$60,000 if 5+ people

2B. Datasets—Administrative Data

Ontario Health Insurance Plan (OHIP)

The OHIP claims database covers all reimbursement claims to the Ontario Ministry of Health and Long-Term Care (MOHLTC), made by fee-for-service physicians, community-based laboratories and radiology facilities. The OHIP database at ICES contains encrypted patient and physician identifiers, code for service provided, date of service and the associated diagnosis and fee paid. Services which are missing from the OHIP claims data include some lab services, services received in provincial psychiatric hospitals, services provided by health service organizations and other alternate funding plans, diagnostic procedures performed on an inpatient basis, or lab

services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through Alternate Fee Plans (AFPs). Their concentration in certain specialties or geographic areas could distort an analysis.

Canadian Institute of Health Information  
Discharge Abstract Database (CIHI-DAD)

The CIHI-DAD contains information abstracted from hospital records. It includes patient-level data for acute and chronic care hospitals, rehabilitation hospitals and day surgery clinics in Ontario. The main data elements of the CIHI-DAD at ICES are encrypted patient identifier, patient demographics (age, sex, geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay).

### **National Ambulatory Care Reporting System (NACRS)**

NACRS is a data collection tool used to capture patient and clinical information on patient visits to hospital and community based ambulatory care: day surgery, outpatient clinics and emergency departments. Client visit data are collected at the time of service in participating facilities, but data collection methods may vary by facility.

### **Registered Persons Database (RPDB)**

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex, address, date of death (where applicable) and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address is removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data from the RPDB are enhanced with available information through other administrative data sources at ICES; however the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality.<sup>198</sup> To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada.

### **Ontario Physician Human Resources Data Centre, Active Physician Registry**

The Ontario Physician Human Resources Data Centre (OPHRDC) is the definitive source for information on physicians and postgraduate medical trainees in Ontario. OPHRDC has maintained a registry of all licensed physicians practicing in Ontario, the Active Physician Registry. From this registry the Centre produces numerous reports and analyses, including an annual

report, Physicians in Ontario (PIO) and special reports based on the annual PIO dataset. This information above was obtained and adapted from the OPHRDC website.<sup>199</sup>

### **IntelliHEALTH**

IntelliHEALTH is a knowledge repository that contains clinical and administrative data collected from various sectors of the Ontario healthcare system. IntelliHEALTH enables the user to create queries and run reports through easy web-based access to high quality, well organized, integrated data. Some of the kinds of data that can be accessed through IntelliHEALTH include data related to hospital services, community care, medical services, vital statistics and population data. Reports created from this data are used to inform operational planning and decision making processes. Clients of IntelliHEALTH include MOHLTC staff, LHINs, health service providers and community agencies responsible for analyzing, evaluating and/or planning the delivery of healthcare services in Ontario.

### **Continuing Care Reporting System (CCRS)**

The Continuing Care Reporting System (CCRS) was created to be a resource for standardized clinical and administrative information on continuing care in Canada. The database includes detailed clinical, functional and service information that identifies residents' preferences, needs and strengths, and provides a snapshot of the services they use.

The CCRS captures information on individuals in publicly funded facilities of two types:

- Hospitals that have beds designated and funded as continuing care beds, commonly known across Canada as extended, auxiliary, chronic, or complex care beds; and,
- Residential care facilities, commonly known across Canada as nursing homes, personal care homes or long-term care facilities.

Nursing staff or other health providers conduct assessments of individuals in designated beds. The data are collected using the Resident Assessment Instrument Minimum Data Set 2.0 (RAI-MDS 2.0), a clinical assessment tool developed by interRAI, an international, non-profit consortium of researchers. The RAI-MDS 2.0 has undergone reliability and validity testing in a number of countries worldwide. This comprehensive assessment instrument contains over 500 data elements documenting the clinical and functional characteristics of residents. The information above was obtained and adapted from the Canadian Institute for Health Information (CIHI) website.<sup>200</sup>

Full assessment of residents using the RAI-MDS 2.0 are to be completed within 14 days of admission and then annually thereafter. A significant change in a resident's status also requires a full assessment. In addition, quarterly assessments are to be completed within 92 days following the last full or quarterly assessment.<sup>201</sup>

In 2009/10, the CCRS received data from 627 Ontario residential care facilities. These facilities provided care to 102,739 residents, of whom 94,939 were assessed with the RAI-MDS 2.0 in 2009/10.<sup>202</sup>

### Home Care Reporting System (HCRS)

The HCRS is a database that captures data from various types of organizations that are responsible for providing publicly funded home care services, such as the Regional Health Authorities (RHAs), Community Care Access Centres (CCAC) or Centre Local de Services Communautaires (CLSCs). The HCRS captures standardized client-specific clinical, demographic, administrative and resource utilization information based on the Resident Assessment Instrument-Home Care (RAI-HC). The RAI-HC is a standardized clinical instrument for the assessment of home care clients and was also developed by interRAI. The RAI-HC was developed to provide "real-time feedback on client risks and needs for care planning; clinical benchmarking using indicators and outcome scales at regional, national and international levels; and a better understanding of the resource needs of diverse home care populations."<sup>203</sup>

People who have chronic conditions or complex needs and require healthcare or personal support services (such as homemaking) for 60 days or longer are considered long-stay home care clients. In Ontario, only long-stay home care clients who are aged 18 or older are currently assessed using the RAI-HC. The aim in Ontario is to assess long-stay home care clients every six months or if there is a change in client's health status. The information above was obtained and adapted from the CIHI website.<sup>204</sup>

## 3. Analysis and Regional and Socioeconomic Variables

### Analysis

CCHS data were used to assess the percentage of older adults who made changes to improve their health and a few descriptive measures of home care use. These analyses were conducted at the provincial level, stratified first by sex and then by annual household income, age group, and LHIN, as allowed by sample size. Relative rates were calculated for women-to-men and lowest-to-highest income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. At the LHIN level, indicators were stratified by sex as allowed by sample size and data availability. For all CCHS-based indicators, with the exception of comparisons across age groups, crude and age-adjusted rates were calculated. Indirect standardization was used to age-adjust rates; this method compares the age specific rates to the standard population average for that age group.

Administrative data were used to examine the potentially preventable emergency department visits and fall-related hospitalizations among long-term care residents. Analyses were conducted at the provincial level, stratified first by sex and then by age group and LHIN. At the LHIN level, indicators were stratified by sex as allowed by sample size. Where possible, relative rates were calculated for women-to-men. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. Indirect age-standardization was applied to these indicators, using the 2009/10 long-term care population as the standard population.



Data from two unique data sets—the CCRS and the HCRS—were used to assess indicators related to home care services and long-term care. Indicators derived from these datasets were developed and validated by interRAI. We report crude rates, as well as risk-adjusted rates. Risk-adjustments were done using methods developed by interRAI.<sup>190, 205, 206</sup> For home care indicators, we report differences associated with sex, age, neighbourhood income and LHIN, as sample size allowed. For indicators related to long-term care residents, we report differences associated with sex, age and LHIN, as sample size allows. Area level income (i.e., neighbourhood income) is not an appropriate measure to assess income of residents of LTC facilities.

CCRS quality indicators were risk-adjusted using statistical techniques to control for population differences at two levels: at the individual resident level, using logistic regression to adjust for multiple individual-level covariates, and at the facility level by stratifying and reweighting data relative to a key adjustment variable (such as an outcome scale or Case Mix Index), using direct standardization. For the HCRS quality indicators, risk adjustment was conducted using logistic regression to adjust for multiple client-level covariates. It should be noted that risk adjustment does not control for all factors that affect resident outcomes.

### Neighbourhood Income Quintile

Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person equivalent (IPPE), which is a household size adjusted measure of household income based on 2006 census summary data at the dissemination area level and using person-equivalents implied by the 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as a proxy for

overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilization. Postal codes were used to assign people to enumerations areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Two-level income data compare people from the first two income quintiles (Q1, Q2) against people from the remaining three quintiles (Q3, Q4, Q5). Enumeration areas and dissemination areas are small adjacent geographic areas, designated for collection of census data. Dissemination areas replaced enumeration areas in 2001 and have a population of 400–700 people.

### Patients' Residence

For all analyses presented in the report, the definition of LHIN was based on the residence of the patient rather than where they received care.

## 4. Indicators

In this Appendix, we provide technical information on all indicators that have not previously been presented in the POWER Study Report. For more detail on previously reported indicators, please see the Appendices titled 'How the Research Was Done' from the previous POWER Study chapters. [Appendix 1](#) of this Report contains a list of all indicators contained in this chapter and the original POWER Chapter in which they were reported.

### Burden of Illness

#### Changes to Improve Health

The CCHS 2007–08 were used to identify community-dwelling adults aged 65 and older who reported making positive lifestyle changes in the previous year intended to improve their health. Changes included increasing physical activity, weight loss, dietary changes, reducing alcohol consumption, reducing stress levels, quitting smoking, receiving medical treatment, taking vitamins, etc. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

Survey respondents were asked, "In the past 12 months, did you do anything to improve your health?" Women and men were also asked to identify what they believed to have been the most important change they had made. We report the percentage of older adults who reported making positive lifestyle changes in the previous year intended to improve their health.

## Chronic Disease Management

### Number of geriatricians

This indicator measures the number of geriatricians per 100,000 adults aged 65 and older, as of the end of 2009. The number of geriatricians in Ontario was obtained from the Ontario Physician Human Resources Data Centre, Active Physician Registry. The population estimates for the population aged 65 and older in each LHIN was obtained from the Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario.

The number of geriatricians reported in this indicator does not take into account physicians that are working part-time nor does it adjust for geriatricians who have significant roles in non-clinical areas such as research, education or administration. As such, the numbers reported may overestimate the number of geriatricians available to serve the clinical needs of the province's older population.

## Settings of Care for Older Adults

### Home care

#### *Use of home care services*

Data from the CCHS, 2007-2008 were used to measure reported use of home care services among community-dwelling adults aged 65 and older. CCHS respondents were asked, 'Have you received any home care services in the past 12 months, with the cost being entirely or partially covered by the government?' and 'Have you received any home care services in the past 12 months, with the costs *not* covered by government?' Respondents were also asked what types of home care services they received.

We assessed the percentage of adults aged 65 and older who reported they received any home care services in the past year (i.e., government-funded or non-government-funded). We also report the types of services received. We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

#### *Unmet home care needs*

Data from the CCHS, 2007-2008 were used to assess the percentage of community-dwelling aged 65 and older who reported that there was a time in the past year when they needed home care services but did not receive them. All CCHS respondents were asked, 'During the past 12 months, was there ever a time when you felt that you needed home care services but didn't receive them?' We calculated crude and age-adjusted rates and the associated 95 percent confidence intervals.

#### *New activity of daily living (ADL) impairment or an ADL impairment that failed to improve*

Data from the HCRS were used to calculate the percentage of long-stay home care clients aged 65 and older whose self-performance of ADLs worsened since their last assessment or those with some impairment in ADL functioning who failed to improve between the previous and most recent assessment. These assessments are usually completed about six months apart, but there may be some variation in timing of administration.

The ADL Long Form of the RAI-HC was used to assess self-performance of the following activities (based on the three days prior to the most recent assessment): mobility in bed, transfer, locomotion inside the home, dressing, eating, toilet use and personal hygiene.<sup>134, 135</sup> All assessments that were completed within 60 days of admission to the home care program were excluded. To be included in this indicator, a client was required to have at least two assessment completed following their admission (or intake) assessment. End-of-life clients were excluded because they are expected to have different functional outcomes. We calculated crude and risk-adjusted rates. Risk-adjusted rates were adjusted for difficulty in transfer and cognitive impairment.

**Poorly controlled pain**

Data from the HCRS were used to calculate the percentage of long-stay home care clients aged 65 and older with pain who had inadequate pain control.

This indicator was based on the RAI-HC. All clients who reported any pain or showed evidence of pain on their most recent assessment (based on the three days prior to the assessment date) were included in this indicator. All assessments that were completed within 60 days of admission to the home care program were excluded. We calculated the percentage of clients with pain who felt that medications did not adequately control their pain. We calculated crude and risk-adjusted rates. Risk-adjusted rates were adjusted for cognitive impairment.

**Prevalence of depressed mood**

Data from the HCRS were used to calculate the percentage of long-stay home care clients aged 65 and older with a depressed mood.

This indicator was based on the RAI-HC. Clients were defined as having a depressed mood if they were identified as having a feeling of sadness or being depressed AND had at least two symptoms of functional depression (based on the three days prior to the most recent assessment). Sad mood and symptoms of functional depression may have been expressed directly by the client or through non-verbal indicators. All assessments that were completed within 60 days of admission to the home care program were excluded. We calculated crude and risk-adjusted rates. Risk-adjusted rates were adjusted for short-term memory problems; self-rated health; flare up of recurrent or chronic problem; caregiver distress, anger or depression; and age (aged 75 and older).

**New cognitive impairment or a cognitive impairment that failed to improve**

Data from the HCRS were used to calculate the percentage of long-stay home care clients aged 65 and older who experienced a new cognitive impairment since their last assessment or those with some level of

cognitive impairment who failed to improve between the previous and most recent assessment. These assessments are usually completed about six months apart, but there may be some variation in timing of administration.

This indicator was based on the RAI-HC Cognitive Performance Scale (CPS) which summarizes the client's cognitive status based on items assessing short-term memory, ability to make daily decisions, expressive communication and a late-loss ADL (eating).<sup>135, 150</sup> All assessments that were completed within 60 days of admission to the home care program were excluded. To be included in this indicator, a client was required to have at least two assessment completed following their admission (or intake) assessment. We calculated crude and risk-adjusted rates. Risk-adjusted rates were adjusted for diagnosis of dementia, bowel incontinence and age (aged 75 and older).

**Prevalence of injury**

Data from the HCRS, RAI-HC were used to calculate the percentage of home care clients aged 65 and older who had any injuries at their last assessment. This indicator was based on the RAI-HC. Injuries included in this indicator were fractures, second or third degree burns or unexplained injuries that were observed at the time of the assessment. All assessments that were completed within 60 days of admission to the home care program were excluded. We calculated crude and risk-adjusted rates. Risk-adjusted rates were adjusted for clients who limited going outdoors due to fear of falling and diagnosis of osteoporosis.

**Long-term Care****Rate of potentially preventable emergency department (ED) visits**

OHIP data were used to identify long-term care residents, defined as all patients having OHIP feecodes with a "W" prefix where the institution listed was a nursing home or a home for the aged. Using linked data, we assessed the number of potentially preventable ED visits per 100 long-term care residents per year. See Table 2 for a list of

ICD codes included in the definition of potentially preventable conditions. Planned or scheduled ED visits and transfers from another ED were excluded. When calculating person-years, time spent in hospital (obtained from the CIHI-DAD) was excluded. We calculated crude and age-standardized rates.

### ***Worsened self-performance of activities of daily living (ADLs)***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older whose self-performance of ADLs worsened since their last assessment. These assessments are usually completed about three months apart, but there may be some variation in timing of administration.

This indicator was based on the RAI-MDS 2.0 ADL Long Form which assesses self-performance (based on the seven days prior to the assessment date) of the following activities: eating, dressing, toilet use, personal hygiene, bed mobility, transfer, and locomotion on the unit.<sup>134</sup> In order to be included in this indicator, residents had to have at least one re-assessment and the re-assessment had to be completed more than 92 day from the admission date. End-of-life and comatose residents were excluded. We calculated crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling adjusting for Case Mix Index at the facility level and difficulty in transfer, locomotion, and Personal Severity Index at the individual-level.

### ***Prevalence of pain***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older with moderate pain at least daily or horrible/excruciating pain at any frequency on their most recent assessment (based on the highest level of pain present in the last seven days).

Assessments were excluded if they were admission full assessments or if the assessment reference date was less than 93 days after the Admission Date. We calculated crude and risk-adjusted rates. Risk-adjustment involved

multi-level modeling adjusting for Depression Rating Scale at the facility level and for Cognitive Performance Scale and long-term memory problems at the individual level.

### ***Worsened cognitive ability***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older whose cognitive ability worsened since their last assessment. These assessments are usually completed about three months apart, but there may be some variation in timing of administration.

This indicator was based on the RAI-MDS 2.0 Cognitive Performance Scale (CPS) which summarizes a resident's cognitive status based on items assessing short-term memory, ability to make daily decisions, expressive communication, a late-loss ADL (eating) and whether the resident is comatose.<sup>150</sup> In order to be included in this indicator, residents had to have at least one re-assessment and the re-assessment had to be completed more than 92 day from the admission date. Residents were excluded if they had a maximum CPS score on their prior assessment (i.e., individuals for whom the CPS could not worsen), were end-of-life or were comatose. We calculated crude and risk-adjusted rates. Risk-adjustment accounted for Case Mix Index at the facility level.

### ***Rate of falls resulting in ED visits or inpatient hospitalization***

OHIP data were used to identify long-term care residents, defined as all patients having OHIP feecodes with a "W" prefix where the institution listed was a nursing home or a home for the aged. Using linked data, we assessed the number of falls resulting in an ED visits or inpatient hospitalization per 100 long-term care residents aged 65 and older per year. Falls resulting in an ED visits were defined as a NACRS record with an ICD-10-CA code of W00-W19. Falls resulting in an inpatient hospitalizations were defined as a CIHI-DAD admission with ICD-10-CA code (M, 1, W, X, Y and not also 2) in (S42, S52, S62, S72, S82, S92, T022, T026, T10, T12) and ICD-10 code W00-W19 with dxtype = 9. Falls/fractures were excluded

if they occurred in hospital. If an ED visit resulted in an inpatient hospitalization, the episode was only counted once. When calculating person-years, time spent in hospital (obtained from the CIHI-DAD) was excluded. We calculated crude and age-standardized rates.

### ***New pressure ulcers***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older who had a pressure ulcer at stages 2 to 4 on their most recent assessment but did not have a pressure ulcer at stage 2 to 4 on their previous assessment. In order to be included in this indicator, residents had to have at least one re-assessment and the re-assessment had to be completed more than 92 day from the admission date. Residents were excluded if they had a stage 2 to 4 pressure ulcer on their previous assessment. We calculated crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling adjusting for Case Mix Index at the facility level and for Personal Severity Index, toilet use, and RUG cognitive impairment at the individual level.

### ***Daily physical restraints***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older in daily physical restraints (based on the last seven days). Physical restraints were defined as trunk restraint, limb restraint or a chair preventing rising. Assessments were excluded if they were admission assessments or if the assessment was completed within 92 days of admission. Residents who were comatose or quadriplegic were excluded. We calculated crude and risk-adjusted rates. Risk-adjustment accounted for self-performance of ADLs (based on the ADL Long Form) at the facility level.

### ***Prevalence of antipsychotic use***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older who received antipsychotic medication in the seven days prior to their most recent assessment (or longer if it was a long-lasting medication that was used less than weekly). Assessments were excluded if they were admission assessments or if the assessment was completed within 92 days of admission. End-of-life residents and residents with schizophrenia, Huntington's chorea, or hallucinations were excluded from the denominator. This indicator includes medications given to the resident by any route or in any setting. We calculated crude and risk-adjusted rates. Risk-adjustment involved multi-level modeling adjusting for Case Mix Index at the facility level and for motor agitation, moderate/impaired decision-making problem, long-term memory problem, Cognitive Performance Scale, and combination Alzheimer's disease or other dementia at the individual level.

### ***Prevalence of anti-anxiety drug or sedative/hypnotic use***

Data from the CCRS were used to calculate the percentage of long-term care residents aged 65 and older who received anti-anxiety or hypnotic medication in the seven days prior to their most recent assessment (or longer if it was a long-lasting medication that was used less than weekly). Assessments were excluded if they were admission assessments or if the assessment was completed within 92 days of admission. End-of-life residents and residents with schizophrenia, Huntington's chorea, or hallucinations were excluded from the denominator. This indicator includes medications given to the resident by any route or in any setting. We calculated crude rates.

**Table 2. Definition of potentially preventable conditions**

Condition	ICD-10-CA	Exclude
Angina	I20, I2382, I240, I248, I249	Cases with surgical procedure (CCI procedure: 1*, 2*, 5*)
Asthma	J45	
Cellulitis	L03	Cases with surgical procedures (CCI: 1*, 2*, 5*)
Chronic obstructive pulmonary disease (COPD)	J41–J44, J47, J20 (only when “other diagnosis” of J41–J44, J47 is present), J12–J16, J18 (only when “other diagnosis” of J41–J44, J47 is present)	
Heart failure (HF)	I50, J81	Cases with surgical procedures (CCI: 1IJ50, 1HZ85, 1IJ76, 1HB53, 1HD53, 1HZ53, 1HB55, 1HD55, 1HZ55, 1HB54, 1HD54)
Dehydration	E86	
Diabetes	E101, E106, E107, E109, E110, E111, E116, E117, E119, E130, E131, E136, E137, E139, E140, E141, E146, E147, E149	
Gastroenteritis	K52 (other noninfective gastroenteritis and colitis)	
Grand mal seizure disorders	G40, G41	
Hypertension	I100, I101, I11	Cases with surgical procedures (CCI: 1IJ50, 1HZ85, 1IJ76, 1HB53, 1HD53, 1HZ53, 1HB55, 1HD55, 1HZ55, 1HB54, 1HD54)
Hypoglycemia	E162	
Injury/fracture from a fall <sup>^</sup>	W00, W03–W08, W10	
<sup>^</sup> In any position		
Kidney/urinary tract infection	N10, N151, N11, N136, N390	
Pneumonia	J12–J16, J18	
Severe ear, nose, or throat infection	J02, J03, J312	



## REFERENCE LIST

- (1) Turcotte M, Schellenberg G. A portrait of seniors in Canada 2006. Ottawa: Statistics Canada, February 2007.
- (2) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of Illness. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences 2009.
- (3) Statistics Canada. Deaths 2008. Ottawa: Statistics Canada, September 2011.
- (4) DesMeules M, Manuel D, Cho R. Mortality: life and health expectancy of Canadian women. BMC Womens Health 2004;4 Suppl 1:S9.
- (5) Bronskill SE, Carter MW, Costa AP, Esensoy AV, Gill SS, Gruneir A, et al. Aging in Ontario: an ICES chartbook of health service use by older adults. Toronto: Institute for Clinical Evaluative Sciences, 2010.
- (6) Andrews GJ, Campbell L, Denton M, McGilton KS. Gerontology in Canada: history, challenges, research. Ageing Int 2009;34(3):136-153.
- (7) McCleary L, McGilton K, Boscart V, Oudshoorn A. Improving gerontology content in baccalaureate nursing education through knowledge transfer to nurse educators. Nursing leadership 2009;22(3):33-46.
- (8) Canadian Union of Public Employees. Residential long-term care in Canada: our vision for better seniors' care – summary. Ottawa: Canadian Union of Public Employees, October 2009.
- (9) Closson T, Oandasan I. Interprofessional care: a blueprint for action in Ontario, 2007.
- (10) Geriatrics Interdisciplinary Advisory Group. Interdisciplinary care for older adults with complex needs: American Geriatrics Society position statement. J Am Geriatr Soc 2006;54(5):849-52.
- (11) McDonald L, Sussman T, Peter D. When bad things happen to good people: the economic consequences of retiring to caregive. Hamilton: McMaster University in its series Social and Economic Dimensions of an Aging Population Research Papers 2007;paper 202.
- (12) McDonald L, Donahue P. Poor health and retirement income: the Canadian case. Ageing Soc 2000;20 (493-522).
- (13) Trottier H, Martel L, Houle C, Berthelot JM, Legare J. Living at home or in an institution: what makes the difference for seniors? Health Rep 2000;11(4):49-61 (Eng); 55-68 (Fre).
- (14) Martikainen P, Moustgaard H, Murphy M, Einio EK, Koskinen S, Martelin T, et al. Gender, living arrangements, and social circumstances as determinants of entry into and exit from long-term institutional care at older ages: a 6-year follow-up study of older Finns. Gerontologist 2009;49(1):34-45.
- (15) Milan A, Vézina M. Women in Canada: A Gender-based Statistical Report. Senior Women. Ottawa: Statistics Canada. Social and Aboriginal Statistics Division, July 2011.
- (16) Gillen M, Kim H. Older women and poverty transition: consequences of income source changes from widowhood. J Appl Gerontol 2009;28(3):320-341.
- (17) McDonald L. The welfare of women and retirement. In: Leroy Stone (Ed.) New Frontiers of Research about Retirement and Other Later-Life Transitions, editor. Ottawa: Statistics Canada, Canada, Institute de la statistique du Québec, 2006:137-164.
- (18) Hirdes JP, Fries BE, Morris JN, Ikegami N, Zimmerman D, Dalby DM, et al. Home care quality indicators (HCQIs) based on the MDS-HC. Gerontologist 2004;44(5):665-679.
- (19) Hirdes JP, Ljunggren G, Morris JN, Frijters DH, Finne Soveri H, Gray L, et al. Reliability of the interRAI suite of assessment instruments: A 12-country study of an integrated health information system. BMC Health Serv Res 2008;8(227):1-11.
- (20) Case A, Paxson C. Sex differences in morbidity and mortality. Demography 2005;42(2):189-214.
- (21) Drewnowski A, Evans WJ. Nutrition, physical activity, and quality of life in older adults: summary. J Gerontol A Biol Sci Med Sci 2001;56A(Special Issue):89-94.
- (22) Paterson DH, Warburton DE. Physical activity and functional limitations in older adults: a systematic review related to Canada's Physical Activity Guidelines. Int J Behav Nutr Phys Act 2010;7:38.



- (23) Taylor AH, Cable NT, Faulkner G, Hillsdon M, Narici M, Van Der Bij AK. Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *J Sports Sci* 2004;22(8):703-25.
- (24) Weening-Dijksterhuis E, de Greef MH, Scherder EJ, Slaets JP, van der Schans CP. Frail institutionalized older persons: A comprehensive review on physical exercise, physical fitness, activities of daily living, and quality-of-life. *Am J Phys Med Rehabil* 2011;90(2):156-68.
- (25) Bosworth HB, Powers BJ, Oddone EZ. Patient self-management support: novel strategies in hypertension and heart disease. *Cardiol Clin* 2010;28(4):655-63.
- (26) Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. *Patient Educ Couns* 2002;48(2):177-87.
- (27) Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Affair (Millwood)* 2001;20(6):64-78.
- (28) Gabbay RA, Bailit MH, Mauger DT, Wagner EH, Siminerio L. Multipayer patient-centered medical home implementation guided by the chronic care model. *Jt Comm J Qual Patient Saf* 2011;37(6):265-73.
- (29) Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. *Diabetes Care* 2002;25(3):512-516.
- (30) The Canadian Continence Foundation. Incontinence: a Canadian perspective. Peterborough: The Canadian Continence Foundation, 2008.
- (31) de Groot M, Kushnick M, Doyle T, Merrill J, McGlynn M, Shubrook J, et al. Depression among adults with diabetes: prevalence, impact, and treatment options. *Diabetes Spectrum* 2010;23(1):15-18.
- (32) Durso SC. Using clinical guidelines designed for older adults with diabetes mellitus and complex health status. *J Amer Med Assoc* 2006;295(16):1935-40.
- (33) Boyd CM, Darer J, Boulton C, Fried LP, Boulton L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. *J Amer Med Assoc* 2005;294(6):716-24.
- (34) Wolff JL, Starfield B, Anderson G. Prevalence, expenditures, and complications of multiple chronic conditions in the elderly. *Arch Intern Med* 2002;162(20):2269-76.
- (35) Tinetti ME, Bogardus ST, Jr., Agostini JV. Potential pitfalls of disease-specific guidelines for patients with multiple conditions. *New Engl J Med* 2004;351(27):2870-4.
- (36) Carroll CB, Zajicek JP. Designing clinical trials in older people. *Maturitas* 2011;68(4):337-41.
- (37) Rochon PA, Clark JP, Binns MA, Patel V, Gurwitz JH. Reporting of gender-related information in clinical trials of drug therapy for myocardial infarction. *Can Med Assoc J* 1998;159(4):321-7.
- (38) Dougherty AH. Gender balance in cardiovascular research: Importance to women's health. *Tex Heart J* 2011;38(2):148-150.
- (39) Mitnitski A, Song X, Skoog I, Broe GA, Cox JL, Grunfeld E, et al. Relative fitness and frailty of elderly men and women in developed countries and their relationship with mortality. *J Am Geriatr Soc* 2005;53(12):2184-2189.
- (40) Syddall H, Roberts HC, Evandrou M, Cooper C, Bergman H, Sayer AA. Prevalence and correlates of frailty among community-dwelling older men and women: findings from the Hertfordshire Cohort Study. *Age Ageing* 2010;39(2):197-203.
- (41) Lobo A, Launer LJ, Fratiglioni L, Andersen K, Di Carlo A, Breteler MMB, et al. Prevalence of dementia and major subtypes in Europe: a collaborative study of population-based cohorts. *Neurology* 2000;54(11 SUPPL. 5):S4-S9.
- (42) DePinho RA. The age of cancer. *Nature* 2000;408(9):248-254.
- (43) Di Maio M, Perrone F. Quality of life in elderly patients with cancer. *Health Qual Life Out* 2003;1(44).
- (44) Brewster A, O'Mahony MS. Cancer treatment in the elderly: can we do better? *CME Cancer Medicine* 2003;2(1):19-22.
- (45) Canadian Cancer Society's Steering Committee on Cancer Statistics. Canadian cancer statistics 2011: featuring colorectal cancer. Toronto, ON: Canadian Cancer Society, 2011.

- (46) Canadian Cancer Society. Prevention. Last accessed August 15, 2011 at [http://www.cancer.ca/Canada-wide/Prevention.aspx?sc\\_lang=en](http://www.cancer.ca/Canada-wide/Prevention.aspx?sc_lang=en).
- (47) Repetto L, Venturino A, Fratino L, Serraino D, Troisi G, Gianni W, et al. Geriatric oncology: a clinical approach to the older patient with cancer. *Eur J Cancer* 2003;39(7):870-80.
- (48) Canadian Society for Exercise Physiology. Canadian physical activity guidelines: clinical practice guideline development report. Ottawa: Canadian Society for Exercise Physiology, 2011.
- (49) Chernoff R. Nutrition and health promotion in older adults. *J Gerontol A Biol Sci Med Sci* 2001;56 (2):47-53.
- (50) Edwards P, Mawani A. Healthy aging in Canada: a new vision, a vital investment from evidence to action: The Alder Group, 2006.
- (51) Health Canada. Healthy aging: nutrition and healthy aging. Ottawa: Division of Aging and Seniors. Health Canada, 2002.
- (52) Vogel T, Brechat PH, Lepretre PM, Kaltenbach G, Berthel M, Lonsdorfer J. Health benefits of physical activity in older patients: a review. *Int J Clin Pract* 2009;63(2):303-20.
- (53) Fiatarone MA, O'Neill EF, Ryan ND, Clements KM, Solares GR, Nelson ME, et al. Exercise training and nutritional supplementation for physical frailty in very elderly people. *N Engl J Med* 1994;330(25):1769-75.
- (54) Kellera HH. Promoting food intake in older adults living in the community: a review. *Appl Physiol Nutr Me* 2007;32(6):991-1000.
- (55) Payette H, Shatenstein B. Determinants of healthy eating in community-dwelling elderly people. *C J public health* 2005;96 Suppl 3:S27-31, S30-35.
- (56) Elgar FJ, Stewart JM. Validity of self-report screening for overweight and obesity: evidence from the Canadian Community Health Survey. *C J Public Health* 2008;99(5):423-427.
- (57) Gorber SC, Tremblay MS. The bias in self-reported obesity from 1976 to 2005: a Canada-US comparison. *Obesity* 2010;18(2):354-361.
- (58) Theou O, Stathokostas L, Roland KP, Jakobi JM, Patterson C, Vandervoort AA, et al. The effectiveness of exercise interventions for the management of frailty: a systematic review. *J Aging Res* 2011;2011:19.
- (59) Blazing MA, O'Connor CM. Evidence supporting secondary prevention strategies. *Curr Opin Cardiol* 1999;14(4):303-309.
- (60) Mohiuddin SM, Mooss AN, Hunter CB, Grollmes TL, Cloutier DA, Hilleman DE. Intensive smoking cessation intervention reduces mortality in high-risk smokers with cardiovascular disease. *Chest* 2007;131(2):446-452.
- (61) de Lorgeril M, Renaud S, Mamelle N, Salen P, Martin JL, Monjaud I, et al. Mediterranean alpha-linolenic acid-rich diet in secondary prevention of coronary heart disease. *Lancet* 1994;343(8911):1454-1459.
- (62) Flynn KE, Pina IL, Whellan DJ, Lin L, Blumenthal JA, Ellis SJ, et al. Effects of exercise training on health status in patients with chronic heart failure: HF-ACTION randomized controlled trial. *J Amer Med Assoc* 2009;301(14):1451-1459.
- (63) Bierman AS, Bubolz TA, Fisher ES, Wasson JH. How well does a single question about health predict the financial health of Medicare managed care plans? *Eff Clin Pract* 1999;2(2):56-62.
- (64) DeSalvo KB, Bloser N, Reynolds K, He J, Muntner P. Mortality prediction with a single general self-rated health question: a meta-analysis. *J Gen Intern Med* 2006;21(3):267-275.
- (65) Shields M, Shooshtari S. Determinants of self-perceived health. *Health Rep* 2001;13(1):35-52.
- (66) Government of Canada. Indicators of well-being in Canada: self-rated health. Accessed July 12, 2011 at [http://www4.hrsdc.gc.ca/3ndic.1t.4r@-eng.jsp?iid=10#M\\_3](http://www4.hrsdc.gc.ca/3ndic.1t.4r@-eng.jsp?iid=10#M_3).
- (67) British Columbia Ministry of Health. Healthy aging through healthy living: towards a comprehensive policy and planning framework for seniors in B.C.: a discussion paper. Vancouver: British Columbia, Ministry of Health, 2005.
- (68) Bierman AS, Lawrence WF, Haffer SC, Clancy CM. Functional health outcomes as a measure of health care quality for Medicare beneficiaries. *Health Serv Res* 2001;36(6 Pt 2):90-109.

- (69) Gloth FM. Pain management in older adults: prevention and treatment. *J Am Geriatr Soc* 2001;49(2):188-99.
- (70) Gloth MJ, Matesi AM. Physical therapy and exercise in pain management. *Clin Geriatr Med* 2001;17(3):525-35, vi.
- (71) Gilmour H, Park J. Dependency, chronic conditions and pain in seniors. *Health Rep* 2006;16 Suppl:21-31.
- (72) Bailey R, Gueldner S, Ledikwe J, Smiciklas-Wright H. The oral health of older adults: an interdisciplinary mandate. *J Gerontol Nurs* 2005;7(31):11-17.
- (73) Huttner EA, Machado DC, De Oliveira RB, Antunes AGF, Hebling E. Effects of human aging on periodontal tissues. *Spec Care Dentist* 2009;29(4):149-155.
- (74) Griffin SO, Griffin PM, Swann JL, Zlobin N. Estimating rates of new root caries in older adults. *J Dent Res* 2004;83(8):634.
- (75) Schwartz B. Access to dental care: a social justice discussion. *Alpha Omegan* 2007;100(3):143-147.
- (76) Main P, Leake J, Burman D. Oral health care in Canada—a view from the trenches. *J Can Dent Assoc* 2006;72(4):319.
- (77) Gambassi G, Forman DE, Lapane KL, Mor V, Sgadari A, Lipsitz LA, et al. Management of heart failure among very old persons living in long-term care: has the voice of trials spread? The SAGE Study Group. *Am Heart J* 2000;139(1):85-93.
- (78) Papaioannou A, Giangregorio L, Kvern B, Boulos P, Ioannidis G, Adachi JD. The osteoporosis care gap in Canada. *BMC Musculoskelet Dis* 2004;5:11.
- (79) Duhoux A, Fournier L, Nguyen CT, Roberge P, Beveridge R. Guideline concordance of treatment for depressive disorders in Canada. *Soc Psych Psych Epid* 2009;44(5):385-92.
- (80) Alexander KP, Newby LK, Armstrong PW, Cannon CP, Gibler WB, Rich MW, et al. Acute coronary care in the elderly, part II: ST-segment-elevation myocardial infarction: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. *Circulation* 2007;115(19):2570-89.
- (81) British Geriatric Society. British Geriatric Society Newsletter. November 1998. p 21.
- (82) Patterson C, Dalziel WB, Goldlist BJ, et al. Geriatric medicine in Ontario: manpower predictions based on a delphi consensus survey. *Ann Roy Coll Physic* 1992;25(2):99-102.
- (83) Stuck AE, Siu AL, Wieland GD, Adams J, Rubenstein LZ. Comprehensive geriatric assessment: a meta-analysis of controlled trials. *Lancet* 1993;342(8878):1032-6.
- (84) Canadian Coalition for Seniors' Mental Health. Canadian guidelines for seniors' mental health: assessment and treatment of depression. Toronto, 2006.
- (85) Lin E, Diaz-Granados N, Stewart DE, Bierman AS. Postdischarge care for depression in Ontario. *Can J Psychiatry* 2011;56(8):481-9.
- (86) Goering P. Making a difference: Ontario's community mental health evaluation initiative. Ontario: Community Mental Health Evaluation Initiative, 2004.
- (87) Lee DS, Tran C, Flintoft V, Grant FC, Liu PP, Tu JV. CCORT/CCS quality indicators for congestive heart failure care. *Can J Cardiol* 2003;19(4):357-364.
- (88) Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE, Jr., et al. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-Elevation myocardial infarction. *J Am Coll Cardiol* 2007;50(7):e1-e157.
- (89) Tu K, Gong Y, Maaten S. Chapter 7: Physician care of patients with congestive heart failure. In: Jaakkimainen L, Upshur R, Klein-Geltink J, Leong A, Maaten S, Schultz S, et al., editors. Primary Care in Ontario, ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences, 2006.
- (90) Low AK, Grothe KB, Wofford TS, Bouldin MJ. Addressing disparities in cardiovascular risk through community-based interventions. *Ethnic Dis* 2007;17(2 Suppl 2):S2-S5-9.
- (91) Jollis JG, DeLong ER, Peterson ED, Muhlbaier LH, Fortin DF, Califf RM, et al. Outcome of acute myocardial infarction according to the specialty of the admitting physician. *N Engl J Med* 1996;335(25):1880-1887.
- (92) Knudtson ML, Beanlands R, Brophy JM, Higginson L, Munt B, Rottger J. Treating the right patient at the right time: access to specialist consultation and non-invasive testing. *Can J Cardiol* 2006;22(10):819-824.
- (93) Tu K, Gong Y, Austin PC, Jaakimianian L, Tu JV. An overview of the types of physicians treating acute cardiac conditions in Canada. *Can J Cardiol* 2004;20(3):282-291.

- (94) Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, Hand M, et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/ American Heart Association Task Force on Practice Guidelines (committee to revise the 1999 guidelines for the management of patients with acute myocardial infarction). *Circulation* 2004;110:e82-e293.
- (95) de Winter RJ, Windhausen F, Cornel JH, Dunselman PH, Janus CL, Bendermacher PE, et al. Early invasive versus selectively invasive management for acute coronary syndromes. *N Engl J Med* 2005;353(11):1095-1104.
- (96) Yan AT, Yan RT, Huynh T, Casanova A, Raimondo FE, Fitchett DH, et al. Understanding physicians' risk stratification of acute coronary syndromes: insights from the Canadian ACS 2 registry. *Arch Intern Med* 2009;169(4):372-8.
- (97) Eagle KA, Lim MJ, Dabbous OH, Pieper KS, Goldberg RJ, Van de Werf F, et al. A validated prediction model for all forms of acute coronary syndrome: estimating the risk of 6-month postdischarge death in an international registry. *J Amer Med Assoc* 2004;291(22):2727-33.
- (98) Bhatt DL, Roe MT, Peterson ED, Li Y, Chen AY, Harrington RA, et al. Utilization of early invasive management strategies for high-risk patients with non-ST-segment elevation acute coronary syndromes: results from the CRUSADE Quality Improvement Initiative. *JAMA* 2004;292(17):2096-104.
- (99) Papaioannou A, Morin S, Cheung AM, Atkinson S, Brown JP, Feldman S, et al. 2010 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada: summary. *CMAJ* 2010;182(17):1864-73.
- (100) Lin E, Durbin J, Zaslavsky N, Teed M, Veldhuizen S, Daniel I, et al. Hospital report 2007: mental health. Toronto: Hospital Report Research Collaborative, a joint initiative of the Ontario Hospital Association and Government of Ontario, University of Toronto, 2008.
- (101) Caminal J, Starfield B, Sanchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. *Eur J Public Health* 2004;14(3):246-251.
- (102) Sanchez M, Vellanky S, Herring J, Liang J, Jia H. Variations in Canadian rates of hospitalization for ambulatory care sensitive conditions. *Healthc Q* 2008;11(4):20-22.
- (103) Guanaïs F, Macinko J. Primary care and avoidable hospitalizations: evidence from Brazil. *J Ambul Care Manage* 2009;32(2):115-122.
- (104) Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;83(3):457-502.
- (105) Roos LL, Walld R, Uhanova J, Bond R. Physician visits, hospitalizations, and socioeconomic status: ambulatory care sensitive conditions in a Canadian setting. *Health Serv Res* 2005;40(4):1167-1185.
- (106) Holman RR, Paul SK, Bethel MA, Matthews DR, Neil HAW. 10-Year follow-up of intensive glucose control in type 2 diabetes. *N Engl J Med* 2008;359(15):1577-1589.
- (107) Nathan DM, Cleary PA, Backlund JYC, Genuth SM, Lachin JM, Orchard TJ, et al. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. *N Engl J Med* 2005;353(25):2643-2653.
- (108) Booth GL, Kapral MK, Fung K, Tu JV. Recent trends in cardiovascular complications among men and women with and without diabetes. *Diabetes Care* 2006;29(1):32-37.
- (109) Booth GL, Hux JE. Relationship between avoidable hospitalizations for diabetes mellitus and income level. *Arch Intern Med* 2003;163(1):101-106.
- (110) Mühlhauser I, Bruckner I, Berger M, Cheta D, Jorgens V, Ionescu-Tirgoviste C, et al. Evaluation of an intensified insulin treatment and teaching programme as routine management of type 1 (insulin-dependent) diabetes. The Bucharest-Dusseldorf Study. *Diabetologia* 1987;30(9):681-690.
- (111) Botting I, Katz A, Provincial Health Contact Centre Congestive Heart Failure Steering Committee. Moving forward in integrating chronic disease management with primary care: a summary of qualitative findings from the chronic disease management of congestive heart failure via health lines demonstration project. Winnipeg: Winnipeg Regional Health Authority and Research and Evaluation Unit, 2009.
- (112) Johansen H, Strauss B, Arnold JM, Moe G, Liu P. On the rise: The current and projected future burden of congestive heart failure hospitalization in Canada. *Can J Cardiol* 2003;19(4):430-435.
- (113) Andersen HE, Schultz-Larsen K, Kreiner S, Forchhammer BH, Eriksen K, Brown A. Can readmission after stroke be prevented? Results of a randomized clinical study: a postdischarge follow-up service for stroke survivors. *Stroke* 2000;31(5):1038-1045.

- (114) Lee DS, Austin PC, Rouleau JL, Liu PP, Naimark D, Tu JV. Predicting mortality among patients hospitalized for heart failure: derivation and validation of a clinical model. *J Amer Med Assoc* 2003;290(19):2581-2587.
- (115) Tu JV, Nardi L, Fang J, Liu J, Khalid L, Johansen H. National trends in rates of death and hospital admissions related to acute myocardial infarction, heart failure and stroke, 1994-2004. *Can Med Assoc J* 2009;180(13):E118-25.
- (116) Lee DS, Johansen H, Gong Y, Hall RE, Tu JV, Cox JL. Regional outcomes of heart failure in Canada. *Can J Cardiol* 2004;20(6):599-607.
- (117) Saposnik G, Jeerakathil T, Selchen D, Baibergenova A, Hachinski V, Kapral MK, et al. Socioeconomic status, hospital volume, and stroke fatality in Canada. *Stroke* 2008;39(12):3360-3366.
- (118) Chrischilles EA, Butler CD, Davis CS, Wallace RB. A model of lifetime osteoporosis impact. *Arch Intern Med* 1991;151(10):2026-2032.
- (119) Kanis JA, Johnell O, Oden A, De Laet C, Mellstrom D. Epidemiology of osteoporosis and fracture in men. *Calcif Tissue Int* 2004;75(2):90-99.
- (120) Sambrook P, Cooper C. Osteoporosis. *Lancet* 2006;367(9527):2010-2018.
- (121) Canadian Institute for Health Information. National trauma 2003 registry report: Injury hospitalizations (includes 2001-2002 data). Ottawa: Canadian Institute for Health Information, 2004.
- (122) Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. *Am J Public Health* 1992;82(7):1020-23.
- (123) Nevitt M, Cummings S, Hudes E. Risk factors for injurious falls: a prospective study. *J Gerontol* 1991;46:M164-M170.
- (124) Zuckerman JD. Hip fracture. *New Engl J Med* 1996;334(23):1519-25.
- (125) Klotzbuecher CM, Ross PD, Landsman PB, Abbott TA, Berger M. Patients with prior fractures have an increased risk of future fractures: a summary of the literature and statistical synthesis. *J Bone Miner Res* 2000;15(4):721-739.
- (126) Williams AP, Challis D, Deber R, Watkins J, Kuluski K, Lum JM, et al. Balancing institutional and community-based care: why some older persons can age successfully at home while others require residential long-term care. *Healthc Q* 2009;12(2):95-105.
- (127) Hollander M, Chappell N. Final report of the national evaluation of the cost-effectiveness of home care. A report prepared for the Health Transition Fund, Health Canada. Victoria: Centre on Aging, University of Victoria and Hollander Analytical Services Ltd., 2002.
- (128) Hirdes JP. Addressing the health needs of frail elderly people: Ontario's experience with an integrated health information system. *Age Ageing* 2006;35(4):329-31.
- (129) Hirdes JP, Poss JW, Curtin-Telegdi N. The Method for Assigning Priority Levels (MAPLe): a new decision-support system for allocating home care resources. *BMC Med* 2008;6:9.
- (130) Levine SA, Boal J, Boling PA. Home care. *JAMA* 2003;290(9):1203-1207.
- (131) Wiener JM, Hanley RJ, Clark R, Van Nostrand JF. Measuring the activities of daily living: comparisons across national surveys. *J Gerontol* 1990;45(6):S229-37.
- (132) Fleishman JA, Spector WD, Altman BM. Impact of differential item functioning on age and gender differences in functional disability. *J Gerontol B Psychol Sci Soc Sci* 2002;57(5):S275-84.
- (133) Community Care Access Center. Care brought to your home. Last accessed March 3, 2011 at <http://www.ccac-ont.ca/Content.aspx?EnterpriseID=7&LanguageID=1&MenuID=143>.
- (134) Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. *J Gerontol. A Biol Sci Med Sci* 1999;54(11):M546-M553.
- (135) Landi F, Tua E, Onder G, Carrara B, Sgadari A, Rinaldi C, et al. Minimum data set for home care: a valid instrument to assess frail older people living in the community. *Med Care* 2000;38(12):1184-90.
- (136) Chapman S. Managing pain in the older person. *Nursing standard (Royal College of Nursing (Great Britain))* : 1987) 2010;25(11):35-39.
- (137) Soldato M, Liperoti R, Landi F, Finne-Soveri H, Carpenter I, Fialova D, et al. Non malignant daily pain and risk of disability among older adults in home care in Europe. *Pain* 2007;129(3):304-310.



- (138) Ross MM, Crook J. Elderly recipients of home nursing services: pain, disability and functional competence. *J Adv Nurs* 1998;27(6):1117-1126.
- (139) Cohen-Mansfield J, Marx MS. Pain and depression in the nursing home: corroborating results. *J Gerontol* 1993;48(2):P96-P97.
- (140) Bruce ML, McAvay GJ, Raue PJ, Brown EL, Meyers BS, Keohane DJ, et al. Major depression in elderly home health care patients. *Am J Psychiat* 2002;159(8):1367-1374.
- (141) Dalby DM, Hirdes JP, Hogan DB, Patten SB, Beck CA, Rabinowitz T, et al. Potentially inappropriate management of depressive symptoms among Ontario home care clients. *Int J Geriatr Psych* 2008;23(6):650-659.
- (142) Onder G, Liperoti R, Soldato M, Cipriani MC, Bernabei R, Landi F. Depression and risk of nursing home admission among older adults in home care in Europe: results from the Aged in Home Care (AdHOC) study. *J Clin Psychiat* 2007;68( 9):1392-1398.
- (143) Almkvist O, Winblad B. Early diagnosis of Alzheimer dementia based on clinical and biological factors. *Eur Arch Psy Clin N* 1999;249(9):S3-S9.
- (144) Black SE, Patterson C, Feightner J. Preventing dementia. *Can J Neurol Sci* 2001;28(1):S56-S66.
- (145) Launer LJ. Prevention of AD: the which, when, and on whom? *Alz Dis Assoc Dis* 2006;20(3):S75 - S78.
- (146) Mariani E, Monastero R, Mecocci P. Mild cognitive impairment: a systematic review. *J Alzheimers Dis* 2007;12(1):23-35.
- (147) Turner RS. Alzheimer's disease. *Semin Neurol* 2006;26(5):499-506.
- (148) Levinoff EJ. Vascular dementia and Alzheimer's disease: diagnosis and risk factors. *Geriatrics and Aging* 2007;10(1):36-41.
- (149) Landi F, Onder G, Cattel C, Gambassi G, Lattanzio F, Cesari M, et al. Functional status and clinical correlates in cognitively impaired community-living older people. *J Geriatr Psych Neur* 2001;14(1):21-27.
- (150) Morris JN, Fries BE, Mehr DR, Hawes C, Phillips C, Mor V, et al. MDS cognitive performance scale. *Journals of Gerontology* 1994;49(4):M174-M182.
- (151) Doran DM, Hirdes J, Blais R, Ross BG, Pickard J, Jantzi M. The nature of safety problems among Canadian homecare clients: evidence from the RAI-HC reporting system. *Journal of nursing management* 2009;17(1365-2834; 0966-0429; 2):165-174.
- (152) Shaughnessy PW, Hittle DF, Crisler KS, Powell MC, Richard AA, Kramer AM, et al. Improving patient outcomes of home health care: findings from two demonstration trials of outcome-based quality improvement. *J Am Geriatr Soc* 2002;50:1354-1364.
- (153) Johnson KG. Adverse events among Winnipeg Home Care clients. *Healthc Q* 2006;9 127-134.
- (154) Carter MW, Gupta S. Characteristics and outcomes of injury-related ED visits among older adults. *Am J Emerg Med* 2008;26(3):296-303.
- (155) Masotti P, Green M, Shortt S, Hunter D, Szala-Meneok K. Adverse events in community care: developing a research agenda. *Healthc Q* 2007;10(3):63-69.
- (156) Gruneir A, Anderson GM, Rochon PA, Bronskill S. Transitions in long-term care and potential implications for quality reporting in Ontario, Canada. *J Am Med Dir Assoc* 2010;11(9):629-635.
- (157) Health Quality Ontario. Explaining our measures. Accessed September 1, 2011 at [http://www.ohqc.ca/en/ltc\\_pl\\_def.php?indicatorid=5](http://www.ohqc.ca/en/ltc_pl_def.php?indicatorid=5). Toronto, 2011.
- (158) Cipher DJ, Clifford PA, Roper KD. Behavioral manifestations of pain in the demented elderly. *JAMDA* 2006;7(6):355-365.
- (159) AGS Panel on Pharmacological Management of Persistent Pain in Older Persons. The management of persistent pain in older persons. *J Am Geriatr Soc* 2002;50(6 Suppl.):S205-S224.
- (160) AGS Panel on Pharmacological Management of Persistent Pain in Older Persons. Pharmacological management of persistent pain in older persons. *J Am Geriatr Soc* 2009;57(8):1331-1346.
- (161) Wagner L. Providers tame risks by: preventing falls. *Provider* 1997;23(6):32-34, 36-37.
- (162) Wagner LM, Capezuti E, Clark PC, Parmelee PA, Ouslander JG. Use of a falls incident reporting system to improve care process documentation in nursing homes. *Qual Saf Health Care* 2008;17(2):104-108.

- (163) Gruneir A, Mor V. Nursing home safety: current issues and barriers to improvement. *Annu Rev Publ Health* 2008;369-382.
- (164) Wagner LM, Damianakis T, Mafrici N, Robinson-Holt K. Falls communication patterns among nursing staff working in long-term care settings. *Clinical Nursing Research* 2010;19(3):311-326.
- (165) Brandeis GH, Wee Lock O, Hossain M, Morris JN, Lipsitz LA. A longitudinal study of risk factors associated with the formation of pressure ulcers in nursing homes. *J Am Geriatr Soc* 1994;42(4):388-393.
- (166) Lynn J, West J, Hausmann S, Gifford D, Nelson R, McGann P, et al. Collaborative clinical quality improvement for pressure ulcers in nursing homes. *J Am Geriatr Soc* 2007;55(10):1663-1669.
- (167) Miles SH, Irvine P. Deaths caused by physical restraints. *Gerontologist* 1992;32(6):762-6.
- (168) Capezuti E, Evans L, Strumpf N, Maislin G. Physical restraint use and falls in nursing home residents. *J Am Geriatr Soc* 1996;44(6):627-33.
- (169) Castle NG. Nursing homes with persistent deficiency citations for physical restraint use. *Med Care* 2002;40(10):868-78.
- (170) Ray WA, Federspiel CF, Schaffner W. A study of antipsychotic drug use in nursing homes: epidemiologic evidence suggesting misuse. *Am J Public Health* 1980;70(5):485-491.
- (171) Hughes CM, Lapane KL. Administrative initiatives for reducing inappropriate prescribing of psychotropic drugs in nursing homes: how successful have they been? *Drug Aging* 2005;22(4):339-351.
- (172) Briesacher BA, Limcangco MR, Simoni-Wastila L, Doshi JA, Levens SR, Shea DG, et al. The quality of antipsychotic drug prescribing in nursing homes. *Arch Intern Med* 2005;165(11):1280-1285.
- (173) Osborne CA, Hooper R, Li KC, Swift CG, Jackson SH. An indicator of appropriate neuroleptic prescribing in nursing homes. *Age Ageing* 2002;31(6):435-439.
- (174) Rochon PA, Normand SL, Gomes T, Gill SS, Anderson GM, Melo M, et al. Antipsychotic therapy and short-term serious events in older adults with dementia. *Arch Intern Med* 2008;168(10):1090-1096.
- (175) Schneider LS, Tariot PN, Dagerman KS, Davis SM, Hsiao JK, Ismail MS, et al. Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease *N Engl J Med* 2006;355(15):1525-1538.
- (176) Schneider LS, Dagerman KS, Insel P. Risk of death with atypical antipsychotic drug treatment for dementia: meta-analysis of randomized placebo-controlled trials. *J Amer Med Assoc* 2005;294(15):1934-1943.
- (177) Wang PS, Schneeweiss S, Avorn J, Fischer MA, Mogun H, Solomon DH, et al. Risk of death in elderly users of conventional vs. atypical antipsychotic medications. *N Engl J Med* 2005;353(22):2335-2341.
- (178) Schneeweiss S, Setoguchi S, Brookhart A, Dormuth C, Wang PS. Risk of death associated with the use of conventional versus atypical antipsychotic drugs among elderly patients. *Can Med Assoc J* 2007;176(5):627-632.
- (179) Gill SS, Bronskill SE, Normand SL, Anderson GM, Sykora K, Lam K, et al. Antipsychotic drug use and mortality in older adults with dementia. *Ann Intern Med* 2007;146(11):775-786.
- (180) Hartikainen S, Lonnroos E, Louhivuori K. Medication as a risk factor for falls: critical systematic review. *J Gerontol. A Biol Sci Med Sci* 2007;62(10):1172-1181.
- (181) Leipzig RM, Cumming RG, Tinetti ME. Drugs and falls in older people: a systematic review and meta-analysis: I. Psychotropic drugs. *J Am Geriatr Soc* 1999;47(1):30-39.
- (182) Oliver D, Daly F, Martin FC, McMurdo ME. Risk factors and risk assessment tools for falls in hospital in-patients: a systematic review. *Age Ageing* 2004;33(2):122-130.
- (183) Page RL, Ruscin JM. The risk of adverse drug events and hospital-related morbidity and mortality among older adults with potentially inappropriate medication use. *Am J Geriatr Pharmac* 2006;4(4):297-305.
- (184) Huston P, Naylor CD. Health services research: reporting on studies using secondary data sources. *CMAJ* 1996;155(12):1697-709.
- (185) interRAI. interRAI website. Available at: <http://www.interrai.org/section/view/>.
- (186) Diamond J. A Report on Alzheimer's disease and current research. Toronto: Alzheimer Society of Canada, 2008.



- (187) Bedard M, Kuzik R, Chambers L, Molloy DW, Dubois S, Lever JA. Understanding burden differences between men and women caregivers: the contribution of care-recipient problem behaviors. *Int Psychogeriatr* 2005;17(1):99-118.
- (188) Bierman AS, Jaakkimainen RL, Abramson BL, Kapral MK, Azad N, Hall RE, et al. Cardiovascular disease. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (189) Rotermann M. Seniors' health care use. *Health Rep* 2005;16:33-45.
- (190) Hirdes JP, Fries BE, Morris JN, Ikegami N, Zimmerman D, Dalby D, et al. interRAI home care quality indicators (HCQIs) for MDS-HC Version 2.0: interRAI, 2001.
- (191) Health Quality Ontario. *Quality monitor: 2011 report on Ontario's health system*. Toronto: Health Quality Ontario, 2011.
- (192) Gruneir A, Bell CM, Bronskill SE, Schull M, Anderson GM, Rochon PA. Frequency and pattern of emergency department visits by long-term care residents—a population-based study. *J Am Geriatr Soc* 2010;58(3):510-517.
- (193) Canadian Institute for Health Information. *Continuing Care Reporting System RAI-MDS 2.0 output specifications, 2010-2011. Supplement: 2010 quality indicators*. Ottawa: Canadian Institute for Health Information, 2010.
- (194) Canadian Institute for Health Information. *Continuing Care Reporting System RAI-MDS 2.0 output specifications, 2010-2011*. Ottawa: Canadian Institute for Health Information, 2009.
- (195) Shiller SK, Bierman AS. Introduction to the POWER study. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report: Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (196) Clark JP, Bierman AS. The POWER study framework. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-based Report, Volume 1*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (197) Krzyzanowska MK, Barbera L, Elit L, Razzaq A, Saskin R, Yeritsyan N, et al. Identifying population-level indicators to measure the quality of cancer care for women. *International Journal for Quality in Health Care* 2011;23(5):554-564.
- (198) Iron K, Zagorski BM, Sykora K, Manuel DG. *Living and dying in Ontario: an opportunity for improved health information*. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2008.
- (199) Ontario Physician Human Resources Data Centre. About OPHRDC. Last accessed October 13, 2011 at <https://www.ophrdc.org/Public/About.aspx>.
- (200) Canadian Institute for Health Information. *Continuing Care Reporting System*. Accessed August 29, 2011 at [http://www.cihi.ca/CIHI-ext-portal/internet/en/document/types+of+care/hospital+care/continuing+care/services\\_ccrs](http://www.cihi.ca/CIHI-ext-portal/internet/en/document/types+of+care/hospital+care/continuing+care/services_ccrs).
- (201) Morris JN, Hawes C, Mor V, Phillips C, Fries BE, Nonemaker S, et al. *Resident Assessment Instrument (RAI) RAI-MDS 2.0: User's Manual, Canadian Version*. Washington DC: interRAI, 2010.
- (202) Canadian Institute for Health Information. *CCRS Profile of Residents in Continuing Care Facilities 2009-2010*. Last accessed August 29, 2011 at [http://www.cihi.ca/CIHI-ext-portal/internet/EN/Quick\\_Stats/quick+stats/quick\\_stats\\_main?xTopic=Community%20Care&pageNumber=1&resultCount=20&filterTypeBy=undefined&filterTopicBy=2&autorefresh=1](http://www.cihi.ca/CIHI-ext-portal/internet/EN/Quick_Stats/quick+stats/quick_stats_main?xTopic=Community%20Care&pageNumber=1&resultCount=20&filterTypeBy=undefined&filterTopicBy=2&autorefresh=1).
- (203) Canadian Institute for Health Information. *The Yukon: pioneers in home care information. Analysis in Brief*. Ottawa: Canadian Institute for Health Information, 2007.
- (204) Canadian Institute for Health Information. *Home Care Reporting System*. Last accessed October 13, 2011 at [http://www.cihi.ca/cihi-ext-portal/internet/en/document/types+of+care/community+care/home+care/services\\_hcrs](http://www.cihi.ca/cihi-ext-portal/internet/en/document/types+of+care/community+care/home+care/services_hcrs).
- (205) Canadian Institute for Health Information. *Home Care Reporting System quality indicators: risk adjustment methodology*. Canadian Institute for Health Information, November 2010.
- (206) Canadian Institute for Health Information. *Continuing Care Reporting System 2010 quality indicators: risk adjustment methodology*. Ottawa: Canadian Institute for Health Information, May 2010.

## FUNDER

### Echo: Improving Women's Health in Ontario

Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# Social Determinants of Health and Populations at Risk

## *Chapter 12*

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### INSIDE

- Social Determinants of Health
- Low-Income Populations
- Immigrant and Minority Populations



Project for an Ontario Women's Health Evidence-Based Report

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# Executive Summary

## ISSUE

The Project for an Ontario Women's Health Evidence-Based Report (POWER) has taken a comprehensive look at health inequities in Ontario associated with income, education, race/ethnicity, where one lives, and how these differ by gender.

In doing so, we documented sizable and modifiable health inequities across multiple measures. We have also demonstrated that the social determinants of health affect the health of women and men differently. It is well-known that social factors—rather than medical care or health behaviours—are the primary drivers of health and health inequities. The social determinants of health influence both physical and mental health. Furthermore, the social determinants of health, which work through many complex and intertwining pathways, are not evenly distributed across the population. The POWER Study Framework emphasizes the importance of these social factors, while recognizing that the way we shape our health care services and community resources can mediate the effects of the social determinants of health (see [Figure 12.1](#)).

Prior POWER Study chapters have examined the burden of illness in the population, access to health care services, cancer, cardiovascular disease, depression, musculoskeletal conditions, diabetes, reproductive health, and HIV infection by assessing variation in performance on a broad set of evidence-based indicators of population health and health system performance. We identified many opportunities for intervention and improvement, and we worked closely with decision makers across the province to ensure that our objective findings would be used to inform practice and policy. In this chapter, the twelfth chapter of the POWER Study, we synthesize prior analyses

that examined the health of low-income, minority, and immigrant populations, and enrich this data by reporting additional indicators of the social determinants of health and immigrant women's health. In doing so, we paint a powerful picture of the health needs of populations at risk, how these differ among women and men in different groups, and highlight the role of the social determinants of health in the Ontario population.

In the first section, the social determinants of health among Ontario's women and men are profiled including: low income, low education, indicators of employment (employment; full-time employment; unemployment; being permanently unable to work, a measure of

### ABOUT THIS CHAPTER

**The chapter has three sections:**

- A. Social Determinants of Health
- B. Low-Income Populations
- C. Immigrant and Minority Populations



disability), lone-parent families, and food insecurity. The second section summarizes POWER Study indicators across all chapters as they relate to **low-income populations**, providing a synthesis of health and functional status, risk factors and prevention, access to health care services, clinical management, and health outcomes among lower-income women and men. The final section re-examines and synthesizes the POWER Study findings (indicators of health and functional status, chronic disease risk factors, and access to health care services) in relation to **immigrant and minority populations**, as well as reporting three indicators of immigrant women's health that have not previously been reported in the POWER Study.

The POWER Study provides the most comprehensive provincial women's health report to date and focuses on several important groups of women with unique health needs. Nevertheless, there are important areas of women's health that we do not address. For example, the POWER Study provides only limited measures of First Nations, Inuit, and Métis women's health due to data limitations. We do not look at important vulnerable groups of Ontario women such as women with disabilities and Deaf women, lesbian and bisexual women, homeless women, and women who have experienced violence. Previous research and advocacy efforts suggest that these groups are more likely to experience poor health, encounter barriers in accessing care, and report receiving poorer quality care.

## STUDY

By stratifying indicators first by sex and then by income, education, race/ethnicity, or geography, we examined how all of these factors intersect individually with gender to produce health. However, in reality, the pathways that determine a woman's health are much more complex. Gender, race, ethnicity, class, and place all intersect, and are influenced by local contexts together with historical and contemporary social, cultural, and institutional factors. Therefore, gender, ethnicity, race, class, and place—along with other important identities and

determinants of health—are not experienced individually, but are integrated and intertwined in a myriad of ways. To fully understand the factors that shape a woman's health requires exploring this intersectionality. Applying an intersectional lens helps us move beyond a listing of factors influencing health, and contextualizes experiences of individuals within inherent power dynamics and changing circumstances. While Canadian health research is beginning to be influenced by an intersectional approach, more remains to be accomplished in changing health research and policy. While the POWER Study assessed the intersection of gender with major social determinants of health, we were unable to explore intersectionality in all of its complexity. For example, we could not explicitly assess the combined effects of poverty, education, race/ethnicity, immigration, and living in a low-income neighbourhood on health.

The POWER Study has used a variety of secondary data sources to produce this report. Data were drawn from routinely collected administrative health care databases (such as those which track hospitalizations and doctor visits), population health surveys, vital statistics datasets, and disease registries. For indicators which have been previously reported in POWER Study chapters and are synthesized here, see the relevant POWER Study chapters for details regarding data sources and indicator definitions. Several indicators reported in this chapter have not previously been reported in the POWER Study. Data from the Canadian Community Health Survey (CCHS) 2007–2008 were used to assess the indicators of social determinants of health related to employment and lone-parent families. We also report three indicators of immigrant and minority women's health that were not previously reported in the POWER Study. These indicators link data from the Landed Immigrant Data System (LIDS), which is maintained by Citizenship and Immigration Canada, to health care administrative databases. This provides a unique opportunity to examine the health of people who have immigrated to Ontario (see [Appendix 12.2](#) for details). Data sources for indicators which are newly reported in this chapter can be found in [Appendix 12.1](#).



## KEY FINDINGS

### Social Determinants of Health

#### Income and education

- Across all age groups, women were more likely to live in lower-income households than men, with gender differences in income greatest among those aged 65 and older ([Exhibit 12A.2](#)). Forty-four percent of women aged 65–79 and 52 percent of women aged 80 and older reported lower income compared to 33 percent and 35 percent of men in these age groups, respectively. While the proportion of low-income households varied by Local Health Integration Network (LHIN), women were more likely to live in low-income households across LHINs ([Exhibit 12A.7](#)).
- There were large differences in income associated with race and ethnicity. White Ontarians were least likely to reside in lower-income households. Recent immigrants, members of racial and ethnic minority groups, and francophones who spoke French only were more likely to live in lower-income households than their counterparts ([Exhibits 12A.3, 12A.4, & 12A.5](#)).
- Among women and men aged 25–64, a similar proportion reported having a secondary school education or less. However, among adults aged 65 and older, women were much more likely than men to report lower levels of education ([Exhibit 12A.9](#)).
- There were differences in educational attainment associated with race and ethnicity. East and Southeast Asians reported the highest levels of education. Among Black Ontarians, women had higher levels of education than men, whereas among South and West Asian or Arab adults, men reported higher levels of education than women. Forty-seven percent of Aboriginal women and 43 percent of Aboriginal men reported secondary school education or less ([Exhibit 12A.10](#)).

- Languages spoken were also associated with education. Ontarians who spoke only French or neither French nor English were most likely to report having a secondary school education or less ([Exhibit 12A.12](#)).

- Despite higher levels of education than the overall Ontario population, immigrants who lived in Canada for 0–9 years were much more likely to reside in households with lower incomes ([Exhibits 12A.4 & 12A.11](#)).

#### Employment

- Women continue to have lower rates of participation in the labour force. Women were less likely than men to report being employed, irrespective of household income, educational attainment, race/ethnicity, or time since immigration ([Exhibits 12A.14, 12A.15, 12A.16, & 12A.17](#)). Among those who were employed, women were less likely than men to report working full-time hours ([Exhibit 12A.18](#)). Unemployment rates did not differ between women and men.
- The proportion of immigrant women who reported being employed in the past week increased with duration of residence in Canada, ranging from 44 percent among the most recent immigrants (0–4 years in Canada) to 65 percent among those who had lived in Canada for 10 or more years. Immigrant women who had been in Canada for 10 or more years were as likely to be employed as women who were born in Canada ([Exhibit 12A.17](#)).
- The proportion of working age adults who reported being employed in the past week increased with higher levels of education, ranging from 40 percent of women and 65 percent of men with less than a secondary school diploma to 73 percent of women and 81 percent of men with a Bachelor's degree or higher ([Exhibit 12A.15](#)).

### Lone-parent households

- Eighty-five percent of all lone-parent families were led by women.
- Lone-parent households headed by women were twice as likely to have lower incomes as those headed by men (46 percent versus 22 percent, respectively) ([Exhibit 12A.22](#)).

### Food insecurity

- While overall five percent of Ontarians reported food insecurity, one in four low-income women and men reported that they did not have enough to eat, worried about there not being enough to eat, or did not eat the quality or variety of foods they desired due to a lack of money ([Exhibit 12A.24](#)).

### Low-income Populations

#### Health and functional status

- We consistently found that lower-income adults reported worse health than those with higher incomes. In the Ontario population, an income gradient was found for measures of both self-rated health and self-rated mental health. Lower-income adults were more than three times as likely to report their health as fair or poor and 3–5 times more likely to report fair or poor mental health as those with higher incomes ([Exhibit 12B.1](#)).
- An income gradient was observed for all measures of functional status examined. Low-income adults were one and a half times more likely than higher-income adults to report activity limitations (37 percent versus 22 percent, respectively) ([Exhibit 12B.3](#)), two and a half times more likely to report activities prevented by pain or discomfort (25 percent versus 10 percent, respectively), and twice as likely to report limitations in carrying out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs) (25 percent versus 12 percent, respectively).

- An income gradient was observed for the prevalence of all common chronic conditions examined, as well as for probable depression ([Exhibits 12B.6 & 12B.7](#)). For all chronic conditions examined (hypertension, arthritis, back problems, obstructive lung disease, diabetes, and heart disease or stroke), low-income women and men had higher prevalence than those with higher income. For example, low-income women were more than twice as likely as higher-income women to report having diabetes or cardiovascular disease ([Exhibit 12B.6](#)).
- There was also an income gradient in the prevalence of multiple chronic conditions (comorbidity) ([Exhibit 12B.9](#)). Irrespective of age, low-income women were more likely than higher-income women to report having two or more chronic conditions. Among those aged 25–64, low-income women were more likely to report two or more chronic conditions compared to higher-income women (34 percent versus 21 percent, respectively), and among those aged 65 and older, nearly three-quarters (70 percent) of low-income women reported having two or more chronic conditions.

#### Risk factors and prevention

- We found large and potentially modifiable differences in chronic disease risk factors and screening associated with income in Ontario. Low-income women were more likely than those with higher incomes to report physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, or smoking ([Exhibit 12B.10](#)). They were also less likely to undergo recommended cancer screening ([Exhibit 12B.12](#)). These behaviours are influenced by social and environmental factors.

#### Access to health care services

- Income differences were found in access to urgent, non-emergent care and satisfaction with the care provided. Women and men living in the lowest-income neighbourhoods were more likely to report difficulties making an appointment with their family doctor for an

urgent, non-emergent health problem (i.e., less likely to report no difficulties) ([Exhibit 12B.14](#)). Women living in the lowest-income neighbourhoods were less likely than women living in higher-income neighbourhoods to report being very satisfied with their experience getting to see their doctor for an urgent, non-emergent health problem and the care their doctor provided for an urgent, non-emergent health problem.

- There was a large income gradient in access to dental care. Compared to higher-income adults, those with low household income were more than twice as likely to have not seen a dentist in the past year ([Exhibit 12B.16](#)).
- An income gradient was observed for unmet health care needs. Overall, approximately one in eight Ontarians aged 25 and older (12 percent) reported having unmet health care needs in the past year. Low-income adults were more likely to report unmet health care needs than other Ontarians ([Exhibit 12B.18](#)).

### Clinical management

- The POWER Study examined income-related differences in the clinical management of many common health conditions. In general, there were fewer income-related differences in the clinical management of health conditions than there were in health and functional status, risk behaviours, and preventive services. However, some notable income differences were found, particularly for certain types of specialist consultations and some types of diagnostic testing needed for evaluation or ongoing management.
- Among patients admitted to hospital for heart failure or an acute myocardial infarction, those from the lowest-income neighbourhoods were less likely to have a cardiologist as their most responsible physician than those from the highest-income neighbourhoods ([Exhibit 12B.21](#)). Low-income women with rheumatoid arthritis were also less likely to have seen a rheumatologist than those with higher incomes ([Exhibit 12B.19](#)).

### Health outcomes

- We found notable and potentially modifiable differences in health outcomes associated with income in Ontario. However, some outcomes (for example, readmissions and mortality among adults admitted to hospital for cardiovascular and cerebrovascular disease) directly related to medical management did not vary by neighbourhood income.
- Women and men from low-income neighbourhoods were much more likely to be hospitalized for specific ambulatory care sensitive conditions (for which effective ambulatory care can prevent or reduce the need for hospitalization) ([Exhibits 12B.28 & 12B.29](#)), to be hospitalized and/or treated for a range of diabetes complications ([Exhibit 12B.31](#)), and to visit an emergency department within 30 days of being discharged from hospital for depression ([Exhibit 12B.32](#)) compared to Ontarians living in higher-income neighbourhoods.
- Compared to Ontarians living in higher-income neighbourhoods, women and men living in low-income neighbourhoods had higher rates of all-cause and premature mortality ([Exhibit 12B.36](#)) and higher cause-specific mortality rates for many conditions ([Exhibits 12B.37 & 12B.38](#)).

### Immigrant and Minority Populations

#### Health and functional status

- Race/ethnicity, time since immigration, and language were associated with health and functional status.
- Aboriginal women and men (living off-reserve) were more likely to report fair or poor health, activity limitations, and two or more chronic conditions than other ethnic groups ([Exhibit 12C.1](#)). Members of some ethnic groups had better health and functional status than the White population. This observation may be due to the healthy immigrant effect.

- Recent immigrants (those who had been in Canada for less than 10 years) were less likely than Canadian-born adults to report activity limitations (19 percent of women and 10 percent of men who were recent immigrants versus 28 percent of women and 27 percent of men who were Canadian born) or the presence of two or more chronic conditions (18 percent of women and 14 percent of men who were recent immigrants versus 34 percent of women and 27 percent of men who were Canadian born) ([Exhibit 12C.2](#)). This advantage was not observed among immigrants who had been in Canada for 10 or more years.
- Ontarians who did not speak English (i.e., spoke only French or spoke neither French nor English) were more likely to report fair or poor health than Ontarians who spoke English (i.e., spoke English only or spoke English and another language) ([Exhibit 12C.3](#)).
- Patient satisfaction with access to and experience with primary care varied by race/ethnicity ([Exhibit 12C.9](#)), time since immigration ([Exhibit 12C.10](#)), and language ([Exhibit 12C.11](#)). Certain racial/ethnic groups (people of East and Southeast Asian, South and West Asian, and Arab ethnicity in particular), more recent immigrants (those who had been in Canada for less than 10 years) and those who spoke neither English nor French most often at home were less satisfied with their access to and experience with primary care than their counterparts.
- The percentage of people who reported having no difficulties accessing needed primary health care varied by race/ethnicity, with South and West Asian and Arab women being most likely to report difficulties obtaining monitoring of health problems from a family doctor and making an appointment for an urgent, non-emergent health problem ([Exhibit 12C.12](#)).

#### **Chronic disease risk factors**

- East and Southeast Asian women had the lowest prevalence of being overweight or obese. East and Southeast Asian, South and West Asian, and Arab women were least likely to report that they were current smokers, while 39 percent of Aboriginal women reported smoking ([Exhibit 12C.4](#)).
- Recent immigrants (less than 10 years in Canada) were more likely than Canadian-born adults to be physically inactive, but less likely to have inadequate intake of fruits and vegetables, to be overweight or obese, or to be current smokers. Immigrants who had been in Canada for 10 or more years had health behaviours that were more similar to Canadian-born adults ([Exhibit 12C.5](#)).
- Immigrant women who had been in Canada for less than 10 years were more likely than Canadian-born women to report difficulties obtaining monitoring of health problems from a family doctor and making an appointment for an urgent, non-emergent health problem ([Exhibit 12C.13](#)).
- Recent immigrants and certain racial/ethnic groups (Aboriginal and East and Southeast Asian adults) were more likely to report difficulties accessing specialists ([Exhibits 12C.15 & 12C.16](#)).
- The proportion of women who reported unmet health care needs varied by race/ethnicity and time since immigration. Twenty-four percent of Aboriginal women reported unmet health care needs compared to 14 percent of White women and 10 percent of East and Southeast Asian women ([Exhibit 12C.18](#)). Women who had been in the country for less than 10 years were more likely to report having unmet health care needs than those who had been in the country longer (16 percent versus 11 percent, respectively).

#### **Access to health care services**

- Immigrants who had been in Canada for less than five years were less likely to have a primary care doctor than those who had been in Canada for 10 or more years and Canadian-born respondents (85 percent versus 94 percent and 93 percent, respectively). Nearly one in six recent immigrants did not have a family doctor ([Exhibit 12C.8](#)).

- Access to dental care, a service not covered by the Ontario Health Insurance Plan (OHIP), is a problem for many Ontarians, particularly for immigrants who had been in Canada for less than 10 years and certain racial/ethnic groups (Exhibits [12C.19](#) & [12C.20](#)).

### Prevalence of diabetes

- Compared to long-term residents of Ontario, prevalence of diabetes was higher among identified immigrants from South Asia, Latin America and the Caribbean, sub-Saharan Africa, and North Africa and the Middle East (Exhibit [12C.21](#)).
- Among long-term residents of Ontario, men were slightly more likely than women to have diabetes (6.5 percent versus 6.2 percent); however, with the exception of immigrants from sub-Saharan Africa, immigrant women from all other world regions had similar or higher rates of diabetes than immigrant men (Exhibit [12C.21](#)).

### Cervical cancer screening

- Canadian-born and long-term residents had higher rates of cervical cancer screening than identified immigrants and recent OHIP registrants (65 percent versus 53 percent and 55 percent, respectively).
- Among urban-dwelling residents, irrespective of immigration status, older women (aged 50–66) were less likely to have had at least one Pap test in a three-year period than younger women (aged 18–49) (45 percent versus 55 percent among identified immigrants; 42 percent versus 57 percent among other recent OHIP registrants; 60 percent versus 67 percent among Canadian-born and long-term residents) (Exhibit [12C.24](#)).
- After adjusting for potential confounders, women from South Asia and the Middle East and North Africa had the lowest rates of cervical cancer screening and women from Latin America and the Caribbean had the highest rates of cervical cancer screening.

- Women living in the lowest-income neighbourhoods had lower rates of cervical cancer screening than women living in the highest-income neighbourhoods. Income differences were noted for Canadian-born and long-term residents, identified immigrants, and recent OHIP registrants (Exhibit [12C.26](#)).

### Preterm births

- Among identified immigrant women, risk-adjusted rates of preterm birth increased with the duration of residence in Canada, ranging from 5.4 percent of singleton live births to mothers who had been in Canada for less than 5 years to 8.0 percent of births to mothers who had been in Canada for 15–22 years (Exhibit [12C.28](#)).
- While recent immigrants (those who had been in Canada for less than 10 years) had lower rates of preterm births compared to long-term residents, this advantage was reversed with a longer duration in Canada, such that immigrants who had been in Canada for 10 or more years had higher rates of preterm births compared to long-term residents (Exhibit [12C.28](#)).
- After adjusting for maternal age and parity at delivery, rates of preterm birth were higher among women born in the Caribbean compared to long-term residents of Canada. Rates of preterm birth were lower among women born in Central or East Europe, the Middle East or North Africa, or other industrialized countries compared to long-term residents (Exhibit [12C.29](#)).

## KEY MESSAGES

It is not surprising that the POWER Study found inequities in health in Ontario, because health inequities associated with socioeconomic position unfortunately present a problem for all societies. What is surprising and of concern is the magnitude of these inequities. Modifiable health inequities among the women and men in Ontario were associated with socioeconomic position, ethnicity, and geography. Our findings illustrated how the social determinants of health impact women and men differently and highlight the need for gender-sensitive interventions to tackle them. It is not hard to make the case for making the reduction and ultimate elimination of health inequities a priority, as consequences of health inequities are large in their impact on human lives, increased demand on health system resources, lost productivity, and associated costs.

Importantly, we found that inequities in health and functional status were much larger than inequities in access to and quality of care, underscoring the importance of moving upstream to address their root causes, which are grounded in the social determinants of health. Health inequities are commonly manifested by a higher burden of chronic disease and disability, much of which is preventable. Furthermore, health inequities in chronic disease management were larger than those for acute care, highlighting the need for health system redesign prioritizing chronic disease prevention and management to improve both population health and health equity. Poor living and working conditions produce illness. Socioeconomically disadvantaged women and men are further disadvantaged if they encounter barriers to accessing care or receive care of suboptimal quality. There were notable areas where care was equitable—including acute cancer and stroke care—illustrating how organized systems of care using evidence-based guidelines and ongoing performance measurement and improvement is one strategy that can help towards achieving health equity. Expanding these approaches to

community settings and incorporating a focus on health equity into these efforts can help us accelerate progress in reducing inequities.

The POWER Study sought to provide evidence needed to improve the health of the women and men of Ontario and to reduce health inequities. The study was unique in employing a community engaged research model to inform both our indicator selection and interpretation of data, including indicators bridging population health and health care, and focusing on the interaction between gender and the social determinants of health. Common themes emerged across our chapters that helped us identify, in consultation with our stakeholders, multiple opportunities to make significant progress towards achieving health equity in Ontario. The POWER Study adds its voice to many scientific studies, reports, and calls to action to address health inequities. The evidence is clear and compelling. Now is the time for action. The enactment of Excellent Care for All legislation provides Ontario with a unique opportunity to implement change that truly improves the health of “all.”

### POWER Health Equity Road Map

We offer the following POWER Health Equity Road Map, a ten-point plan to move us forward. The road map emerged from our analyses and broad community consultation and dialogue. The time to move forward is now. What is needed is the will and commitment.

#### **1. Equity, a major attribute of high-performing health systems and important dimension of health care quality, is key to health system sustainability and needs to be a priority.**

- Progress in achieving health equity can make important contributions to health system sustainability by reducing the incidence of costly and preventable illnesses such as late stage cancer (identified through screening) or hospitalizations for diabetes or heart failure (through better chronic disease management).



- Health systems can make important contributions to efforts to reduce inequities in health through health system redesign aimed at meeting the needs of populations at risk for poor health, as well as through cross-sectoral partnerships aimed at addressing the social determinants of health.

## 2. Health equity cannot be achieved without moving upstream and addressing the root causes of disease in the social determinants of health.

- Focusing efforts upstream through cross-sectoral collaboration to address the root causes of health inequities (i.e., income, education, food security, housing, and environment) while reducing the burden of illness in the population is essential. A multifaceted approach is required to tackle the many complex problems which contribute to greater chronic disease prevalence and poorer health outcomes in these groups.
- Policy approaches such as “Health in All Policies” encourage the consideration of the health impact of policies across all sectors. Tools to accomplish this, such as Health Impact Assessments, are available and currently being used by the Ontario Ministry of Health and Long-Term Care, some Local Health Integration Networks, and hospitals. These efforts should be encouraged.

## 3. Prioritize chronic disease prevention and management to improve overall population health and reduce health inequities.

- Because chronic diseases and their risk factors contribute greatly to health inequities, the implementation of a comprehensive and coordinated chronic disease prevention and management strategy—one that addresses the needs of at-risk populations—is the key to improving population health and achieving health equity.

- Because socioeconomically disadvantaged populations have a higher burden of chronic illness and disability, the current mismatch between the way care is organized and the needs of people with chronic illness disproportionately impacts those who are disadvantaged. Health system redesign that supports chronic illness care and fosters patient empowerment and community partnership is an important strategy for driving health equity.

## 4. Focus on patient-centeredness to improve access to, satisfaction with, and outcomes of care for all.

- Patient-centred care is care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions. It is care that addresses an individual's constellation of problems rather than being disease specific. Patient-centred models of care that address the multiple health care needs of individuals and are sensitive to gender and cultural differences can improve patients' experiences with care and increase satisfaction with access to care and the care received. Patient-centred models of care that integrate and coordinate care across care settings are central to improving satisfaction with health care access.
- Chronic disease management must also take into consideration that many Ontarians have multiple chronic conditions in part due to common risk factors for many of these conditions such as diabetes, heart disease, cancer, and arthritis. The adoption of a more patient-centred focus to chronic disease management that acknowledges this high prevalence of comorbidity and integrates care is essential. This can be accomplished through primary care-based medical homes with strong linkages to speciality services and community care.



- Improving access to and quality of care is dependent upon understanding access barriers as experienced by populations at risk and developing effective interventions to address them. Our findings highlight the need to address cultural and linguistic barriers to care among Ontario's diverse population. There are models to draw upon internationally and locally that, with wider implementation and adaptation to the needs of specific communities, can help meet this objective. Because barriers encountered by women and men in cultural and linguistic minority communities differ, these interventions need to be gender sensitive. Community engagement and partnership along with increased diversity in the health care workforce, with the explicit goal of addressing these barriers, can help to ensure access to effective care among Ontario's diverse communities.

#### **5. Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.**

- We found few inequities in the delivery of acute cancer and stroke care—areas where organized, integrated, and coordinated strategies for guideline implementation, as well as quality improvement using performance measurement and feedback with validated quality indicators, have been implemented. Expanding this approach across other health care sectors and especially to primary care practices can help foster health equity.
- Integrated, organized models of care can also help to make our complex and often fragmented system easy to navigate.

#### **6. Coordinate population health, community, and clinical responses.**

- There are many important ongoing activities aimed at improving health in the province including: targeting population-based health promotion, enhancing the quality and capacity of community-based services, and improving the quality of care delivered in clinical settings.

Efforts to integrate and coordinate these efforts could produce synergies to accelerate progress in improving health and reducing health inequities among Ontarians.

- It is especially important to identify specific opportunities to improve quality of life and functional status through both community-based and health care interventions. For example, community-based interventions combined with clinical preventive services such as for tobacco control and smoking cessation, together can be more effective. Falls prevention interventions in clinical practice can address medical factors to reduce falls, while community-based interventions such as activity promotion can also reduce the risk of falls.

#### **7. Link community and health services to optimize outcomes and improve efficiency.**

- Both health services and community services are vital for maintaining and improving health. Strengthening linkages between these sectors can help assure that people can readily access needed care and services to promote, maintain, and improve health.

#### **8. Implement a health equity measurement and monitoring strategy and routinely include gender and equity analysis in health indicator monitoring.**

- Equity analysis and reporting should be integrated into ongoing measurement efforts. We have identified a leading set of health equity indicators based on POWER Study findings and broad-based consultation that can be used for this purpose. Adoption of these indicators can provide the needed information to effectively target gender, socioeconomic, and ethnic inequities in health. Monitoring these indicators over time will allow us to assess progress in improving health and reducing inequities.
- Incentives to foster health equity can be created. For example, health equity indicators and targets can be included in accountability agreements for LHINs, hospitals, family health teams, and other care providers.

- Improvement in data quality, availability, and timeliness is needed to support monitoring and reporting strategies. There is a particular need for data on ethnicity to improve the capacity to measure, monitor, and improve health for Ontario's diverse communities.

### **9. Develop strategies for effective implementation by creating learning networks and designing innovations for scale up and spread.**

- There is a great deal of local innovation aimed at tackling the issues reported by the POWER Study. We now need to identify which innovations are most effective and promising for large scale adoption and design them for scale up and spread, and sustainability.
- Support of a health equity knowledge exchange infrastructure by creating learning networks for innovation and equity can accelerate the adoption of best practices.

### **10. Create a culture of innovation and learning while building the evidence base for accelerated improvement through rigorous evaluation and research.**

- Creation of a culture of innovation and learning across communities, sectors, and settings of care can play an important role in successfully implementing strategies aimed at achieving health equity.
- While there is much known about patterns of health inequities and their causes, there is a critical need for evidence specific to what works to close existing gaps. Critically evaluating health equity policies, strategies, and interventions to determine what works and what doesn't work is required to build the evidence base needed to accelerate progress and support wide-spread adoption of best practices.
- It will be important to take a continuous quality improvement approach to implementing this road map by identifying specific interim points to evaluate progress and making adjustments based on these assessments.



# Introduction

The Project for an Ontario Women’s Health Evidence-Based Report (POWER) has taken a comprehensive look at health inequities in Ontario associated with income, education, race/ethnicity, where one lives, and how these differ by gender.

In doing so, we documented sizable and modifiable health inequities across multiple measures. We have also demonstrated that the social determinants of health affect the health of women and men differently. It is well-known that social factors—rather than medical care or health behaviours—are the primary drivers of health and health inequities.<sup>1–7</sup> The social determinants of health influence both physical and mental health.

## The chapter has three sections:

- Social Determinants of Health
- Low-Income Populations
- Immigrant and Minority Populations

Furthermore, the social determinants of health, which work through many complex and intertwining pathways, are not evenly distributed across the population. The POWER Study Framework<sup>8</sup> emphasizes the importance of these social factors, while recognizing that the way we shape our health care services and community resources can mediate the effects of the social determinants of health (see [Figure 12.1](#)).

Prior reports have examined the burden of illness in the population, access to health care services, cancer, cardiovascular disease, depression, musculoskeletal conditions, diabetes, reproductive health, and HIV infection by assessing variation in performance on a broad set of evidence-based indicators of population

health and health system performance. We identified many opportunities for intervention and improvement, and we worked closely with decision makers across the province to ensure that our objective findings would be used to inform practice and policy. In this chapter, the twelfth chapter of the POWER Study, we synthesize prior analyses that examined the health of low-income, minority, and immigrant populations, and enrich this data by reporting additional indicators of the social determinants of health and immigrant women’s health. In doing so, we paint a powerful picture of the health needs of populations at risk, how these differ among women and men in different groups, and highlight the role of the social determinants of health in the Ontario population.

In the first section, the **social determinants of health** among Ontario’s women and men are profiled including: low income, low education, indicators of employment (employment, full-time employment, unemployment; being permanently unable to work, a measure of disability), lone-parent families, and food insecurity. The second section summarizes POWER Study indicators across all chapters as they relate to **low-income populations**, providing a synthesis of health and functional status, risk factors and prevention, access to health care services, clinical management, and health outcomes among lower-income women and men. The final section re-examines and synthesizes the POWER Study findings (indicators of health and functional status, chronic disease risk factors and access

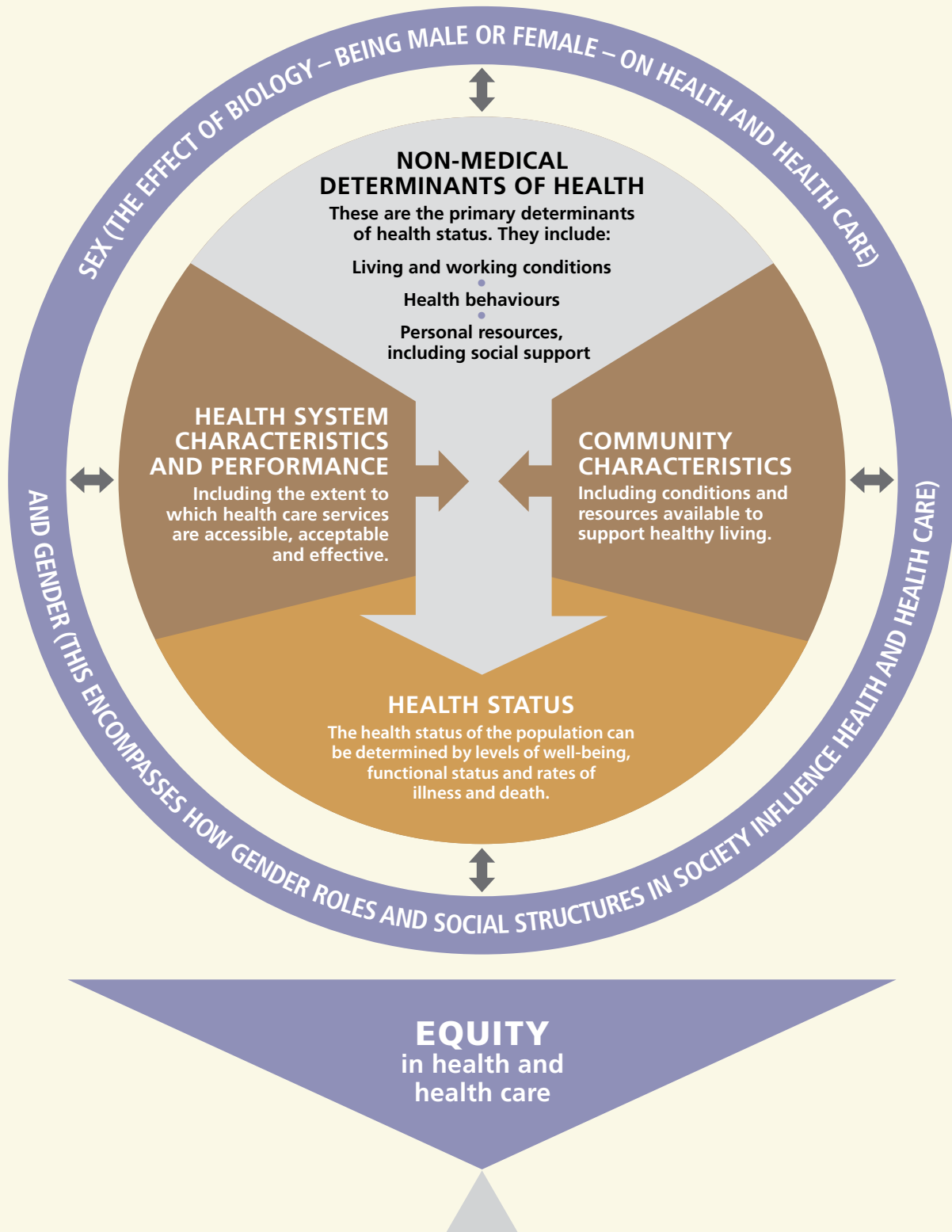
to health care services) in relation to **immigrant and minority populations**, as well as reporting three indicators of immigrant women's health that have not previously been reported in the POWER Study.

The POWER Study provides the most comprehensive provincial women's health report to date and focuses on several important groups of women with unique health needs. Nevertheless, there are important areas of women's health that we do not address. For example, the POWER Study provides only limited measures of First Nations, Inuit and Métis women's health due to data limitations. We do not look at important vulnerable groups of Ontario women such as women with disabilities and Deaf women, lesbian and bisexual women, homeless women, and women who have experienced violence. Previous research and advocacy efforts suggest that these groups are more likely to experience poor health, encounter barriers in accessing care, and report receiving poorer quality care.<sup>9–13</sup>

By stratifying indicators first by sex and then by income, education, race/ethnicity, or geography, we examined how all of these factors intersect individually with gender to produce health. However, in reality, the pathways that determine a woman's health are much more complex. Gender, race, ethnicity, class, and place all intersect, and are influenced by local contexts together with historical and contemporary social, cultural, and institutional factors.<sup>14</sup> Therefore, gender, ethnicity, race, class, and place—along with other important identities and determinants of health—are not experienced individually, but are integrated and intertwined in a myriad of ways.<sup>15–20</sup> To fully understand the factors that shape a woman's health requires exploring this intersectionality.<sup>15–20</sup> Applying an intersectional lens helps us move beyond a listing of factors influencing health, and contextualizes

experiences of individuals within inherent power dynamics and changing circumstances. While Canadian health research is beginning to be influenced by an intersectional approach, more remains to be accomplished in changing health research and policy.<sup>21</sup> While the POWER Study assessed the intersection of gender with major social determinants of health, we were unable to explore intersectionality in all of its complexity. For example, we could not explicitly assess the combined effects of poverty, education, race/ethnicity, immigration, and living in a low-income neighbourhood on health.

The POWER Study has used a variety of secondary data sources to produce this report. Data were drawn from routinely collected administrative health care databases (such as those which track hospitalizations and doctor visits), population health surveys, vital statistics datasets, and disease registries. For indicators which have been previously reported in POWER Study chapters and are synthesized here, see the relevant POWER Study chapters for details regarding data sources and indicator definitions. Several indicators reported in this chapter have not previously been reported by the POWER Study. Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to assess the indicators of social determinants of health related to employment and lone-parent families. We also report three indicators of immigrant and minority women's health that were not previously reported by the POWER Study. These indicators link data from the Landed Immigrant Data System (LIDS), which is maintained by Citizenship and Immigration Canada, to health care administrative databases. This provides a unique opportunity to examine the health of people who have immigrated to Ontario (see [Appendix 12.2](#) for details). Data sources for indicators which are newly reported in this chapter can be found in [Appendix 12.1](#).

**Figure 12.1** | POWER Study Gender and Equity Health Indicator Framework

**SOURCE:** Clark JP, Bierman AS. The POWER Study Framework. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1: Toronto; 2009.

POWER Study



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# A Guide to Reading Maps

Maps are the main visual representation of spatial patterns of data and analyses covered in this Report.

Ontario is difficult to map as a province, due to its vast areas in the North and detailed characteristics in the South. As such, all maps consist of three views—Northern Ontario, Toronto and surrounding areas, and Southern Ontario. The measures of distance and area on these views differ from one another.

There are two types of thematic maps in this Report that depict a magnitude of analyzed variables: 1) bar chart maps and 2) choropleth (shaded) maps. The following descriptions aim to help the reader correctly view and interpret these two map types.

## BAR CHART MAPS

Bar chart maps can depict a variety of numeric variables including counts and ratios across Local Health Integration Networks (LHINs) in Ontario. In most of the maps in this Report, the bars show values of relative risks, odds ratios or rates (percentages).

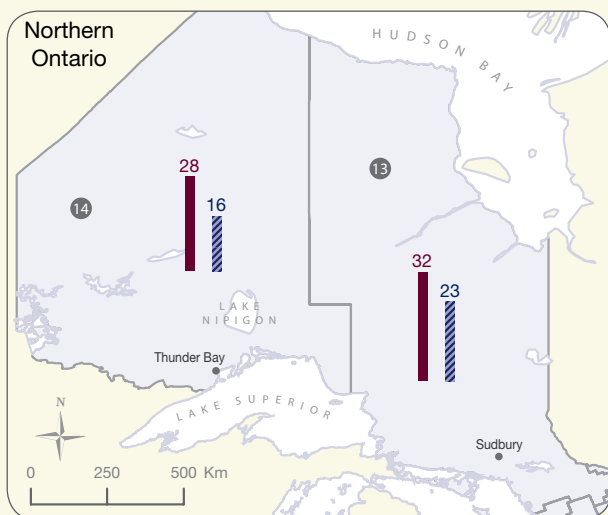
The main feature to look for is the height of the bars, since it represents the value of the mapped attribute. The larger the attribute number (relative risk, odds ratio, or rate), the taller the bar. The number at the top or beside each bar represents the actual value of the attribute.

If the attribute is presented in two subgroups (e.g., women and men) as in Figure 2, then each LHIN area on the map has two bars. When the attribute is presented in four subgroups (e.g., lower-education women, higher-education women, lower-education men, and higher-education men) as in Figure 3, then each LHIN area on the map has four bars. In all cases, the height of the bar is proportional to the value of the mapped attribute.

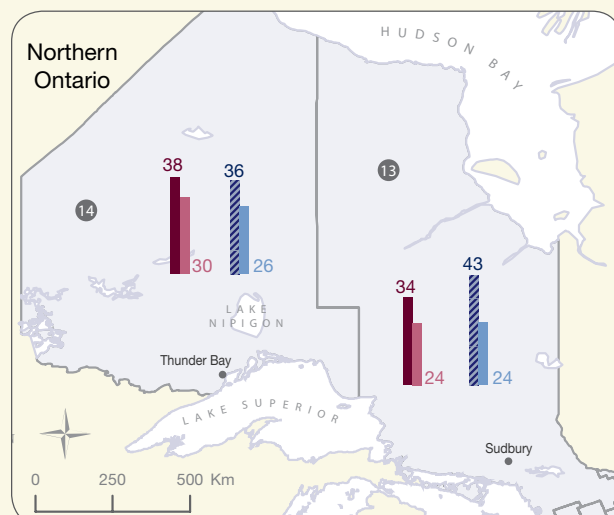
In the legend of the map the top set of bars reflects the highest observed value in the depicted data set. This can be used for visual comparison with the bars on the map.

The bottom set of bars shows the overall Ontario values of the depicted attributes and can be also compared visually to the bars on the map.

**Figure 1: Example of a Two Bar Map**



**Figure 2: Example of a Four Bar Map**

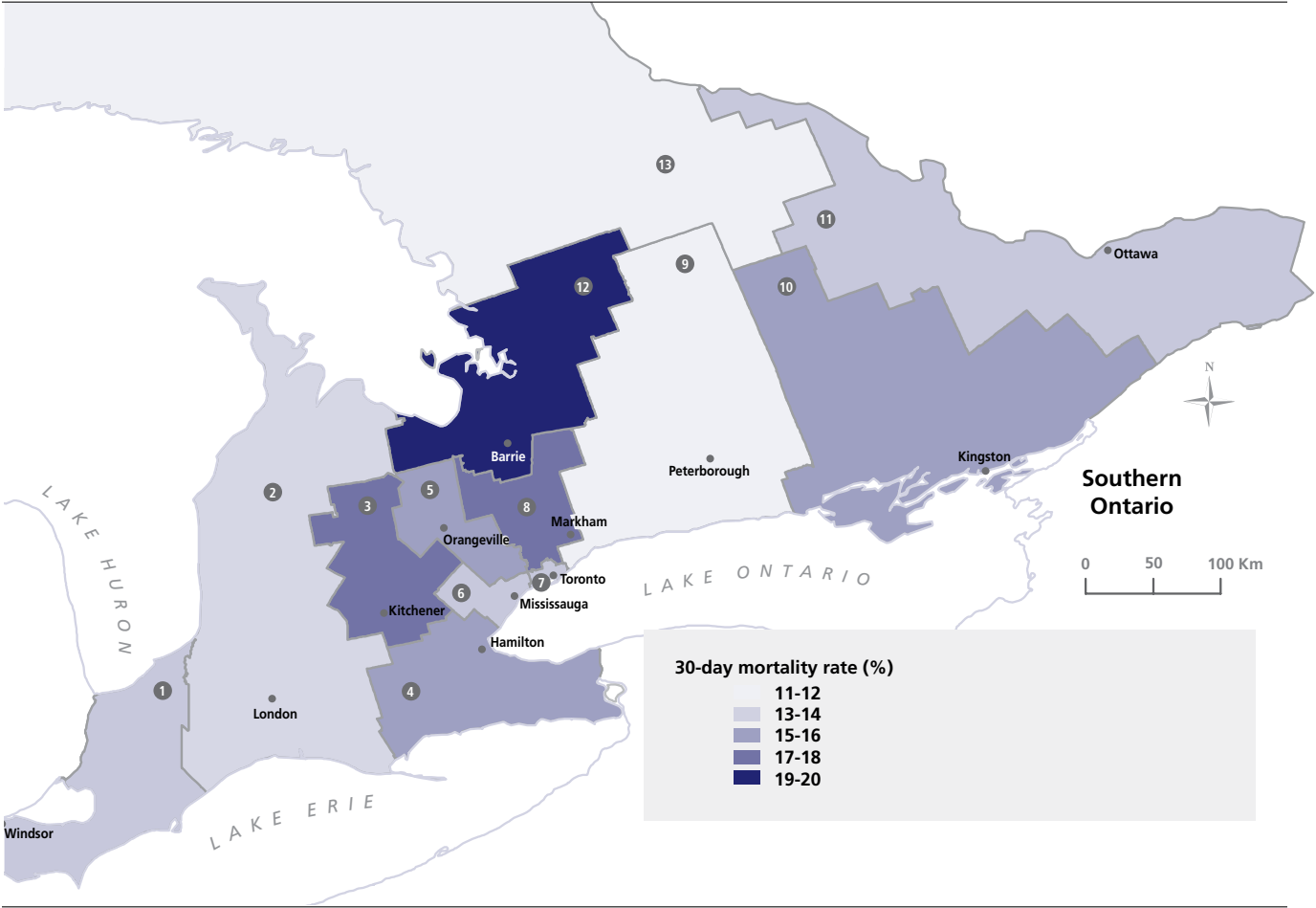


## CHOROPLETH (SHADED) MAPS

Choropleth maps use different shades or colours to depict data values. Each colour generally represents a range of values, as shown in the map legend. In general, the darkness of the shade or colour is

proportional to a larger data value—the larger the data value, the darker the shade or colour on the map. Shaded maps usually represent rate or ratio variables rather than raw counts or amounts.

**Figure 3: Example of a Choropleth Map**



## INTERPRETING CRUDE AND ADJUSTED RATES

In this report on Older Women's health, we present crude or unadjusted rates, as well as rates that have been age-standardized or risk-adjusted. Each type of rate provides unique information that is useful for different reasons. Below is a brief description of what these rates mean and how they should be interpreted.

**Crude or unadjusted rates** provide true and accurate information about the frequency of an event or health outcome in a population. These rates are useful in describing a population and provide important information for resource allocation and policy planning. However, when making comparisons between different groups, crude rates should be interpreted with caution because they do not take into account differences between groups.

**Age-standardized or age-adjusted rates** are useful when comparing two or more groups that have different age profiles. Many health indicators are closely related to age, with risk increasing or decreasing with age. Age-standardization involves using statistical techniques to remove the effect of age. While these rates are useful in making comparisons, they do not reflect the true rates of events or health outcomes within the groups.

**Risk-adjusted rates** use statistical techniques to take into account the effect of multiple factors that may differ between groups and can influence the outcome measure. Risk-adjusted rates are intended to allow for comparisons between groups that may have very different risk profiles. Note that risk-adjustment may not account for all factors that affect the health indicator. Again, while adjusted rates are useful in making comparisons, they do not reflect the true rates of events or health outcomes within the groups.





# Section 12A

## *Social Determinants of Health*

### INTRODUCTION

It is well-known that social factors—rather than medical care or health behaviours—are the primary drivers of health and health inequities.<sup>1–7</sup>

The social determinants of health are the conditions in which people live, work, and age, including factors such as: income and income distribution; education and literacy; employment and working conditions; food insecurity; housing; neighbourhood characteristics; and social support. The POWER Study Framework<sup>8</sup> emphasizes the importance of these social factors, while recognizing that the way we shape our health care services and community resources can mediate the effects of the social determinants of health (see [Figure 12.1](#) on page 15).

Decades of research, both within Canada and internationally, have unequivocally demonstrated that the social determinants of health strongly influence both physical and mental health.<sup>1, 2, 22–25</sup> Despite universal access to health care, Canadians living in poverty experience higher rates of nearly all health conditions and worse health outcomes than those who are more affluent.<sup>2, 26–28</sup> In Canada, lower socioeconomic position—whether it is measured by income, education, or occupation—is also associated with higher mortality rates.<sup>29</sup>

The social determinants of health work through many complex and intertwining pathways. Income has a tremendous influence on housing and living conditions, stress and psychological well-being, health-related behaviours, nutrition and food insecurity, and social exclusion.<sup>2, 30</sup> Similarly, education can affect health by influencing other social determinants of health, such as income, job security, and working conditions.<sup>2, 31</sup> Beyond improving job opportunities and earnings, education can

improve social capital and provide a sense of control and mastery over life, which in turn can benefit health.<sup>31–33</sup> People with low income or low educational attainment may be forced to live in housing and neighbourhoods where there is less access to healthy foods, community services, and recreational activities. In addition, social factors such as low income, inadequate housing, food insecurity, unemployment or poor working conditions, social exclusion, and lack of social capital cause great amounts of stress in people's lives. Stress has been associated with many different health outcomes and is thought to influence health directly (through physiologic processes) and indirectly (by influencing health behaviours).<sup>34</sup> There is growing evidence that the physiological consequences of stress—as measured by “allostatic load”—increase the risk of chronic disease and poor health outcomes and may accelerate the aging process.<sup>35, 36</sup>

As they do with physical health, social determinants affect mental health and access to timely and appropriate mental health services including health promotion, prevention, and recovery services. Although this chapter has only a limited focus on mental health, it is important to recognize the relationship between the social determinants of health and multiple dimensions of mental health. The World Health Organization (WHO) notes that, “women's low status in society, their burden of work and the violence they experience are all contributing factors” to their mental health problems (p. xiii, 2007).<sup>37</sup> The WHO has also emphasized that without mental health there is no health.<sup>38</sup>



The social determinants of health are not evenly distributed across the population. The social determinants of health impact women and men differently. Socially constructed gender roles have traditionally resulted in women being socioeconomically and politically disadvantaged. While these traditional gender roles have been changing, in Canada, women continue to be at greater risk than men of being socioeconomically disadvantaged: compared to men, women are more likely to have lower incomes and head lone-parent families, and less likely to be employed.<sup>39–41</sup> Women who are employed are more likely than men to work in low-paid jobs, part-time jobs, or jobs with low control or autonomy over their work.<sup>39, 41</sup> While women's participation in the labour market has increased over the past decades, women continue to be the primary providers of care and to do the majority of household work.<sup>42</sup> As a result, women may experience more time-stress and caregiver burden than men.<sup>43</sup> Traditional gender roles and expectations of masculine behaviour can also negatively impact on men's health. Therefore a gendered approach to these problems can help foster health equity among both women and men.

The social determinants of health are also differentially distributed across different ethnic and cultural groups. Immigrant and minority populations in Canada are more likely to be unemployed or underemployed, and to have low-paid jobs with limited control and autonomy.<sup>44, 45</sup> These populations may also experience racism and discrimination, which have been linked to worse health.<sup>46–49</sup> Immigrant populations may also face additional challenges related to the resettlement process.<sup>50</sup> Importantly, all of these factors interact and intersect with gender, meaning immigrant and minority women are often uniquely disadvantaged in multiple domains. This intersectionality and the specific needs and vulnerabilities of different populations need to be considered and addressed within policies and programs to improve the social determinants of health.

Canada has a long history of recognizing the importance of the social determinants of health. However, in both Canada and Ontario, the income gap between the richest and poorest is widening.<sup>51, 52</sup> In 2008, Canada had the

seventh highest GDP per capita of 41 OECD countries,<sup>53</sup> yet many Canadian citizens continue to live in poverty, experience food insecurity, and are unable to find appropriate and affordable housing.<sup>2</sup> It has been noted that taxation measures aimed at reducing inequities have been eroded.<sup>54</sup> While Canada has fewer social inequities than some countries (including the United States), we fall well behind many other countries in addressing the social determinants of health and reducing inequities.<sup>55</sup> In fact, Canada is included among the group of OECD countries where income inequality has grown most rapidly over the last decade.<sup>55</sup>

Many reports in Canada and internationally have called for action on the social determinants of health. In 2008, the WHO's Commission on Social Determinants of Health proposed a strategy for reducing health inequities within and across countries by improving living and working conditions through fostering healthy communities, promoting fair employment practices, and addressing inequitable resource distribution.<sup>1</sup> The report also emphasized the need for systems of universal health care "based on principles of equity, disease prevention, and health promotion." Finally, the report underscored the need for systems of routine measurement and monitoring of health inequities, and the evaluation of interventions aimed at reducing health inequities in order to learn which interventions are effective in which contexts.<sup>1</sup> In 2011, the WHO hosted a World Conference on Social Determinants of Health to build support for the implementation of action on social determinants of health. The WHO issued a discussion paper from this conference that builds on the 2008 recommendations and lays out the key components necessary in implementing a social determinants approach.<sup>6</sup> Similar themes and approaches have been consistently recommended in other reports.<sup>3, 4, 24, 28, 56</sup> For example, in 2008, the Conference Board of Canada produced a report making the case for the business sector to become actively engaged in addressing the social determinants of health and provided approaches the industry could take to effectively address this problem.<sup>57</sup>

The POWER Study has documented sizable and modifiable health inequities in Ontario. In order to understand the health inequities identified throughout the POWER Study, it is important to consider how the social determinants of health produce an unequal distribution of health and health outcomes in society. In the following pages, we provide a brief description of many of the major social determinants of health, including their associations with health and the pathways through which they influence health. These social factors are the root causes of health inequities and must be addressed in order to achieve health equity in Ontario.

While all of the social determinants of health discussed on the following pages contribute to the health inequities documented throughout the POWER Study, it was beyond the scope of this chapter to examine indicators of each of these factors. In this section, we take a more detailed look at some of the social determinants of health that were previously reported in the POWER Study and supplement these data with some additional indicators derived from the Canadian Community Health Survey (CCHS). Specifically, in this section, we report the following indicators:

- Lower annual household income
- Lower education
- Employment
- Full-time employment
- Unemployment
- Permanently unable to work
- Lone-parent families
- Food insecurity

The measures of lower income, lower education, and food insecurity have been previously reported in the [POWER Study Burden of Illness chapter](#).<sup>58</sup> In this chapter, we report these indicators in slightly more detail and interpret them in relation to other social determinants of health. The indicators related to employment and lone-parent families have not previously been reported by the POWER Study. Lone parents are more likely to experience financial stress, food insecurity, poor housing conditions, high levels of stress, lower levels of social support and social capital, and worse health.<sup>59–64</sup>

All indicators in this section have been assessed using the CCHS. Lower annual household income, lower education, and food insecurity were assessed using data from the CCHS, 2005 (Cycle 3.1). Data from CCHS, 2007–2008 were used to assess all other indicators in this section (see [Appendix 12.2](#) for details). Differences associated with sex, age, income, education, race/ethnicity, immigration status, language, rural/urban residency, and Local Health Integration Network (LHIN) are examined, where data are available and sample size allows.

## UNDERSTANDING THE ROOT CAUSES OF HEALTH INEQUITIES: AN OVERVIEW OF SOME OF THE MAJOR SOCIAL DETERMINANTS OF HEALTH

In the following pages, we provide a brief overview of many of the major social determinants of health. While it is beyond the scope of this chapter to report indicators of each of these factors, we emphasize that these social determinants of health are the primary drivers of health inequities and action on these social factors is needed to achieve health equity in Ontario.

### Income

According to the World Health Organization, “poverty is the single largest determinant of health.”<sup>5</sup> Low income greatly increases the risk of poor health and creates significant health inequity in Canada, due to its compounding impacts on health; income level affects almost every aspect of life, including other social determinants of health such as housing, food security, and education.<sup>65</sup> Income influences mental health, experiences of stress, and health-related behaviours such as diet, physical activity, and tobacco or alcohol use.<sup>66</sup> Health and illness follow a clear social gradient across all income levels, whereby low socioeconomic status is profoundly linked to poor health.<sup>1</sup> Notably, income becomes particularly crucial in societies that deliver fewer public services, such as childcare, affordable housing, post-secondary education, and recreational opportunities.<sup>2</sup> For this reason, policies and programs aimed at eliminating poverty, ensuring adequate income, and mitigating the effects of poverty are critical to achieving health equity.<sup>2</sup>

### Education

In general, people with higher levels of educational attainment are healthier than those with lower levels of educational attainment. There are a number of possible pathways by which education leads to better health.

First, educational attainment is highly correlated with other social determinants of health such as income, job security, and working conditions, and creates opportunities to climb the socioeconomic ladder.<sup>2</sup> Second, lower levels of educational attainment are associated with lower levels of health literacy. Low health literacy has been related to possessing less health knowledge and having more difficulty in accessing health information, and is linked to poorer self-reported health and non-adherence to medical regimens.<sup>67</sup> Health literacy provides people with more sophisticated skills and abilities that support the adoption of healthy behaviours, and the ability to actively participate in the clinical management of complex conditions.<sup>66, 67</sup> Third, higher education may help people better navigate the health system, fostering greater access to health services.<sup>66</sup> Fourth, education may also have physiologic effects on health. For example, education may be protective against cognitive decline and the development of dementia.<sup>68</sup>

### Employment/Unemployment/Working Conditions

Employment has powerful effects on health and health equity, both positive and negative. Employment is directly related to income, which increases access to better living conditions, leads to better food and shelter security, and improved access to health services.<sup>2, 30</sup> Additionally, employment can affect the mental health and social well-being of an individual by providing a time structure, social contact with peers, and an increased sense of identity.<sup>69, 70</sup> Cumulative research shows that high levels of unemployment correlate with poor health and increased mortality.<sup>71</sup> However, adverse health impacts are not limited to those who are unemployed. Working conditions including exposure to occupational hazards, workplace stress, and low autonomy and control can have a large impact on health.<sup>72, 73</sup> Individuals in precarious employment situations—employment with limited social benefits, job insecurity, and low wages—are also at high risk of ill

health.<sup>74</sup> The World Health Organization states that precarious employment causes stress, due to a lack of income and meaningful work, and uncertain future prospects, and that it has the potential to undermine social networks.<sup>75</sup> Statistics Canada reported evidence that between 2000 and 2004, Canada and the United States had the highest proportions of low-paid workers among 12 countries studied.<sup>76</sup> Since the 2008 recession, the volume of precarious work has accelerated in Canada, with temporary full-time jobs rising by 99,400, while permanent full-time jobs have declined by 115,000.<sup>77</sup> The Federal Labour Standards Review recommends “limits on long working-time and arbitrary work schedules, more paid time off the job, and measures to secure respect for human rights in the workplace” (p.70).<sup>78</sup>

### Food Security

Food is a basic human need and an essential determinant of health. The World Food Summit of 1996 defined food security as existing “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”<sup>79</sup> In 2010, food bank usage in Canada reached its highest level, with over 867,000 people using food banks, 9 percent of whom were first time users.<sup>80</sup> Food insecure households more commonly experience dietary deficiencies and associated chronic diseases; for instance, individuals experiencing food insecurity are 80 percent more likely to report diabetes, 60 percent more likely to report high blood pressure, and 70 percent more likely to report food allergies than households with sufficient food.<sup>2</sup> Furthermore, a healthy diet is essential in the management of many chronic diseases including high blood pressure, diabetes, heart failure, and high cholesterol. Food insecurity can result in suboptimal control and worsening of these conditions, and ultimately lead to poor health outcomes, including preventable complications. Food insecurity often results from lack of

economic resources; thus, assuring access to healthy diets through food policy and poverty reduction strategies is an important mechanism for reducing health inequities and improving population health.<sup>2</sup>

### Housing

Shelter is a fundamental human need and a prerequisite for optimal health. With 13 percent of Canadian households unable to access adequate and affordable housing,<sup>81</sup> in 2007 the United Nations Special Rapporteur labeled Canada’s housing situation a “national emergency.”<sup>82</sup> The Commission on the Social Determinants of Health also stated that the housing crisis will worsen social inequities, particularly health inequities.<sup>1</sup> Inadequate housing compromises health in many ways; for instance, research shows that poor housing increases the risk of respiratory and infectious disease due to lead, mould, vermin, overcrowding, and poor ventilation,<sup>83–85</sup> as well as mortality.<sup>86</sup> In a comprehensive eleven-year study, homeless adult women were 10 times more likely to die than women of the same age group in the general population in Toronto.<sup>86</sup> A recent U.S. study showed that providing poor women with adequate housing in good neighbourhoods resulted in improved health outcomes.<sup>87</sup> Thus, policies that provide access to safe and affordable housing are another important strategy for reducing health inequities.

### Healthy Neighbourhoods

Akin to adequate housing, healthy neighbourhoods significantly shape our environment, and thus provide either positive or negative health exposures. There are many neighbourhood characteristics that influence health, for example access to services, crime rates, and housing stock. An Ontario-based study showed children living in poor neighbourhoods had 67 percent higher rates of minor, moderate, and extreme injuries than children living in the wealthiest neighbourhood.<sup>88</sup>

Neighbourhood features and the presence of amenities such as parks, recreational centres, and healthy food retailers have also been linked to the risk of obesity.<sup>89, 90</sup> Urban design practices dating back to the 1960s and 70s have led to the development of neighbourhoods that are less conducive environments for walking or other physical activities. Physical activity levels have been found to be lower in newly developed areas—characterized by urban sprawl—than older, more traditionally designed neighbourhoods, in part because of the reliance suburban design places on mass automobile transit.<sup>91</sup> This growing literature also suggests that residents living in areas that are more walkable are less likely to be obese and have lower rates of diabetes.<sup>91–93</sup>

### **Racism/Discrimination**

Experiences of racism and discrimination are associated with worse physical and mental health.<sup>46–49, 94–96</sup> Racism and discrimination may occur at individual, organizational, and societal levels. Racism and discrimination can have indirect negative health affects by influencing other social determinants of health, such as income, education and employment. Since the 1960s, over three-quarters of immigrants to Canada have come from the global south or developing nations, and most are members of visible minority groups.<sup>97</sup> Racialized Canadians experience a range of adverse living conditions that negatively impact their health. For example, Canadians of colour in every province experience higher rates of unemployment and underemployment than Canadians of European descent, and incomes are often lower given the same level of educational attainment.<sup>98</sup> This was less pronounced in the 1970s when the employment levels and earned incomes of Canadians of European and non-European descent were similar.<sup>98</sup> It has also been suggested that racism and discrimination may directly influence health by resulting in chronic stress,<sup>47, 48, 96</sup> which (as discussed below) can compromise health. Racism and discrimination may contribute to declining health among immigrants.<sup>49</sup>

### **Work-Life Balance/Unpaid Work**

Work-life balance has been defined as satisfaction and good functioning at work and home, with a minimum of role conflict.<sup>99</sup> While some claim this definition is largely gender-blind,<sup>100</sup> others argue that the term “work-life balance” implies quick-fix solutions that negate fundamental gender-based inequalities, and place the responsibility solely on individuals.<sup>101</sup> Still, research shows that when employees are provided with flexible working hours, parental entitlements, and childcare subsidies, the result is increased organizational commitment and job satisfaction.<sup>102, 103</sup> Work-life programmes that create greater employee autonomy over work schedules also lead to improved mental health.<sup>104</sup> On the other hand, when these employee needs are not met, work-life stress can result.<sup>105</sup> Globally, the provision of work-life balance support appears to be chiefly contingent on the nature of jurisdictional social welfare policies.<sup>106</sup> Some countries, including Canada, the U.S., the U.K., and Australia, may be reluctant to impose on the private sphere, resulting in weaker public childcare provisions and work-life balance policies. Scandinavian welfare states, by contrast, successfully achieve work-life balance by providing enabling policy measures to both male and female employees.<sup>107</sup>

### **Social Support/Social Capital**

Social support is a broadly used term that describes the extent to which individuals are able to receive help and assistance from family members, friends, and social networks.<sup>108</sup> Beginning with Berkman and Syme’s landmark study,<sup>109</sup> which found that individuals in Alameda County, California with lower levels of support suffered from higher mortality rates, research has consistently associated levels of social support to health outcomes. For example, a 2006 review of epidemiologic studies linking social support to cardiovascular, neuroendocrine, and immune functions confirmed that

higher levels of social support were related to more positive “biological profiles” across these disease-relevant systems.<sup>110</sup> In addition, people with low social support have higher rates of major mental health disorders than those with high support.<sup>111, 112</sup> This relationship reinforces the predominant stress and coping social support theory, which maintains that social support protects people from the negative health effects of stressful events (i.e., stress buffering) by influencing how people think about and cope with these events.<sup>108</sup> Closely aligned with the concept of social support is the concept of social capital, which refers to the collective value of connections within and between social networks.<sup>113</sup> A growing body of research has found that the presence of social capital, through social networks or community organizations, has a protective impact on health; individuals who are embedded in communities rich in social capital have greater resources to help them achieve health goals and maintain good health.<sup>114</sup>

### Stress/Allostatic Load

Prolonged, chronic stress can have detrimental effects on a person's physical and mental health. Stress can affect a person's physical health directly (through physiological processes) or indirectly (through health behaviours).<sup>115</sup> While the human body has evolved to

adapt quickly to stressful or dangerous situations though the “fight or flight” response, the body's stress response seems to be maladaptive when chronically activated. When stressed, the body releases the hormone cortisol, which if released at higher levels and for prolonged periods, has been linked to greater rates of obesity and other health-compromising conditions.<sup>116, 117</sup> Epinephrine and norepinephrine levels also rise and contribute to the negative consequences of chronic stress. The accumulation of stress over time increases the risk of heart disease<sup>118</sup> and cardiovascular mortality.<sup>73</sup> Allostatic load refers to the cumulative physiological burden that results as the body adapts to environmental and psychosocial stressors. Allostatic load may help explain how the social determinants of health biologically impact the body to produce poor health.<sup>35, 36</sup> The physiologic consequences of this stress include high blood pressure, elevated blood sugar, and hormonal changes. In addition to its direct physical effects on health, stress is associated with worse mental health, as well as higher rates of smoking, alcohol consumption, sleeping problems, accidents, and eating disorders.<sup>115</sup> While everyone experiences everyday challenges throughout their lives, a disproportionate amount of people living in poverty experience toxic levels of chronic stress.<sup>119</sup>

## EXHIBITS AND FINDINGS

### INCOME

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported living in lower-income households.

**Background:** Income is a major determinant of health, given its influence on housing and living conditions, stress and psychological well-being, health-related behaviours, nutrition and food insecurity, and social exclusion.<sup>2, 30</sup> In Canada, low income is a strong predictor of poor health outcomes, including: poor self-rated health, chronic conditions, disability, stress and poor mental health, hospitalizations, lower life-expectancy, and higher mortality rates.<sup>2, 120–122</sup> The POWER Study—which examined a broad range of indicators across many health conditions—has documented sizeable and modifiable inequities in health associated with income among women and men in Ontario.<sup>26, 27</sup> While personal income has a large impact on an individual’s health, the distribution of wealth in a society is also extremely important. Societies with a relatively equal distribution of wealth (i.e., a smaller gap between the richest and poorest people) have better health than societies with less equal income distributions.<sup>123, 124</sup> Within Canada, many groups are disproportionately affected by poverty, including women, lone-parent families, older adults, recent immigrants, and racialized groups.<sup>44, 125</sup>

Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to assess this indicator. Lower-income households were defined as the two lowest annual household income categories; see [Appendix 12.2](#) for a more detailed definition. Sample size for many at-risk populations in the CCHS was insufficient for us to examine these two categories separately.

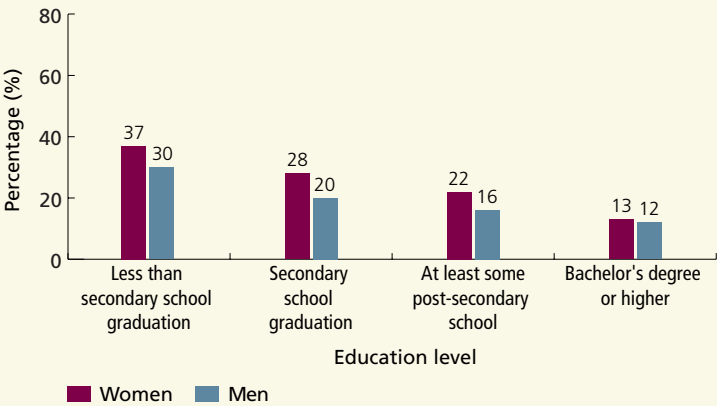
**Findings:** In Ontario, 21 percent of adults aged 25 and older reported living in lower-income households in 2005. Women were more likely to live in a lower-income household than men (24 percent versus 18 percent, respectively).



**Exhibit 12A.1 | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and education level, in Ontario, 2005**

**FINDINGS**

- As expected, adults with less education were more likely to have lower household income compared to people with more education.
- About one-third of adults with less than a secondary school education reported living in a lower-income household.
- With the exception of those with a Bachelor's degree or higher, at all other levels of educational attainment, women were more likely to report living in a lower-income household.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

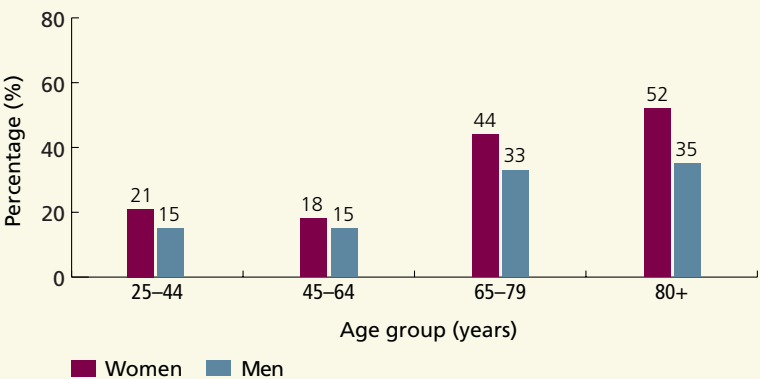
<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12A.2 | Percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and age group, in Ontario, 2005**

**FINDINGS**

- Across all age groups, women were more likely to report lower annual household income than men, with the greatest sex differences among those aged 65 and older.
- Forty-four percent of women aged 65–79 and 52 percent of women aged 80 and older reported lower household income compared to 33 percent and 35 percent of men, respectively.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

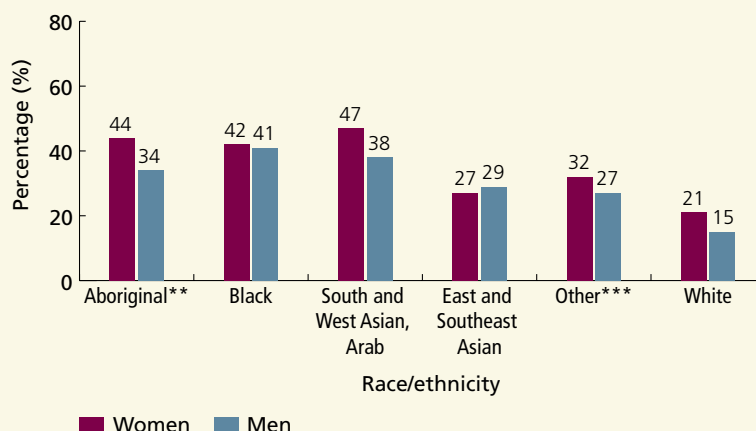
<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

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### Exhibit 12A.3 | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and race/ethnicity, in Ontario, 2005

#### FINDINGS

- The proportion of women and men living in lower-income households varied widely by race/ethnicity.
- White Ontarians were least likely to reside in lower-income households (21 percent of White women and 15 percent of White men reported lower annual household income). However, there were an estimated 1,061,633 White Ontarians (633,861 women and 427,772 men) living in lower-income households, demonstrating that low income is an important problem for all racial/ethnic groups in Ontario.
- Women and men of all other racial/ethnic groups were more likely to report living in lower-income households compared to White women and men. Forty-two percent of Black women and 41 percent of Black men resided in lower-income households, as did 44 percent of Aboriginal women and 34 percent of Aboriginal men, and 47 percent of South and West Asian and Arab women and 38 percent of South and West Asian and Arab men.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

\*\* Includes off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

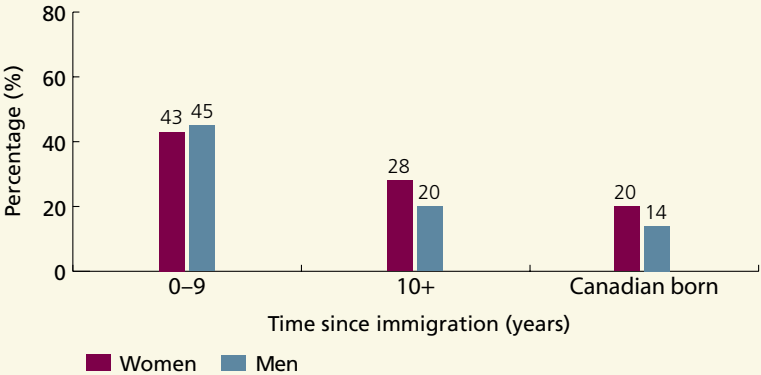
\*\*\* Includes Latin American, other racial and multiple racial origins

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**Exhibit 12A.4 | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and time since immigration, in Ontario, 2005**

**FINDINGS**

- Despite higher levels of education than the Canadian-born population (see next indicator), immigrants who had resided in Canada for less than 10 years were much more likely to live in lower-income households than people who were born in Canada.
- Among immigrants who had been in Canada less than 10 years, 43 percent of women and 45 percent of men lived in lower-income households compared to 20 percent of women and 14 percent of men who were born in Canada.
- Among immigrants who had lived in Canada for 10 or more years, 28 percent of women and 20 percent of men lived in lower-income households.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

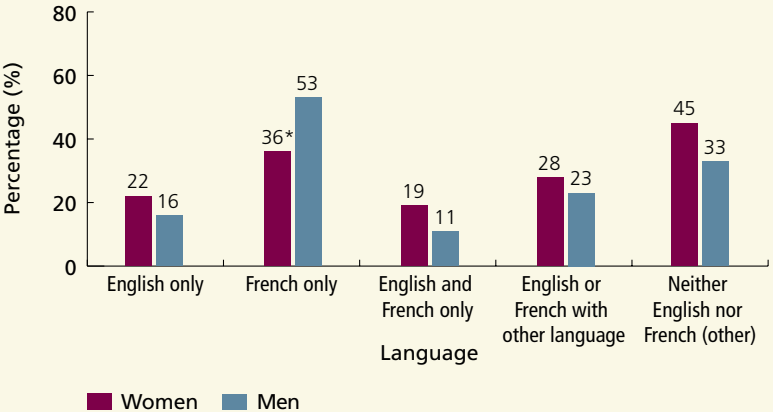
<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12A.5 | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and language spoken, in Ontario, 2005**

**FINDINGS**

- Language was associated with income disparities.
- Ontarians who did not speak English (i.e., spoke only French or spoke neither French nor English) were most likely to live in lower-income households.
- Among those who spoke only French, 36 percent of women and 53 percent of men reported living in lower-income households.
- Among those who spoke neither English nor French, 45 percent of women and 33 percent of men reported living in lower-income households.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

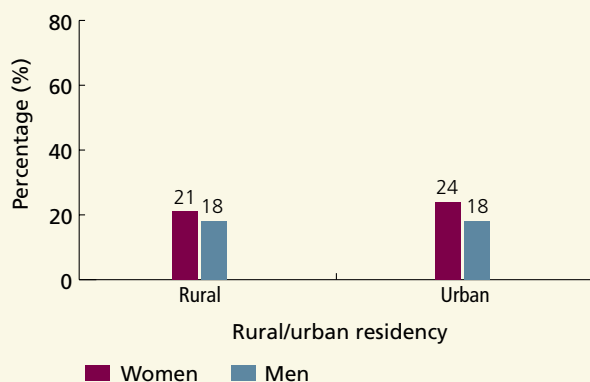
\* Interpret with caution due to high sampling variability

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## Exhibit 12A.6 | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and rural/urban residency, in Ontario, 2005

### FINDINGS

- Women living in urban areas were more likely to live in a lower-income household than women living in rural areas, though the difference was small (24 percent versus 21 percent, respectively).
- In both urban and rural communities, women were more likely than men to report living in a lower-income household.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

<sup>^</sup> Lower income includes the two lowest annual household income categories; see [Appendix 12.2](#) for definitions of annual household income categories

**NOTE:** See [Appendix 12.2](#) for definitions of rural/urban residency

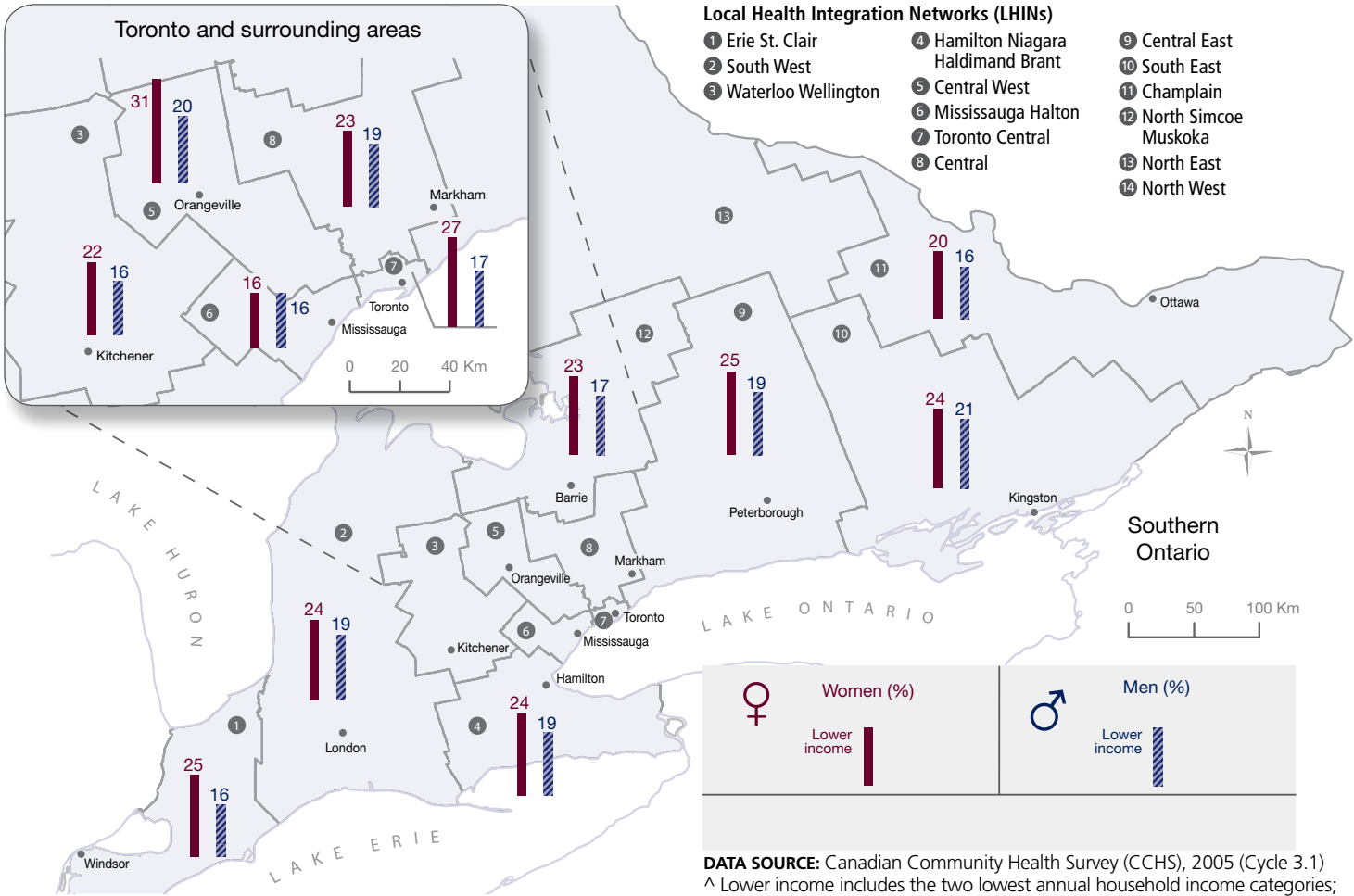
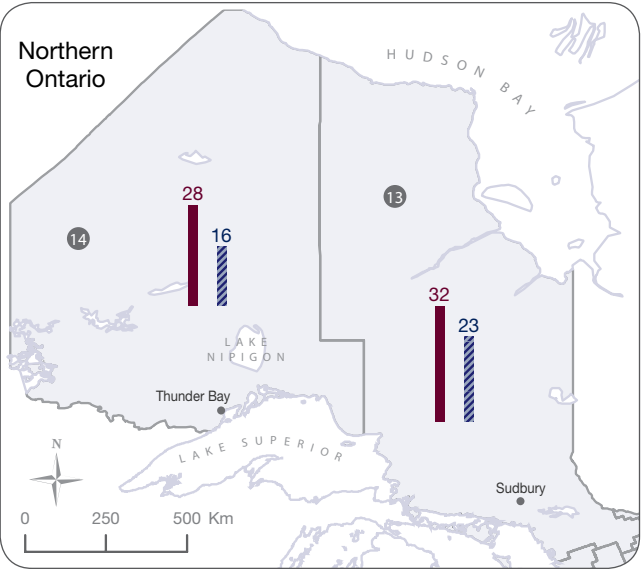
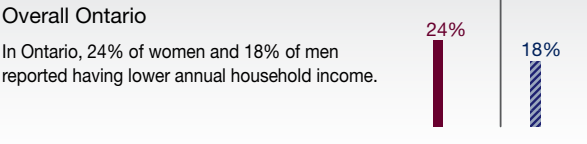
POWER Study

**Exhibit 12A.7** | Age-standardized percentage of adults aged 25 and older who reported a lower annual household income,<sup>^</sup> by sex and Local Health Integration Network (LHIN), in Ontario, 2005

**FINDINGS**

- The percentage of adults living in lower-income households varied across LHINs.
- The percentage of women living in lower-income households ranged from 16 percent in the Mississauga Halton LHIN to 32 percent in the North East LHIN.
- The percentage of men living in lower-income households ranged from 16 percent (Erie St. Clair, Waterloo Wellington, Mississauga Halton, Champlain, and North West LHINs) to 23 percent in the North East LHIN.
- In nearly all LHINs, women were more likely than men to live in lower-income households.

POWER Study



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)  
<sup>^</sup> Lower income includes the two lowest annual household income categories; see Appendix 12.2 for definitions of annual household income categories

## EDUCATION

**Indicator:** This indicator measures the percentage of adults aged 25 and older who reported having a secondary school education or less.

**Background:** Educational attainment is positively associated with health status and health outcomes. A higher education can improve health by influencing other social determinants of health such as income, job security, and working conditions.<sup>2, 31</sup> Beyond improving job opportunities and earnings, education can improve social capital and provide a sense of control and mastery over life, which in turn can benefit health.<sup>31–33</sup> Education can also improve health literacy and a person's ability to access, understand, and use health information to improve their own health.<sup>30, 126</sup> People with higher education may also be more receptive to health promotion messages and have more resources to adopt healthy lifestyles.<sup>2, 31, 33</sup>

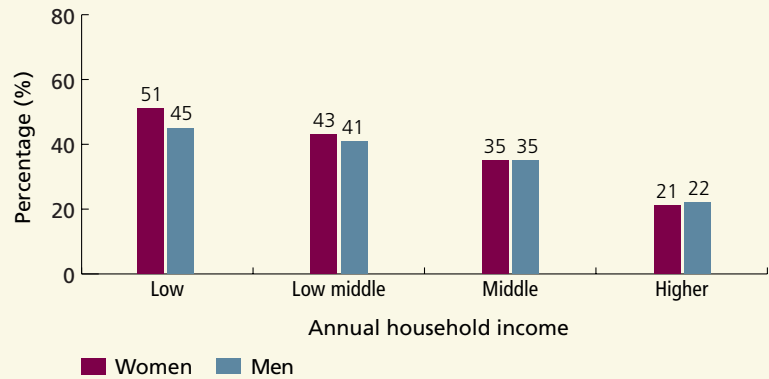
Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to measure this indicator. Lower educational attainment was defined as having a secondary school education or less. Sample size for many at-risk populations in the CCHS was insufficient for us to examine these two categories separately.

**Findings:** In Ontario, almost one-third of adults aged 25 and older (32 percent) reported having a secondary school education or less in 2005. Women were slightly more likely than men to have a secondary school education or less, though this difference was small (33 percent versus 31 percent, respectively).

**Exhibit 12A.8 |** Age-standardized percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and annual household income, in Ontario, 2005

**FINDINGS**

- As expected, people living in low-income households also reported lower levels of educational attainment. Nearly half of adults in low-income households had a secondary school education or less (51 percent of women and 45 percent of men).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

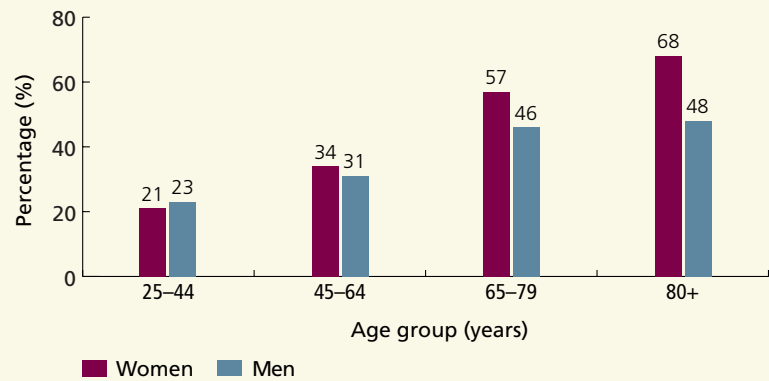
**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12A.9 |** Percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and age group, in Ontario, 2005

**FINDINGS**

- The proportion of women and men who reported having a secondary school education or less increased with age.
- Among adults aged 25–64, a similar proportion of women and men reported having a secondary school education or less.
- However, among adults aged 65 and older, women were much more likely than men to report lower levels of educational attainment (57 percent versus 46 percent, respectively, among those aged 65–79; 68 percent versus 48 percent, respectively, among those aged 80 and older).
- Sex differences in educational attainment were wider in the older age groups, reflecting women’s increasing access to education over time.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

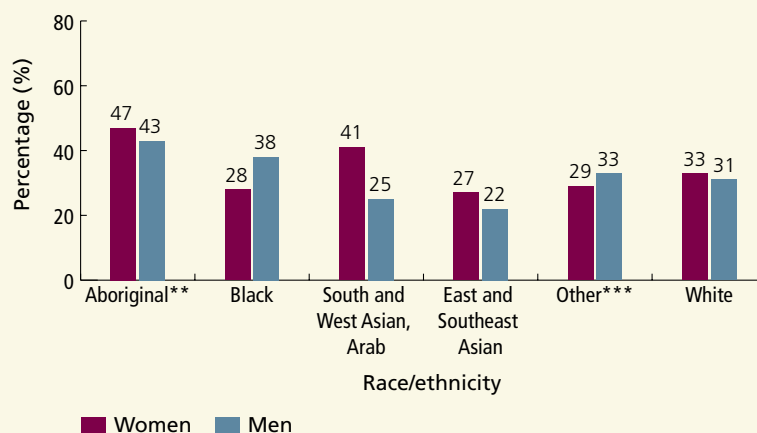
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### Exhibit 12A.10 | Age-standardized percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and race/ethnicity, in Ontario, 2005

#### FINDINGS

- There were large differences in educational attainment associated with race/ethnicity.
- About one in three White Ontarians reported a secondary school education or less.
- East and Southeast Asians were least likely to report lower educational attainment, with 27 percent of women and 22 percent of men reporting a secondary school education or less.
- Among Black Ontarians, men were more likely to report lower educational attainment than women; whereas, among South and West Asian and Arab Ontarians, women were more likely to report lower educational attainment than men.
- Forty-seven percent of Aboriginal women and 43 percent of Aboriginal men reported having a secondary school education or less.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\*\* Includes off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

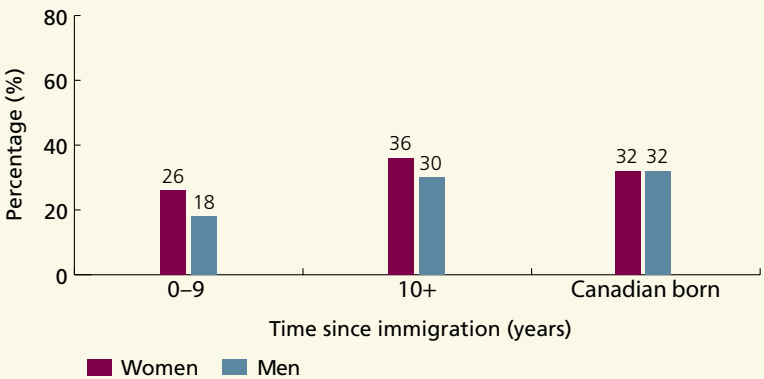
\*\*\* Includes Latin American, other racial and multiple racial origins

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**Exhibit 12A.11** | Age-standardized percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and time since immigration, in Ontario, 2005

**FINDINGS**

- A smaller proportion of immigrants who had been in Canada less than 10 years reported having a secondary school education or less compared to immigrants who had been in Canada for 10 or more years or people who were born in Canada.
- Among women, 26 percent of more recent immigrants reported having a secondary school education or less compared to 36 percent of immigrant women who had been in Canada for 10 or more years and 32 percent of women who were born in Canada.
- Among men, 18 percent of more recent immigrants reported having a secondary school education or less compared to 30 percent of immigrant men who had been in Canada for 10 or more years and 32 percent of men who were born in Canada.



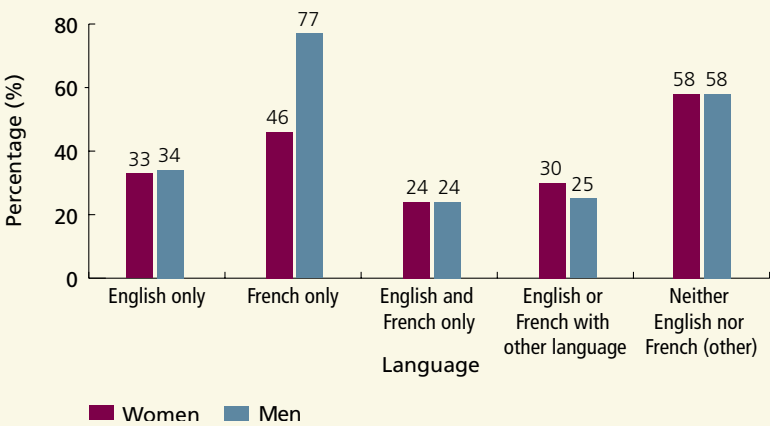
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

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**Exhibit 12A.12** | Age-standardized percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and language spoken, in Ontario, 2005

**FINDINGS**

- Languages spoken were also associated with education. Ontarians who did not speak English (i.e., spoke only French or spoke neither French nor English) were most likely to report having a secondary school education or less.
- Among those who spoke only French, 46 percent of women and 77 percent of men reported having a secondary school education or less.
- Among those who spoke neither English nor French, 58 percent of women and men reported having a secondary school education or less.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

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**Exhibit 12A.13** | Age-standardized percentage of adults aged 25 and older who reported having a secondary school education or less, by sex and Local Health Integration Network (LHIN), in Ontario, 2005

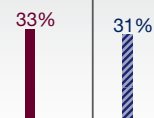
**FINDINGS**

- The percentage of adults who reported having lower educational attainment varied across LHINs.
- The percentage of women who reported having a secondary school education or less ranged from 25 percent in the Toronto Central LHIN to 41 percent in the North East LHIN.
- The percentage of men who reported having a secondary school education or less ranged from 19 percent in the Mississauga Halton LHIN to 42 percent in the North West LHIN.
- Women and men living in rural areas were more likely to report having a secondary school education or less than women and men living in urban areas (36 percent versus 31 percent, respectively) (data not shown).

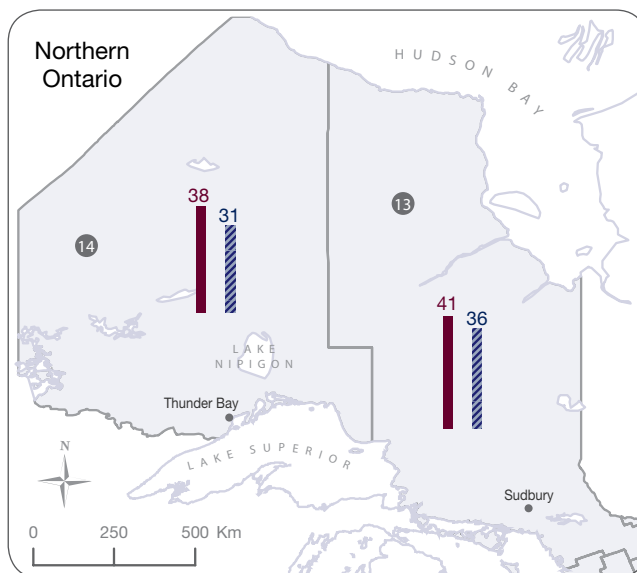
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**Overall Ontario**

In Ontario, 33% of women and 31% of men reported having lower educational attainment.

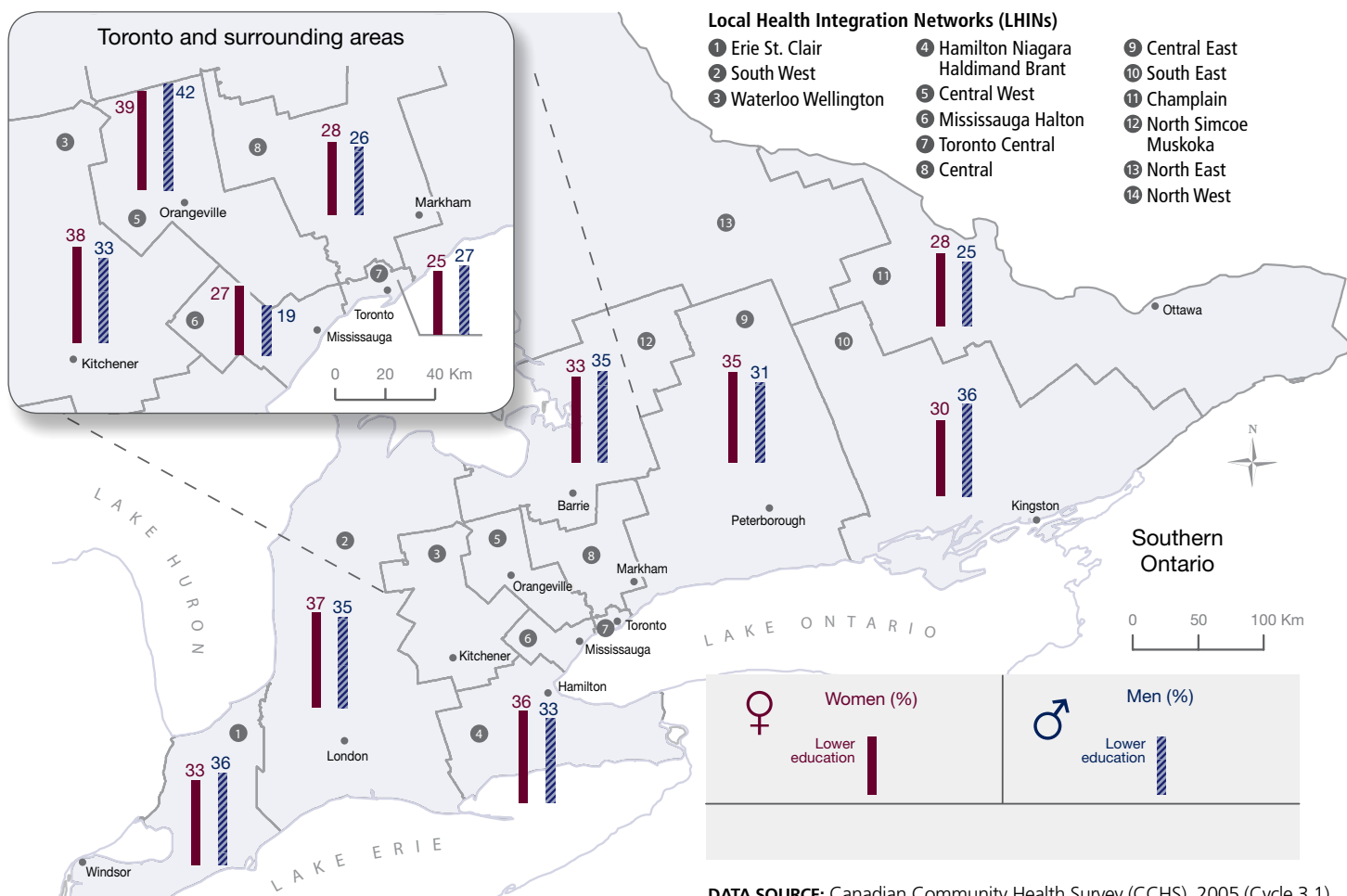


Note: Lower education denotes secondary school graduation or less



**Local Health Integration Networks (LHINs)**

- |                       |                                    |                         |
|-----------------------|------------------------------------|-------------------------|
| 1 Erie St. Clair      | 4 Hamilton Niagara Haldimand Brant | 9 Central East          |
| 2 South West          | 5 Central West                     | 10 South East           |
| 3 Waterloo Wellington | 6 Mississauga Halton               | 11 Champlain            |
|                       | 7 Toronto Central                  | 12 North Simcoe Muskoka |
|                       | 8 Central                          | 13 North East           |
|                       |                                    | 14 North West           |



DATA SOURCE: Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

## EMPLOYMENT

**Indicator:** This indicator measures the percentage of adults aged 25–75 who reported that they were employed in the last week.

**Background:** Employment is an important determinant of physical and mental health, and social well-being. Employment provides income, which increases access to better living conditions, leads to better food and shelter security, and improved access to health services.<sup>2, 30</sup> Employment not only contributes to income, but also affects the mental health and social well-being of an individual by providing a time structure, social contact with peers, and an increased sense of identity.<sup>69, 70</sup> Over the past several decades, employment rates among women have risen dramatically. From 1976 to 2007 the number of women participating in the labour market increased by 120.5 percent; however, in 2007, men continued to have higher employment rates than women (68.0 and 59.1 percent, respectively); nevertheless, this gap is smaller than it has ever been in recorded history.<sup>127</sup> While this may have a positive impact on women, having a job does not necessarily equate to better health. Although not reported here, other job characteristics (such as unsafe working conditions, job insecurity, low decision latitude, low wages, long working hours, job strain, etc.) are also important determinants of health.<sup>72, 128–133</sup> Additionally, as women continue to do the majority of household work and caregiving,<sup>42</sup> employed women may experience more time-stress and caregiver burden than employed men.<sup>134–137</sup>

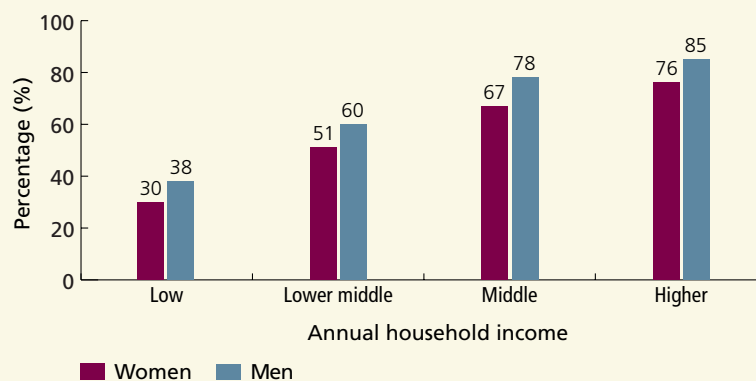
Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to assess this indicator. All jobs (including part-time jobs, seasonal work, contract work, self-employment, baby-sitting, and any other paid work) were counted regardless of the number of hours worked. We included those aged 65–75 because women and men are increasingly working past the traditional retirement age.

**Findings:** In Ontario, 72 percent of adults aged 25–75 reported being employed in the last week. Women were less likely than men to report being employed (66 percent versus 78 percent, respectively).

### Exhibit 12A.14 | Age-standardized percentage of adults aged 25–75 who reported being employed in the last week, by sex and annual household income, in Ontario, 2007–2008

#### FINDINGS

- Across all income levels, women were less likely than men to report being employed in the last week.
- As expected, there was a strong relationship between employment and annual household income.
- While the majority of adults living in the higher-income households reported being employed in the last week (76 percent of women and 85 percent of men), only about one-third of adults living in low-income households reported being similarly employed (30 percent of women and 38 percent of men).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

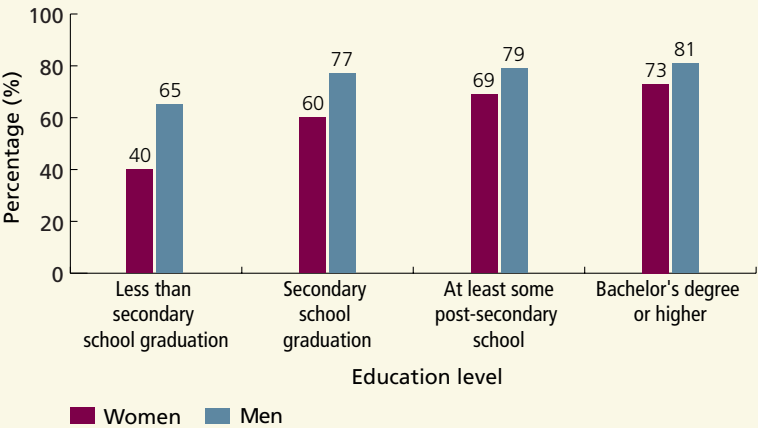
**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12A.15** | Age-standardized percentage of adults aged 25–75 who reported being employed in the last week, by sex and education level, in Ontario, 2007–2008

**FINDINGS**

- Women were less likely than men to report being employed in the last week, irrespective of educational attainment. However, the sex differences narrowed with higher levels of educational attainment.
- Only 40 percent of women with less than a secondary school education reported being employed in the last week.
- The proportion of working-age adults who reported being employed in the last week increased with higher levels of educational attainment, ranging from 40 percent of women and 65 percent of men with less than a secondary school diploma to 73 percent of women and 81 percent of men with a Bachelor's degree or higher.
- The proportion of adults who reported being employed in the last week declined with age. Women and men aged 25–44 were most likely to report being employed in the last week (78 percent of women and 91 percent of men) compared to 69 percent of women and 79 percent of men aged 45–64, and 11 percent of women and 21 percent of men aged 65–75 (data not shown).



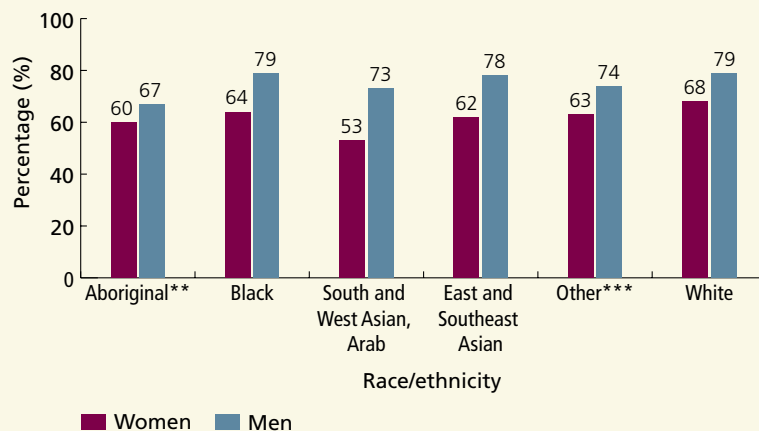
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

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### Exhibit 12A.16 | Age-standardized percentage of adults aged 25–75 who reported being employed in the last week, by sex and race/ethnicity, in Ontario, 2007–2008

#### FINDINGS

- The proportion of adults aged 25–75 who reported being employed in the last week varied by race/ethnicity.
- Fifty-three percent of South and West Asian and Arab women reported being employed in the last week, compared to 68 percent of White women. Although South and West Asian and Arab women were least likely to report being employed in the last week, this proportion was not significantly different from other minority women, possibly due to small sample size and limited power to detect differences.
- Aboriginal men were less likely to report being employed in the last week compared to White, Black, and East and Southeast Asian men.
- Across all racial/ethnic groups, women were less likely to report being employed in the last week compared to men, although sex differences were not significant among Aboriginal people or people who were categorized as being of “other” race/ethnicity.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

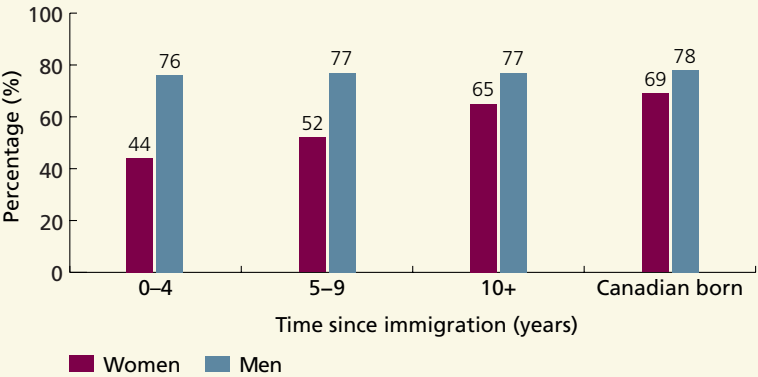
\*\* Includes off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

\*\*\* Includes Latin American, other racial and multiple racial origins

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**Exhibit 12A.17** | Age-standardized percentage of adults aged 25–75 who reported being employed in the last week, by sex and time since immigration, in Ontario, 2007–2008



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

**FINDINGS**

- Regardless of how long people had been living in Canada, women were less likely than men to report being employed in the last week. These sex differences were widest among the most recent immigrants and narrowed with duration of residence in Canada.
- The proportion of immigrant women who reported being employed in the last week increased with duration of residence in Canada, ranging from 44 percent among the most recent immigrants (0–4 years in Canada) to 65 percent among those who had lived in Canada for 10 or more years.
- The proportion of women who reported being employed in the last week was similar between immigrant women who had been living in Canada for 10 or more years and women who were born in Canada.
- The proportion of immigrant men who reported being employed in the last week was similar, irrespective of duration of residence in Canada; this proportion did not differ between immigrant and Canadian-born men.
- The percentage of men who reported being employed in the last week varied across Local Health Integration Networks (LHINs), ranging from 70 percent (South East LHIN) to 83 percent (Mississauga Halton LHIN). The proportion of women who reported being employed in the last week ranged from 60 percent to 70 percent, however, this difference was not significant (data not shown).
- The proportion of men who reported being employed in the last week was slightly lower among those living in urban areas than rural areas (77 percent versus 80 percent, respectively); the proportion of women who reported being employed was the same among rural- and urban-dwelling women (66 percent and 66 percent, respectively) (data not shown).

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## FULL-TIME EMPLOYMENT

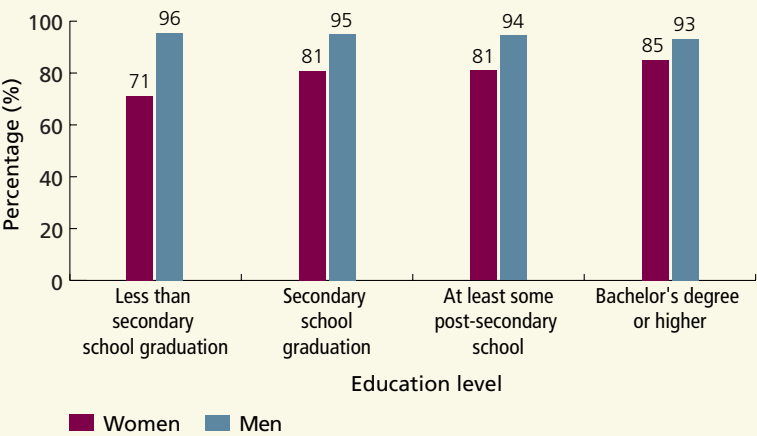
**Indicator:** This indicator measures the percentage of employed adults aged 25–75 who reported that they usually worked full-time (30 hours or more per week).

**Background:** While employment is an important determinant of health, whether a person is employed full-time or part-time can also influence health. In addition to higher earnings, full-time employees in Canada are entitled to a greater number of benefits and employment insurance. However, full-time employment may also result in challenges to achieving a work-life balance. Part-time employment can be voluntary; however, it can also be involuntary if someone is working part-time because they are unable to find full-time employment. In Canada, women are more likely than men to work part-time and are more likely to report working part-time due to family or caregiving responsibilities. Therefore, the distinction between voluntary and involuntary part-time work is important; however, the indicator reported here does not make this distinction.

Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to measure this indicator. This indicator includes the number of hours usually worked at all jobs, including any extra hours usually worked (extra hours usually worked were included irrespective of whether they were paid or unpaid). In this chapter, we report the percentage of employed adults aged 25–75 who reported that they usually worked full-time (30 hours or more per week). Of note, an individual who had multiple part-time jobs and worked 30 hours or more per week would be counted as working full-time. Due to small numbers and limited power to detect differences, we do not report the percentage of employed adults who reported working part-time.

**Findings:** In Ontario, 88 percent of employed adults aged 25–75 reported that they usually worked full-time. Women were less likely than men to work full-time (82 percent versus 94 percent, respectively).

**Exhibit 12A.18** | Age-standardized percentage of employed adults aged 25–75 who reported that they usually work full-time, by sex and education level, in Ontario, 2007–2008



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

**FINDINGS**

- Among women who reported being employed, those with higher levels of education were more likely to report working full-time than women with lower levels of education (85 percent of women with a Bachelor's degree or higher versus 71 percent of women with less than a high school education). Among employed men, full-time employment did not vary by educational attainment.
- Not surprisingly, among those who reported being employed, there was a higher percentage that worked full-time in the highest-income households (86 percent of women and 96 percent of men) than in the lowest-income households (58 percent of women and 78 percent of men) (data not shown).
- Among those aged 25–64, over 80 percent of employed women and over 90 percent of employed men reported working full-time. Among those aged 65–75 who are employed, this figure dropped to 45 percent of women and 60 percent of men aged 65–75 (data not shown).
- Employed women living in rural areas were less likely to report working full-time than employed women living in urban areas (77 percent versus 83 percent, respectively); employed men were equally likely to report working full-time, regardless of whether they lived in rural or urban areas (95 percent versus 94 percent, respectively) (data not shown).
- The percentage of employed adults who reported that they usually worked full-time did not vary by race/ethnicity, time since immigration, or Local Health Integration Network (LHIN) (data not shown).

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## UNEMPLOYMENT

**Indicator:** This indicator measures the proportion of the labour force aged 25–75 who reported not having a job in the last week and having looked for a job in the last 4 weeks.

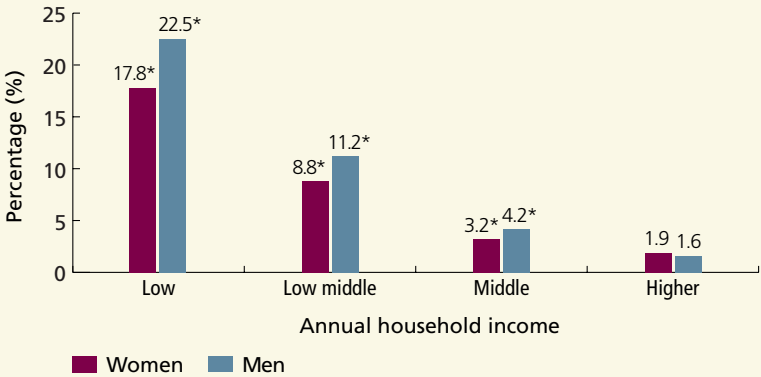
**Background:** Unemployment affects the physical, psychological, and social well-being of individuals. With unemployment comes material and social deprivation, as well as psychological stress—all of which are related to health.<sup>30</sup> While the relationship between unemployment and health is complex, unemployment is associated with poor health: people who are unemployed have worse physical and emotional health, increased health service use, and higher rates of mortality.<sup>138–140</sup>

Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to assess this indicator. This indicator is defined as the percentage of the labour force (those who were employed and those who were unemployed but looking for work) who reported that they did not have a job last week but had looked for work in the past four weeks.

The official 2008 Ontario unemployment rate reported by Statistics Canada was 6.5 percent among adults aged 15 and older.<sup>141</sup> Although this figure includes youth (aged 15–24) who tend to have higher rates of unemployment, the official unemployment rate is much higher than the rates we have estimated from the CCHS data. Therefore, the rates we report in this section are an underestimate; these differences may be due to differences in sampling, timing, and survey methods. Nevertheless, comparison of this indicator across groups should reflect variation in unemployment across groups.

**Findings:** Based on data from the CCHS, 2007–2008, the percentage of adults aged 25–75 who were unemployed was 3.8 percent (3.8 percent among women and 3.8 percent among men); however, this is likely an underestimate.

**Exhibit 12A.19** | Age-standardized percentage of the labour force^ aged 25–75 who reported being unemployed but had looked for a job in the past four weeks, by sex and annual household income, in Ontario, 2007–2008



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

^ Labour force consists of all people who are either employed or unemployed but looked for work in the past four weeks

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

**FINDINGS**

- Not surprisingly, the percentage of adults aged 25–75 who reported being unemployed was higher among adults with the lowest annual household income than among those with the highest annual household income (19.9 percent versus 1.7 percent, respectively).
- Immigrant women who had been in Canada less than 10 years were more likely to report being unemployed compared to immigrant women who had been in Canada for 10 or more years and those who had been born in Canada (10.5 percent versus 2.8 and 3.3 percent, respectively) (data not shown).
- The percentage of immigrant men who reported being unemployed did not differ by duration of residence in Canada, and was similar to rates among Canadian-born men (data not shown).
- Adults who reported being visible minorities were more likely to report being unemployed than White adults (6.6 percent of women and 5.9 percent of men among visible minorities versus 2.8 percent of White women and 3.0 percent of White men). Note that the percentage of visible minority men who reported being unemployed (5.9 percent) should be interpreted with caution due to high sampling variability (data not shown).
- Unemployment did not vary by rural/urban residency (data not shown).
- We did not find differences in unemployment by age or Local Health Integration Network (LHIN). However, this may have been due to small sample sizes and therefore limited power to detect differences (data not shown).

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## PERMANENTLY UNABLE TO WORK

**Indicator:** This indicator measures the percentage of adults aged 25–75 who reported that they were permanently unable to work.

**Background:** As previously discussed, employment is an important determinant of health, providing people with financial security as well as having the potential to positively affect mental and social well-being.<sup>2, 30, 69</sup> However, many people may be unable to work due to physical or mental health conditions.<sup>142–145</sup> People with lower income and lower levels of educational attainment are more likely to experience injury and illness leading to disability.<sup>146–148</sup> Public health efforts are needed to reduce disability in the population. However, it is also important to advance the inclusion of people with disabilities in the workforce.<sup>149</sup> While employment rates among people with disabilities have risen, in 2006, the employment rate for working-age Canadians with disabilities was still only 53.5 percent.<sup>149</sup>

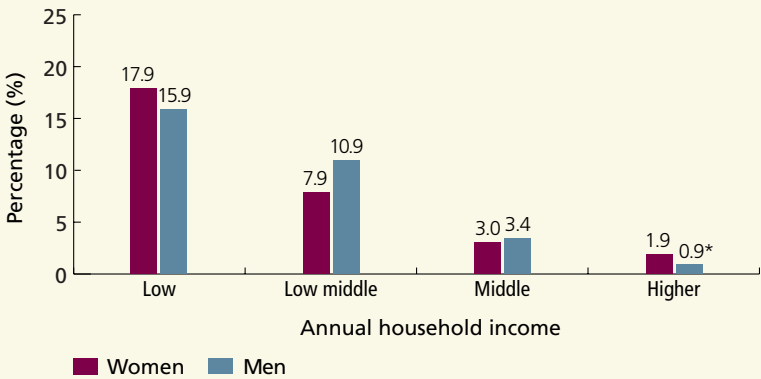
Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to measure this indicator. All survey participants were asked, “Last week, did you work at a job or a business?” The response options for this question were “yes,” “no,” and “permanently unable to work.” This indicator measures the percentage of all survey participants who reported that they were permanently unable to work. Although reasons for being unable to work were not specified, these reasons would include physical and mental illnesses as well as disability.

**Findings:** In Ontario, 4.0 percent of adults aged 25–75 reported being permanently unable to work (4.3 percent of women and 3.8 percent of men).

**Exhibit 12A.20** | Age-standardized percentage of adults aged 25–75 who reported that they were permanently unable to work, by sex and annual household income, in Ontario, 2007–2008

**FINDINGS**

- Not surprisingly, women and men who reported being permanently unable to work were more likely to live in low-income households. While 17.2 percent of people living in the lowest-income households reported being permanently unable to work, only 1.3 percent of people in the highest-income households reported being unable to work (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

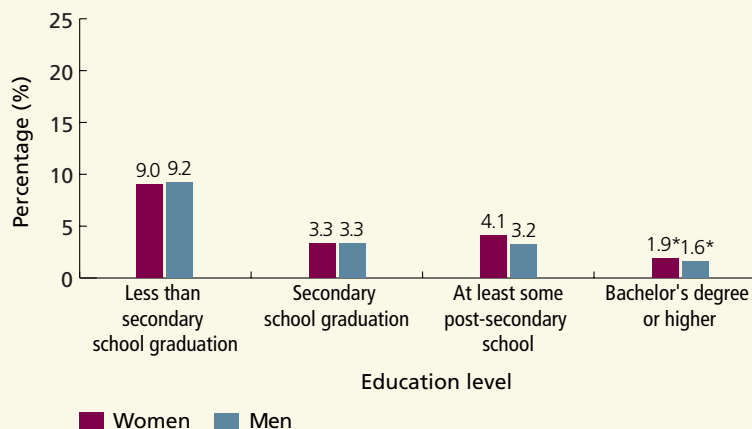
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### Exhibit 12A.21 | Age-standardized percentage of adults aged 25–75 who reported that they were permanently unable to work, by sex and education level, in Ontario, 2007–2008

#### FINDINGS

- Women and men who had not completed secondary school were more likely to report being permanently unable to work than those with higher educational attainment.
- Nearly one in ten adults who had not completed secondary school reported being permanently unable to work.
- The percentage of adults who reported being permanently unable to work increased with age. The percentage who reported being permanently unable to work ranged from 1.6 percent of those aged 25–44 to 9.0 percent of those aged 65–75 among women and from 1.5 percent of those aged 25–44 to 7.3 percent of those aged 65–75 among men (data not shown).
- The percentage of people who reported being permanently unable to work varied somewhat by rural/urban residence, although the difference was small (3.4 percent of rural residents versus 4.2 percent of urban residents) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

\* Interpret with caution due to high sampling variability

POWER Study

## LONE-PARENT FAMILIES

**Indicator:** This indicator measures the percentage of families with children under age 25 that are lone-parent families. For this indicator, families were defined as “economic families,” which include a group of two or more people who live in the same dwelling and are related to each other by blood, marriage, common-law, or adoption. A couple could be of opposite or same sex.

**Background:** Lone-parent families have become increasingly common and women continue to represent the majority of lone parents. Lone parents, and particularly lone mothers, are more likely to experience important risk factors for poor health. Specifically, lone parents are at increased risk of financial stress leading to food insecurity, poor housing conditions, and reduced standard of living.<sup>60, 62, 150</sup> Compared to their married or attached counterparts, lone parents have higher levels of stress and lower levels of social support and social capital.<sup>61, 63</sup> Consequently, their physical and mental health may be affected.<sup>59, 60, 64</sup>

Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to measure this indicator. The denominator represents economic families.

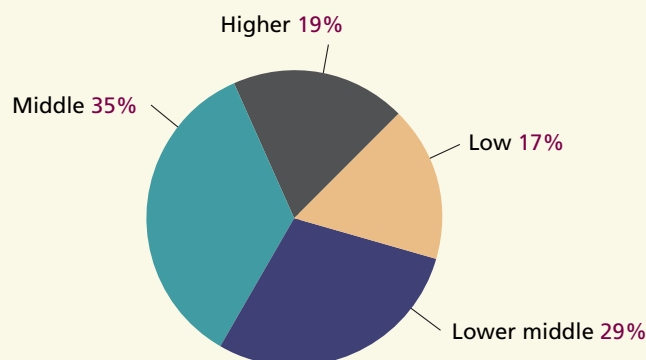
**Findings:** In Ontario, 15 percent of all economic families with children under age 25 were lone-parent households. Eighty-five percent of all lone-parent households were led by women.

## Exhibit 12A.22 | Distribution of annual household income among female-headed and male-headed lone-parent households with children under age 25, in Ontario, 2007–2008

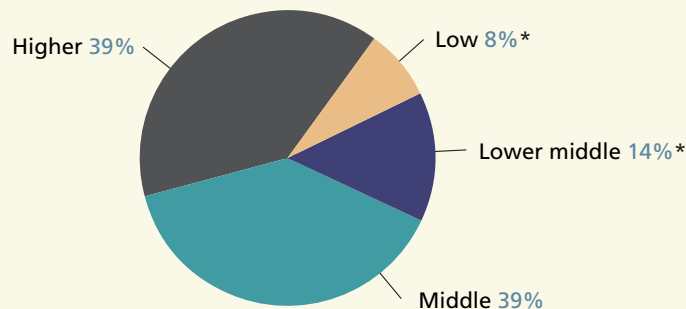
### FINDINGS

- Overall, a high proportion of lone-parent households (43 percent) were in the two lowest-income categories; this was primarily driven by the high rates of lower income among female-headed lone parent households (data not shown).
- Lone-parent households headed by women were twice as likely to be in the two lowest-income categories as those headed by men (46 percent versus 22 percent, respectively). The proportion of male-headed lone-parent households that were in the two lowest-income categories was comparable to the low-income rate observed in the overall adult population (21 percent) (see [low income indicator](#)).

### Female-headed lone-parent households



### Male-headed lone-parent households



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

\* Interpret with caution due to high sampling variability

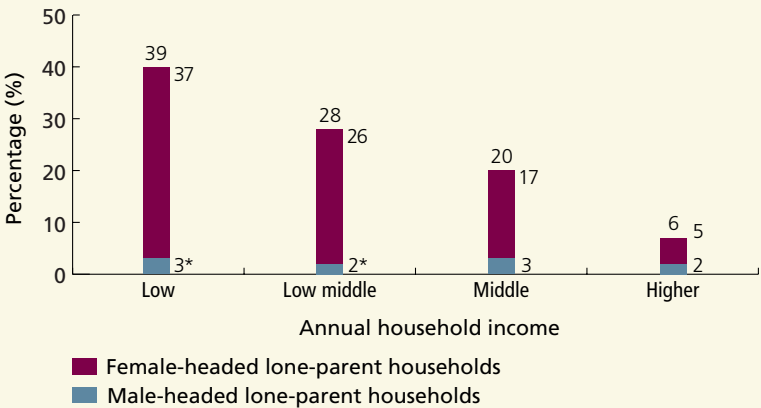
**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12A.23 | Percentage of households with children under age 25 that are lone-parent households, by sex of lone-parent and annual household income, in Ontario, 2007–2008**

**FINDINGS**

- Among households with children, the low-income households were over six times as likely to be headed by a lone parent compared to the higher-income households (39 percent versus 6 percent, respectively).
- This difference was primarily due to the distribution of female-headed, lone-parent households. While 37 percent of the lowest-income households were headed by female lone parents, only five percent of the highest-income households were led by female lone parents.
- Irrespective of income, only two to three percent of households with children were headed by male lone parents.
- A higher proportion of households with children were headed by lone parents in urban areas compared to rural areas (16 percent versus 9 percent, respectively). This difference was primarily due to a higher proportion of female-headed, lone-parent households in urban areas (14 percent) compared to rural areas (7 percent); in both rural and urban areas, two percent of households with children were headed by male lone parents (data not shown).
- The proportion of households with children that were headed by lone parents did not vary across Local Health Integration Networks (LHINs) (data not shown).



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007–2008

\* Interpret with caution due to high sampling variability

**NOTES:** Numbers may not add up due to rounding. See [Appendix 12.2](#) for definitions of annual household income categories

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## FOOD SECURITY

**Indicator:** Food insecurity is an indicator of the percentage of adults who reported that, due to a lack of money, they or a member of their household did not have enough to eat, worried about there not being enough to eat, or did not eat the quality or variety of foods desired.

**Background:** Good nutrition promotes health, reduces the risk of illness and chronic disease, and improves health outcomes among individuals with chronic conditions. As such, food insecurity is associated with worse health status and increased use of clinical services.

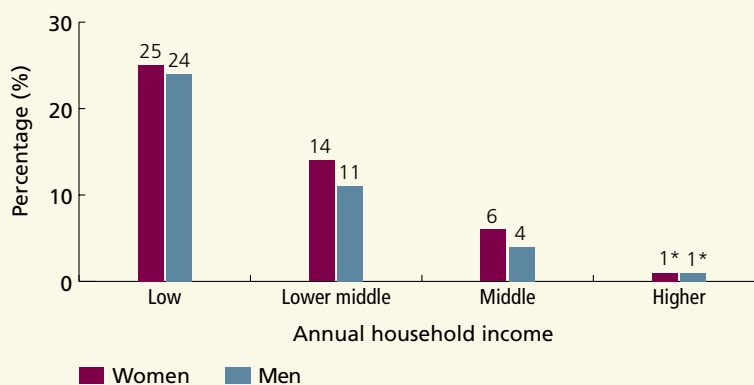
Data from the Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) were used to measure this indicator.

**Findings:** Overall, five percent of Ontario adults aged 25 and older reported food insecurity in 2005. Food insecurity was reported by six percent of women and four percent of men.

### Exhibit 12A.24 | Age-standardized percentage of adults aged 25 and older who reported food insecurity, by sex and annual household income, in Ontario, 2005

#### FINDINGS

- There was a large income gradient in the percentage of adults who reported food insecurity, with one-quarter of low-income women and men reporting that they did not have enough to eat, worried about there not being enough to eat, or did not eat the quality or variety of foods they desired due to a lack of money.
- Not surprisingly, food insecurity was not reported to be a problem among higher-income households.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

POWER Study

# Section 12B

## *Low-Income Populations*

### INTRODUCTION

Income is a powerful social determinant of health. Poverty has been described as “the single largest determinant of health”<sup>5</sup> due to its pervasive effect on many other social determinants of health, including education, food security and nutrition, housing, and lifestyle choices.<sup>66</sup>

Income also shapes people's ability to access and benefit from health services.<sup>151, 152</sup> Neighbourhood income is also associated with the other social determinants of health, such as unemployment rates, educational attainment, family structure (e.g., lone parent households or living alone), home ownership, crime rates, and neighbourhood resources.<sup>93, 153–156</sup> Low income—at the personal, household, and neighbourhood levels—is associated with higher rates of chronic illness, disability, and mortality. It is not just the poorest people who are affected; a gradient in health has been consistently found on multiple measures internationally, such that the poorest people have the worst health status and those in the middle-income categories have worse health status than those who are more affluent.<sup>1</sup>

Poverty remains an important problem in Canada and Ontario. In 2009, an estimated 9.6 percent of Canadians, or almost 3.2 million people, had an annual household income below the low income cut-off (LICO), a measure used by Statistics Canada to assess poverty.<sup>157</sup> Between 2002 and 2007, one in five Canadians experienced low annual income (below the LICO) at least once.<sup>153</sup> Women have higher rates of poverty than men.<sup>58, 151</sup> As reported earlier in this chapter, women were more likely to live in lower-income households than men (24 percent versus 18 percent, respectively) (see [Income Indicator](#)). Female-

headed, lone-parent families continue to experience one of the highest rates of poverty, with a low-income rate that is more than four times higher than two-parent families.<sup>125, 151</sup> The POWER Study found that low-income women in Ontario are particularly disadvantaged with respect to health status.<sup>58</sup> Poverty rates are also higher among recent immigrants, racialized communities, Aboriginal Canadians, and people with disabilities.<sup>45, 98, 125, 149, 158</sup>

Despite universal health insurance, inequities in health associated with socioeconomic position are pervasive in Canada.<sup>26, 27, 146, 153, 159–161</sup> People in the lowest-income quintile account for more than twice as much health service utilization as those in the highest-income quintile; it is estimated that health care spending could be reduced by almost 20 percent by addressing these income-related disparities.<sup>162</sup> Additionally, the difference in life expectancy between Canadians living in the lowest-income neighbourhoods compared to those living in the highest-income neighbourhoods is about three years.<sup>146</sup> In Ontario, the POWER Study has found sizable and modifiable health inequities on multiple measures associated with gender, income, education, race/ethnicity, and where one lives.<sup>26, 27</sup>

While income-related disparities in avoidable mortality have declined over time since the initiation of universal health care in Canada, the amount of reduction observed

has varied by condition, and income-related disparities have persisted for the most common causes of death.<sup>120</sup> James and colleagues found that for conditions primarily amenable to medical intervention, the remaining disparities were small; however, for conditions which were primarily amenable to public health interventions (e.g., lung cancer, chronic obstructive pulmonary disease, HIV), there was little change over time in income-related disparities.<sup>120</sup> These findings underscore the importance of population-based interventions that address the root causes of health inequities.

For health equity to become a reality, health and social policies to address the social determinants of health, as well as universal access to effective health care, are needed. Implementing strategies that address poverty and other social determinants of health can reduce health inequities, as well as improve overall population health, enhance quality of life, reduce mortality, and reduce health care costs. Additionally, health systems need to be redesigned to optimize health-related outcomes among low-income populations. International, national, and regional agencies and governments are increasingly recognizing the impact of health disparities and the importance of addressing them. Recently, the World Health Organization issued a declaration expressing global political commitment and dedicated national action plans to reduce health inequities by implementing a social determinants of health approach.<sup>25</sup> A number of countries have developed and implemented national strategies to reduce health inequities, including England, the Netherlands, Sweden, Norway, and Finland.<sup>163–165</sup> These strategies address the problems through various interventions targeted at the population, system, or individual level, with varying levels of success.<sup>163</sup>

This section synthesizes findings related to income differences in health status as well as access, quality, and outcomes of care across prior POWER Study chapters to paint a picture of health inequities associated with

income in Ontario. Income-related disparities have been summarized and organized into the following five subsections:

- Health and Functional Status
- Risk Factors and Prevention
- Access to Health Care Services
- Clinical Management
- Health Outcomes

Throughout the POWER Study, we have measured income using neighbourhood income or annual household income. For indicators that were based on data from the Canadian Community Health Survey (CCHS), self-reported annual household income was stratified into four levels based on income and household size. Indicators based on health care administrative databases (e.g., data from the Ontario Health Insurance Plan (OHIP)) were stratified by neighbourhood income quintiles. See [Appendix 12.2](#) for more detail on these measures of income and how income categories were defined.

The POWER Study found that while access to care and quality of care varied somewhat by income, many measures of health care quality, particularly in the acute care setting, exhibited minimal or no differences associated with income. However, large differences were observed in how sick people were (health status, functioning, chronic disease prevalence, and comorbidity), their chronic disease risk factors and preventive care (behaviour-related factors, teen pregnancy, and cancer screening), and their health outcomes (including hospitalizations and mortality).<sup>26, 27</sup> Thus, while it is important to provide equitable access to effective care irrespective of socioeconomic position, success at reducing health inequities requires interventions aimed at the social determinants of health, since “creating a fairer society is fundamental to improving the health of the whole population and ensuring a fairer distribution of good health.”<sup>7</sup>



# HEALTH AND FUNCTIONAL STATUS

The primary goal of both public health and health care services is to improve quality of life by optimizing health and functional status.<sup>22, 166</sup> Health and functional status are influenced by individuals' experiences over their life course, including their socioeconomic position, the characteristics of their communities, and their interactions with the health care system.<sup>94, 167</sup> Chronic diseases have a large impact on quality of life and the affected individual's functional status and ability to work, while placing enormous demands on the health care system.<sup>58</sup> Chronic diseases are estimated to account for 87 percent of disability in Canada and 67 percent of total health care costs.<sup>168</sup>

Throughout the POWER Study, we found large and potentially modifiable differences in health and functional status associated with income in Ontario. Low-income women and men were much more likely to report fair or poor health, fair or poor mental health, functional limitations, and the presence of chronic conditions compared to higher-income Ontarians. In this section, we re-examine and synthesize these findings to paint a picture of the health and functional status of lower-income people in Ontario. See [Table 12B.1](#) for a full list of indicators that are synthesized in this section. This table summarizes where income-related disparities were found and notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

**Table 12B.1 | Income Disparities in Health and Functional Status**

Indicator	Income Difference	POWER Study chapter where reported
<b>Self-Rated Health Status</b>		
<b>Self-rated health</b>		
• in the Ontario population	Y	<a href="#">Burden of Illness</a>
• among those with cardiovascular disease	Y	<a href="#">Cardiovascular Disease</a>
• among those with diabetes	Y	<a href="#">Diabetes</a>
<b>Self-rated mental health</b>		
• in the Ontario population	Y	<a href="#">Burden of Illness</a>
<b>Self-rated health as compared to a year ago</b>		
• among those with cardiovascular disease	Y <sup>c</sup>	<a href="#">Cardiovascular Disease</a>
<b>Functional Status and Disability</b>		
<b>Activity limitations</b>		
• in the Ontario population	Y	<a href="#">Burden of Illness</a>
• among those with cardiovascular disease	Y	<a href="#">Cardiovascular Disease</a>
• among those with arthritis or rheumatism	Y	<a href="#">Musculoskeletal Conditions</a>
<b>Activities prevented by pain or discomfort</b>		
• in the Ontario population	Y	<a href="#">Burden of Illness</a>
• among those with cardiovascular disease	Y	<a href="#">Cardiovascular Disease</a>
• among those with arthritis and rheumatism	Y	<a href="#">Musculoskeletal Conditions</a>

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**Table 12B.1 | Income Disparities in Health and Functional Status (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Functional Status and Disability (Continued)</b>		
<b>Limitations in instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs)</b>		
• in the Ontario population	Y	<a href="#">Burden of Illness</a>
• among those with cardiovascular disease	Y	<a href="#">Cardiovascular Disease</a>
• among those with arthritis or rheumatism	Y	<a href="#">Musculoskeletal Conditions</a>
• among those with diabetes	Y	<a href="#">Diabetes</a>
<b>Chronic Disease, Cancer, and Multiple Chronic Conditions</b>		
<b>Prevalence of selected chronic conditions</b>		
• hypertension	Y	<a href="#">Burden of Illness</a>
• arthritis	Y	<a href="#">Burden of Illness</a>
• obstructive lung disease (asthma, chronic bronchitis, emphysema or chronic obstructive pulmonary disease)	Y	<a href="#">Burden of Illness</a>
• diabetes	Y	<a href="#">Burden of Illness</a>
• heart disease or stroke	Y	<a href="#">Burden of Illness</a>
• prevalence of back problems	Y	<a href="#">Musculoskeletal Conditions</a>
• prevalence of probable depression	Y <sup>a</sup>	<a href="#">Depression</a>
<b>Cancer incidence for selected cancer types</b>		
• lung cancer	Y	<a href="#">Cancer</a>
• colorectal cancer	Y <sup>b</sup>	<a href="#">Cancer</a>
• breast cancer	Y <sup>^</sup>	<a href="#">Cancer</a>
• gynaecological cancers (ovarian, cervical, uterine)	N	<a href="#">Cancer</a>
<b>Prevalence of multiple chronic conditions</b>	Y	<a href="#">Burden of Illness</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

<sup>^</sup> Higher-income women have higher rates of breast cancer compared to lower-income women. Other significant income gradients in this table show lower-income adults to be disadvantaged.

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Self-Rated Health Status

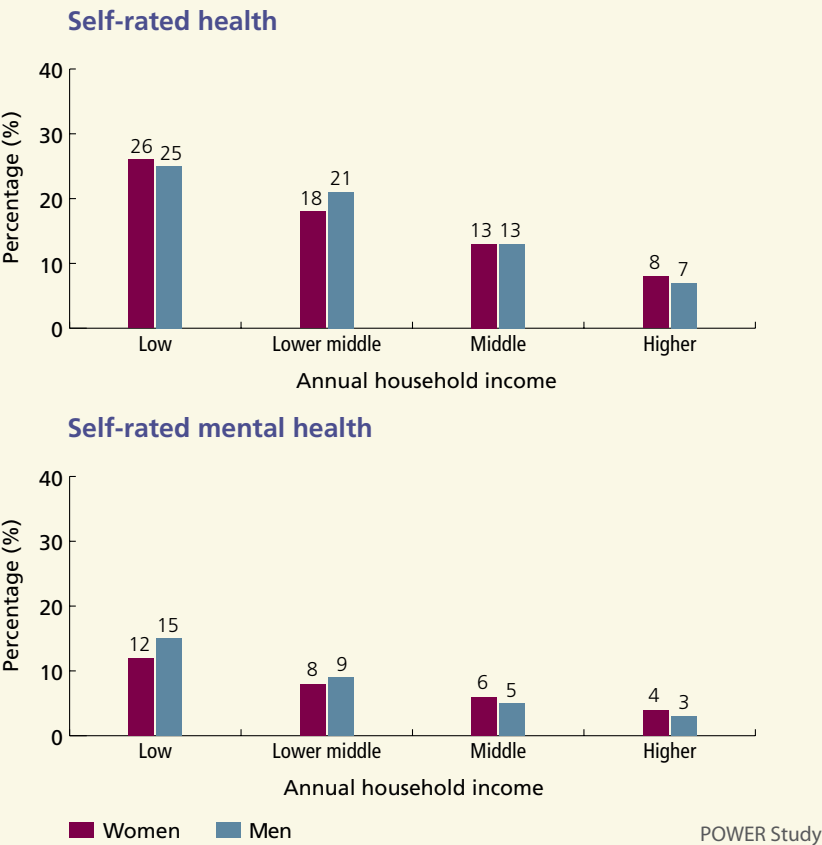
Self-rated health—also referred to as global, self-reported, or self-perceived health—is an indicator of how people rate their overall health status. Self-rated health is a well-validated measure of health status and has been shown to be predictive of numerous health outcomes including mortality, health care utilization, and health care costs in diverse populations.<sup>169–171</sup>

Throughout the POWER Study, we consistently found that lower-income adults reported being in worse

health than those with higher incomes. An income gradient was found for measures of both self-rated health and self-rated mental health. Compared to higher-income adults, those with low income were more than three times as likely to report their health as fair or poor and 3–5 times as likely to report fair or poor mental health (Exhibit 12B.1). For example, after adjusting for age, 26 percent of low-income women reported fair or poor health compared to eight percent of women in the highest-income category.

**Exhibit 12B.1** | Age-standardized percentage of adults aged 25 and older who reported their health or mental health as fair or poor, by sex and annual household income, in Ontario, 2005

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)  
**NOTE:** See Appendix 12.2 for definitions of annual household income categories



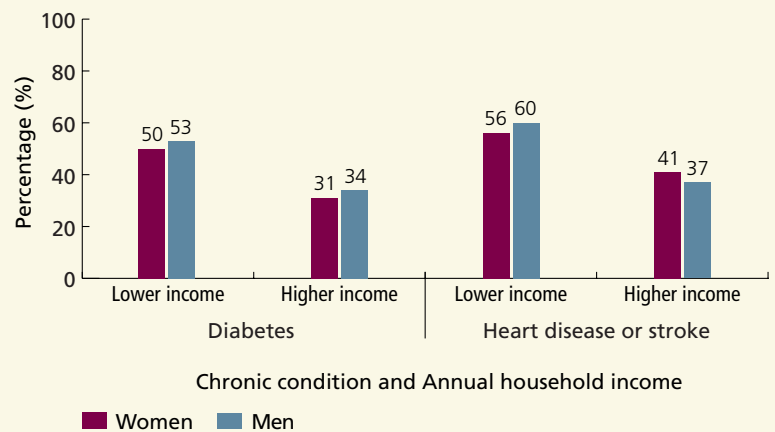
Not unexpectedly, individuals with chronic conditions were more likely to report fair or poor health than the general population. Among adults with chronic conditions, the income gradient in self-rated health persisted. Among those who reported having diabetes or cardiovascular disease, lower-income adults were much more likely than higher-income adults to report fair or poor health ([Exhibit 12B.2](#)). For example, 50 percent of lower-income women with diabetes rated

their health as fair or poor compared to 31 percent of higher-income women with diabetes. Income was associated not only with worse health, but also with declining health status. Among adults who reported having heart disease or stroke, adults living in the lowest-income households were more likely than those living in the highest-income households to report that their health worsened over the last year (34 percent versus 20 percent, respectively).

**Exhibit 12B.2 | Age-standardized percentage of adults aged 20 and older with self-reported diabetes or cardiovascular disease who rated their health as fair or poor, by sex, annual household income and condition, in Ontario, 2005 and 2007**

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories



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### Functional Status and Disability

Functional status refers to an individual's ability to carry out their daily activities and the activities necessary to achieve their goals, and is a product of overall physical and mental health.<sup>166</sup> Three indicators were used to measure functional status: activity limitations (the percentage of the population who reported that their activities at home, school, or work had been limited due to a long-term physical condition, mental condition, or health problem); activities prevented by pain (the percentage of the population reporting that at least some of their activities were prevented due to pain or discomfort); limitations in instrumental activities of

daily living (IADLs) and/or activities of daily living (ADLs) (the percentage of the population who report needing assistance of another person to carry out routine life activities and self-care activities). IADL and/or ADL limitations are a commonly used measure of disability.

Throughout the POWER Study, we consistently found that lower-income adults reported worse functional status than those with higher income; an income gradient was observed for all three measures of functional status. After adjusting for age, low-income adults were one and a half times more likely than higher-income adults to report activity limitations (37 percent versus

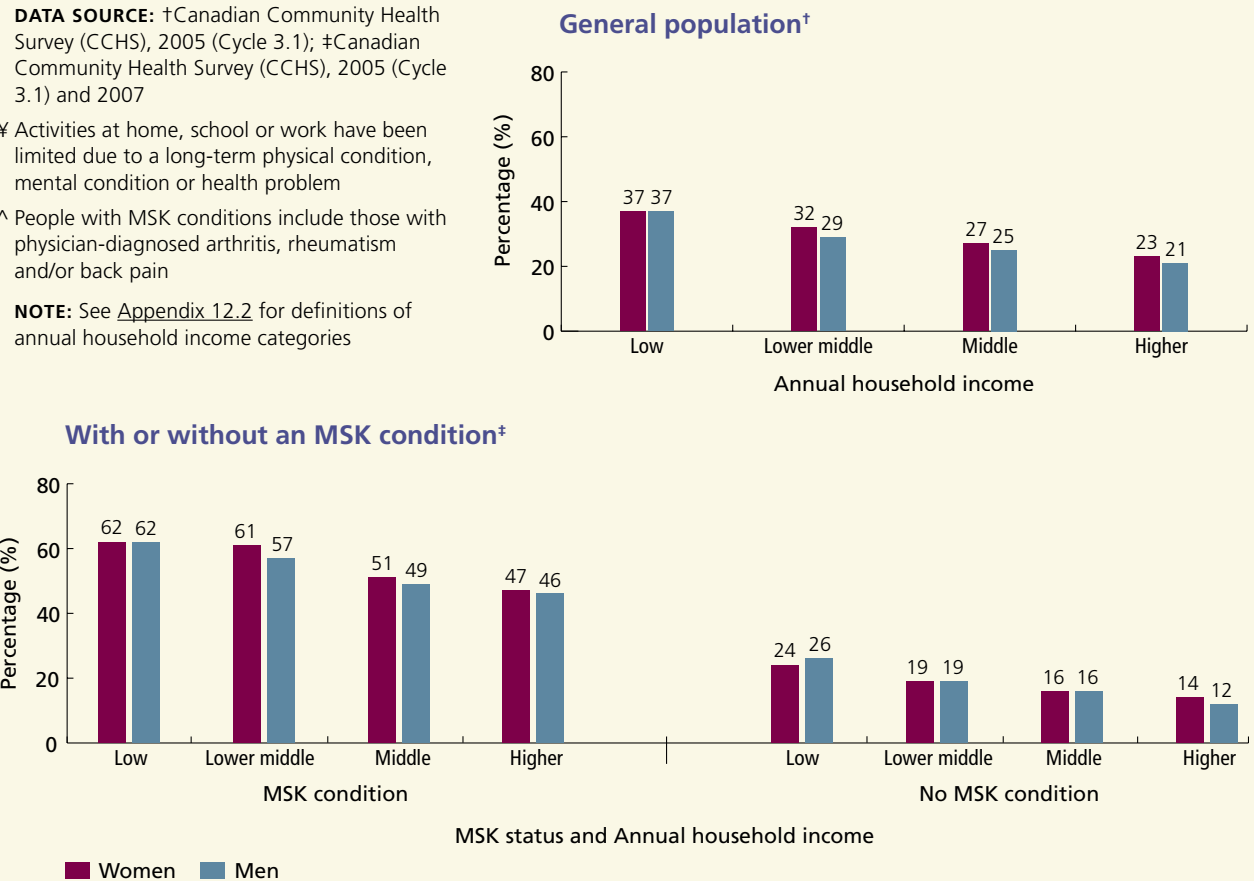
**Exhibit 12B.3 | Age-standardized percentage of adults aged 25 and older who reported having activity limitations<sup>‡</sup> in the general population, and among those with and without a musculoskeletal (MSK) condition,<sup>^</sup> by sex and annual household income, in Ontario**

**DATA SOURCE:** †Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1); ‡Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

‡ Activities at home, school or work have been limited due to a long-term physical condition, mental condition or health problem

<sup>^</sup> People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories



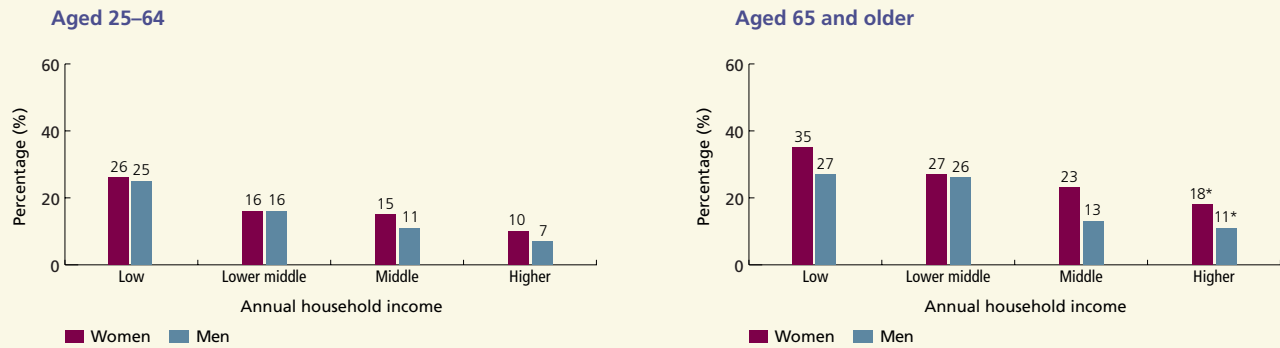
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22 percent, respectively) ([Exhibit 12B.3](#)), two and a half times more likely to report activities prevented by pain or discomfort (25 percent versus 10 percent, respectively), and twice as likely to report IADL and/or ADL limitations (25 percent versus 12 percent, respectively).

Women and men were equally likely to report activity limitations, but women were more likely to report chronic pain and disability than men, irrespective of income.

Among adults aged 65 and older, over a third (35 percent) of low-income women reported that at least some of their activities were limited due to pain or discomfort ([Exhibit 12B.4](#)) and over half (52 percent) reported having IADL and/or ADL limitations ([Exhibit 12B.5](#)). While older adults (aged 65 and older) were generally more likely to report functional limitations than those aged 25–64, income differences were observed in both the younger and older age groups ([Exhibits 12B.4 and 12B.5](#)).

**Exhibit 12B.4** | Age-specific percentage of adults aged 25 and older who reported that their activities were prevented due to pain or discomfort, by sex and annual household income, in Ontario, 2000/01



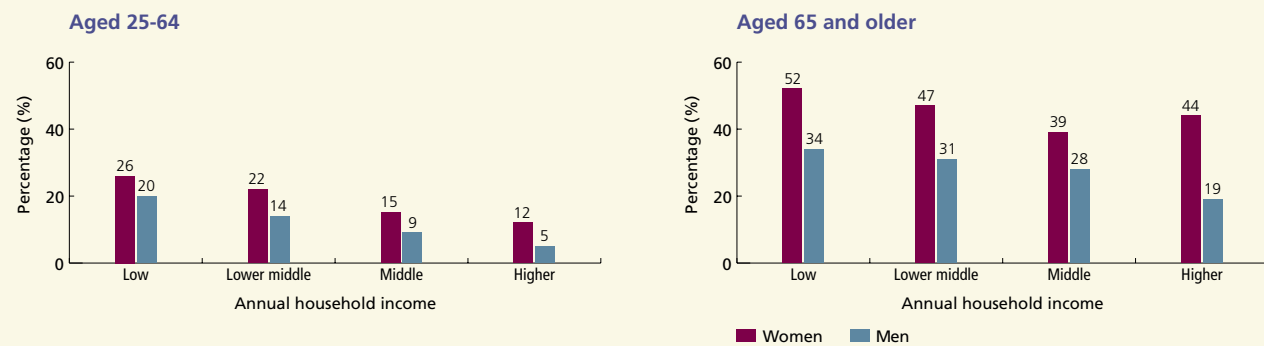
**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1)

\* Interpret with caution due to high sampling variability

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12B.5** | Age-specific percentage of adults aged 25 and older who reported having limitations in IADLs (Instrumental Activities of Daily Living) and/or ADLs (Activities of Daily Living), by sex and annual household income, in Ontario, 2005



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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The POWER Study also examined functional status among people with common chronic conditions (arthritis or rheumatism, cardiovascular disease, and diabetes). While functional limitations were more common among people with chronic conditions, in all cases, income differences persisted (see [Table 12B.1](#)). For example, people with a musculoskeletal (MSK) condition were about three times more likely to report activity limitations than those without an MSK condition ([Exhibit 12B.3](#)). In both groups, there was a clear income gradient with lower-income adults being more likely to report activity limitations than higher-income adults (i.e., among women with an MSK condition, 62 percent versus 47 percent, respectively). Similar patterns were found for other measures of functional

status among people with an MSK condition, as well as for measures of functional status among people with cardiovascular disease or diabetes. Among those who reported heart disease and/or a history of stroke, 64 percent of lower-income women compared to 58 percent of higher-income women, and 52 percent of lower-income men compared to 35 percent of higher-income men reported IADL and/or ADL limitations (see [POWER Study Cardiovascular Disease chapter](#)). There was a similar pattern among adults who reported having diabetes, with 45 percent of the lowest-income adults reporting IADL and/or ADL limitations compared to 26 percent of the highest-income adults (see [POWER Study Diabetes chapter](#)).



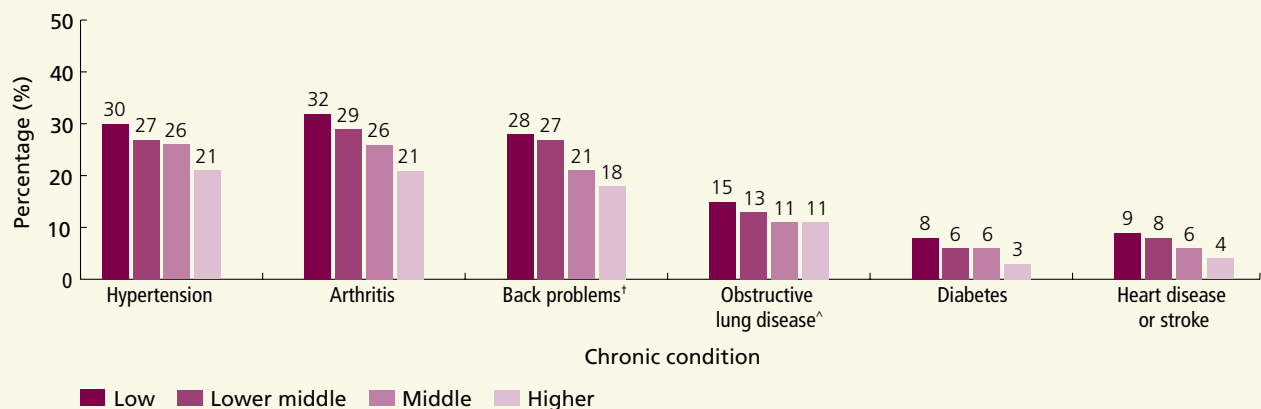


## Chronic Disease, Cancer, and Multiple Chronic Conditions

Chronic conditions have a large impact on a person's quality of life and ability to function and work, while placing enormous demands on the health care system. We found that the majority of women (62 percent) and men (55 percent) aged 25 and older in Ontario were living with at least one chronic condition (see [POWER Study Burden of Illness chapter](#)). We measured the prevalence of common chronic conditions, the cancer incidence for specific types of cancer, and the prevalence of comorbidity (multiple chronic conditions). Chronic disease prevalence and cancer incidence differed by sex, with some conditions more prevalent in women and others more prevalent in men (see [POWER Study Burden of Illness chapter](#)). Women were more likely than men to have multiple chronic conditions.

Lower-income adults had higher prevalence rates of chronic conditions, had higher incidence of some cancers, and were more likely to report having multiple chronic conditions than those with higher incomes. An income gradient was observed for the prevalence of all common chronic conditions examined (hypertension, arthritis, back problems, obstructive lung disease, diabetes, and heart disease or stroke) (Exhibits 12B.6 and 12B.7). For example, low-income women were more than twice as likely as higher-income women to report having diabetes or cardiovascular disease (Exhibit 12B.6). Similar income differences in chronic disease prevalence were observed among men. Among women, the prevalence of probable depression varied by neighbourhood income (11.8 percent of women aged 15 and older living in the lowest-income neighbourhoods compared to 8.5 percent of women living in the highest-income neighbourhoods) (Exhibit 12B.7).

**Exhibit 12B.6** | Age-standardized percentage of women aged 25 and older who reported having selected chronic diseases, by annual household income, in Ontario, 2005



**DATA SOURCES:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1);

<sup>†</sup>Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

<sup>^</sup> Obstructive lung disease includes asthma, chronic bronchitis, emphysema, or chronic obstructive pulmonary disease

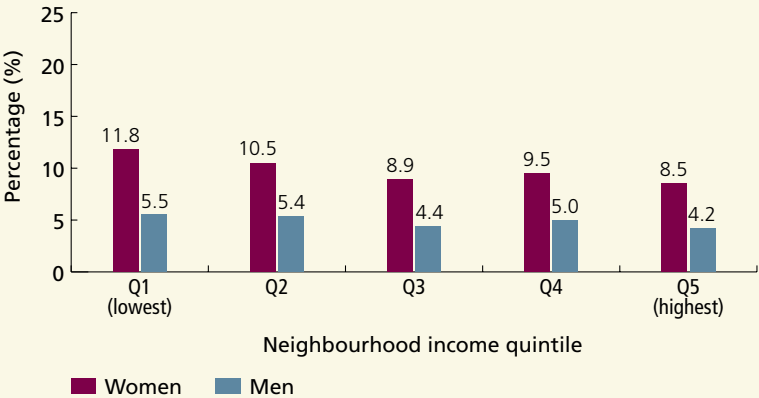
**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories

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**Exhibit 12B.7 | Age-standardized prevalence of probable depression in Ontarians aged 15 and older, by sex and neighbourhood income quintile, 2000/01**

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2000/01 (Cycle 1.1); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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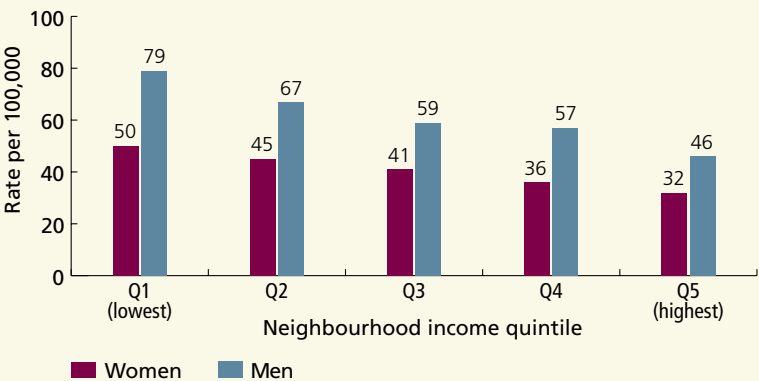
Different patterns were observed in cancer incidence for each cancer type examined. Women and men living in low-income neighbourhoods had higher incidence of lung cancer and men living in low-income neighbourhoods had a higher incidence of colorectal cancer than those living in higher-income neighbourhoods. Lung cancer incidence was more than one and a half times greater for women and men living in the lowest-income

neighbourhoods compared to those living in the highest-income neighbourhoods (50 percent versus 32 percent, respectively, among women; 79 percent versus 46 percent, respectively, among men) ([Exhibit 12B.8](#)). Differences in smoking rates and occupational/ environmental exposures contribute to differences in lung cancer incidence. Incidence of breast cancer also varied by neighbourhood income, but the pattern was

**Exhibit 12B.8 | Age-standardized incidence of lung cancer per 100,000 population, by sex and neighbourhood income quintile, in Ontario, 2004/05**

**DATA SOURCES:** Ontario Cancer Registry (OCR); Registered Persons Database (RPDB); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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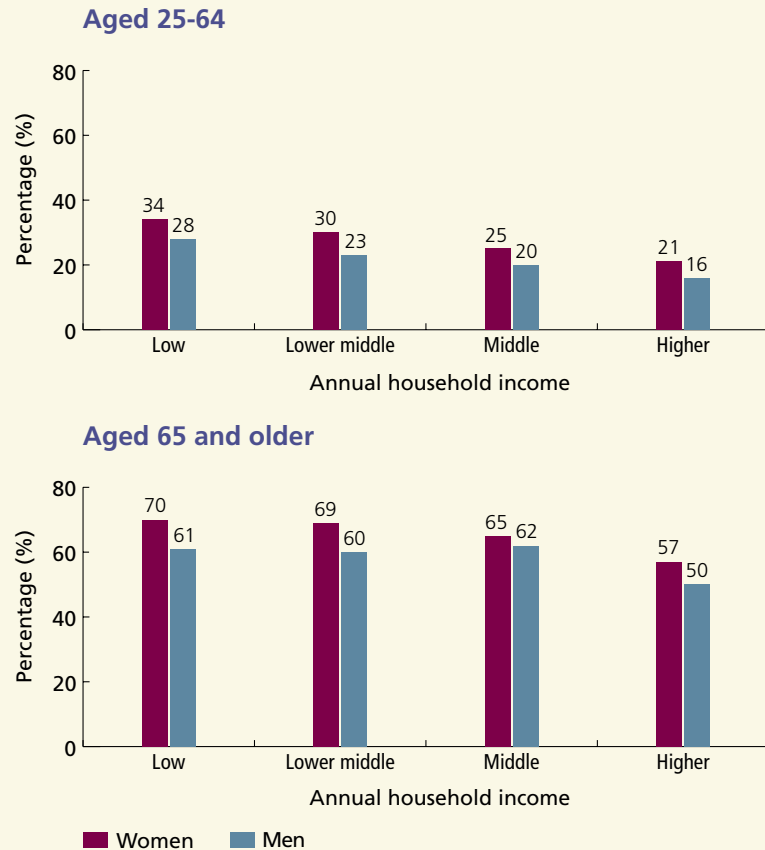
reversed—higher-income women were more likely to develop breast cancer than lower-income women (88 cases versus 103 cases per 100,000 women, respectively, in 2004/05). The incidence of gynaecological cancers (ovarian, cervical, and uterine) did not vary by neighbourhood income.

Among Ontarians, there was also an income gradient in the prevalence of multiple chronic conditions ([Exhibit 12B.9](#)). Irrespective of age, low-income women were more

likely than higher-income women to report having two or more chronic conditions. Among women aged 25–64, low-income women were more likely to report two or more chronic conditions compared to higher-income women (34 percent versus 21 percent, respectively) and among those aged 65 and older, nearly three-quarters (70 percent) of low-income women reported having two or more chronic conditions.

### Exhibit 12B.9 | Age-specific percentage of adults aged 25 and older who reported having two or more chronic conditions, by sex and annual household income, in Ontario, 2005

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)



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## RISK FACTORS AND PREVENTION

Health promotion and disease prevention are important goals of public health and clinical practice. It has been estimated that 80 percent of common chronic conditions are potentially preventable.<sup>172</sup> Reducing the prevalence of chronic disease risk factors and increasing adherence to evidence-based guidelines for health screening are essential to reducing the burden of chronic disease and improving health outcomes. As with health status, low income is associated with increased prevalence of common modifiable chronic disease risk factors (such as smoking, obesity, physical inactivity, and inadequate fruit and vegetable intake), as well as reduced use of preventive health care services.<sup>173, 174</sup>

People living in poverty experience constrained choice when it comes to adopting healthy lifestyles. Limited financial resources, neighbourhood characteristics, and social networks strongly influence the ability to adopt healthy behaviours.<sup>93, 175, 176</sup> To be successful, health promotion efforts will need to address the contextual factors—socioeconomic, social, and environmental—that influence health behaviours.

Another important public health goal is prevention of teenage pregnancies. Despite declining rates of births to teenage women in Ontario,<sup>177, 178</sup> there are still substantial numbers of teenage women who give birth each year. Early pregnancy and childbirth have health and social consequences for both infants and their mothers.<sup>179</sup> Infants born to teenage mothers have increased risk of preterm birth, low birth weight, and neonatal mortality compared to those born to mothers aged 20–24. Teenage mothers are also more likely than other women to limit their education which limits their employment opportunities and its associated economic benefits.<sup>180, 181</sup> As such, the teenage birth rate is an important indicator of the health of women and children.

In the POWER Study, we found large and potentially modifiable income differences in chronic disease risk factors, teenage birth rates, and cancer screening.

Low-income women and men were much more likely than higher-income adults to report a range of behavioural risk factors for chronic disease, and were less likely to undergo cancer screening. Teenage women living in lower-income neighbourhoods had substantially higher birth rates than those living in higher-income neighbourhoods. See [Table 12B.2](#) for a full list of indicators that are synthesized in this section. This table summarizes where income-related disparities were found and notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

### Chronic Disease Risk Factors

Common, modifiable risk factors—such as poor nutrition, sedentary lifestyle, and smoking—contribute to the development of many different chronic conditions including cardiovascular disease, diabetes, cancer, and osteoarthritis. These health behaviours are influenced by income, education, gender, culture, living and working conditions, and other social factors.<sup>167, 182, 183</sup> The POWER Study examined the prevalence of four major health behaviours or risk factors that increase the risk of chronic disease (physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, and smoking). Among those who have been diagnosed with a chronic condition such as heart disease or stroke, positive lifestyle changes can reduce the risk of complications and extend overall survival (secondary prevention). As well as measuring risk behaviours, the [POWER Study Cardiovascular Disease chapter](#) measured the percentage of people with heart disease or stroke who reported making positive lifestyle changes in the past year to improve their health.

Throughout the POWER Study, we found that lower-income adults generally had a higher prevalence of chronic disease risk factors and were less likely to engage in positive lifestyle changes than higher-income adults.

**Table 12B.2 | Income Differences in Risk Factors and Prevention**

Indicator	Income Difference	POWER Study chapter where reported
<b>Chronic Disease Risk Factors</b>		
<b>Health behaviours that increase the risk of chronic disease</b>		
• physical inactivity	Y	<a href="#">Burden of Illness</a>
• inadequate fruit and vegetable intake	Y <sup>a</sup>	<a href="#">Burden of Illness</a>
• being overweight or obese	Y <sup>^</sup>	<a href="#">Burden of Illness</a>
• smoking	Y	<a href="#">Burden of Illness</a>
<b>Changes to improve health among people with cardiovascular disease</b>	Y	<a href="#">Cardiovascular Disease</a>
<b>Teen Pregnancy</b>		
<b>Live births to teenage women</b>	Y	<a href="#">Reproductive and Gynaecological Health</a>
<b>Cancer Screening</b>		
<b>Screening for:</b>		
• colorectal cancer	Y	<a href="#">Cancer</a>
• breast cancer	Y	<a href="#">Cancer</a>
• cervical cancer	Y	<a href="#">Cancer</a>
<b>Follow up of abnormal Pap tests with low-grade lesions</b>	Y	<a href="#">Cancer</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

<sup>^</sup> Lower-income women were more likely to be overweight or obese than higher-income women. Higher-income men were more likely to be overweight or obese than lower-income men. Other significant income gradients in this table show lower-income adults to be disadvantaged.

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Modifiable chronic disease risk factors are all too common among Ontarians. Overall, more than half of Ontarians reported being physically inactive (51 percent), having inadequate fruit and vegetable intake (57 percent), and being overweight or obese (53 percent), and more than one in five were current smokers (22 percent). Women were more likely than men to report that they were physically inactive, but less likely than men to

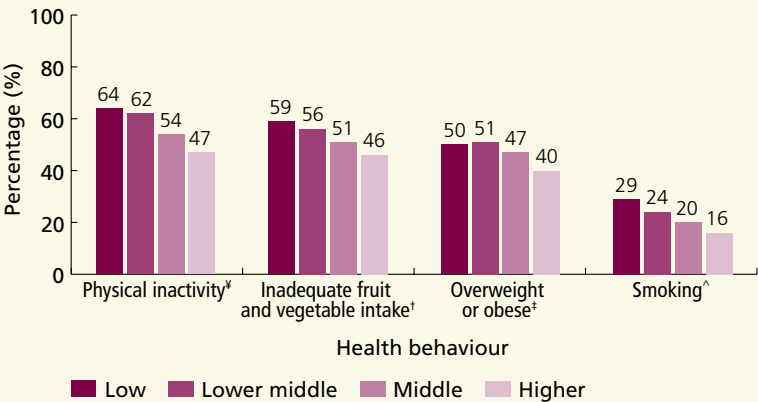
report having inadequate fruit and vegetable intake, being overweight or obese, or smoking.

Important income differences were found for all of these risk factors. Low-income women were more likely to report all chronic disease risk factors than higher-income women ([Exhibit 12B.10](#)). For example, 64 percent of low-income women reported physical inactivity compared to 47 percent of higher-income women.

**Exhibit 12B.10** | Age-standardized percentage of women aged 25 and older who report health behaviours that increase risk for chronic diseases, by sex and annual household income, in Ontario, 2005

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

- ¥ Physical Activity Index of < 1.5 cal/kg/day
- † Daily consumption of less than five servings of fruits and vegetables
- ‡ Body Mass Index (BMI) ≥25, calculated from self-reported height and weight
- ^ Current smokers (daily or occasional)



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Similar income gradients were noted for inadequate fruit and vegetable intake, being overweight or obese, and smoking. Importantly, nearly one-third (29 percent) of low-income women were smokers, making them almost twice as likely to be smokers as higher-income women.

Income differences were also noted among men. Low-income men were more likely to report being physically inactive or current smokers than men with higher income (after-adjusting for age, 55 percent versus 42 percent, respectively, for physical inactivity; 37 percent versus 21 percent, respectively, for smoking). There were also income differences in the percentage of men who were overweight or obese, but the pattern was reversed—higher-income men were more likely to be overweight or obese than lower-income men (after adjusting for age, 65 percent versus 55 percent, respectively). Inadequate fruit and vegetable intake did not vary by income among men.

Risk factor modification, or secondary prevention, among those with chronic conditions is important to prevent worsening of the condition and the development of associated complications. Among adults who reported heart disease or who had a stroke, low-income adults were less likely to have made changes to improve their health than higher-income adults (45 percent of low-income women versus 60 percent of higher-income women; 41 percent of low-income men versus 56 percent of higher-income men; the estimate for low-income men should be interpreted with caution due to high sampling variability). Among adults with chronic illnesses (cardiovascular disease (CVD), diabetes, or musculoskeletal (MSK) conditions), the prevalence rates of chronic disease risk factors were high and some income-related differences were noted. These findings emphasize the need for greater secondary prevention for people with all levels of income.

## Teen Pregnancy

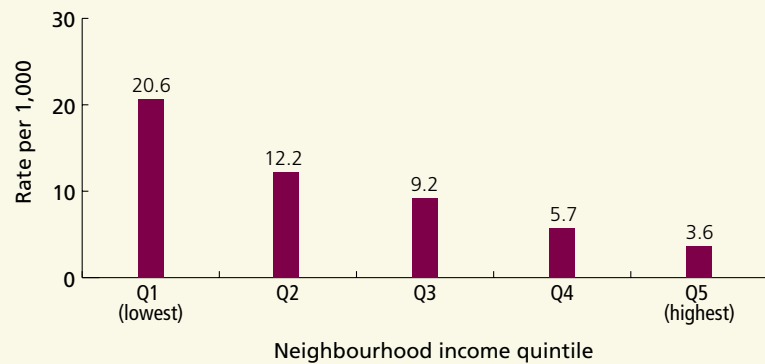
Early pregnancy and childbirth have health consequences for both infants and mothers. Children born to teenage mothers have worse health and social outcomes.<sup>184</sup> The POWER Study found the rate of live births to teenage women (aged 15–19) ranged from 3.6 per 1,000 in the highest-income neighbourhoods to

20.6 per 1,000 in the lowest-income neighbourhoods—nearly a six-fold difference ([Exhibit 12B.11](#)). We were not able to calculate the teen pregnancy rate, which would be higher than the live birth rate, because these data are not collected consistently.

### Exhibit 12B.11 | Age-standardized rate of live births to teenage women (per 1,000 women aged 15–19), by neighbourhood income quintile, in Ontario, 2007

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database); Statistics Canada 2006 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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## Cancer Screening

Screening allows some cancers to be identified earlier in their course leading to improved outcomes for these cancers. Current guidelines recommend screening for cervical, breast, and colorectal cancer. Screening for cervical cancer (Papanicolaou (Pap) tests) and colorectal cancer can prevent cancer from developing by promoting early detection and treatment of precancerous lesions. We found that adults living in lower-income neighbourhoods consistently reported lower screening rates for colorectal, breast, and cervical cancers than those living in higher-income neighbourhoods. Among adults aged 50–74 with no history of colorectal cancer, those living in lower-income neighbourhoods were 25–30 percent less likely to have had one or more fecal occult blood tests in the last two years compared to women and men living in higher-income

neighbourhoods. Screening rates for both breast (among women aged 50–69 with no history of breast cancer) and cervical cancers (among women aged 18–70 with no history of cervical cancer) were lower for women living in the lowest-income neighbourhoods compared to those living in the highest-income neighbourhoods (53 percent versus 67 percent, respectively, for mammography; 61 percent versus 75 percent, respectively, for Pap tests) (cervical cancer screening rates shown in [Exhibit 12B.12](#)). While follow up rates (repeat Pap test or colposcopy) of abnormal Pap tests with low-grade lesions were suboptimal across all income levels, women living in the lowest-income neighbourhoods were less likely to undergo follow up testing than those living in the highest-income neighbourhoods (42 percent versus 47 percent, respectively).

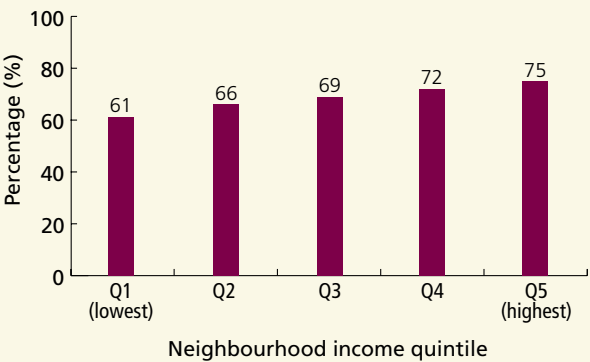


**Exhibit 12B.12** | Age-standardized percentage of screen-eligible^ women who had at least one Papanicolaou (Pap) test in the last three years, by neighbourhood income quintile, in Ontario, 2004/05

**DATA SOURCES:** Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); CytoBase; Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

^ Women aged 18-70 with no history of cervical cancer or prior hysterectomy

**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



POWER Study



## ACCESS TO HEALTH CARE SERVICES

While the Canadian health care system is based on the premise of equal access for all, a wide range of financial and non-financial barriers to access persist. Factors associated with access barriers include (but are not limited to) gender,<sup>185, 186</sup> socioeconomic status,<sup>187, 188</sup> citizenship or immigration,<sup>189, 190</sup> health status,<sup>191</sup> and geographic location.<sup>192</sup> Income inequities have been found in multiple studies including access to HIV care,<sup>193</sup> access to cardiac care,<sup>153</sup> non-cardiac related mortality among cardiac patients,<sup>194</sup> and asthma control and emergency department utilization among people with asthma.<sup>195</sup> Across urban areas of Canada, residents of lower-income neighbourhoods have higher rates of health service utilization than residents of higher-income neighbourhoods (including preventable hospitalizations), which is consistent with the higher burden of illness in lower-income communities.<sup>146</sup>

In the POWER Study, we found income-related differences on some measures of primary care access and satisfaction, use of services without universal health coverage, and likelihood of having unmet health care needs. In this section, we re-examine and synthesize these findings to paint a picture of lower-income Ontarians' access to health care services. See [Table 12B.3](#) for a full list of indicators that are included in this section. This table summarizes where income-related disparities were found and notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

### Primary Care

Primary health care is essential to achieve and maintain health. It has been shown to lower the overall costs of care, improve health through access to more appropriate services, and reduce health inequalities at the population level.<sup>196</sup> Patient satisfaction and reports of difficulties accessing health care provide information about a patient's experience of care, reflect problems in health

care delivery, and are part of the evaluation of health care.<sup>197</sup> These measures can be affected by the accessibility and convenience of health care services (i.e., ease or difficulty in scheduling and physically accessing appointments), as well as the perceived quality of care. Satisfaction is also influenced by expectations, so that individuals who have higher expectations may report lower satisfaction.<sup>198</sup> The POWER Study used the Primary Care Access Survey (PCAS) and the Canadian Community Health Survey (CCHS) to assess several indicators of primary care access, including having a primary care doctor, difficulties obtaining needed care, and satisfaction with services provided (see [Table 12B.3](#) for a list of indicators). Additionally, we assessed the proportion of people with diabetes who had no physician care over a two-year period.

In the POWER Study, we found that, while most Ontarians (93 percent) had a primary care provider, there were income differences in access to and satisfaction with primary care. The percentage of Ontarians who reported that they had a primary care doctor varied by neighbourhood income and gender. Income differences were smaller among women than men: 92 percent of women living in the lowest-income neighbourhoods reported having a primary care doctor compared to 96 percent of women living in the highest-income neighbourhoods; 87 percent of men living in the lowest-income neighbourhoods reported having a primary care doctor compared to 94 percent of men living in the highest-income neighbourhoods ([Exhibit 12B.13](#)).

Income differences were found in access to urgent, non-emergent care and satisfaction with the care provided. Women and men living in the lowest-income neighbourhoods were more likely to report difficulties making an appointment with their family doctor for an urgent, non-emergent health problem (i.e., less likely to report no difficulties) ([Exhibit 12B.14](#)). Women living in the lowest-income neighbourhoods were less likely than

**Table 12B.3 | Income Differences in Access to Health Care Services**

Indicator	Income Difference	POWER Study chapter where reported
<b>Primary Care</b>		
<b>Had a primary care doctor</b>	Y	<a href="#">Access to Health Care Services</a>
<b>Satisfaction with primary care</b>		
• experience getting an appointment for a regular check-up	N	<a href="#">Access to Health Care Services</a>
• experience getting to see their doctor for an urgent, non-emergent health problem	Y <sup>a</sup>	<a href="#">Access to Health Care Services</a>
• care their doctor provided for an urgent, non-emergent health problem	Y <sup>a</sup>	<a href="#">Access to Health Care Services</a>
<b>Difficulties accessing primary care</b>		
• accessing routine or ongoing care for themselves or a family member	N	<a href="#">Access to Health Care Services</a>
• obtaining monitoring of health problems from a family doctor	N	<a href="#">Access to Health Care Services</a>
• making an appointment for an urgent, non-emergent health problem	Y	<a href="#">Access to Health Care Services</a>
<b>No physician care (GP/FP or specialist) over a two-year period among people with diabetes</b>	Y	<a href="#">Diabetes</a>
<b>Services without Universal Health Coverage</b>		
<b>Dental visits</b>	Y	<a href="#">Access to Health Care Services</a>
<b>Insurance coverage for prescription medication among those with a musculoskeletal condition</b>	Y	<a href="#">Musculoskeletal Conditions</a>
<b>Consultations with allied health professionals among those with a musculoskeletal condition</b>		
• physiotherapist	Y	<a href="#">Musculoskeletal Conditions</a>
• chiropractor	Y	<a href="#">Musculoskeletal Conditions</a>
<b>Unmet Health Care Needs</b>		
<b>Unmet health care needs</b>	Y	<a href="#">Access to Health Care Services</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

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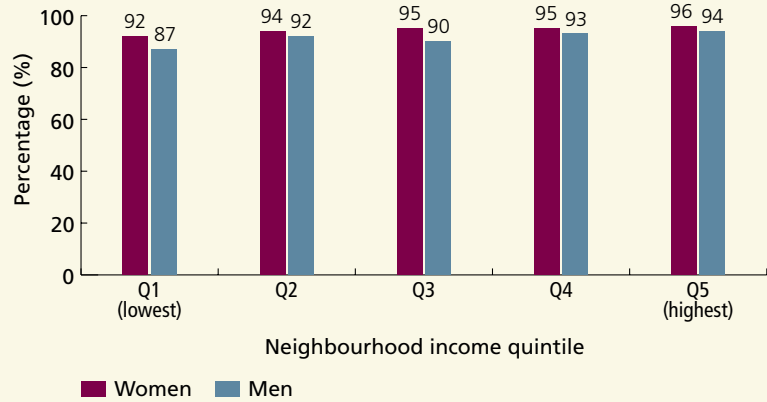
**Exhibit 12B.13** | Percentage of adults aged 25 and older who reported having a primary care doctor,<sup>¥</sup> by sex and neighbourhood income quintile, in Ontario, 2006–2008<sup>^</sup>

**DATA SOURCES:** Primary Care Access Survey (PCAS), Waves 4–11; Statistics Canada 2006 Census

<sup>¥</sup> Includes family doctor, family physician, general practitioner, or medical doctor

<sup>^</sup> The survey period was from October 2006–September 2008

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



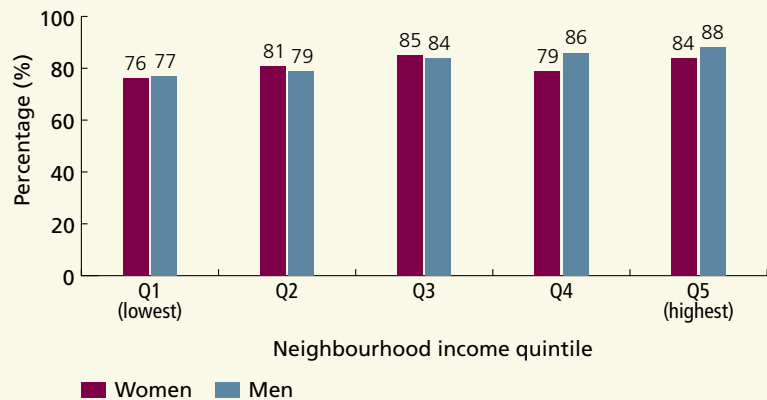
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**Exhibit 12B.14** | Percentage of adults aged 25 and older who reported no difficulties making an appointment for an urgent, non-emergent health problem, by sex and neighbourhood income quintile, in Ontario, 2006–2008<sup>^</sup>

**DATA SOURCES:** Primary Care Access Survey (PCAS), Waves 4–11; Statistics Canada 2001 Census

<sup>^</sup> The survey period was from October 2006–September 2008

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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women living in higher-income neighbourhoods to report being very satisfied with their experience getting to see their doctor for an urgent, non-emergent health problem and were also less likely to be satisfied with the care their doctor provided for this problem. These indicators did not vary by income among men. Access to routine and chronic care (satisfaction with experience getting an appointment for a regular check-up; difficulties accessing routine or ongoing care; difficulties obtaining monitoring of health problems) did not vary significantly by income for women or men. However, since these indicators are affected by patient expectations, lack of income differences may reflect lower perceived need for these services among lower-income adults.

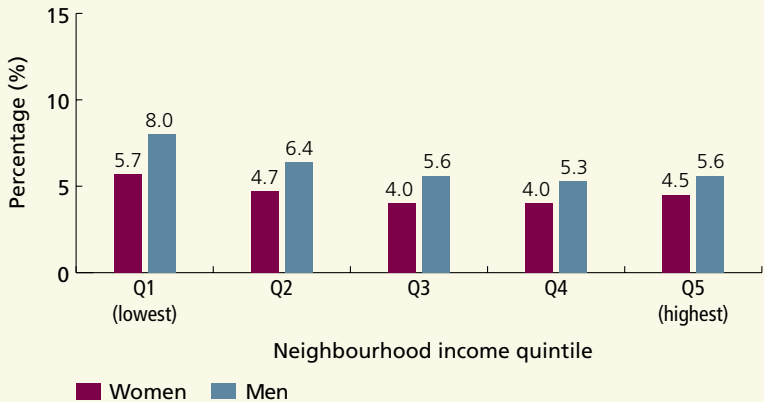
Among Ontario adults with diabetes, women and men living in the lowest-income neighbourhoods were less likely to have seen a general practitioner/family physician (GP/FP) or specialist (endocrinologist, general internist or geriatrician) over a two-year period than those living in higher-income neighbourhoods; 5.7 percent of women and 8.0 percent of men with diabetes who were living in the lowest-income neighbourhoods had not seen a physician at all during this period (Exhibit 12B.15). This is especially concerning as diabetes can lead to serious complications if it is left uncontrolled. For adults with diabetes who did receive care, those living in lower-income neighbourhoods had a higher mean number of GP/FP visits than those living in higher-income neighbourhoods, suggesting a greater need for health care in the lower-income groups.

**Exhibit 12B.15** | Age-standardized percentage of adults aged 20 and older with diabetes who had no visits to a general practitioner/family physician (GP/FP) or a specialist† over a two-year period, by sex and neighbourhood income quintile, in Ontario, 2005/06–2006/07

**DATA SOURCES:** Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Statistics Canada 2006 Census

† Includes visits to endocrinologists, general internists, or geriatricians

**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



POWER Study

## Services without Universal Health Coverage

Our universal health care system insures Canadian residents for physician, hospital, and laboratory and testing services. Canadians do not have universal coverage for medication (adults aged 65 and older in Ontario have universal coverage for prescription medications), dental services, or for many services provided by allied health professionals (such as outpatient physiotherapy). We examined access to dental care among all Ontarian adults (see [POWER Study Access to Health Care Services chapter](#)), as well as prescription drug coverage and services provided by physiotherapists and chiropractors among people with musculoskeletal conditions (see [POWER Study Musculoskeletal Conditions chapter](#)). We found that lower-income adults reported less access to services without universal health coverage than those with higher incomes. As would be expected, the income differences observed for these indicators were much larger than those observed on measures of access to physician care.

Oral health is an essential component of general health. Adults with poor oral health have a greater risk of developing poor general health, oral cancer, and complications associated with cardiovascular disease and diabetes.<sup>199–201</sup> In the Ontario population, there

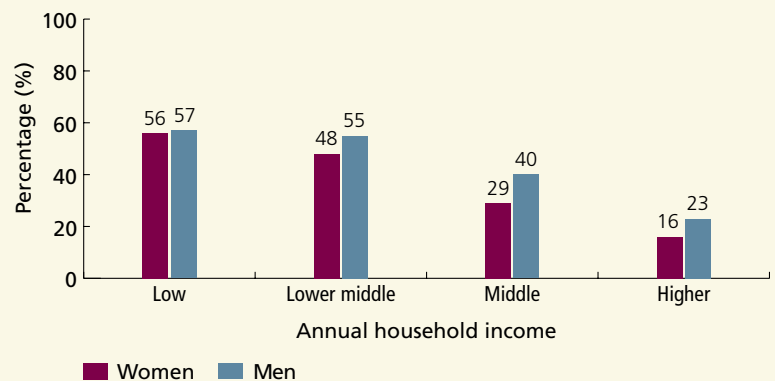
was a large income gradient in access to dental care. Compared to higher-income adults, those with low household income were more than twice as likely to have not seen a dentist in the last year ([Exhibit 12B.16](#)).

Among those with a musculoskeletal (MSK) condition, income differences were observed for prescription medication insurance coverage and consultations with allied health professionals. Among people with an MSK condition, only about two-thirds of lower-income adults had prescription drug coverage compared to about 90 percent of higher-income adults ([Exhibit 12B.17](#)). Similarly, lower-income women and men were half as likely as their higher-income counterparts to have seen a physiotherapist or chiropractor in the last year (e.g., 11 percent of low-income women versus 22 percent of higher-income women with an MSK condition saw a physiotherapist). Since many people with MSK conditions would be prescribed medications to control pain and symptoms as well as to manage co-existing chronic conditions, an inability to pay for these medications may limit their use of these drugs and so contribute to declines in functional status and overall health. Additionally, the use of chiropractic and physiotherapy services may contribute to improved functioning of people with MSK conditions.

### Exhibit 12B.16 | Percentage of adults aged 25 and older who did not visit a dentist in the last 12 months, by sex and annual household income, in Ontario, 2005

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories



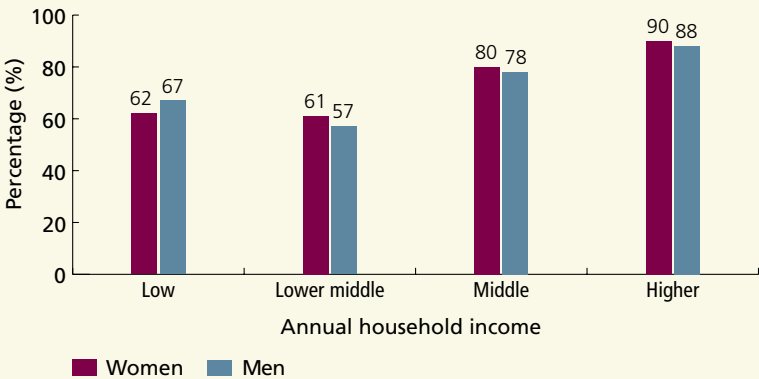
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**Exhibit 12B.17** | Age-standardized percentage of adults aged 25-64 with a musculoskeletal (MSK) condition^ who had prescription drug coverage, by sex and annual household income, in Ontario, 2005 and 2007

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1) and 2007

^ People with MSK conditions include those with physician-diagnosed arthritis, rheumatism and/or back pain

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories



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## Unmet Health Care Needs

“Unmet need” is a self-reported measure of an individual’s experiences in obtaining the care they believe they require.<sup>202, 203</sup> While non-specific, it is commonly used as an indicator of access to care. Inability to access needed care may reflect both financial and non-financial barriers within the health system or it may reflect unavailability of services. Unmet need is correlated with adverse health outcomes and worse health-related quality of life.<sup>203</sup>

Income was associated with unmet need. Overall, approximately one in eight Ontarians aged 25 and older (12 percent) reported having unmet health care needs in the last year and this varied by annual household income. Low-income adults were more likely to report unmet health care needs than other Ontarians (18 percent of low-income women compared to 14 percent or less

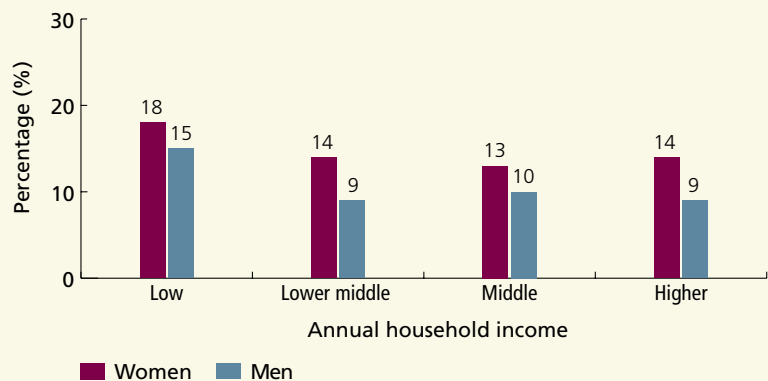
of higher-income women; 15 percent of low-income men compared to 10 percent or less of higher-income men) ([Exhibit 12B.18](#)).

The POWER Study also examined unmet health care need among people with two or more chronic conditions and people with an MSK condition. Among those with two or more chronic conditions, low-income and higher-income women were more likely to report having unmet health care needs than lower-middle and middle-income women (see [POWER Study Access to Health Care Services chapter](#)). Among women who reported having an MSK condition, those with lower income were more likely to report unmet need than those with higher income. While these indicators followed similar patterns among men, income differences were not significant, possibly due to small sample sizes and limited power to detect differences.

### Exhibit 12B.18 | Percentage of adults aged 25 and older who reported having unmet health care needs, by sex and annual household income, in Ontario, 2005

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

**NOTE:** See [Appendix 12.2](#) for definitions of annual household income categories



POWER Study

## CLINICAL MANAGEMENT

High-quality, evidence-based health care improves health outcomes. Despite principles of accessibility and equity in the Canadian health care system, there is continued evidence of socioeconomic variation in the quality of care that people receive.<sup>153, 204, 205</sup> In the 1990s, Alter and colleagues reported that in Ontario, patients from less affluent neighbourhoods were less likely to receive angiography and revascularization procedures than those from more affluent neighbourhoods.<sup>204</sup> More than 10 years later, a national report found that these disparities persist, even after adjusting for patient and hospital characteristics.<sup>153</sup>

Throughout the POWER Study, we examined patterns of care for the leading causes of morbidity and mortality in the province. We assessed indicators of clinical management including the receipt of specialist care, timeliness of patient follow up, diagnostic testing, medication management, and surgical treatment. While we looked at many indicators of clinical management, there are important gaps in what we were able to assess. Administrative data lack the clinical detail needed to fully assess quality of care. Additionally, Ontario data do not allow the assessment of performance on many quality indicators of chronic disease management in the community that are routinely reported in other jurisdictions.<sup>206</sup>

The POWER Study examined income-related differences in the clinical management of many common health conditions. In general, there were fewer income-related differences in the clinical management of health conditions than there were in health and functional status, risk behaviours, and preventive services. However, some notable income-related differences were found, particularly for certain types of specialist consultations and some types of diagnostic testing needed for evaluation or ongoing management. See [Table 12B.4](#) for a full list of indicators that are synthesized in this section. This table summarizes where income-related disparities were found and notes the

POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

### Care Providers

#### Out-Patient Specialist Consultation

Care from a specialist is associated with higher rates of guideline-recommended testing and interventions for specific conditions. For example, care by a rheumatologist is more likely to ensure patients have access to recommended disease modifying therapies for rheumatoid arthritis.<sup>207</sup> The indicators of specialist consultation that we examined include: the proportion of patients with newly diagnosed heart failure (HF) seen by a cardiologist; the proportions of rheumatoid arthritis and diabetes patients receiving specialty care; and among cancer patients, the proportion with resectable rectal cancer referred to radiation oncology, the proportion referred to medical oncology after resection of colon cancer, and the proportion of breast cancer patients assessed by a medical oncologist. In the POWER Study, we found that, with the exception of cancer care, lower-income adults were less likely to receive specialist care.

In Ontario, women and men living in lower-income neighbourhoods were less likely to have a specialty consultation for rheumatoid arthritis, diabetes, or HF than those living in higher-income neighbourhoods. For example, among adults with rheumatoid arthritis, 39 percent of women living in the lowest-income neighbourhoods had seen a specialist (rheumatologist, orthopaedic surgeon, general internist or physical medicine specialist) in the last year compared to 45 percent of women living in the highest-income neighbourhoods; similar income variation was noted for men ([Exhibit 12B.19](#)). There was also income variation in cardiologist care within one year of HF diagnosis (45 percent among those living in the lowest-income neighbourhoods versus 50 percent among those living in the highest-income neighbourhoods) and in specialist care (endocrinologist,

**Table 12B.4 | Income Differences in Clinical Management**

Indicator	Income Difference	POWER Study chapter where reported
<b>Care Providers</b>		
<b>Out-Patient Specialty Consultation</b>		
Cardiologist care for newly diagnosed heart failure	Y	<a href="#">Cardiovascular Disease</a>
Specialist care for rheumatoid arthritis	Y	<a href="#">Musculoskeletal Conditions</a>
Specialist care for diabetes	Y	<a href="#">Diabetes</a>
<b>Specialist care for cancer</b>		
• referral to radiation oncology for resectable rectal cancer	N	<a href="#">Cancer</a>
• referral to medical oncology following resection of colon cancer	N	<a href="#">Cancer</a>
• referral to medical oncology for breast cancer	N	<a href="#">Cancer</a>
<b>In-Hospital Specialty Care</b>		
<b>In-hospital cardiologist care</b>		
In-hospital physician care by a cardiologist among those hospitalized for:		
• heart failure	Y	<a href="#">Cardiovascular Disease</a>
• acute myocardial infarction	Y	<a href="#">Cardiovascular Disease</a>
<b>Admission of patients with stroke or transient ischemic attack to a dedicated stroke unit</b>	N	<a href="#">Cardiovascular Disease</a>
<b>In-hospital neurology or neurosurgical consultation for stroke or transient ischemic attack</b>	N	<a href="#">Cardiovascular Disease</a>
<b>Prenatal Care Providers</b>		
<b>Prenatal care provider after first trimester</b>		
• obstetricians	N	<a href="#">Reproductive and Gynaecological Health</a>
• general practitioners/family physicians	N	<a href="#">Reproductive and Gynaecological Health</a>
• midwives	N	<a href="#">Reproductive and Gynaecological Health</a>
<b>Prenatal care for women with diabetes</b>		
• obstetrician care during pregnancy (for gestational and pregestational diabetes)	N	<a href="#">Diabetes</a>
• endocrinologist or general internist care during pregnancy (for pregestational diabetes)	Y^	<a href="#">Diabetes</a>
• eye examination in the year before delivery (for pregestational diabetes)	N	<a href="#">Diabetes</a>

POWER Study

**Table 12B.4 | Income Differences in Clinical Management (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Diagnosis, Monitoring, and Treatment</b>		
<b>Follow Up Care After Hospitalization</b>		
<b>Physician visit within four weeks of hospitalization for:</b>		
• heart failure	N	<a href="#">Cardiovascular Disease</a>
• acute myocardial infarction	N	<a href="#">Cardiovascular Disease</a>
<b>Physician visit for depression within 30 days of hospitalization for depression</b>	Y	<a href="#">Depression</a>
<b>Diagnosis and Monitoring</b>		
<b>Left ventricular function evaluation in heart failure</b>	N	<a href="#">Cardiovascular Disease</a>
<b>Cardiac testing in heart failure</b>		
• echocardiography	Y <sup>b</sup>	<a href="#">Cardiovascular Disease</a>
• cardiac stress testing	N	<a href="#">Cardiovascular Disease</a>
• angiography	Y <sup>b</sup>	<a href="#">Cardiovascular Disease</a>
<b>Angiography for acute myocardial infarction</b>	Y	<a href="#">Cardiovascular Disease</a>
<b>Stroke</b>		
• neuroimaging for stroke or transient ischemic attack	N	<a href="#">Cardiovascular Disease</a>
• carotid imaging for stroke or transient ischemic attack	N	<a href="#">Cardiovascular Disease</a>
• dysphagia screening for stroke patients	N	<a href="#">Cardiovascular Disease</a>
<b>Bone mineral density testing after low-trauma fracture</b>	Y	<a href="#">Musculoskeletal Conditions</a>
<b>No bone mineral density testing nor prescription drug treatment following a low-trauma fracture</b>	Y <sup>a</sup>	<a href="#">Musculoskeletal Conditions</a>
<b>Eye examination after diabetes diagnosis</b>	Y <sup>b</sup>	<a href="#">Diabetes</a>
<b>Cancer surveillance in survivors</b>		
• surveillance colonoscopy after resection of colorectal cancer	N	<a href="#">Cancer</a>
• surveillance mammography among breast cancer survivors	N	<a href="#">Cancer</a>
<b>Surgical Treatment</b>		
<b>Carotid endarterectomy following stroke</b>	N	<a href="#">Cardiovascular Disease</a>

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**Table 12B.4 | Income Differences in Clinical Management (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Surgical Treatment (Continued)</b>		
<b>Cancer surgeries</b>		
• use of sphincter-sparing procedures for rectal cancer	N	<a href="#">Cancer</a>
• surgery for non-small cell lung cancer	Y	<a href="#">Cancer</a>
• breast-conserving surgery	N	<a href="#">Cancer</a>
• axillary lymph node dissection	N	<a href="#">Cancer</a>
<b>Hysterectomy</b>		
• hysterectomy rate for benign conditions	Y	<a href="#">Reproductive and Gynaecological Health</a>
• use of laparoscopic or vaginal hysterectomy	N	<a href="#">Reproductive and Gynaecological Health</a>
<b>Medical Treatment</b>		
<b>Acute stroke treatment</b>		
• use of thrombolytic therapy with recombinant tissue plasminogen activator (rtPA) for ischemic stroke	N	<a href="#">Cardiovascular Disease</a>
• use of acute antiplatelet therapy for ischemic stroke or TIA within 48 hours of hospital arrival	N	<a href="#">Cardiovascular Disease</a>
<b>Medication management after hospitalization for cardiovascular disease</b>		
• ACE inhibitor or ARB for patients with:		
– heart failure (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
– AMI (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
• beta blockers for patients with:		
– heart failure (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
– AMI (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
• lipid-lowering therapy for patients with:		
– AMI (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
– stroke (discharge, 90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
• warfarin for patients with:		
– heart failure (90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
– stroke (discharge, 90 day, 1 year)	N	<a href="#">Cardiovascular Disease</a>
<b>Medication use among people with diabetes</b>		
• insulin or at least one oral glucose	N	<a href="#">Diabetes</a>
• at least one anti-hypertensive drug	N	<a href="#">Diabetes</a>
• ACE inhibitor and/or an ARB	N	<a href="#">Diabetes</a>
• a statin	N	<a href="#">Diabetes</a>

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**Table 12B.4 | Income Differences in Clinical Management (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Medical Treatment (Continued)</b>		
<b>Cancer treatment</b>		
• adjuvant chemotherapy for non-small cell lung cancer	N	<a href="#">Cancer</a>
• chemotherapy use in small cell lung cancer	N	<a href="#">Cancer</a>
• radiation after breast-conserving surgery	N	<a href="#">Cancer</a>
• postoperative chemotherapy in ovarian cancer	N	<a href="#">Cancer</a>
<b>Treatment with a disease modifying anti-rheumatic drug (DMARD) or a biologic agent</b>	N	<a href="#">Musculoskeletal Conditions</a>
<b>Childbirth</b>		
<b>Interventions during childbirth</b>		
• induction of labour	N	<a href="#">Reproductive and Gynaecological Health</a>
• episiotomy	N	<a href="#">Reproductive and Gynaecological Health</a>
• forceps- and/or vacuum-assisted deliveries	N	<a href="#">Reproductive and Gynaecological Health</a>
• caesarean section	N	<a href="#">Reproductive and Gynaecological Health</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

^ Women with pregestational diabetes living in the lowest-income neighbourhoods were more likely to see an endocrinologist or general internist than women living in the highest-income neighbourhoods

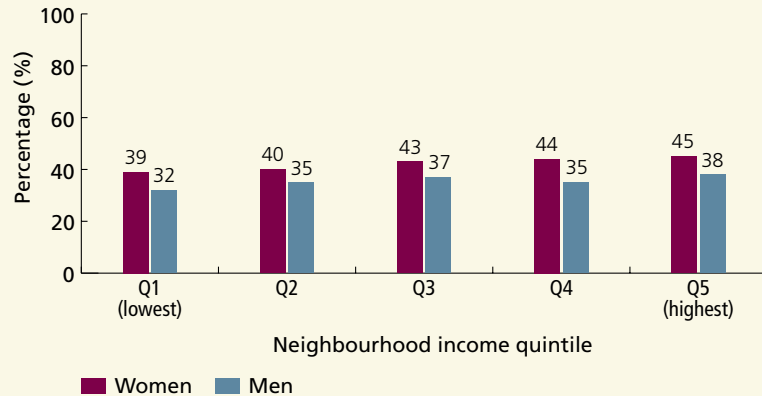
POWER Study

### Exhibit 12B.19 | Age-standardized percentage of adults aged 25 and older with rheumatoid arthritis who were seen by a specialist<sup>^</sup> during a one-year period, by sex and neighbourhood income quintile, in Ontario, 2005/06

**DATA SOURCES:** Ontario Health Insurance Plan (OHIP); ICES Physician Database (IPDB); Statistics Canada 2006 Census; Registered Persons Database (RPDB)

<sup>^</sup> Specialists include rheumatologists, orthopaedic surgeons, general internists, and physical medicine specialists

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



POWER Study

general internist, or geriatrician) over a two-year period among women and men with diabetes (24 percent among those living in the lowest-income neighbourhoods versus 26 percent of those living in the highest-income neighbourhoods), although the differences were small among people with diabetes.

The POWER Study did not find income differences in the use of specialist care for cancer. Approximately two-thirds of patients with breast cancer saw a medical oncologist, with little variation by neighbourhood income ([Exhibit 12B.20](#)). Similarly, there were no income differences in referral to radiation oncology for resectable rectal cancer, referral to medical oncology following resection of colon cancer, or referral to medical oncology for breast cancer. The absence of income-related disparities on these measures may be due in part to provincial initiatives to improve quality of cancer care by Cancer Care Ontario and to measure and report performance through the Cancer System Quality Index of Cancer Care Ontario.<sup>208</sup>

### In-Hospital Specialty Care

Patients who have been hospitalized may require specialist care or consultation while in hospital. Among patients with an acute myocardial infarction (AMI), hospital care by a cardiologist may provide better access to guideline-recommended diagnostic testing such as cardiac catheterization and interventions such as percutaneous coronary intervention when indicated.<sup>209, 210</sup>

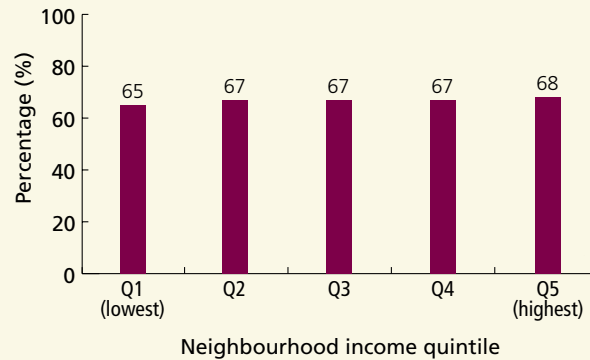
The [POWER Study Cardiovascular Disease chapter](#) examined income differences related to in-hospital specialty care for HF, AMI, and stroke. Indicators of in-hospital specialist care include the proportion of patients with HF or an AMI receiving in-hospital care from a cardiologist; the proportion of stroke or transient ischemic attack (TIA) patients who were admitted to a dedicated stroke unit; and the proportion of stroke or TIA patients receiving in-hospital neurology or neurosurgical consultation.



**Exhibit 12B.20 | Age-standardized percentage of breast cancer patients seen by medical oncologist within three months of diagnosis, by neighbourhood income quintile, in Ontario, 2003/04–2004/05**

**DATA SOURCES:** Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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While no income differences were observed for stroke specialty care, there were differences in in-hospital specialist care for HF and AMI patients. Among patients admitted to hospital for HF or an AMI, those from the lowest-income neighbourhoods were less likely to have a cardiologist as their most responsible physician than those from the highest-income neighbourhoods. For example, among AMI patients, 29 percent of women and 36 percent of men from the lowest-income neighbourhoods had a cardiologist as their most responsible physician compared to 37 percent of women and 42 percent of men from the highest-income neighbourhoods ([Exhibit 12B.21](#)). A similar income gradient was observed among HF patients. Irrespective of neighbourhood income, women admitted to hospital for AMI or HF were less likely than men to receive care from a cardiologist.

Specialty care for patients admitted for a stroke or TIA did not vary by neighbourhood income. Adults living in lower-income neighbourhoods had similar rates of

admission to a dedicated stroke unit and were equally likely to receive a neurology or neurosurgery consultation as adults living in higher-income neighbourhoods. One of the key findings from the [Cardiovascular Disease chapter](#) was that organized models of care delivery that target care across the continuum—such as the Ontario Stroke System—can help reduce inequities in care delivery. Similar patterns were seen for cancer care, where the system of care is also organized around ensuring quality and access.

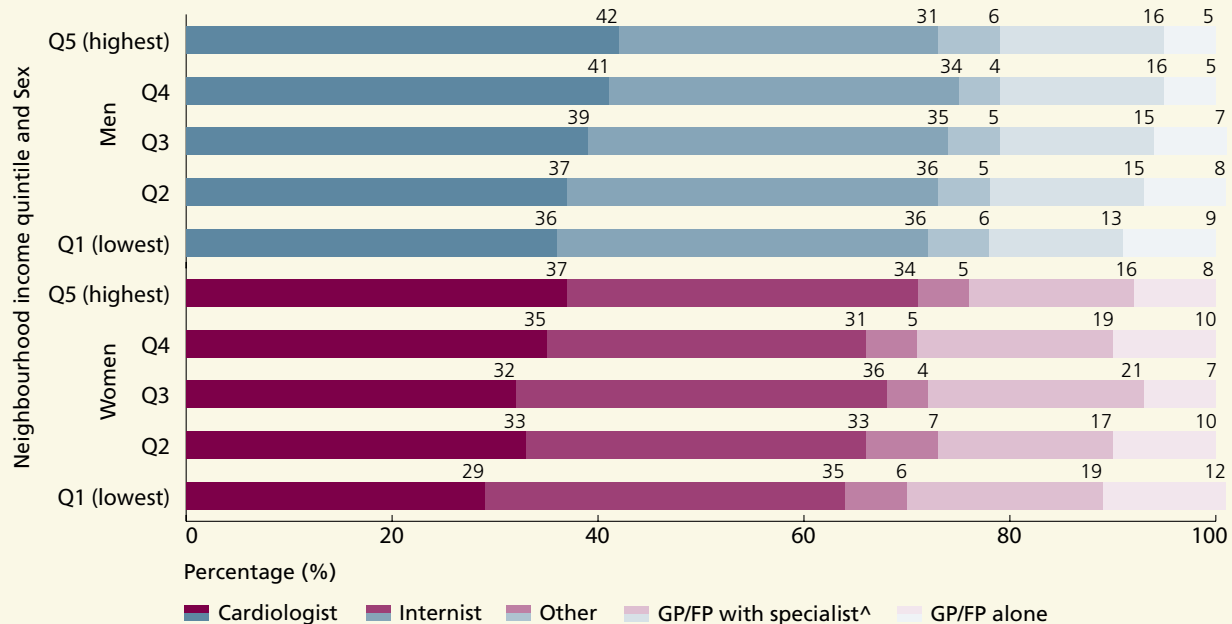
**Prenatal Care Providers**

We assessed the type of health care provider providing prenatal care to pregnant women after the first trimester, the proportion of women with pregestational or gestational diabetes receiving obstetrician care during pregnancy, the proportion of women with pregestational diabetes receiving endocrinologist or general internist care during pregnancy, and the proportion of women with pregestational diabetes receiving an eye examination in the year before delivery.

In general, there were no income differences in these indicators of prenatal care. The type of health care professional (obstetrician, family physician, or midwife) providing prenatal care to pregnant women after the first trimester did not vary by neighbourhood income. Similarly no income-related differences were observed in the proportion of women with pregestational or gestational diabetes who were seen by an obstetrician, nor in the proportion of women with pregestational

diabetes who had an eye examination in the year before childbirth. However, among women with pregestational diabetes, those living in the lowest-income neighbourhoods were somewhat more likely to be seen by an endocrinologist or internist in the nine months prior to delivery than those living in the highest-income neighbourhoods (59 percent versus 52 percent, respectively), which may reflect greater need in this group due to severity of diabetes.

**Exhibit 12B.21** | Type of physician providing in-hospital care to adults aged 45 and older hospitalized for an acute myocardial infarction (AMI), by sex and neighbourhood income quintile, in Ontario, 2005/06



**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

GP/FP = General practitioner/family physician

^ Specialist includes cardiologists and internists

**NOTE:** Bars may not add to 100 percent due to rounding

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation

POWER Study

Diagnosis, Monitoring and Treatment

Follow Up Care

After patients are discharged from hospital, follow up in the outpatient setting provides an important opportunity to assess the patient’s recovery, to make sure they are stable in the outpatient setting, to check their understanding of their treatment and their compliance with treatment, and to manage their ongoing care.<sup>211</sup> In the POWER Study, we examined the proportion of patients who had a physician visit within four weeks of discharge after a hospitalization for heart failure (HF) or acute myocardial infarction (AMI), and the proportion of patients who had a physician visit within 30 days of discharge for patients hospitalized for depression.

Post-discharge follow up care among patients admitted to hospital for HF or AMI was consistently high across income groups; nearly all HF patients (98 percent) and all AMI patients (99 percent) had seen a physician within four weeks of discharge from hospital, irrespective of neighbourhood income. This was not the case for patients who were discharged after an admission for

depression—more than one-third did not have a physician visit within 30 days of discharge and an income gradient was evident. Among those hospitalized for depression, women and men living in the lowest-income neighbourhoods were less likely to have a physician visit within 30 days of discharge compared to those living in the highest-income neighbourhoods (62 percent versus 70 percent, respectively, among women; 56 percent versus 64 percent, respectively, among men) (Exhibit 12B.22).

Diagnosis and Monitoring

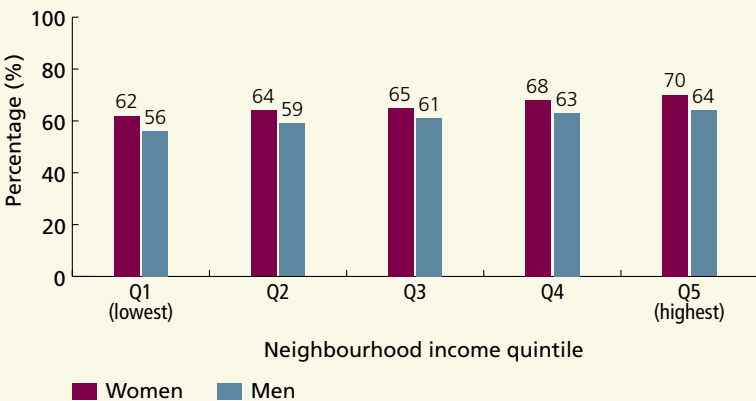
Guideline concordant diagnostic testing and monitoring of chronic conditions can improve health outcomes. The indicators of effective diagnosis and monitoring that we examined in the POWER Study include: left ventricular function evaluation and cardiac testing (echocardiography, cardiac stress testing, angiography) among patients admitted to hospital for HF; angiography for patients admitted to hospital for AMI; neuroimaging and carotid imaging for patients admitted to hospital for stroke or

**Exhibit 12B.22 |** Age-standardized percentage of patients aged 15 and older admitted to hospital for depression who had a physician visit for depression within 30 days of discharge, by sex and neighbourhood income quintile, in Ontario, 2005/06<sup>^</sup>

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Health Insurance Plan (OHIP); Statistics Canada 2001 Census

<sup>^</sup> People who were discharged from hospital from March 1, 2005–February 28, 2006

**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



POWER Study

transient ischemic attack (TIA); dysphagia screening among patients admitted to hospital for stroke; bone mineral density testing after low-trauma fracture; eye examination after diabetes diagnosis; and cancer surveillance (including surveillance colonoscopy after resection of colorectal cancer and surveillance mammography among breast cancer survivors). While many of these indicators did not differ by neighbourhood income, there were several indicators for which income-related disparities were found.

The POWER Study found no income differences in indicators relating to diagnostics or monitoring among stroke patients or cancer survivors. Use of neuroimaging (computed tomography (CT) and/or magnetic resonance imaging (MRI)), dysphagia screening, and carotid imaging after a hospital admission for stroke or TIA did not vary by neighbourhood income. There was also no income variation in cancer surveillance among cancer survivors (surveillance mammography among breast cancer survivors and colonoscopy after resection of colorectal cancer). Cancer care and stroke care in Ontario are delivered and monitored under provincial programs which oversee delivery of care, routinely assess

performance, and implement quality improvement in priority areas.

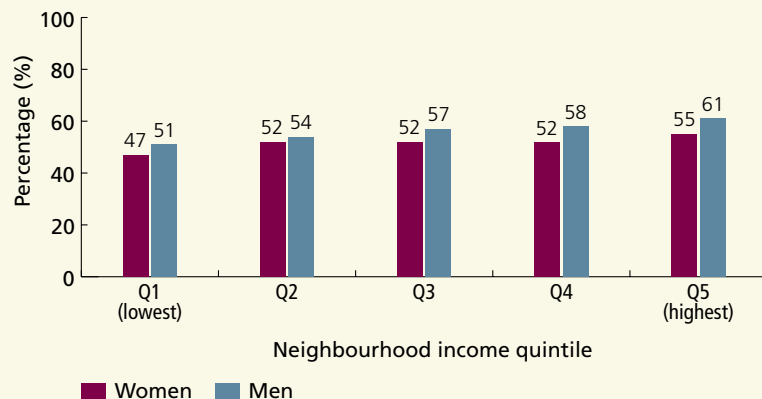
Some income differences were found in the diagnosis and monitoring of HF and AMI patients. There were no income differences in the proportion of HF patients undergoing left ventricular function assessments overall. However, among those admitted to hospital with HF, men living in the lowest-income neighbourhoods were less likely to undergo echocardiography or angiography than men living in the highest-income neighbourhoods (32 percent versus 39 percent, respectively, for echocardiography; 14 percent versus 18 percent, respectively, for angiography). While cardiac diagnostic testing rates for HF did not vary by neighbourhood income for women, rates of all forms of testing were lower for women than men, irrespective of neighbourhood income. Among adults admitted to hospital with an AMI, angiography rates were lower among those from lower-income neighbourhoods compared to those from higher-income neighbourhoods (47 percent versus 55 percent, respectively, among women; 51 percent versus 61 percent, respectively, among men) ([Exhibit 12B.23](#)).

**Exhibit 12B.23** | Age-standardized percentage of adults aged 45 and older admitted to hospital with an acute myocardial infarction (AMI) who underwent coronary angiography<sup>^</sup> within three months of discharge, by sex and neighbourhood income quintile, in Ontario, 2005/06

**DATA SOURCES:** Cardiac Care Network (CCN); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

<sup>^</sup> Angiography was measured as in-hospital procedures performed prior to hospital discharge or referral within three months of discharge

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



POWER Study

The POWER Study found small income disparities in the rates of eye examinations among people with diabetes and in the rates of bone mineral density (BMD) testing among women and men following a low-trauma fall. Eye examination for adults with diabetes is important to prevent visual impairment or loss as a complication of diabetes, but only 58 percent of those with diabetes had an eye exam within two years of diagnosis. Men aged 30 and older living in the highest-income neighbourhoods were slightly more likely to have an eye examination within two years of diagnosis than men living in the lowest-income neighbourhoods; however, this difference was small (55 percent versus 58 percent, respectively). Eye examinations following a diabetes diagnosis did not vary by income among women. BMD testing rates within one year of discharge after a low-trauma fracture were slightly lower among women and men living in lower-income neighbourhoods than those from higher-income neighbourhoods; however, these differences were also small (24 percent versus 28 percent, respectively, among women; 12 percent versus 15 percent, respectively, among men).

### **Surgical Treatment**

Indicators of surgical treatment examined include: carotid endarterectomy following stroke; the use of sphincter-sparing procedures for rectal cancer; surgery for non-small cell lung cancer; breast-conserving surgery; axillary lymph node dissection; hysterectomy rates for benign conditions; and the use of laparoscopic or vaginal hysterectomy for women with benign gynecological conditions. Across the POWER Study, we generally found few income differences in surgical treatment rates, although there were some exceptions.

There was minimal variation in the surgical treatment for cancer or stroke. There were no income differences in the percentage of stroke patients who underwent carotid endarterectomy. There was also no income variation in the use of sphincter-sparing procedures for colorectal cancer, breast-conserving surgery, and axillary lymph node dissection for breast cancer. However,

variation by neighbourhood income was observed for the rates of surgery for non small-cell lung cancer—women and men living in the lowest-income neighbourhoods were less likely than those living in the highest-income neighbourhoods to have surgery for non-small cell lung cancer (20 percent versus 24 percent, respectively, among women; 17 percent versus 21 percent, respectively, among men). This may reflect income-related differences of stage at diagnosis, which may influence whether the tumor was found to be resectable.

Hysterectomy rates displayed a more complex relationship with income, which may be partially explained by the range of options, including a number of non-surgical alternatives, for the treatment of benign gynaecological conditions. Hysterectomy rates for benign conditions were lowest in the lowest- and highest-income neighbourhoods ([Exhibit 12B.24](#)), which might reflect access to alternative treatments by more affluent women, barriers to care among the lowest-income women and differences in decision making. We also found that women who lived in communities with the lowest levels of educational attainment were more likely to undergo hysterectomy for benign conditions, which may reflect lack of information about alternatives.

### **Medical Treatment**

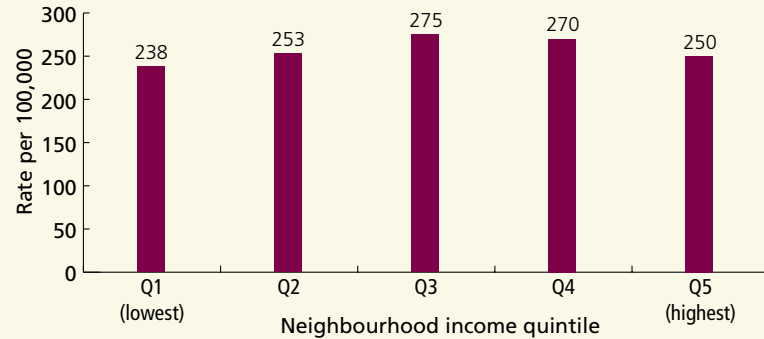
Medications are an important element of chronic disease treatment plans—for example, glucose-lowering medications for diabetes, disease modifying anti-rheumatic drugs (DMARDs) for rheumatoid arthritis, and medications for the management and secondary prevention of ischemic heart disease, HF and stroke. The use of medication requires ongoing follow up to ensure treatment effectiveness and to monitor for potential side effects. A number of indicators were used to assess the quality of medical treatment for acute stroke, medication management for cardiovascular disease (CVD), medication use among people with diabetes, cancer treatment, and treatment with a DMARD or a biologic agent for those with rheumatoid arthritis (see [Table 12B.4](#) for the complete list of indicators of medical treatment).

### Exhibit 12B.24 | Age-standardized hysterectomy rates for benign conditions<sup>^</sup> per 100,000 women aged 15-84, by neighbourhood income quintile, in Ontario, 2007

**DATA SOURCES:** Canadian Institute for health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Statistics Canada 2006 Census

<sup>^</sup> Benign conditions include fibroids, excessive, frequent and irregular menstruation, abnormal uterine and vaginal bleeding, endometriosis, female genital prolapse and inflammatory diseases of female pelvic organs.

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



POWER Study

In general, medication management did not vary by neighbourhood income (for example, see exhibits [12B.25](#), [12B.26](#), and [12B.27](#)). While we found no income-related differences in medication use in the indicators we reported, nearly all of these indicators relied on data from older adults (aged 65 and older) with drug coverage through the Ontario Drug Benefits (ODB) program. With rare exceptions, we were unable to assess medication use among those under age 65. Ontario does not have universal drug coverage for those under age 65 and income-related disparities in obtaining medications are more likely in this group.

In the [Cardiovascular Disease](#) chapter, we looked at the acute management of stroke or TIA and the continued use of medications for the secondary prevention of cardiovascular and cerebrovascular disease including angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB) for patients with heart failure (HF) or acute myocardial infarction (AMI), beta blockers for patient with HF or AMI, lipid-lowering therapy for AMI or stroke, and warfarin prescription for patients with HF or stroke. Among patients aged 45 and older presenting to hospital with a stroke or TIA, neither receipt of thrombolytic therapy (at all, and within 2.5 hours of stroke onset) nor receipt of anti-platelet therapy (within 48 hours of hospital arrival) varied by

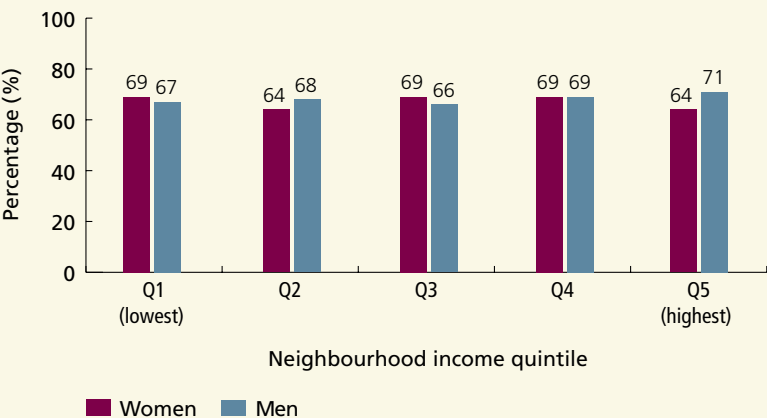
neighbourhood income ([Exhibit 12B.25](#)). Among patients aged 65 and older who were hospitalized for HF, AMI, or stroke, prescription fill rates at 90 days or at one year post-discharge did not vary by neighbourhood income (data on statin use within 90 days for patients discharged after an AMI are shown in [Exhibit 12B.26](#)).

In other POWER Study chapters that included measures of medication management (Musculoskeletal (MSK) Conditions, Diabetes), there was also little evidence of income variation in medication use; however, in most cases the sample was restricted to seniors covered under ODB. The exception was the use of glucose-lowering medications among adults aged 20 and older with diabetes. Data from this indicator were based on self-report from the Canadian Community Health Survey. Use of glucose-lowering medications among adults with diabetes did not vary by annual household income.

As was the case for the surgical management of cancer, there was no significant income variation in use of radiation therapy (breast cancer) or chemotherapy (non-small cell lung cancer, small cell lung cancer, ovarian cancer) for cancer patients in Ontario (data on small cell lung cancer are shown in [Exhibit 12B.27](#)).

**Exhibit 12B.25** | Age-standardized percentage of adults aged 45 and older admitted to hospital for ischemic stroke or transient ischemic attack (TIA) who received antiplatelet therapy within 48 hours of arrival to hospital, by sex and neighbourhood income quintile, in Ontario, 2004/05

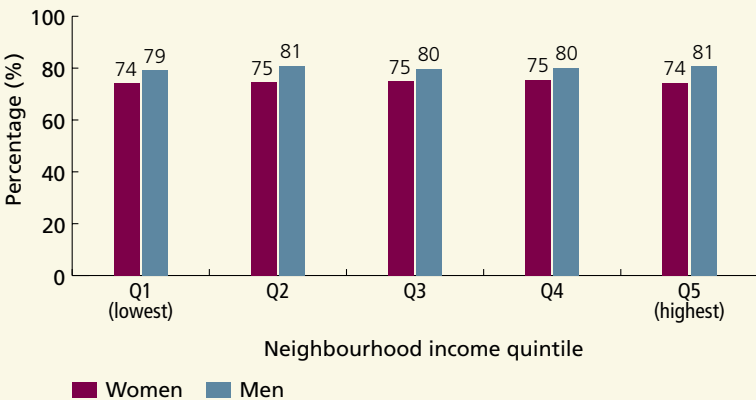
**DATA SOURCE:** Registry of the Canadian Stroke Network Ontario Stroke Audit (RCSN-OSA)  
**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



POWER Study

**Exhibit 12B.26** | Percentage of acute myocardial infarction (AMI) patients aged 65 and older who filled a statin prescription within 90 days post discharge from hospital, by sex and neighbourhood income quintile, in Ontario, 2005/06

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Ontario Drug Benefits (ODB) Database; Registered Persons Database (RPDB); Statistics Canada 2001 Census  
**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



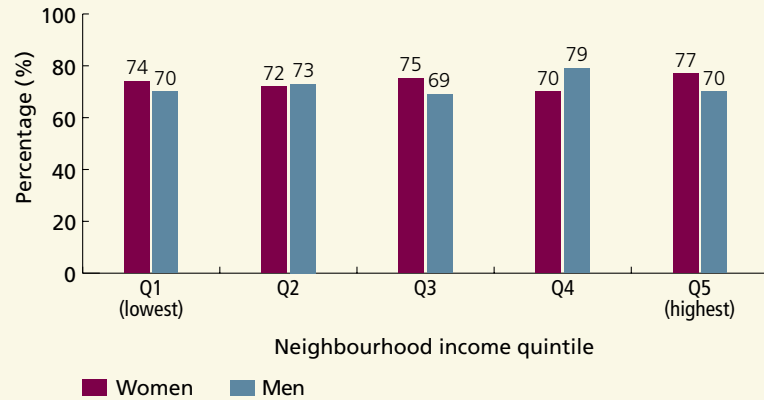
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### Exhibit 12B.27 | Age-standardized percentage of patients with small cell lung cancer who received chemotherapy within six month after diagnosis, by sex and neighbourhood income quintile, in Ontario, 2003/04–2004/05

**DATA SOURCES:** Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



POWER Study

### Childbirth

In the [Reproductive and Gynaecological Health chapter](#), we looked at rates of four childbirth interventions: induction of labour, episiotomy, assisted delivery, and caesarean section. Among women who delivered in Ontario hospitals, one in four deliveries were preceded by labour induction; one in five women with full-term, singleton, vertex, vaginal deliveries had an episiotomy;

one in ten vaginal deliveries were forceps- and/or vacuum-assisted; and almost three in ten deliveries in Ontario were caesarean sections. For all four interventions, the percentage of women who underwent the procedures did not vary by neighbourhood income.

## HEALTH OUTCOMES

Public health and health care delivery systems are aimed at improving health outcomes in the population. Despite a universal health care system aimed at delivering equitable health care to all Canadians, low socioeconomic status continues to be associated with worse health outcomes.<sup>26, 27, 146, 153, 159–161</sup> While mortality rates in Canada have declined over time, there continue to be socioeconomic disparities in health outcomes such as hospitalizations, premature mortality, and cause-specific mortality.<sup>120</sup> The Canadian Institute for Health Information estimates that income disparities account for between one-third and two-fifths of admissions for ambulatory care sensitive conditions and admissions associated with mental health.<sup>159</sup> It is also estimated that hospitalization rates for acute myocardial infarction could be reduced by 16 percent by eliminating socioeconomic disparities.<sup>153</sup>

Measures of health outcomes—including emergency department use, hospitalizations, readmissions, and mortality—were reported in prior POWER Study chapters. Despite relatively small income-related variation on most measures of access to health care and clinical management, we see much larger disparities in health outcomes associated with income. This suggests that, while there is still a need to address inequities in health care access and delivery, inequities associated with income in health outcomes are systemically rooted in Ontario's social, economic, and political context, and eliminating them will require a comprehensive strategy that addresses the social determinants of health.

Throughout the POWER Study, we found notable and potentially modifiable differences in health outcomes associated with income in Ontario. Some outcomes directly related to medical management (e.g., readmissions and mortality among adults admitted to hospital for cardiovascular and cerebrovascular disease) did not vary by neighbourhood income. However, compared to Ontarians living in higher-income neighbourhoods, women and men living in low-income neighbourhoods had higher rates of all-cause and premature mortality and higher cause-specific mortality rates for most conditions examined. Women and men living in low-income neighbourhoods were also much more likely than those living in higher-income neighbourhoods to be hospitalized for specific ambulatory care sensitive conditions (for which effective ambulatory care can prevent or reduce the need for hospitalization), to be hospitalized and/or treated for diabetes complications, and to visit an emergency department within 30 days of being discharged from hospital for depression.

In this section, we re-examine and synthesize these findings to paint a picture of health outcomes among lower-income adults in Ontario. See [Table 12B.5](#) for a full list of indicators that are synthesized in this section. This table summarizes where income-related disparities were found and notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

**Table 12B.5 | Income Differences in Health Outcomes**

Indicator	Income Difference	POWER Study chapter where reported
<b>Hospital Use and Complications</b>		
<b>Hospitalizations and Disease Complications</b>		
<b>Hospital admission rates for specific ambulatory care sensitive conditions</b>		
• chronic obstructive pulmonary disease	Y	<a href="#">Access to Health Care Services</a>
• heart failure	Y	<a href="#">Access to Health Care Services</a>
• diabetes	Y	<a href="#">Access to Health Care Services</a>
• asthma	Y	<a href="#">Access to Health Care Services</a>
<b>Hospitalization or diabetes-related complication among people with diabetes</b>		
• hyperglycemia or hypoglycemia (including ED visits)	Y	<a href="#">Diabetes</a>
• skin and soft tissue infections	Y	<a href="#">Diabetes</a>
• acute myocardial infarction	Y	<a href="#">Diabetes</a>
• heart failure	Y	<a href="#">Diabetes</a>
• stroke	Y <sup>b</sup>	<a href="#">Diabetes</a>
• major amputation	Y <sup>b</sup>	<a href="#">Diabetes</a>
• minor amputation	Y <sup>b</sup>	<a href="#">Diabetes</a>
• chronic dialysis	Y	<a href="#">Diabetes</a>
<b>Hospitalizations for depression</b>	Y	<a href="#">Depression</a>
<b>Non-elective admissions that included an HIV diagnosis</b>	Y	<a href="#">HIV Infection</a>
<b>Emergency Department Use After Hospitalization</b>		
<b>Emergency department visit following a hospitalization for</b>		
• heart failure within:		
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
• depression within:		
– 30 days	Y	<a href="#">Depression</a>

**Table 12B.5 | Income Differences in Health Outcomes (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Hospital Readmission</b>		
<b>All-cause readmission rates following a hospitalization for</b>		
• heart failure within:		
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
• acute myocardial infarction within:		
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
• stroke within:		
– one week	N	<a href="#">Cardiovascular Disease</a>
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
<b>Depression-related readmission rates within 30 days of hospitalization for depression</b>	N	<a href="#">Depression</a>
<b>Reproductive and Gynaecological Health Outcomes</b>		
<b>Birth trauma to newborns</b>	N	<a href="#">Reproductive and Gynaecological Health</a>
<b>Severe maternal morbidity rate</b>	N	<a href="#">Reproductive and Gynaecological Health</a>
<b>Maternal and neonatal readmission rates or complication rates after hysterectomy</b>	N	<a href="#">Reproductive and Gynaecological Health</a>
<b>Survival and Mortality</b>		
<b>Cancer Survival</b>		
Five-year survival rates among people with:		
• lung cancer	Y <sup>c</sup>	<a href="#">Cancer</a>
• colorectal cancer	Y <sup>b</sup>	<a href="#">Cancer</a>
• breast cancer	N	<a href="#">Cancer</a>
• gynaecological cancers (ovarian, uterine)	N	<a href="#">Cancer</a>
<b>Mortality</b>		
• all-cause mortality rate	Y	<a href="#">Burden of Illness</a>
• premature mortality (deaths before age 75)	Y	<a href="#">Burden of Illness</a>

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**Table 12B.5 | Income Differences in Health Outcomes (Continued)**

Indicator	Income Difference	POWER Study chapter where reported
<b>Survival and Mortality (Continued)</b>		
<b>Cause-specific mortality rates</b>		
• diabetes	Y	<a href="#">Burden of Illness</a>
• circulatory diseases	Y	<a href="#">Burden of Illness</a>
• chronic obstructive pulmonary disease	Y	<a href="#">Burden of Illness</a>
• pneumonia	N	<a href="#">Burden of Illness</a>
• intentional and non-intentional injury (homicide, fire, drowning, and poisoning)	Y	<a href="#">Burden of Illness</a>
<b>Mortality following hospitalization for</b>		
• heart failure within:		
– one year	N	<a href="#">Cardiovascular Disease</a>
• acute myocardial infarction within:		
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
• stroke/transient ischemic attack within:		
– 30 days	N	<a href="#">Cardiovascular Disease</a>
– one year	N	<a href="#">Cardiovascular Disease</a>
• hip fracture within:		
– one year	N	<a href="#">Musculoskeletal Conditions</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

POWER Study

## Hospital Use and Complications

Hospital visits—including emergency department (ED) visits, hospitalizations, and readmissions—were examined in prior POWER Study chapters. Potentially avoidable hospitalizations and ED visits for common chronic conditions and their complications indicate inadequate care or lack of appropriate community and ambulatory support. Visits to an ED or a hospital readmission shortly after discharge from an inpatient stay may signal less-than-optimal continuity of care, poor discharge planning, lack of appropriate community supports, or poor integration with community services.

## Hospitalizations and Disease Complications

An income gradient was observed for hospital admission rates for chronic obstructive pulmonary disease (COPD), heart failure (HF), diabetes, and asthma. For all of these conditions, effective ambulatory care can prevent or reduce the need for hospitalization (ambulatory care sensitive conditions (ACSCs)).<sup>196, 212</sup> Hospitalizations for these conditions may reflect impaired access to, or suboptimal quality of outpatient care. Compared to women and men living in the highest-income

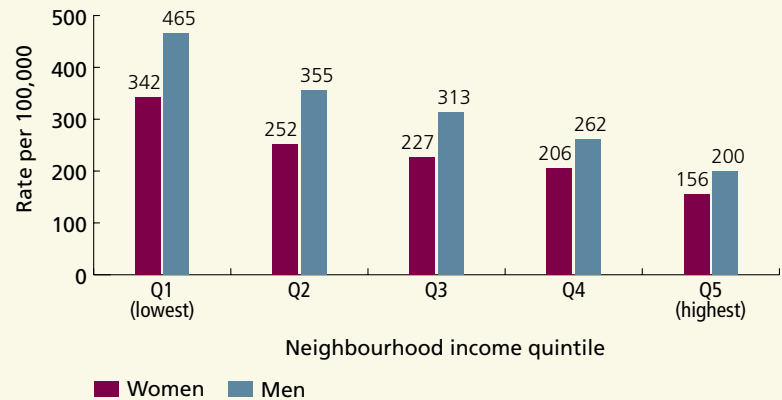
neighbourhoods, those living in the lowest-income neighbourhoods were more than twice as likely to be admitted to hospital for COPD ([Exhibit 12B.28](#)) and 50 percent more likely to be admitted for HF ([Exhibit 12B.29](#)).

Similar income gradients were observed for hospitalizations for asthma and diabetes. We estimated that 30 percent of hospitalizations for these four ACSCs (or almost 16,000 hospitalizations a year) could potentially be

**Exhibit 12B.28 |** Age-standardized rates of hospitalization for chronic obstructive pulmonary disease (COPD) per 100,000 adults aged 25 and older, by sex and neighbourhood income quintile, in Ontario, 2006/07

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation

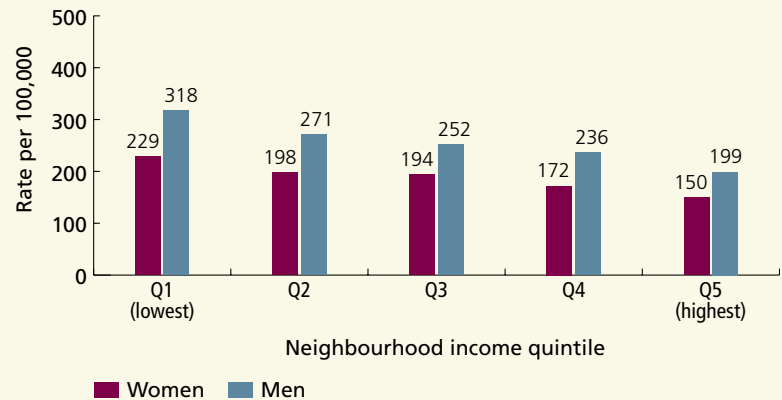


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**Exhibit 12B.29 |** Age-standardized rates of hospitalization for heart failure (HF) per 100,000 adults aged 25 and older, by sex and neighbourhood income quintile, in Ontario, 2006/07

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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avoided if the hospitalization rates observed among adults living in the highest-income neighbourhoods could be achieved across all neighbourhood income levels. While depression is not included in the standard list of ACSCs, effective ambulatory management for depression will reduce hospitalization rates for this condition. Adults with depression living in low-income neighbourhoods were 80 percent more likely to be hospitalized for depression than those living in higher-income neighbourhoods ([Exhibit 12B.30](#)). Based on the pattern of admissions, it is important to target interventions to improve ambulatory care for lower-income adults. Because most admissions for HF and COPD occur among those aged 65 and older, there is also a need to specifically target older, lower-income adults.

The [POWER Study Diabetes chapter](#) examined several complications among people with diabetes, including hospitalizations for hyper- or hypoglycemia (including ED visits), skin and soft tissue infections, acute myocardial infarction (AMI), HF, and amputations, as well as chronic dialysis. Income gradients were noted for all diabetes

complications. Among adults with diabetes, those living in lower-income neighbourhoods had worse health outcomes than those living in higher-income neighbourhoods. Income-related differences for stroke, major amputation, and minor amputation were significant among men, but not women. [Exhibit 12B.31](#) illustrates income gradients in selected diabetes complications.

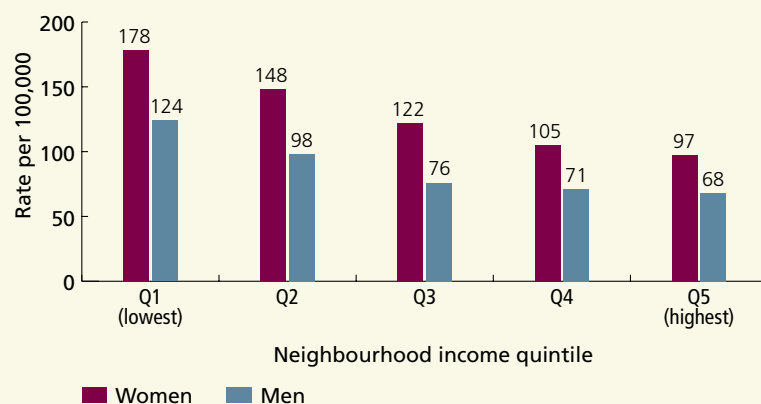
Income-related differences were also noted for hospital admissions including an HIV diagnosis. The number and rates of admissions that identified HIV as contributing significantly to length of stay were highest among adults living in the lowest-income neighbourhoods. The HIV admission rates were 0.8 per 1,000 admissions among women living in the lowest-income neighbourhoods versus 0.4 per 1,000 admissions among women living in the highest-income neighbourhoods, and 3.1 per 1,000 admissions among men living in the lowest-income neighbourhoods versus 1.2 per 1,000 admissions among men living in the highest-income neighbourhoods (see [POWER Study HIV Infection chapter](#)).

### Exhibit 12B.30 | Age-standardized rate (per 100,000 population) of hospitalizations for depression in Ontarians aged 15 and older, by sex and neighbourhood income quintile, 2005/06<sup>^</sup>

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census; Registered Persons Database (RPDB)

<sup>^</sup> People who were discharged from hospital from March 1, 2005–February 28, 2006

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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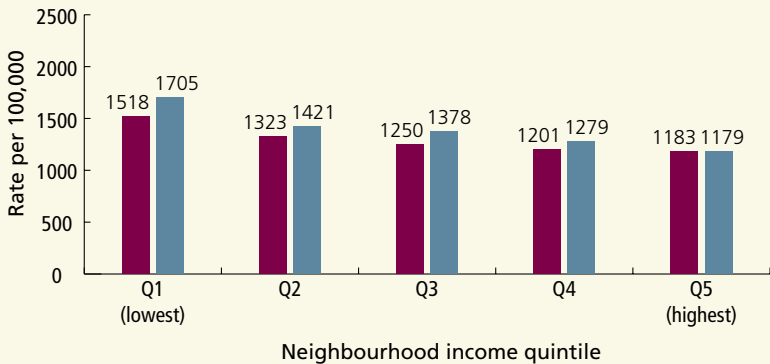


**Exhibit 12B.31 | Age-standardized rate of selected diabetes complications (per 100,000) among adults aged 20 and older with diabetes, by sex and neighbourhood income quintile, in Ontario, 2006/07**

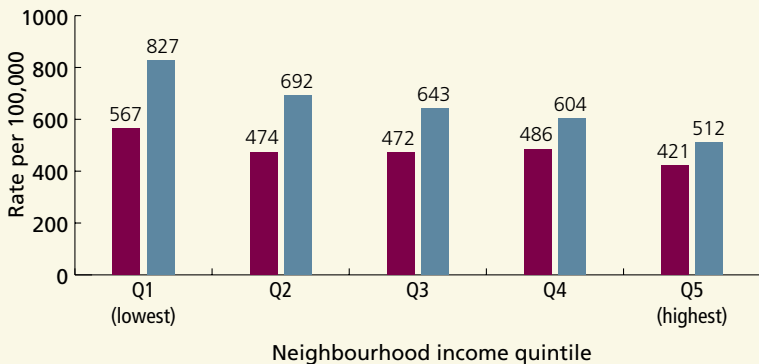
**DATA SOURCES:**

- <sup>^</sup> Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada Census 2006
  - <sup>¥</sup> Ontario Diabetes Database (ODD); Ontario Health Insurance Plan (OHIP); Statistics Canada 2006 Census
  - <sup>†</sup> Ontario Diabetes Database (ODD); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada Census 2006
- NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation

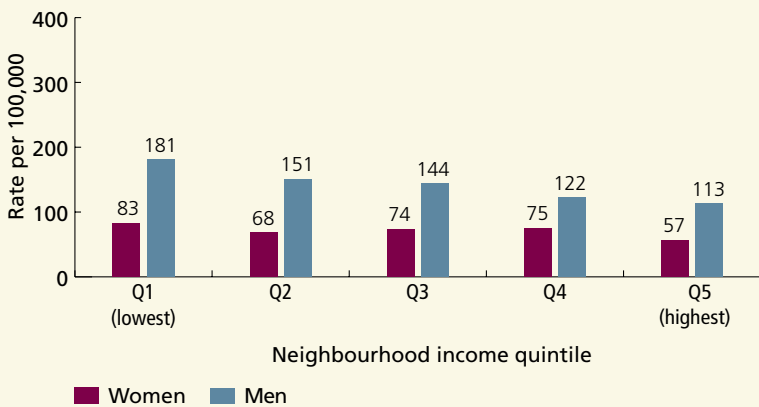
**Hospitalization or emergency department visit for hyperglycemia/hypoglycemia<sup>^</sup>**



**Rate of chronic dialysis<sup>¥</sup>**



**Rate of major amputations<sup>†</sup>**



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### Emergency Department (ED) Use After Hospitalization

ED visits after a hospital discharge may be a marker of suboptimal outpatient management and may be preventable with access to effective primary care and ambulatory specialty care. While ED visits following hospitalization for HF were quite common (30 percent were seen in an ED within 30 days and 75 percent were seen in an ED within one year), these rates did not vary by neighbourhood income for women or men. However, there was significant income variation in ED visits following a depression-related hospitalization. Among men who had been hospitalized for depression, 22 percent of those living in lower-income neighbourhoods were seen in an ED within 30 days of discharge compared to 13 percent of those living in higher-income neighbourhoods; the income-related difference was smaller among women (19 percent among women living in lower-income neighbourhoods compared to 15–17 percent among those living in higher-income neighbourhoods) (Exhibit 12B.32).

### Readmission Rates

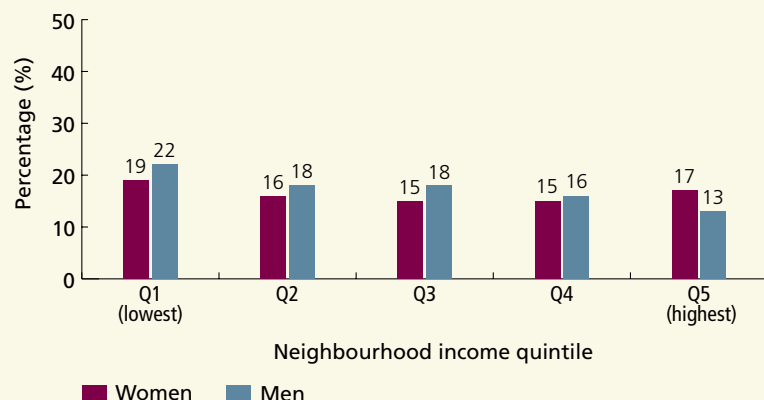
Hospital readmissions can reflect a variety of factors, including (but not limited to) the clinical care provided in hospital and in the community, as well as self-management. The POWER Study examined all-cause, risk-adjusted readmission rates following a hospitalization for HF, AMI, and stroke (within 7 days (stroke only), 30 days, or one year of discharge), as well as depression-related readmission rates within 30 days following a hospitalization for depression. Readmission rates did not vary significantly by neighbourhood income (data for one-year, all-cause readmission rates among those hospitalized for HF and 30-day depression-related readmission rates among those hospitalized for depression are shown in [Exhibit 12B.33](#)).

#### Exhibit 12B.32 | Age-standardized percentage of patients aged 15 and older hospitalized for depression who were seen in an emergency department (ED) within 30 days of discharge without a subsequent hospitalization, by sex and neighbourhood income quintile, in Ontario, 2005/06<sup>^</sup>

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); National Ambulatory Care Reporting System (NACRS); Statistics Canada 2001 Census

<sup>^</sup> People who were discharged from hospital from Mar 1, 2005–Feb 28, 2006

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



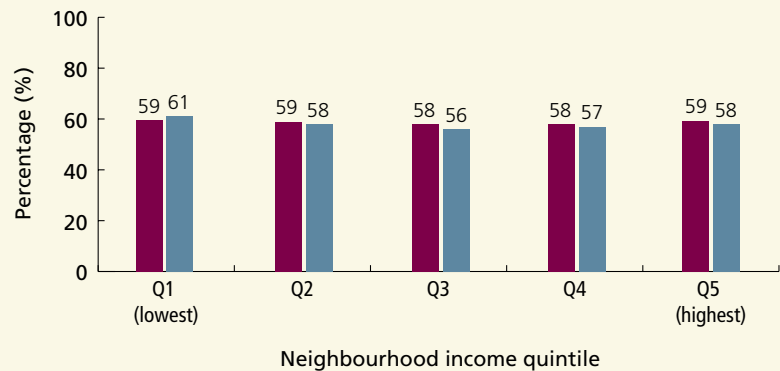
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**Exhibit 12B.33 | Readmission rates among patients admitted to hospital for heart failure (HF) or depression, by sex and neighbourhood income quintile, in Ontario, 2005/06**

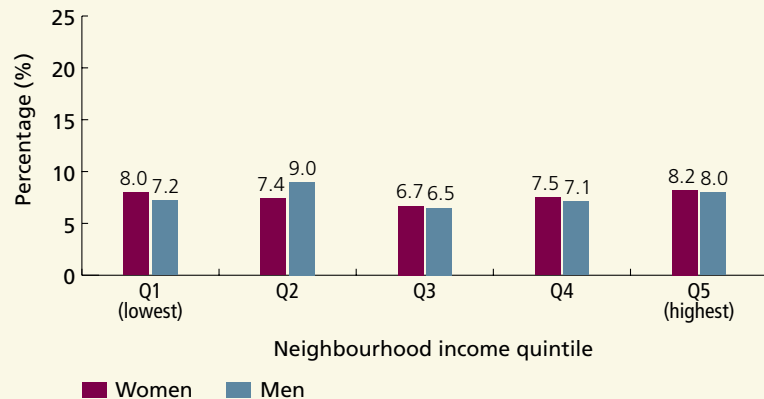
**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2001 Census

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation

**One-year, risk-adjusted all-cause readmission rates after an admission for heart failure**



**30 day, age-standardized depression-related readmission rates after an admission for depression**



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## Reproductive And Gynaecological Health Outcomes

Rates of reproductive and gynaecological health outcomes—including birth trauma to newborns, severe maternal morbidity rates, maternal and neonatal readmission rates, or complication rates after

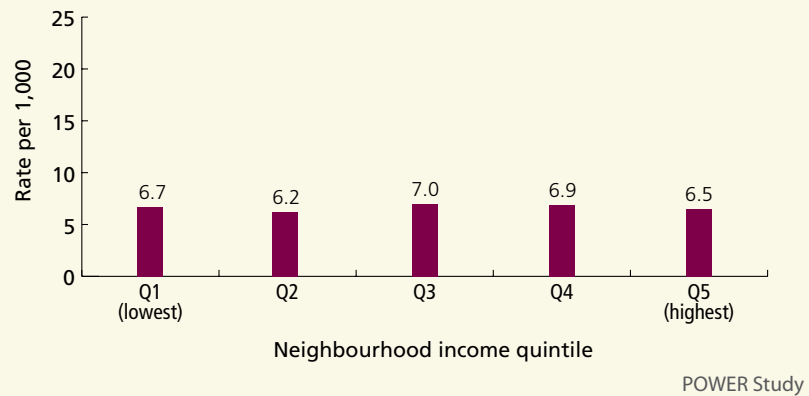
hysterectomy—did not vary by neighbourhood income (data on birth trauma or injury to newborns are shown in [Exhibit 12B.34](#)).

### Exhibit 12B.34 | Rate (per 1,000 live births) of birth trauma or injury<sup>^</sup> in newborns, by neighbourhood income quintile, in Ontario, 2007

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) (ICES Mother-Baby (MOMBABY) linked database); Statistics Canada 2006 Census

<sup>^</sup> Excluding preterm and low birth weight infants if they had subdural and/or cerebral hemorrhage and newborns with congenital malformations and deformations of the musculoskeletal system and central nervous system

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



## Survival and Mortality

Mortality and survival indicators are important measures of population health and are widely used to assess health inequities. Both health care delivery and public health practice are aimed at improving health by extending length of life, while also improving quality of life. In the [Burden of Illness chapter](#), we found that if all Ontarians had the same health as Ontarians with higher income, there would be an estimated 3,373 fewer deaths each year among Ontarians living in metropolitan areas. In the POWER Study, we measured cancer survival, all-cause mortality, premature mortality, cause-specific mortality, and mortality after specific adverse events (hospitalization for hip fracture, heart failure (HF), acute myocardial infarction (AMI), or stroke/transient ischemic attack (TIA)).

### Cancer Survival

Differences in cancer survival rates may reflect differences in the timing of the diagnosis, the accessibility and quality of health care services, and the

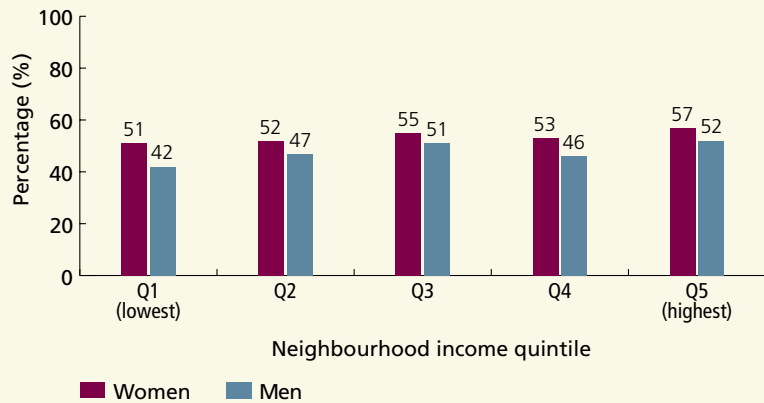
presence of comorbidities. In Ontario, the five-year survival rate was 50 percent for colorectal cancer, 13 percent for lung cancer, 80 percent for breast cancer, 77 percent for uterine cancer, 42 percent for ovarian cancer, and 77 percent for cervical cancer. The five-year survival rates for colorectal cancer varied by neighbourhood income among men but not among women (42 percent of men living in the lowest-income neighbourhoods were alive five years after diagnosis compared to 52 percent of men living in the highest-income neighbourhoods) ([Exhibit 12B.35](#)). Five-year survival rates for lung cancer were slightly lower among those living in the lowest-income neighbourhoods compared to those living in the highest-income neighbourhoods (11 percent versus 13 percent, respectively). There were no income differences in five-year survival rates for breast, ovarian, or uterine cancers.

**Exhibit 12B.35 | Age-standardized five-year survival rate (percentage) among colorectal cancer patients, by sex and neighbourhood income quintile, in Ontario<sup>^</sup>**

**DATA SOURCES:** Ontario Cancer Registry (OCR); Registered Persons Database (RPDB); Statistics Canada 2001 Census

<sup>^</sup> for cases diagnosed in 2000/2001

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



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### Mortality

All-cause mortality and premature mortality rates were higher among men than women across all neighbourhood income quintiles ([Exhibit 12B.36](#)). Both all-cause mortality and premature mortality rates exhibited income gradients, which were steeper for men than for women. For example, 41 percent of men living in the lowest-income neighbourhoods died before age 75 compared to 28 percent of men in the highest-income neighbourhoods; meanwhile, 26 percent of women living in the lowest-income neighbourhoods died before age 75 compared to 19 percent of women in the highest-income neighbourhoods.

In general, lower-income adults had higher cause-specific mortality rates than higher-income adults, with some exceptions. Cause-specific mortality rates for diabetes, circulatory diseases, chronic obstructive pulmonary disease (COPD), and injury (homicide, fire, drowning, and poisoning) all exhibited income gradients, such that adults living in lower-income neighbourhoods had higher cause-specific mortality

rates for these four conditions compared to those living in higher-income neighbourhoods. For example, the diabetes mortality rate among adults living in the lowest-income neighbourhoods was over 1.6 times higher than for adults living in the highest-income neighbourhoods ([Exhibit 12B.37](#)). Pneumonia mortality rates did not vary significantly by neighbourhood income. Mortality rates from road traffic accidents (including motor vehicle, pedestrian, and bicycle accidents) were higher among women and men living in higher-income neighbourhoods, though these differences were not significant.

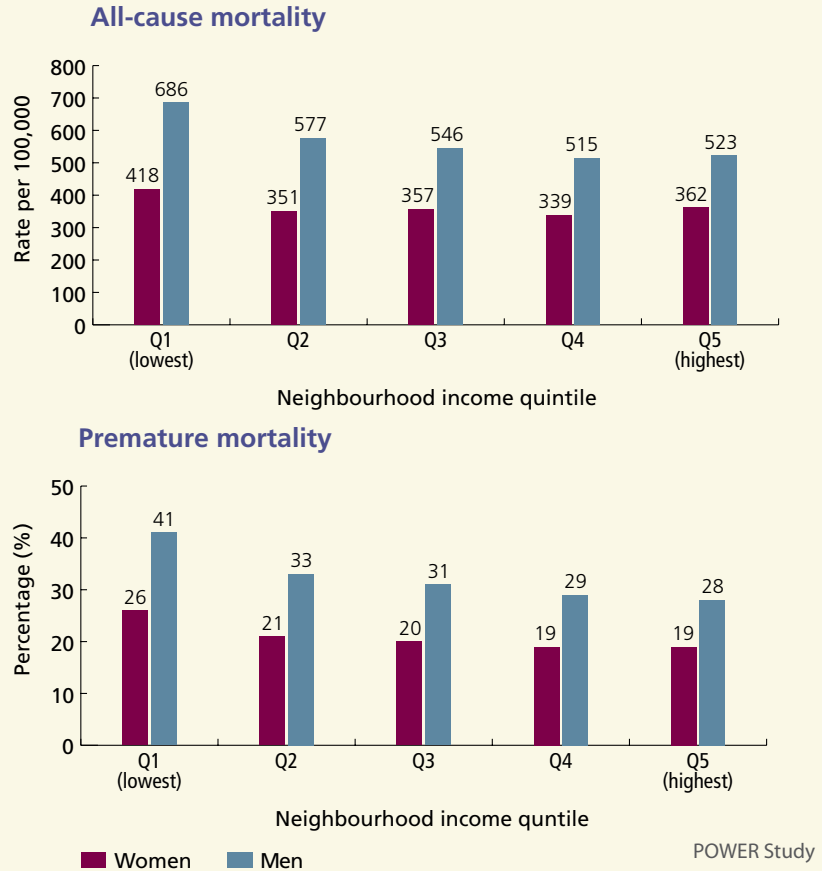
Mortality rates following a hospital admission did not follow the same pattern of income variation that was seen for all-cause mortality, premature mortality or cause-specific mortality rates in the population. Mortality rates among people who had been admitted to hospital for HF, AMI, stroke/TIA, or a hip fracture did not vary by neighbourhood income (one-year mortality rates after an admission for HF are shown in [Exhibit 12B.38](#)).

### Exhibit 12B.36 | All-cause mortality (per 100,000 population) and the percentage of the population who died before age 75 (premature mortality), by sex and neighbourhood income quintile, in Ontario,^ 2001

**DATA SOURCES:** Statistics Canada's Canadian Mortality Database; Statistics Canada 2001 Census

^ Only Ontario Census Metropolitan Areas (CMAs) were included

**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation

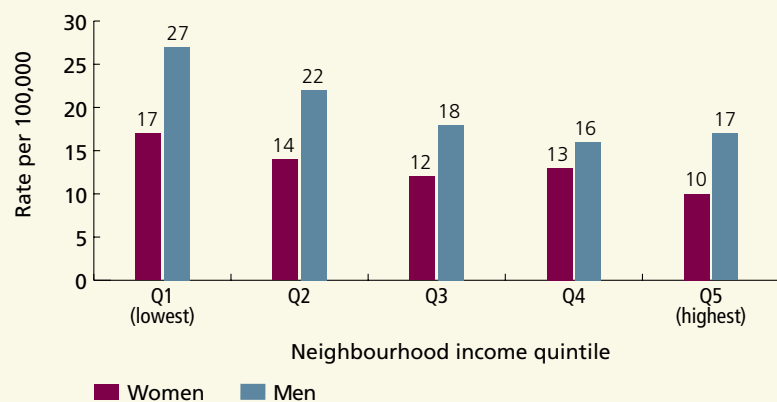


### Exhibit 12B.37 | Age-standardized diabetes mortality rate per 100,000 population, by sex and neighbourhood income quintile, in Ontario,^ 2001

**DATA SOURCES:** Statistics Canada's Canadian Mortality Database; Statistics Canada 2001 Census

^ Only Ontario Census Metropolitan Areas (CMAs) were included

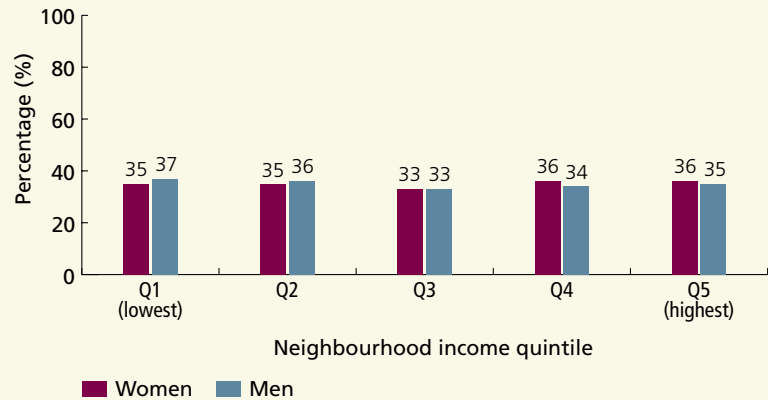
**NOTE:** See [Appendix 12.2](#) for details about neighbourhood income quintile calculation



**Exhibit 12B.38** | Risk-adjusted one-year mortality (percentage) among adults aged 45 and older admitted to hospital for heart failure (HF), by sex and neighbourhood income quintile, in Ontario, 2005/06

**DATA SOURCES:** Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Registered Persons Database (RPDB); Statistics Canada 2001 Census

**NOTE:** See Appendix 12.2 for details about neighbourhood income quintile calculation



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# Section 12C

## *Immigrant and Minority Populations*

### INTRODUCTION

Canada has a tremendously diverse population. Since the early 1990's, Canada has granted permanent resident status to an average of more than 250,000 immigrants each year.<sup>213</sup>

In 2006, 6.2 million immigrants lived in Canada, accounting for 19.8 percent of the population.<sup>213</sup> This proportion was projected to rise to 25–29 percent by 2031,<sup>214</sup> though recent changes to immigration policy regarding family reunification could alter this projection.

Newcomer settlement is highly concentrated in Canada's thirty-three Census Metropolitan Areas (CMAs), which have consistently drawn approximately 90 percent of Canada's new immigrants since 1990. Canada's three largest cities—Toronto, Vancouver, and Montreal—receive the highest numbers of international immigrants, accounting for 70 percent between them.<sup>214</sup> Containing less than 40 percent of the Canadian population, Ontario received half of all newcomers to Canada in 2006; this is in part due to the fact that fifteen of the thirty-three CMA's are in the province.<sup>214</sup> In that same year, Ontario's population had a higher proportion of immigrants than any other province, with nearly one in three (28.3 percent) Ontarians being foreign-born.<sup>213</sup>

Patterns of immigration to Canada have changed over time.<sup>215</sup> Historically, most immigrants originated from European countries, until changes to federal immigration policy in 1967 established the "Points System," shifting the priorities for entry criteria to education credentials and entrepreneurial aptitudes rather than country of origin.<sup>216</sup> As a result, Canada's racial and ethnic minority population nearly quadrupled between 1981 and 2001, rising from five percent to

13 percent.<sup>213</sup> Between 2001 and 2006, about 60 percent of immigrants to Canada came from Asia and about 10 percent from Africa compared to 6.4 percent and 3.0 percent, respectively, 40 years earlier.<sup>213</sup> It is projected that by 2031, three in ten Canadians will be racial or ethnic minorities, with an even higher proportion in cities. For example, in Toronto and Vancouver, three in five people could belong to a racial or ethnic minority group by 2031.<sup>214</sup>

Upon arrival, recent immigrants often have better health than their Canadian-born counterparts (termed the "healthy immigrant effect"), but this advantage is lost over time.<sup>217, 218</sup> This initial health advantage is believed to be a result of two factors: (1) healthy people are more likely to have the resources necessary to emigrate, and (2) Canadian immigration policies select immigrants based on education, job skills, and language abilities—all of which are linked to health—while excluding people with serious medical conditions.<sup>218–222</sup> The subsequent decline in health is likely the result of a complex interaction between race, ethnicity, gender, other social determinants of health, and the migration process.<sup>18, 20, 215, 223</sup> Thus, it is important to focus attention on maintaining and improving the health of immigrant and minority communities.

As discussed earlier in this chapter, health is primarily influenced by the social determinants of health. While these social factors influence the health of all Ontarians, racialized and immigrant communities are

disproportionately more likely to live in poverty, be underemployed or unemployed, have limited access to services, have difficulties meeting core housing needs, live in neighbourhoods that increase the risk of illness, and experience food insecurity.<sup>45, 93, 158, 224–228</sup> Recent, non-European immigrants are especially disadvantaged.<sup>158, 226</sup> These groups may also experience racism and discrimination, both of which have been associated with worse mental and physical health.<sup>46–49</sup>

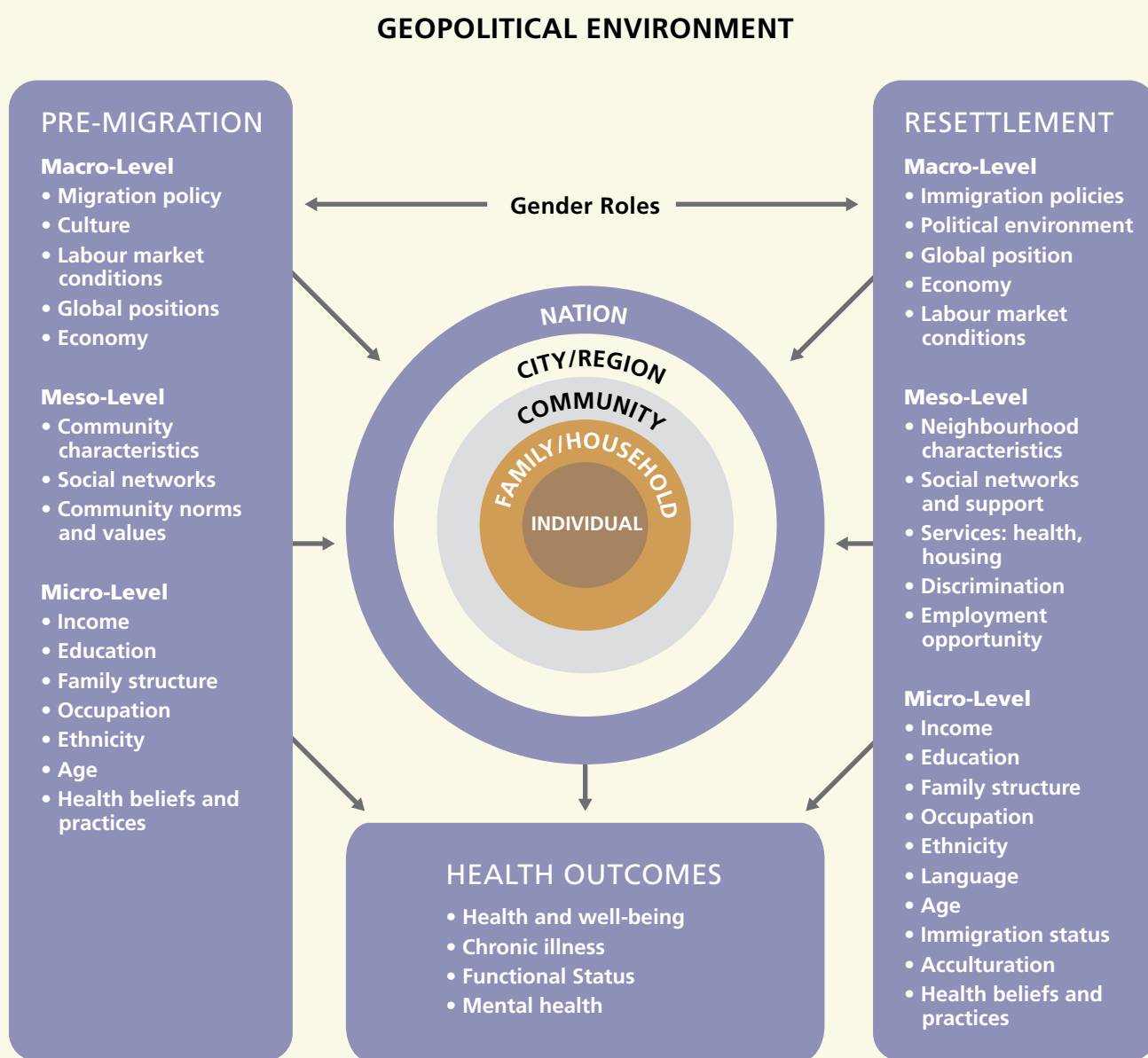
In Ontario, there is evidence that immigrants and minority populations have differential use of and access to health care services compared to White or Canadian-born populations. While use of primary care physicians appears to be similar between the two groups,<sup>229, 230</sup> immigrants and ethnic minorities are less likely to use preventive<sup>190, 230</sup> and mental health services,<sup>231</sup> and may seek alternative or traditional forms of health care.<sup>232</sup> In addition to barriers to health care that are encountered by all Ontarians, immigrant and minority populations also face many unique barriers to care. These barriers include care that may not be culturally sensitive and a healthcare system that is difficult to navigate. Additional barriers include experiences of discrimination, distrust of the biomedical system, fear of deportation in some circumstances, as well as cost and language barriers.<sup>233–236</sup> Additionally, culture-specific beliefs influence how people perceive their health, seek care, and interact with health care providers.<sup>237–240</sup> Cultural competency within the healthcare system and among care providers is necessary to provide appropriate care to these groups.

The experiences of immigration, racialization, and health are also shaped by gender.<sup>241–243</sup> Women often immigrate to Canada as dependents under the family class immigration category, and traditional women's roles (domestic work, nursing, etc.) tend to predominate for those who come to Canada on work permits or immigrate under economic categories. This has an impact on immigrant women's financial status and independence once they arrive in Canada, as "feminine-type" work is typically undervalued and underpaid.<sup>244–250</sup> Immigrant and racialized women often face "double" or

"triple-jeopardy," facing discrimination and oppression based on their race, ethnicity, immigration status, and gender.<sup>18</sup> Additionally, the barriers that immigrant and minority women confront when accessing health care services will be influenced by their jobs, family responsibilities, and cultural expectations.<sup>215, 251–253</sup> Immigrant women, as with all women, are a diverse group. Their pre-migration circumstances and post-migration resettlement and integration context intersect with their individual, family, community, and society-level resources and challenges.<sup>254</sup>

The conceptual framework<sup>215</sup> presented in [Figure 12.2](#) illustrates the complex interplay between gender, migration, and health. The health status and well-being of immigrant women is shaped by the broader geopolitical context, which has a powerful constitutive impact on who is able to migrate, from where they are able to migrate, and where they settle. Macro-level factors, such as federal immigration policies, labour market, and economic conditions, as well as international relations, interact with factors at the more tangible meso and micro levels. The meso level influences the environment that is largely outside the home, including community-level support systems, neighbourhood composition, and social interactions (positive or negative). Both the macro and meso environments influence the quality of micro-level factors, which include personal income and family composition, education levels, health beliefs, and behaviours in both the pre- and post-migration countries. Social determinants of health—combined with gendered and racialized policies, norms, and practices—operate at the macro, meso, and micro levels in both the countries of origin and immigration, to produce differential opportunities and outcomes between male and female immigrants.

Although wide-ranging disparities in access and quality of health care exist between immigrant populations and those born in Canada, a number of programs and interventions have been initiated to respond to the diverse needs of Canada's newcomers. Interventions

**Figure 12.2** | Gender, Migration, and Health: A Conceptual Framework

**SOURCE:** Bierman AS, Ahmad F, Mawani FN. Gender, migration, and health. In: Agnew V, editor. *Racialized Migrant Women in Canada: Essays in Health, Violence, and Equity*. Toronto: University of Toronto Press, 2009:98-136

**NOTE:** Central concentric circles adapted from Hertzman C, Power C, Matthews S, Manor O. 2001. Using an interactive framework of society and life course to explain self-rated health in early adulthood. *Social Science and Medicine*, 53:1575-1585

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aimed at primary care practitioners include training in cultural roles, norms, and values, as well as anti-oppression practices. At the clinic level, greater access to healthcare for newcomers has been achieved through the use of tracking and reminder systems and helpful reception staff. The ability to access healthcare in their own language (or with translation support) has also been a key factor in whether or not newcomers seek or follow up with health programs and services.<sup>255–258</sup> These strategies can be complemented with outreach interventions that extend beyond health clinics and hospitals to address social and physical barriers that newcomers face in achieving health. Such interventions may include advocacy for policy and system change, community-level care and programs that respond to the needs and sensitivities of specific groups, and provision of supports and training for newcomers on how to negotiate the healthcare system.<sup>259, 260</sup> Along with other reports that have sought to develop “best practices” for improving the health of immigrants and marginalized populations,<sup>256, 261</sup> the POWER Study provides an evidenced-based tool to identify health inequities in order to improve health practices and outcomes.

In [Section 12A](#) of this chapter, we examined the social determinants of health and their associations with gender, race/ethnicity, and immigration status. These social factors have a strong influence on the health of immigrant and minority women. In this section, we report indicators related to the health status of Ontario's immigrant and minority populations, as well as other factors that affect health status. Among immigrant and minority women and men, we report differences associated with race/ethnicity or world region of birth, immigration status and time since immigration, language spoken, income, and age, where data are available and sample size allows. The categories of race/ethnicity used to stratify indicators from the Canadian

Community Health Survey (CCHS) are those used by Statistics Canada and include categories based upon both race and world region of origin. Most indicators in this section have been previously reported in other POWER Study chapters; here, we have re-examined and synthesized the findings specifically in relation to immigrant and minority populations. In addition to synthesizing across POWER Study chapters, we report three indicators of immigrant women's health that have not been previously reported in the POWER Study. Specifically, in this section, we have organized our discussion into the following sections:

### **Synthesis across POWER Study chapters**

- Indicators of health and functional status
- Indicators of chronic disease risk factors
- Indicators of access to health care services

### **Additional indicators not previously reported in the POWER Study**

- Prevalence of diabetes
- Cervical cancer screening
- Preterm births

Several data sources were used in this section. For indicators which have been reported in previous POWER Study chapters and are synthesized here, see relevant POWER Study chapters for details regarding data sources and indicators. The three indicators which have not previously been reported in the POWER Study were calculated by linking data from the Landed Immigrant Data System (LIDS), which is maintained by Citizenship and Immigration Canada, to health care administrative databases. This provides a unique opportunity to examine the health of people who have immigrated to Ontario (see [Appendix 12.2](#) for more detailed information on these indicators).

## SYNTHESIS ACROSS POWER STUDY CHAPTERS

### Health and Functional Status

A primary goal of both public health and health care services is to improve quality of life by optimizing health and functional status.<sup>22, 262</sup> The [POWER Study Burden of Illness chapter](#) examined three indicators of health and functional status among immigrant and minority populations: self-rated health, activity limitations, and the prevalence of comorbidity. [Table 12C.1](#) lists the indicators that are synthesized in this section and summarizes where disparities in health and functional status were found in relation to race/ethnicity and time since immigration. This table also notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

Self-rated health—also referred to as global, self-reported, or self-perceived health—is an indicator of how people rate their overall health status. Self-rated health is a well-validated measure of health status that has been shown to have strong predictive relationships with numerous health outcomes including mortality, health care utilization, and health care costs in diverse populations.<sup>169–171</sup> However, self-rated health is a subjective measure that is sensitive to an individual's life experiences, including the influence of culture, and could therefore result in differences in self-assessments of health between ethnic groups.<sup>263</sup> Activity limitations are measured as the percentage of the population who reported that their activities at home, school, or work have been limited due to a long-term physical condition, mental condition, or health problem. The prevalence of comorbidity is the percentage of adults who reported having more than one chronic condition diagnosed by a health professional.

**Table 12C.1 | Disparities in Health and Functional Status by Race/Ethnicity and Time Since Immigration**

Indicator	Race/ethnicity	Time since immigration/immigration status <sup>^</sup>	POWER Study chapter where reported
<b>Self-rated health</b>	Y	Y <sup>b</sup>	<a href="#">Burden of Illness</a>
<b>Activity limitations</b>	Y	Y	<a href="#">Burden of Illness</a>
<b>Prevalence of multiple chronic conditions</b>	Y	Y	<a href="#">Burden of Illness</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

<sup>^</sup> Patterns suggest recent immigrants (less than 10 years since arrival) have a health advantage for these indicators (compared to immigrants who had been in Canada 10 or more years and/or Canadian-born respondents)

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**Exhibit 12C.1 | Age-standardized indicators of health and functional status among adults aged 25 and older, by sex and race/ethnicity, in Ontario, 2005**

**FINDINGS**

- In Ontario, health and functional status varied among adults from different racial/ethnic groups.
- Aboriginal women and men (off-reserve) had worse health and functional status than White Ontarians. For example, 29 percent of Aboriginal women and 24 percent of Aboriginal men reported fair or poor health compared to 12 percent of White women and 13 percent of White men. Similar trends were noted for activity limitations and comorbidity.
- Members of some racial/ethnic groups had better health and functional status than the White population. For example, East and Southeast Asian adults were less likely to report activity limitations (16 percent of women and 11 percent of men of East and Southeast Asian origin compared to 28 percent of White women and 26 percent of White men) and were less likely to report two or more chronic conditions (16 percent of women and men of East and Southeast Asian origin compared to 34 percent of White women and 26 percent of White men). This observation may be due to the healthy immigrant effect.<sup>221, 264</sup>
- In general, women reported worse health and functional status than men.

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

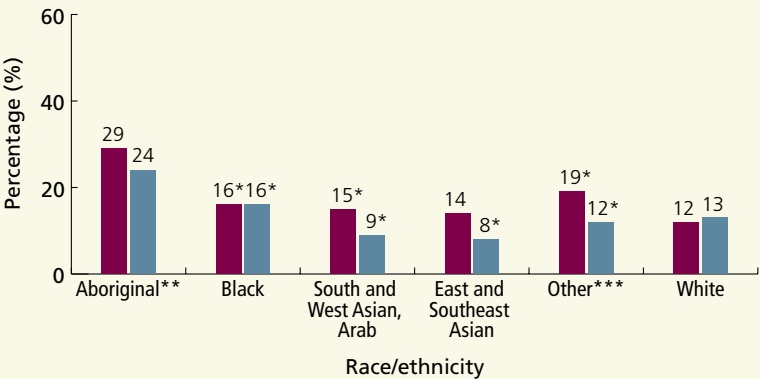
\*\* Includes self-identified off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

\*\*\* Includes Latin American, other racial and multiple racial origins

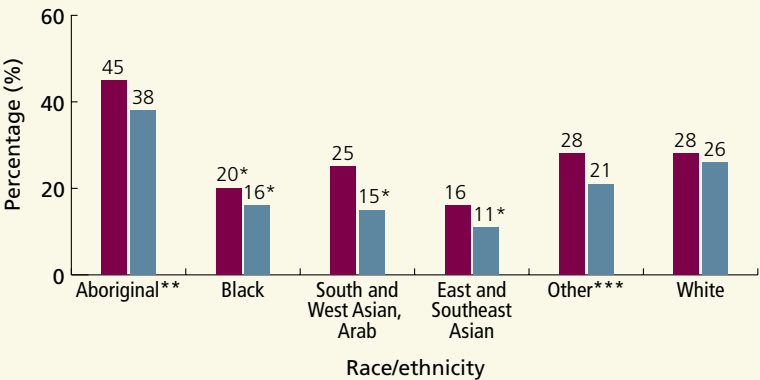
¥ Activities at home, school, or work have been limited due to a long-term physical condition, mental condition, or health problem

**NOTE:** Race/ethnic group names are those used by Statistics Canada in the CCHS

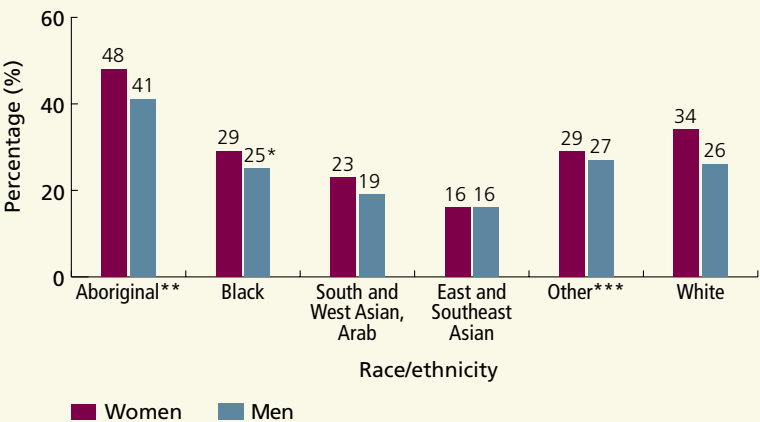
**Percentage who reported their health as fair or poor**



**Percentage who reported having activity limitations\***



**Percentage who reported having two or more chronic conditions**



## Exhibit 12C.2 | Age-standardized indicators of health and functional status among adults aged 25 and older, by sex and time since immigration, in Ontario, 2005

### FINDINGS

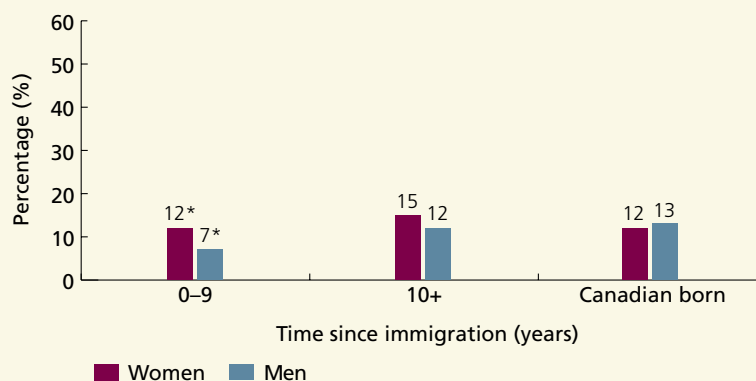
- Health and functional status varied by duration of residence in Canada, providing further support for the healthy immigrant effect.
- After adjusting for age, recent immigrants (those who had been in Canada for less than 10 years) were less likely than Canadian-born adults to report activity limitations (19 percent of women and 10 percent of men who were recent immigrants versus 28 percent of women and 27 percent of men who were born in Canada) or the presence of two or more chronic conditions (18 percent of women and 14 percent of men who were recent immigrants versus 34 percent of women and 27 percent of men who were born in Canada).
- This advantage was not observed among immigrants who had been in Canada for 10 or more years.

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

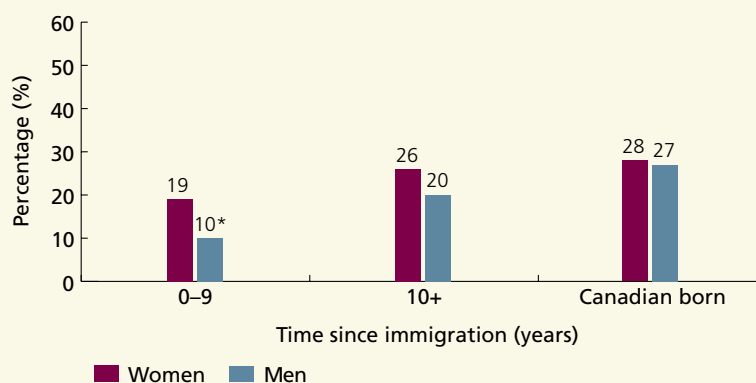
\* Interpret with caution due to high sampling variability

¥ Activities at home, school, or work have been limited due to a long-term physical condition, mental condition, or health problem

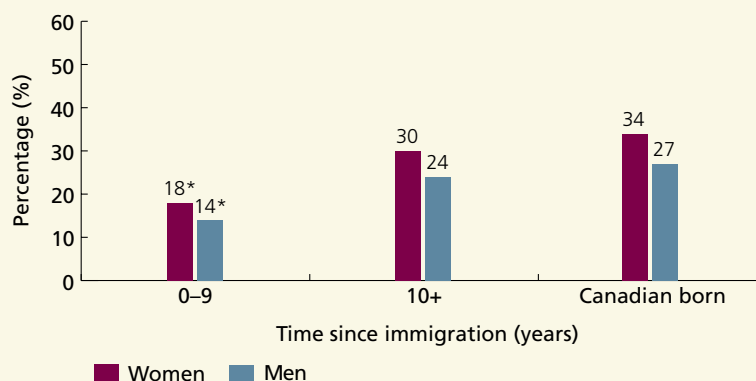
### Percentage who reported their health as fair or poor



### Percentage who reported having activity limitations¥



### Percentage who reported having two or more chronic conditions



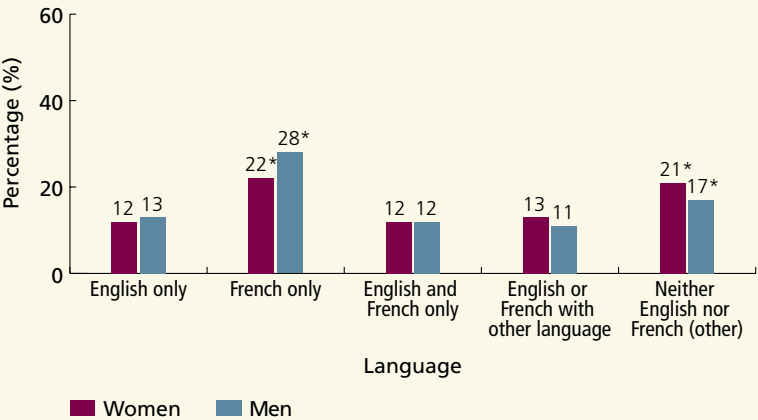
POWER Study



**Exhibit 12C.3** | Age-standardized percentage of adults aged 25 and older who reported their health as fair or poor, by sex and language spoken, in Ontario, 2005

**FINDINGS**

- Ontarians who did not speak English (i.e., spoke only French or spoke neither French nor English) were more likely to report fair or poor health than Ontarians who spoke English.



**DATA SOURCE:** Canadian Community Health Survey, 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

POWER Study

## Chronic Disease Risk Factors

Chronic diseases are a major contributor to health inequities in Ontario.<sup>23, 265</sup> Social determinants of health and certain health behaviours increase the risk of developing chronic conditions and their associated morbidity and mortality.<sup>266</sup> Earlier in this chapter, we discussed socioeconomic factors that are related to increased risk for chronic conditions.

As discussed previously in this chapter, there were significant differences in income and education associated with race, ethnicity, and immigration status. White Ontarians were least likely to live in lower-income households and, despite higher educational attainment than the overall Ontario population, immigrants who had resided in Canada for less than ten years were much

more likely to live in lower-income households (see [Section 12A](#) for more detail).

The [POWER Study Burden of Illness chapter](#) examined differences by race/ethnicity and immigration status for four major factors that increase the risk for chronic diseases: physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, and smoking. In this section, we synthesize where differences in chronic disease risk factors were found in relation to race/ethnicity and time since immigration. [Table 12C.2](#) lists the indicators presented in this section and the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

**Table 12C.2 | Disparities in Chronic Disease Risk Factors by Race/Ethnicity and Time Since Immigration**

Indicator	Race/ ethnicity	Time since immigration/ immigration status	POWER Study chapter where reported
<b>Socioeconomic Risk Factors</b>			
<b>Lower annual household income</b>	Y	Y	<a href="#">Burden of Illness</a>
<b>Lower educational attainment</b>	Y	Y <sup>a</sup>	<a href="#">Burden of Illness</a>
<b>Health Behaviours</b>			
<b>Health behaviours that increase the risk of chronic disease</b>			
• physical inactivity	Y	Y	<a href="#">Burden of Illness</a>
• inadequate fruit and vegetable intake	Y	Y <sup>b</sup> <sup>a</sup>	<a href="#">Burden of Illness</a>
• being overweight or obese	Y	Y <sup>a</sup>	<a href="#">Burden of Illness</a>
• smoking	Y	Y <sup>a</sup>	<a href="#">Burden of Illness</a>
<b>Changes to improve health among people with cardiovascular disease</b>	—	Y <sup>b</sup> <sup>a</sup>	<a href="#">Cardiovascular Disease</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

<sup>a</sup> Pattern suggests recent immigrants (less than 10 years since arrival) have a health advantage (compared to immigrants who had been in Canada 10 or more years and/or Canadian-born respondents). Otherwise, Y indicates that recent immigrants are disadvantaged for that indicator.

— limited power to detect differences due to small sample size in some groups

POWER Study

**Exhibit 12C.4** | Age-standardized percentage of adults aged 25 and older who reported physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, or being current smokers, by sex and race/ethnicity, in Ontario, 2005

**FINDINGS**

- The prevalence of all four of these risk factors varied across racial/ethnic groups, with the largest differences observed for smoking and being overweight or obese.
- Smoking rates were highest among Aboriginal (41 percent) and White (23 percent) adults and lowest among South and West Asian and Arab adults (12 percent) and East and Southeast Asian adults (10 percent) (data not shown).
- East and Southeast Asian women (four percent), South and West Asian, and Arab women (five percent) were least likely to report that they were current smokers.
- East and Southeast Asian adults had the lowest likelihood of being overweight or obese (17 percent of women and 35 percent of men).
- In general, women were more likely than men to report being physically inactive, while men were more likely than women to report inadequate fruit and vegetable intake, being overweight or obese, and smoking; however, due to small sample sizes in some groups, we had limited power to detect sex differences within some ethnic groups.

**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

\*\* Includes self-identified off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

\*\*\* Includes Latin American, other racial and multiple racial origins

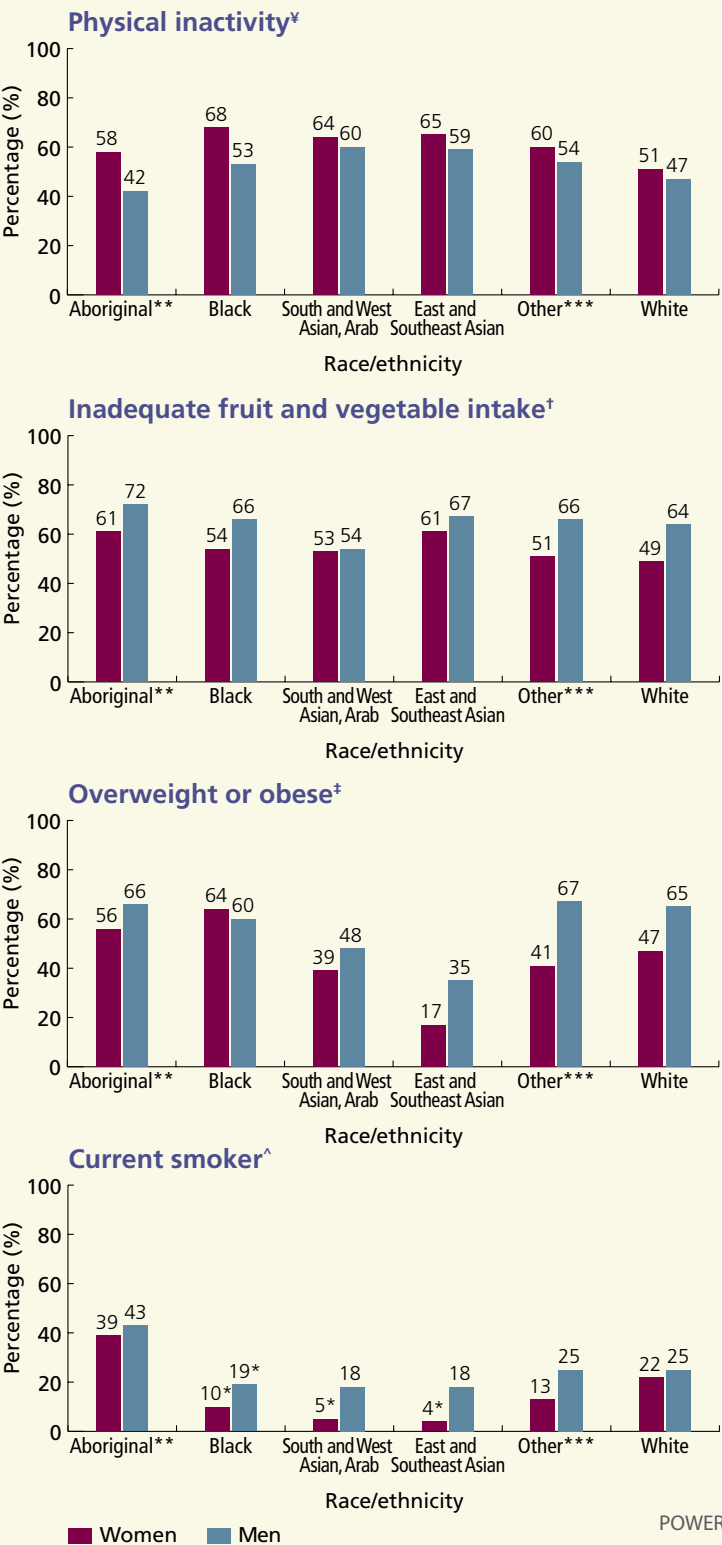
¥ Physical Activity Index of < 1.5 cal/kg/day

† Daily consumption of less than five servings of fruits and vegetables

‡ Body Mass Index (BMI)  $\geq$  25, calculated from self-reported height and weight

^ Current smokers (daily or occasional)

**NOTE:** The racial/ethnic group names are those used by Statistics Canada in the CCHS

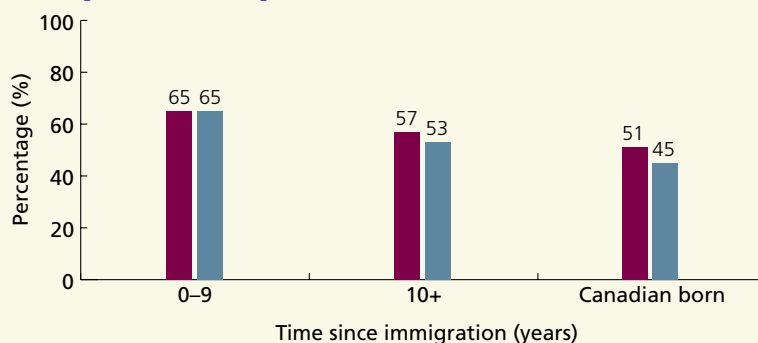


## Exhibit 12C.5 | Age-standardized percentage of adults aged 25 and older who reported physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, or being current smokers, by sex and time since immigration, in Ontario, 2005

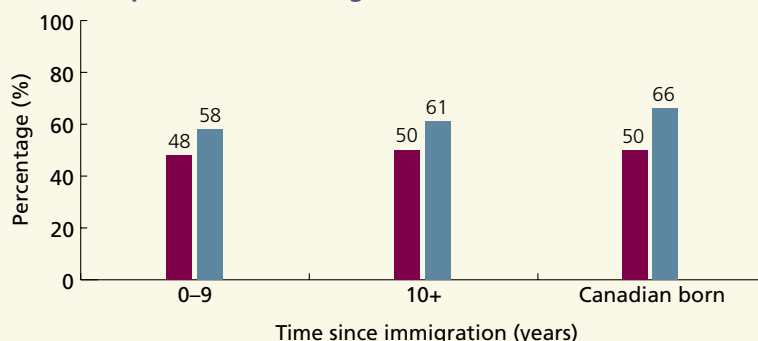
### FINDINGS

- Health behaviours also varied with time since immigration.
- Recent immigrants (less than 10 years in Canada) were more likely than Canadian-born adults to be physically inactive, but less likely to be overweight or obese or to be current smokers.
- Immigrants who had been in Canada for 10 or more years had health behaviours that were more similar to Canadian-born adults.

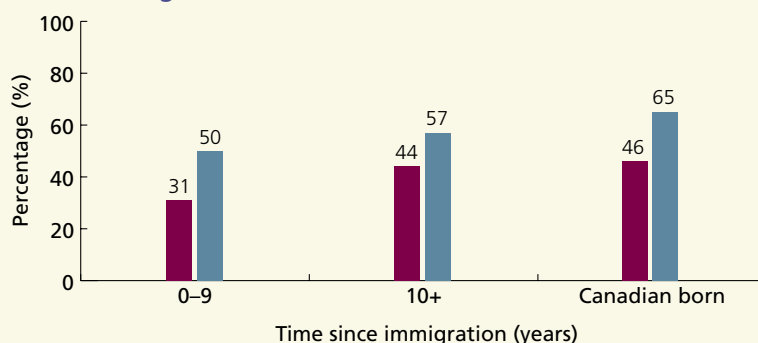
#### Physical inactivity<sup>¥</sup>



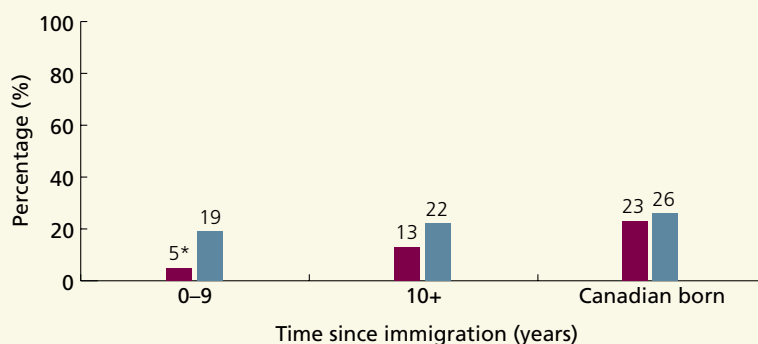
#### Inadequate fruit and vegetable intake<sup>†</sup>



#### Overweight or obese<sup>‡</sup>



#### Current smoker<sup>^</sup>



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\* Interpret with caution due to high sampling variability

¥ Physical Activity Index of < 1.5 cal/kg/day

† Daily consumption of less than five servings of fruits and vegetables

‡ Body Mass Index (BMI)  $\geq 25$ , calculated from self-reported height and weight

<sup>^</sup> Current smokers (daily or occasional)

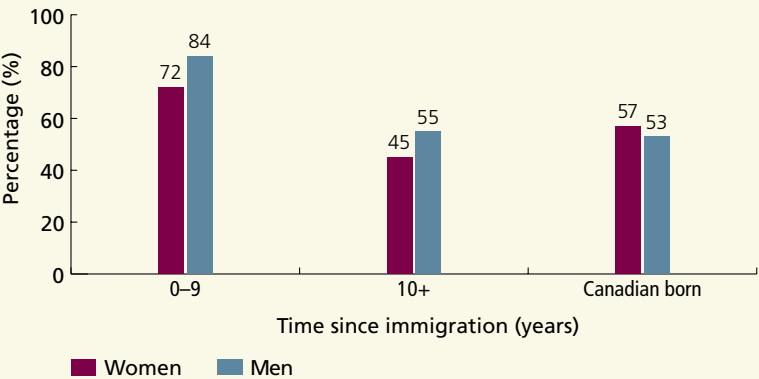
■ Women ■ Men

POWER Study

**Exhibit 12C.6 | Age-standardized percentage of adults aged 25 and older with heart disease or who have had a stroke who did something to improve their health in the previous year, by sex and time since immigration, in Ontario, 2005**

**FINDINGS**

- Among adults with heart disease or who have had a stroke, recent immigrants were more likely to report making positive lifestyle changes (for example, increased physical activity, weight loss, dietary changes, smoking cessation, reduced alcohol consumption, reduced stress, or increased medical care) in the previous year to improve their health (78 percent) than Canadian-born adults (55 percent) and immigrants who had been in the country for 10 or more years (51 percent).
- This difference was significant among men (84 percent of recent immigrants versus 55 percent of immigrants who had been in Canada for 10 or more years and 53 percent of those born in Canada), but was not significant among women, however, the sample size was small.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

POWER Study

**Access to Health Care Services**

In the [POWER Study Access to Health Care Services chapter](#),<sup>152</sup> we assessed differences in access to care by race/ethnicity, time since immigrating to Canada, and language. We examined the percentage of people who reported having a regular primary care provider, and assessed satisfaction and difficulties with accessing care. Data on satisfaction and difficulties accessing care are based on survey data from the Canadian Community Health Survey (CCHS) and the Primary Care Access Survey (PCAS) and rely on respondent self-report. These indicators may be influenced by differences in expectations for care that vary by sociodemographic factors, including race/ethnicity and immigration status.

For a number of the indicators reported in this section, the sample sizes available within the strata limit the power to detect differences. While we have reported differences that were statistically significant, it is worthwhile to note that some differences across racial/ethnic groups, by time since immigration, and by language may not have reached statistical significance due to a lack of statistical power.

[Table 12C.3](#) lists the indicators that are synthesized in this section and summarizes where differences in access to health care services were found in relation to race/ethnicity and time since immigration. This table also notes the POWER Study chapter in which the indicator was originally reported (see previous chapters for detailed definitions of the indicators).

**Table 12C.3 | Disparities in Chronic Disease Risk Factors by Race/Ethnicity and Time Since Immigration**

Indicator	Race/ ethnicity	Time since immigration/ immigration status <sup>^</sup>	POWER Study chapter where reported
<b>Had a primary care doctor</b>	N	Y*	<a href="#">Access to Health Care Services</a>
<b>Satisfaction with primary care</b>			
• experience getting an appointment for a regular check-up	Y	Y	<a href="#">Access to Health Care Services</a>
• experience getting to see their doctor for an urgent, non-emergent health problem	Y	Y	<a href="#">Access to Health Care Services</a>
• care their doctor provided for an urgent, non-emergent health problem	Y	Y	<a href="#">Access to Health Care Services</a>
<b>Difficulties accessing primary care</b>			
• obtaining monitoring of health problems from a family doctor	Y <sup>a</sup>	N	<a href="#">Access to Health Care Services</a>
• making an appointment for an urgent, non-emergent health problem	Y <sup>a</sup>	Y <sup>c</sup>	<a href="#">Access to Health Care Services</a>
<b>Difficulties accessing specialist care for diagnosis or consultation</b>	Y <sup>c</sup>	Y <sup>a</sup>	<a href="#">Access to Health Care Services</a>
<b>Difficulties accessing health information or advice</b>	N	Y <sup>a</sup>	<a href="#">Access to Health Care Services</a>
<b>Unmet health care needs</b>	Y <sup>a</sup>	Y <sup>a</sup>	<a href="#">Access to Health Care Services</a>
<b>Dental visits</b>	Y	Y	<a href="#">Access to Health Care Services</a>

Y Significant income differences in the overall population, and among women and men

Y<sup>a</sup> Significant income differences among women

Y<sup>b</sup> Significant income differences among men

Y<sup>c</sup> Significant income differences in the overall population, but not significant when stratified by sex

<sup>^</sup> For all indicators marked with a Y, the pattern suggests recent immigrants (less than 10 years since arrival) have a health disadvantage (compared to immigrants who had been in Canada 10 or more years and/or Canadian-born respondents)

Y\* Immigrants living in Canada for less than 5 years were less likely to have a family doctor than those living in Canada 10 or more years or those born in Canada

**NOTE:** Due to small sample sizes in some groups we may have had insufficient power to detect some differences

POWER Study

Access to a Regular Primary Care Provider

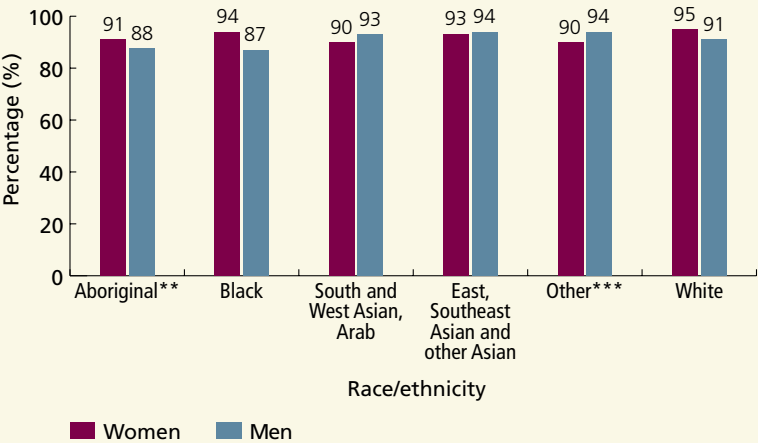
A primary care doctor is a patient’s first point of entry into the health care system.<sup>267, 268</sup> Access to a regular primary care provider is associated with better health outcomes, regardless of a person’s initial health status, demographic characteristics, or socioeconomic status.<sup>196, 269</sup>

The [POWER Study Access to Health Care Services chapter](#) examined differences in the percentage of the population aged 25 and older who reported having a primary care doctor (family physician, general practitioner or medical doctor) by race/ethnicity, time since immigration, and language.

**Exhibit 12C.7 |** Percentage of adults aged 25 and older who reported having a primary care doctor,<sup>¥</sup> by sex and race/ethnicity, in Ontario, 2006–2008<sup>^</sup>

FINDINGS

- Across most racial/ethnic groups, at least 90 percent of women and men reported having a primary care doctor. However, only 88 percent of Aboriginal men and 87 percent of Black men reported having a primary care doctor. These differences were not significant, possibly due to small sample sizes in these groups and thus limited power to detect differences.



**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>¥</sup> Includes family doctor, family physician, general practitioner or medical doctor (could include nurse practitioner)

<sup>^</sup> The survey period was from October 2006–September 2008

\*\* Includes North American Indian, Métis, Inuit

\*\*\* Includes El Salvador, other European, other Central American, other South American, religion as an ethnicity

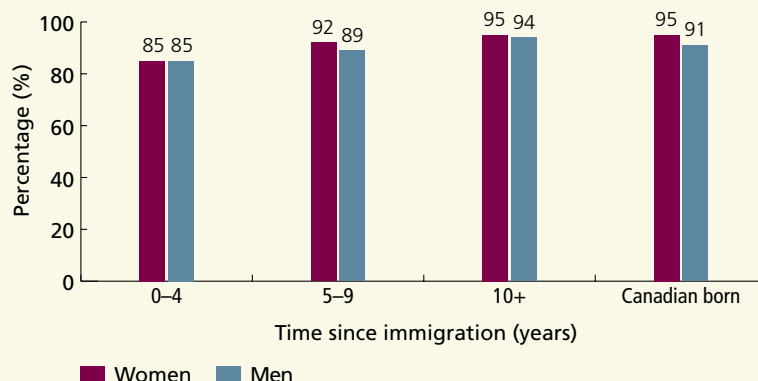
POWER Study



### Exhibit 12C.8 | Percentage of adults aged 25 and older who reported having a primary care doctor,<sup>¥</sup> by sex and time since immigration, in Ontario, 2006–2008<sup>^</sup>

#### FINDINGS

- Immigrants who had been in Canada for less than five years were less likely to report having a primary care doctor than immigrants who had been in Canada for 10 or more years and Canadian-born respondents (85 percent versus 94 percent and 93 percent, respectively). While the patterns were similar for women and men, the variation was significant among men only.



**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>¥</sup> Includes family doctor, family physician, general practitioner, or medical doctor (could include nurse practitioner)

<sup>^</sup> The survey period was from October 2006–September 2008

POWER Study

#### Satisfaction With Health Care

Patient satisfaction indicators provide information about a patient's experience of health care, reflect problems in health care delivery, and are part of the evaluation of health care.<sup>197</sup> Patient satisfaction can be affected by accessibility and convenience of health care services (i.e., ease or difficulty in scheduling and physically accessing appointments), as well as perceived quality of care. Satisfaction is also influenced by expectations, so that individuals who have higher expectations may report lower satisfaction.<sup>198</sup> Shared experiences, circumstances, and beliefs among people of the same ethnic group may influence expectations, resulting in different levels of satisfaction between ethnic groups.<sup>270</sup>

The [POWER Study Access to Health Care Services](#)

[chapter](#) examined differences in patient satisfaction by race/ethnicity, time since immigration, and language spoken. The chapter examined the percentage of the population aged 25 and older who reported being very satisfied with:

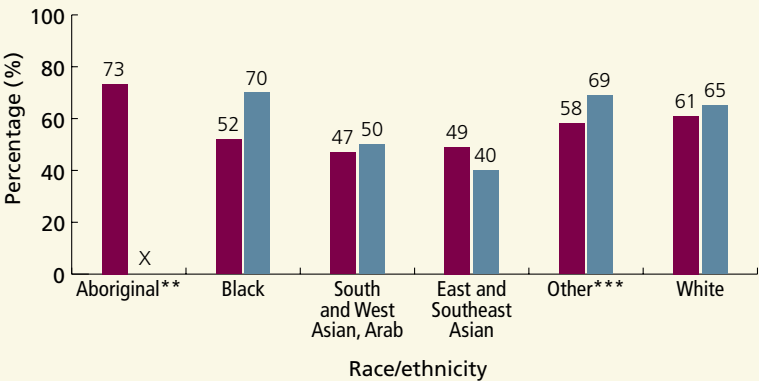
- their experience getting an appointment for a regular check-up,
- their experience getting to see a doctor for an urgent, non-emergent health problem, and
- the care they received when they sought care from a family doctor for an urgent, non-emergent health problem.

**Exhibit 12C.9 | Percentage of adults aged 25 and older who reported being very satisfied with access to and experience with primary health care, by sex and race/ethnicity, in Ontario, 2006–2008<sup>^</sup>**

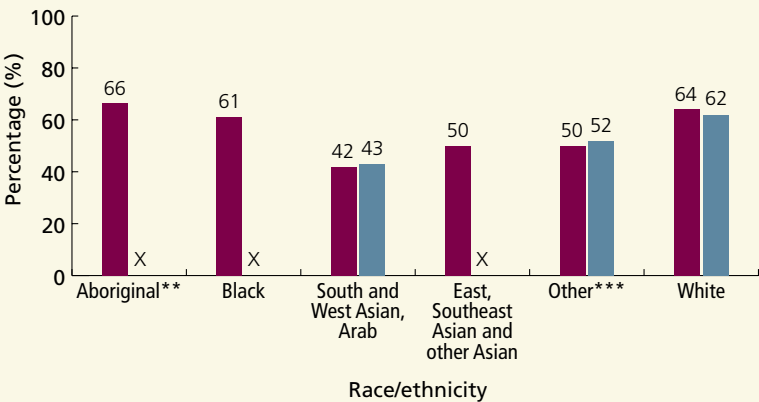
**FINDINGS**

- Patient satisfaction with access to and experience with primary care varied by race/ethnicity.
- In general, people of East and Southeast Asian, South and West Asian, and Arab origins were less satisfied with access to and experience with primary care than other racial/ethnic groups. For example, 45 percent of East and Southeast Asian adults and 49 percent of South and West Asian and Arab adults reported being very satisfied with their experience getting an appointment for a regular check-up, as compared to 62 percent of White adults, 60 percent of Black adults, and 72 percent of Aboriginal adults (data not shown). Similar racial/ethnic differences were noted for satisfaction with the experience of getting to see a doctor for an urgent, non-emergent health problem, and satisfaction with the care received for an urgent, non-emergent health problem.

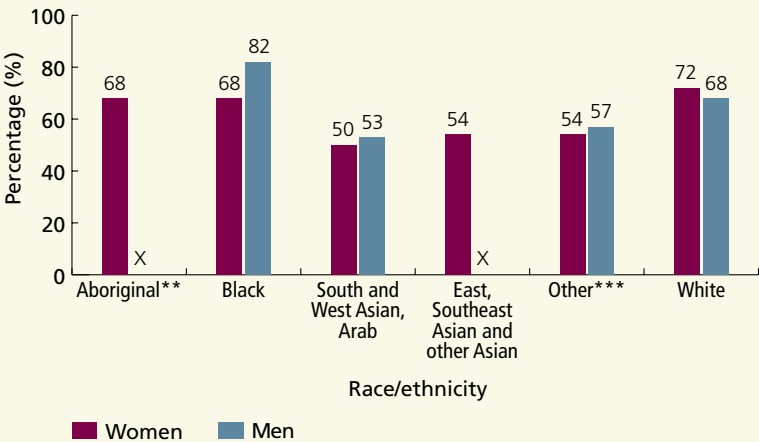
**Experience getting an appointment for a regular checkup**



**Experience getting to see their doctor for an urgent, non-emergent health problem**



**Care their doctor provided for an urgent, non-emergent health problem**



**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>^</sup> The survey period was from October 2006–September 2008

X Suppressed due to small sample size

\*\* Includes North American Indian, Métis, Inuit

\*\*\* Includes El Salvador, other European, other Central American, other South American, religion as an ethnicity

POWER Study

## Exhibit 12C.10 | Percentage of adults aged 25 and older who reported being very satisfied with access to and experience with primary health care, by sex and time since immigration, in Ontario, 2006–2008<sup>a</sup>

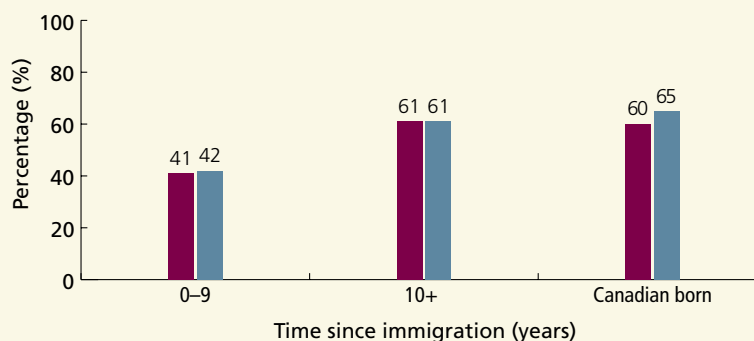
### FINDINGS

- Patient satisfaction with access to and experience with primary care also varied by immigration status and time since arriving in Canada.
- Recent immigrants (those who had been in Canada for less than 10 years) were less likely than Canadian-born adults to report being satisfied with their access to and experience with primary care.
- For example, among recent immigrants (in Canada less than 10 years), 41 percent of women and 42 percent of men reported being very satisfied their experience getting an appointment for a regular check-up compared to 60 percent of women and 65 percent of men who were born in Canada.
- Immigrants who had been in Canada for 10 or more years reported similar levels of patient satisfaction as Canadian-born adults.
- Similar patterns were observed for satisfaction with the experience of getting to see a doctor for an urgent, non-emergent health problem, and the care received for an urgent, non-emergent health problem.

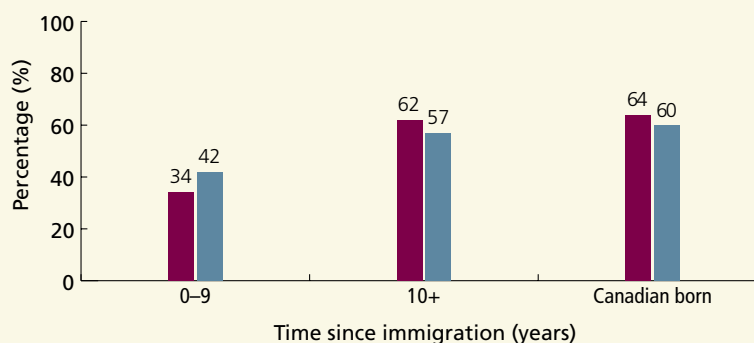
**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>a</sup> The survey period was from October 2006–September 2008

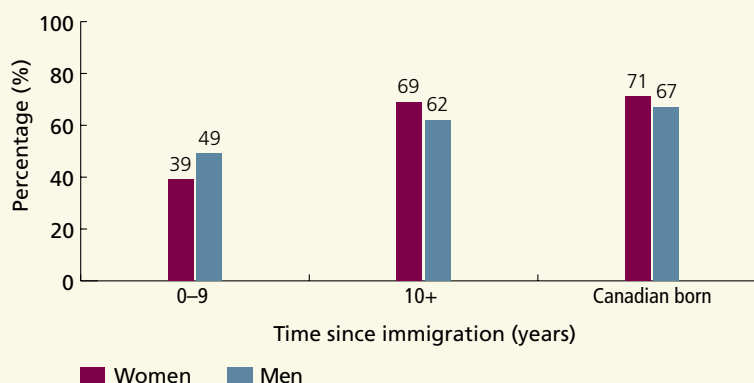
### Experience getting an appointment for a regular checkup



### Experience getting to see their doctor for an urgent, non-emergent health problem



### Care their doctor provided for an urgent, non-emergent health problem



■ Women ■ Men

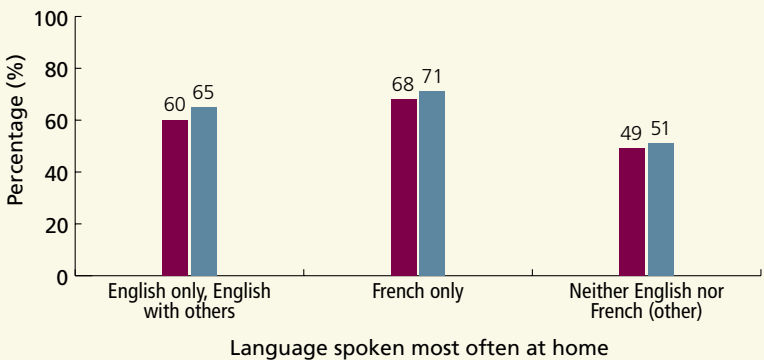
POWER Study

**Exhibit 12C.11** | Percentage of adults aged 25 and older who reported being very satisfied with access to and experience with primary health care, by sex and language spoken most often at home, in Ontario, 2006–2008<sup>^</sup>

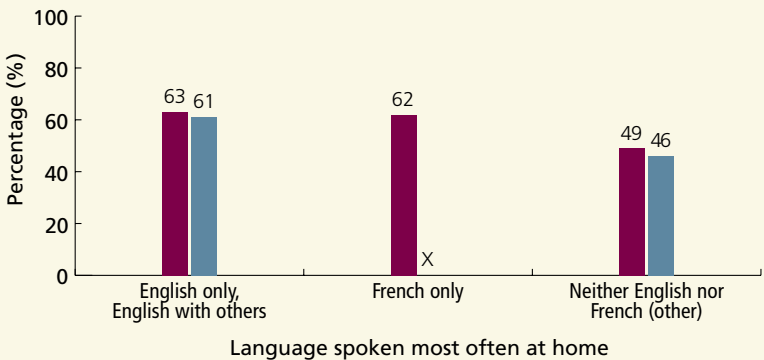
**FINDINGS**

- Language was also associated with patient satisfaction regarding access to and experience with primary care.
- Women and men who spoke neither English nor French most often at home reported lower levels of satisfaction with access and care than those who reported speaking either English or French most often at home.

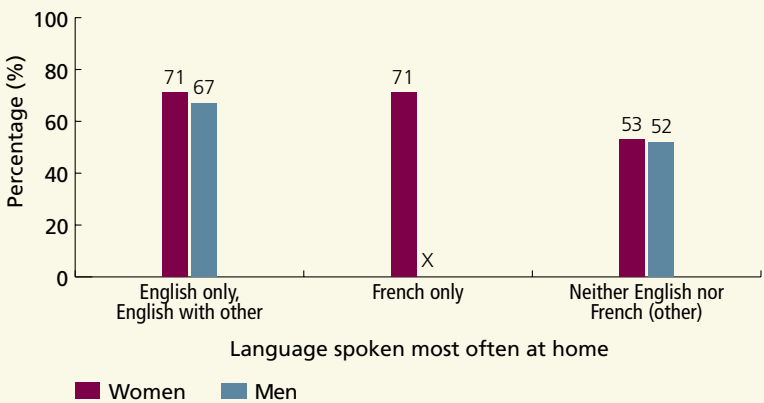
**Experience getting an appointment for a regular checkup**



**Experience getting to see their doctor for an urgent, non-emergent health problem**



**Care their doctor provided for an urgent, non-emergent health problem**



**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>^</sup> The survey period was from October 2006–September 2008

X Suppressed due to small sample size

POWER Study

### **Difficulties Accessing Health Care**

Access to health care services and health information are important to maintain optimal health. Adults who are able to successfully access primary care in a timely manner are more likely to receive appropriate preventive care and more accurate diagnoses, require fewer diagnostic tests and prescriptions, have fewer hospitalizations, and have lower costs of care.<sup>196, 271, 272</sup>

When patients require specialized services, these need to be accessed in a timely manner. Access to health information is also important for informed decision making about treatment choice and lifestyle changes to improve health, and for self-management support for chronic conditions.

The [POWER Study Access to Health Care Services chapter](#) looked at whether people had difficulties accessing health care and health information, and

looked at inequities associated with race/ethnicity, time since immigration, and language spoken. The chapter examined the percentage of adults aged 25 and older who reported no difficulties:

#### **Primary Care**

- obtaining monitoring of health problems from a family doctor
- making an appointment for an urgent, non-emergent health problem

#### **Specialty Care**

- accessing specialist care for diagnosis or consultation

#### **Health Information**

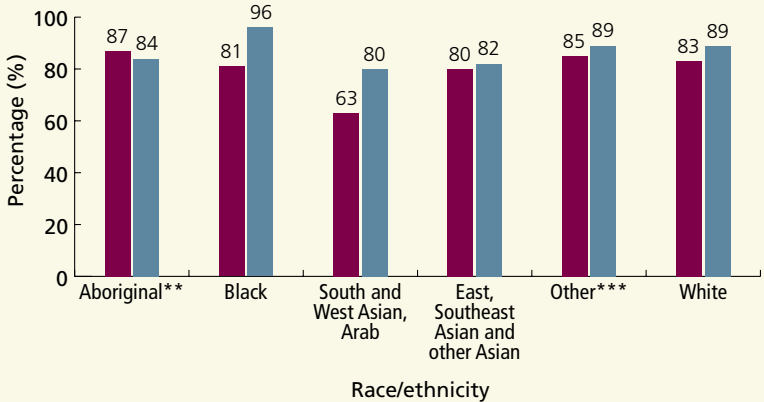
- accessing health information or advice

**Exhibit 12C.12 | Percentage of adults aged 25 and older who reported no difficulties accessing needed primary health care, by sex and race/ethnicity, in Ontario, 2006–2008<sup>^</sup>**

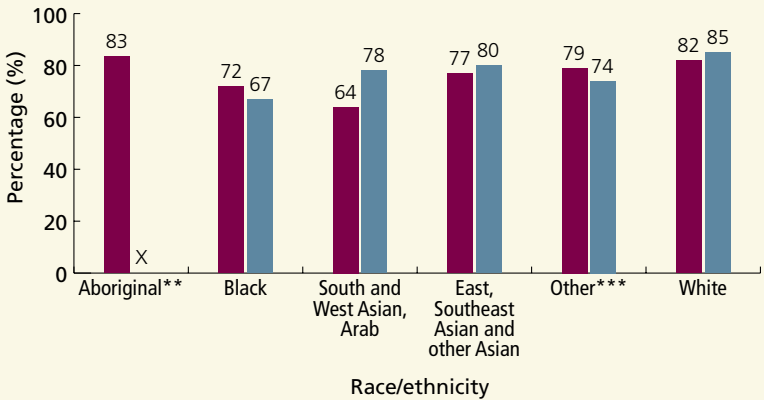
**FINDINGS**

- The percentage of people who reported having no difficulties accessing needed primary health care varied by race/ethnicity.
- South and West Asian and Arab women were most likely to report difficulties obtaining monitoring of health problems from a family doctor and making an appointment for an urgent, non-emergent health problem.
- The racial/ethnic differences among men were not statistically significant, possibly due to small sample sizes among some racial/ethnic groups and thus limited power to detect differences.

**Obtaining monitoring of health problems from a family doctor**



**Making an appointment for an urgent, non-emergent health problem**



■ Women ■ Men

**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11

<sup>^</sup> The survey period was from October 2006–September 2008

X Suppressed due to small sample size

\*\* Includes North American Indian, Métis, Inuit

\*\*\* Includes El Salvador, other European, other Central American, other South American, religion as an ethnicity

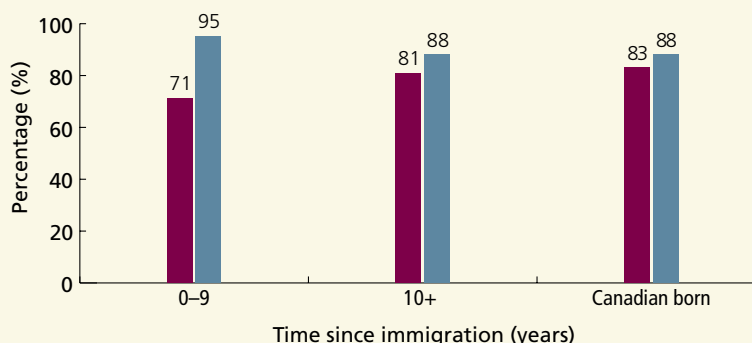
POWER Study

### Exhibit 12C.13 | Percentage of adults aged 25 and older who reported no difficulties accessing needed primary health care, by sex and time since immigration, in Ontario, 2006–2008<sup>^</sup>

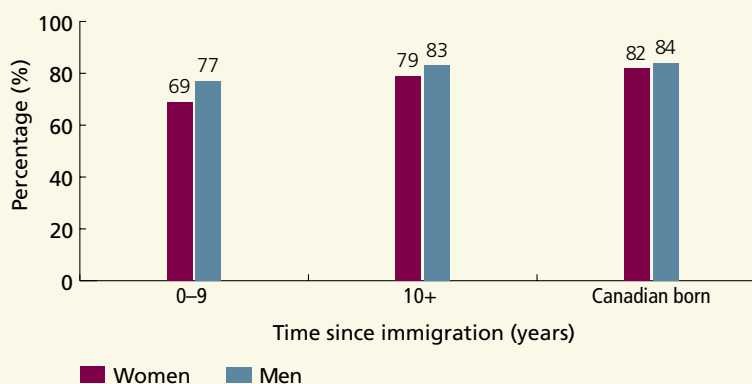
#### FINDINGS

- Immigrants who had been in Canada for less than 10 years were more likely to report difficulties making an appointment for an urgent, non-emergent health problem than Canadian-born adults; this difference was not statistically significant when stratified by sex, possibly due to small sample size and limited power to detect differences. Immigrants who had been in Canada for 10 or more years were more similar to Canadian-born adults.
- Among women, a similar pattern was seen for difficulties obtaining monitoring of a health problem. Immigrant women who had been in Canada less than 10 years were more likely to report difficulties compared to those who had been born in Canada or who had been living in Canada for 10 or more years; again, this difference was not significant, possibly due to small sample size.
- The pattern of difficulties in obtaining monitoring for a health problem was reversed among men: immigrant men who had been in Canada less than 10 years were less likely to report difficulties obtaining monitoring for a health problem compared to those who had been in Canada longer or had been born in Canada (although again, this difference was not significant). This may be due to recent immigrant men having lower perceived need for monitoring of health problems.

#### Obtaining monitoring of health problems from a family doctor



#### Making an appointment for an urgent, non-emergent health problem



DATA SOURCE: Primary Care Access Survey (PCAS), Waves 4–11

<sup>^</sup> The survey period was from October 2006–September 2008

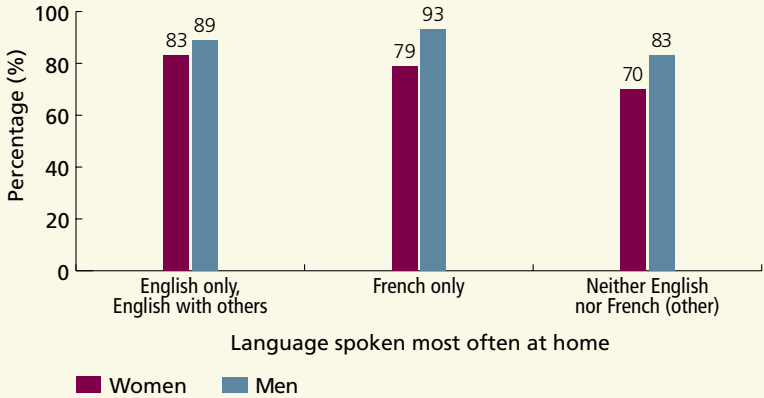
POWER Study



**Exhibit 12C.14** | Percentage of adults aged 25 and older who reported no difficulties obtaining monitoring of health problems from a family doctor, by sex and language spoken most often at home, in Ontario, 2006–2008<sup>^</sup>

**FINDINGS**

- The percentage of adults who reported no difficulties obtaining monitoring of health problems from a family doctor varied by language spoken most often at home.
- Seventy percent of women and 83 percent of men who spoke neither English nor French most often at home reported no difficulties obtaining monitoring of health problems from a family doctor, compared to 79 percent of women and 93 percent of men who spoke French only and 83 percent of women and 89 percent of men who spoke English. These differences were significant for women but not for men, possibly due to small sample sizes among language groups and thus limited power to detect differences.



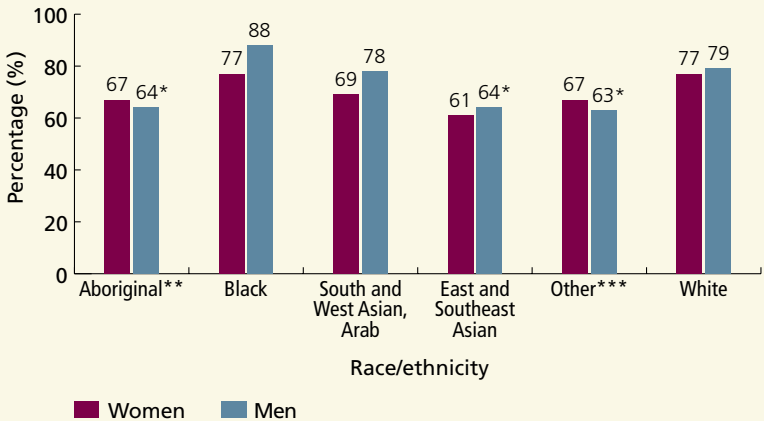
**DATA SOURCE:** Primary Care Access Survey (PCAS), Waves 4–11  
<sup>^</sup> The survey period was from October 2006–September 2008

POWER Study

**Exhibit 12C.15** | Percentage of adults aged 25 and older who reported no difficulties accessing specialist care for diagnosis or consultation, by sex and race/ethnicity, in Ontario, 2007<sup>¥</sup>

**FINDINGS**

- Among those who reported needing specialist care, 62 percent of East and Southeast Asian adults and 66 percent of Aboriginal adults reported no difficulties accessing specialist care compared to 78 percent of White adults and 79 percent of Black adults (data not shown).
- While the overall pattern was consistent for women and men, these differences were not significant when stratified by sex, possibly due to small sample sizes in some groups and limited power to detect differences.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2007

<sup>¥</sup> Among those who reported needing the service

\* Interpret with caution due to high sampling variability

\*\* Includes off-reserve Aboriginal adults (North American Indian, Métis, Inuit)

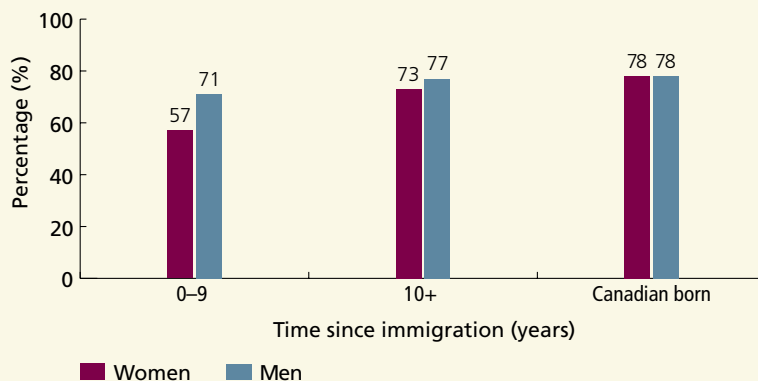
\*\*\* Includes Latin American, other racial and multiple racial origins

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### Exhibit 12C.16 | Percentage of adults aged 25 and older who reported no difficulties accessing specialist care for diagnosis or consultation,<sup>¥</sup> by sex and time since immigration, in Ontario, 2007

#### FINDINGS

- Among those who reported needing specialist care, 57 percent of women who had been in Canada for less than 10 years reported no difficulties with access, compared to 73 percent of women who had been in the country for at least 10 years and 78 percent of women who were born in Canada.
- The difference among men was not significant, possibly due to small sample sizes and limited power to detect differences.



DATA SOURCE: Canadian Community Health Survey (CCHS), 2007

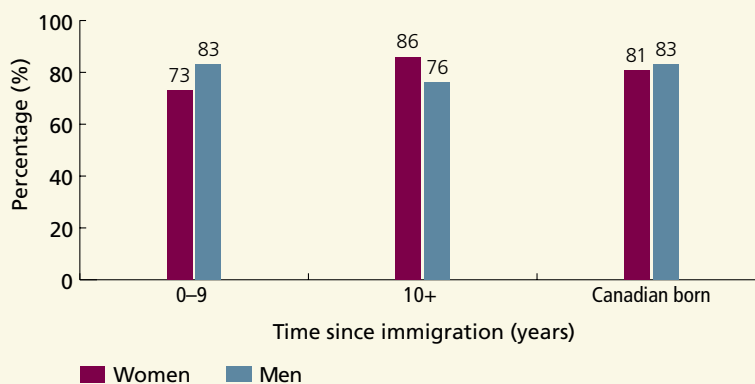
¥ Among those who reported needing the service

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### Exhibit 12C.17 | Percentage of adults aged 25 and older who reported no difficulties accessing health information or advice, by sex and time since immigration, in Ontario, 2007

#### FINDINGS

- Compared to those who had been in the country for 10 or more years, women who were recent immigrants were less likely to report that they had no difficulties accessing health information or advice.
- This indicator did not vary by time since immigration among men.
- The percentage of people who reported that they had no difficulties accessing health information or advice did not vary by race/ethnicity, possibly due to small sample sizes in some racial/ethnic groups and thus limited power to detect differences (data not shown).



DATA SOURCE: Canadian Community Health Survey (CCHS), 2007

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Unmet Health Needs

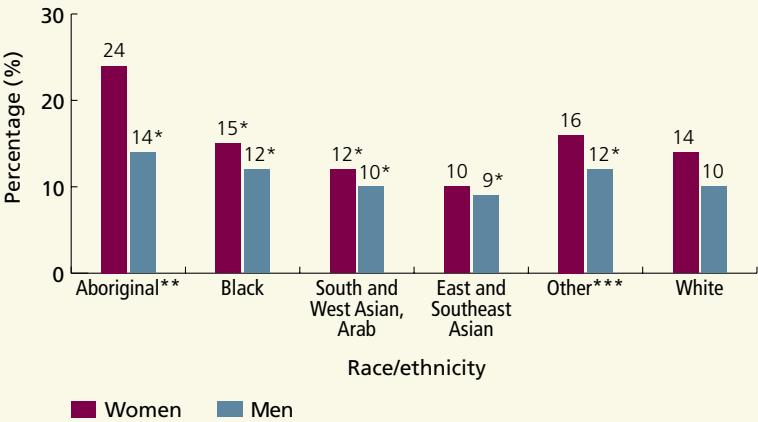
“Unmet need” is a self-reported measure of an individual’s experiences in obtaining the care that they believe they require.<sup>202, 203</sup> While non-specific, it is commonly used as an indicator of access to care. Unmet need is correlated with adverse health outcomes and

worse health-related quality of life.<sup>203</sup> The [POWER Study Access to Health Care Services chapter](#) measured the percentage of adults aged 25 and older who reported that there was a time during the last 12 months when they needed health care but did not receive it.

**Exhibit 12C.18 |** Percentage of adults aged 25 and older who reported having unmet health care needs, by sex and race/ethnicity, in Ontario, 2005

FINDINGS

- The proportion of women who reported unmet health care needs varied by race/ethnicity. Twenty-four percent of Aboriginal women reported unmet health care needs compared to 14 percent of White women and 10 percent of East and Southeast Asian women. The proportion of men who reported unmet health care needs did not varied by race/ethnicity, possibly due to small sample sizes and limited power to detect differences.
- Immigrants who had been in the country for less than 10 years were more likely to report having unmet health care needs than those who had been in the country longer (14 percent versus 10 percent, respectively) (data not shown). This difference was significant for women but not for men.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)  
\* Interpret with caution due to high sampling variability  
\*\* Includes off-reserve Aboriginal people (North American Indian, Métis, Inuit)  
\*\*\* Includes Latin American, other racial and multiple racial origins

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Dental Care

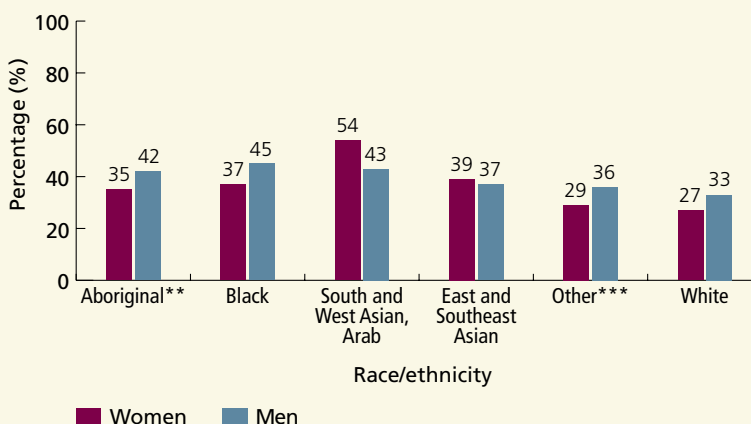
Oral health is an essential component of overall health. Adults with poor oral health have a greater risk of developing poor general health, oral cancer, and complications associated with cardiovascular disease and diabetes.<sup>199–201, 273</sup> In Canada, dental care is not a universally insured benefit—some Canadians receive dental insurance as an employment benefit,

government programs provide care to some, and others must fund dental care using their own resources. The [POWER Study Access to Health Care Services chapter](#) examined differences in the percentage of the population aged 25 and older who did not visit a dentist in the last 12 months by race/ethnicity and time since immigration to Canada.

### Exhibit 12C.19 | Percentage of adults aged 25 and older who did not visit a dentist in the last 12 months, by sex and race/ethnicity, in Ontario, 2005

#### FINDINGS

- The percentage of adults who had not visited a dentist in the last 12 months varied by race/ethnicity.
- Over half of South and West Asian and Arab women in Ontario had not seen a dentist in the previous 12 months compared to about one-quarter of White women.
- Forty-five percent of Black men, 43 percent of South and West Asian and Arab men and 42 percent of Aboriginal men had not seen a dentist in the previous 12 months compared to 33 percent of White men.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

\*\* Includes off-reserve Aboriginal people (North American Indian, Métis, Inuit)

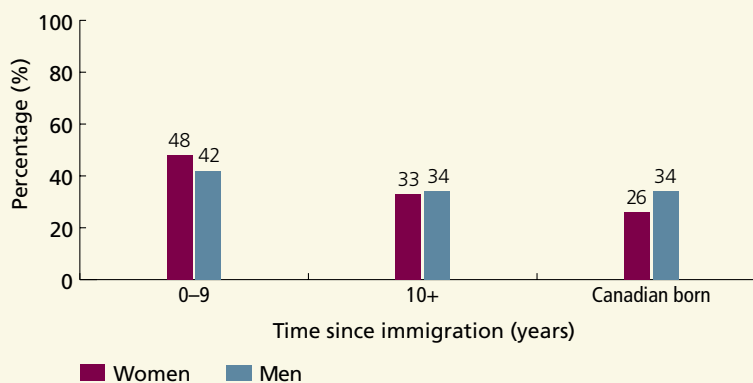
\*\*\* Includes Latin American, other racial and multiple racial origins

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### Exhibit 12C.20 | Percentage of adults aged 25 and older who did not visit a dentist in the last 12 months, by sex and time since immigration, in Ontario, 2005

#### FINDINGS

- The percentage of adults who had not visited a dentist in the last 12 months varied by time since immigration.
- Women and men who had been in Canada for less than 10 years were significantly more likely to report not having seen a dentist in the previous 12 months compared to adults who had been in the country for a longer period or those who were born in Canada.



**DATA SOURCE:** Canadian Community Health Survey (CCHS), 2005 (Cycle 3.1)

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## NEW INDICATORS

### PREVALENCE OF DIABETES

**Indicator:** This indicator measures the prevalence of diabetes among adults aged 20 and older living in urban areas of Ontario. Prevalence of diabetes is compared between immigrants to Canada and long-term residents (see definitions below).

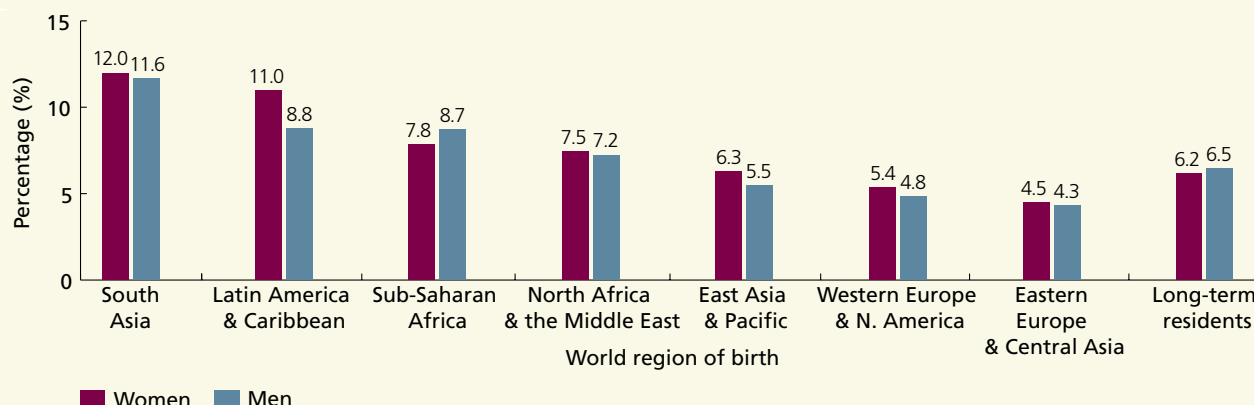
**Background:** Diabetes is a large and growing health problem for Ontarians.<sup>274–277</sup> The high prevalence of diabetes places a significant and growing strain on health care resources, given the high costs of care associated with diabetes and diabetes-related conditions and the projected growth of the affected population.<sup>277, 278</sup> It has been estimated that as many as one-third of all cases of diabetes are undiagnosed in Canada.<sup>279</sup> Research suggests that type 2 diabetes is preventable;<sup>280</sup> therefore, improved prevention strategies are needed to stem the epidemic of this condition. Diabetes prevalence is increasing rapidly in developing countries, particularly in the Middle East, sub-Saharan Africa, and India.<sup>277, 281, 282</sup> A high proportion of immigrants to Canada arrive from these regions<sup>283</sup> and evidence suggests that diabetes prevalence is higher among people of non-European ethnicity.<sup>284–295</sup> Genetic, socioeconomic, and cultural factors increase the risk of developing diabetes.

The number of people in Ontario with physician-diagnosed diabetes as of March 31, 2005 was established using the Ontario Diabetes Database (ODD), a population-based disease registry based on a validated algorithm that uses Ontario health care databases.<sup>296</sup> Administrative health care data were linked to the Landed Immigrant Data System (LIDS), in order to determine the prevalence of diabetes among identified immigrants and long-term residents of Canada. “Identified immigrants” refers to people identified through LIDS as having obtained permanent resident status and settled in Ontario between 1985 and 2000. “Long-term residents” include all other adults who were eligible for OHIP on March 31, 2005 and would include Canadian-born individuals and long-term immigrants (who arrived before 1985) (see [Appendix 12.2](#) for more detail). This indicator is based on previously published analyses.<sup>297</sup>

Given that diabetes rates have been rising,<sup>276, 298</sup> the current prevalence of diabetes is likely higher than the 2005 estimates presented by this indicator. Nevertheless, comparison of this indicator will reflect variation in diabetes prevalence across groups. Estimates of diabetes prevalence presented here differ somewhat from prior POWER Study chapters due to differences in data source and year of data.

**Findings:** Among urban populations in Ontario in 2005, and after adjusting for age, 7.5 percent of identified immigrants (7.8 percent of women and 7.1 percent of men) and 6.4 percent of long-term residents of Canada (6.2 percent of women and 6.5 percent of men) had diabetes. Although immigrants had higher rates of diabetes overall, it must be noted that there were considerable differences in diabetes prevalence across racial/ethnic groups ([Exhibit 12C.21](#)). Diabetes prevention strategies targeting high-risk groups must acknowledge and account for these differences.

### Exhibit 12C.21 | Age-standardized prevalence of diabetes among urban-dwelling immigrants,<sup>^</sup> by sex and world region of birth, and among urban-dwelling long-term residents,<sup>†</sup> in Ontario, 2005



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Diabetes Database (ODD)

<sup>^</sup> includes women and men who were granted permanent residency status in Canada between 1985 and 2000

<sup>†</sup> includes Canadian-born residents, as well as people granted permanent residency status before 1985

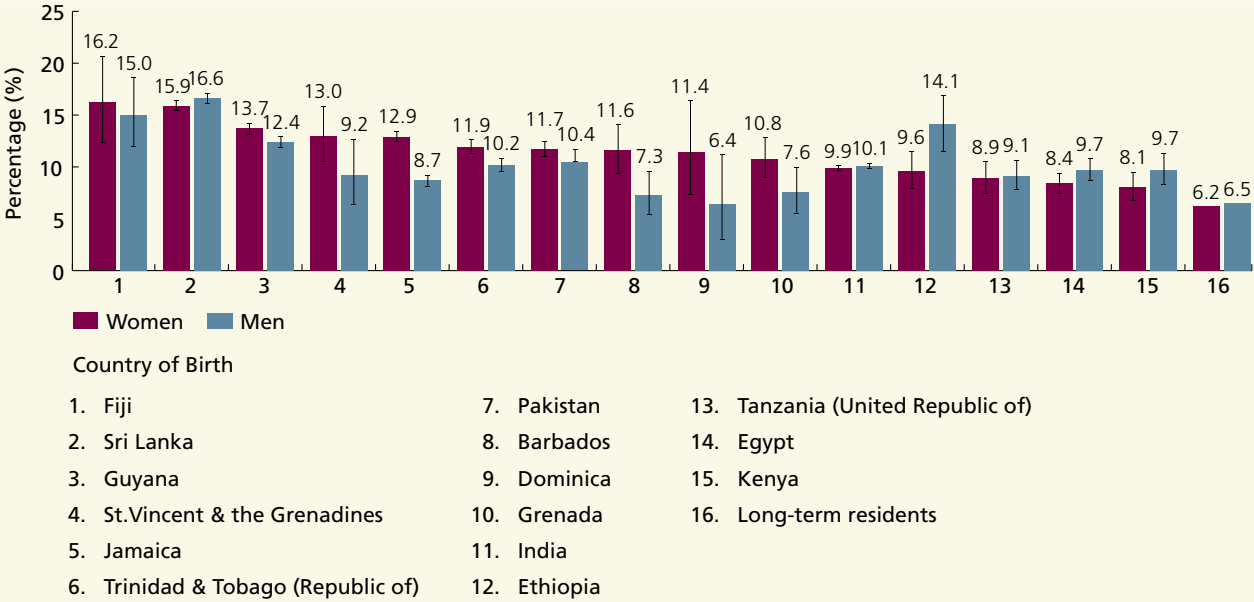
This graph has been adapted from: Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. *CMAJ* 2010;182(8):781-789.

#### FINDINGS

- Compared to long-term residents of Ontario, the prevalence of diabetes was higher among identified immigrants from South Asia, Latin America and the Caribbean, sub-Saharan Africa, and North Africa and the Middle East.
- Among long-term residents of Ontario, men were slightly more likely than women to have diabetes (6.5 percent versus 6.2 percent); however, with the exception of immigrants from sub-Saharan Africa, immigrant women from all other world regions had similar or higher rates of diabetes than immigrant men.
- After adjusting for age, immigration category, education, income, and time since arrival, immigrants from all regions except for Eastern Europe and Central Asia had higher rates of diabetes compared to immigrants from Western Europe and the U.S. In fact, the adjusted diabetes rates were four times higher among South Asian men and three times higher among South Asian women compared to their Western European and North American counterparts (data not shown).<sup>297</sup>

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**Exhibit 12C.22** | Age-standardized prevalence of diabetes among urban-dwelling immigrants<sup>^</sup> from the 15 countries of birth with the highest prevalence<sup>¥</sup> and among urban-dwelling long-term residents,<sup>†</sup> by sex, in Ontario, 2005



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Diabetes Database (ODD)

<sup>^</sup> includes women and men who were granted permanent residency status in Canada between 1985 and 2000

<sup>¥</sup> only countries with a rate based on a population  $\geq 100$  and diabetes cases  $\geq 20$  were included

<sup>†</sup> includes Canadian-born residents, as well as people granted permanent residency status before 1985

This graph has been adapted from: Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. CMAJ 2010;182(8):781-789.

**FINDINGS**

- The 15 countries of origin with the highest prevalence of diabetes among urban-dwelling immigrants were located in South Asia, the Pacific Islands, Latin America, the Caribbean, and Africa.

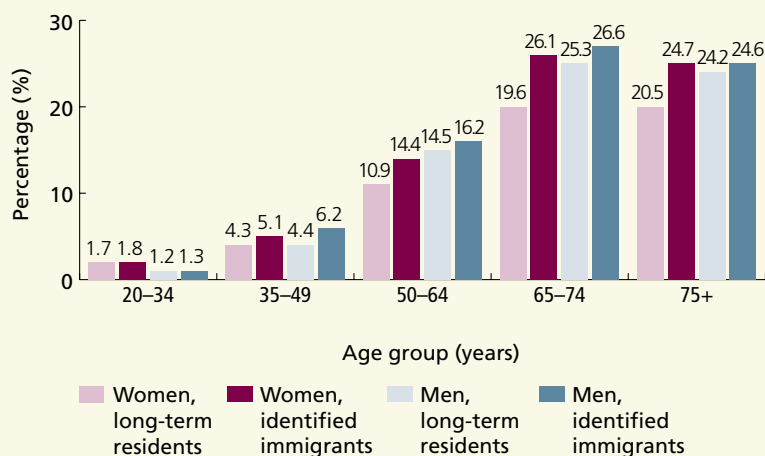
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### Exhibit 12C.23 | Prevalence of diabetes among urban-dwelling immigrants<sup>^</sup> and long-term residents,<sup>†</sup> by sex and age group, in Ontario, 2005

#### FINDINGS

- Irrespective of whether someone was identified as an immigrant or a long-term resident, the prevalence of diabetes increased with age until age 65.
- For both women and men across all age groups, identified immigrants had higher rates of diabetes than long-term residents, except among men aged 75 and older.
- The disparity between immigrants and long-term residents was particularly striking among women.



**DATA SOURCE:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Diabetes Database (ODD)

<sup>^</sup> includes women and men who were granted permanent residency status in Canada between 1985 and 2000

<sup>†</sup> includes Canadian-born residents, as well as people granted permanent residency status before 1985

This graph has been adapted from: Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. CMAJ 2010;182(8):781-789.

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## CERVICAL CANCER SCREENING

**Indicator:** This indicator measures the percentage of screen-eligible women aged 18–66 living in urban areas who had at least one Papanicolaou (Pap) test over a three-year period. Rates of cervical cancer screening were compared between identified immigrants, other recent OHIP registrants, and long-term residents (see definitions below).

**Background:** Cervical cancer is the second most common type of cancer among women.<sup>299</sup> Pap tests screen for early changes in the cervix and, when implemented as a widespread screening tool, can effectively reduce incidence and mortality from cervical cancer. Cancer Care Ontario recommends that eligible patients be screened every two to three years after three consecutive years of negative screens.<sup>300</sup> Previous Canadian studies have found Pap test rates vary by age, socioeconomic status, and ethnicity.<sup>174, 190, 301–303</sup>

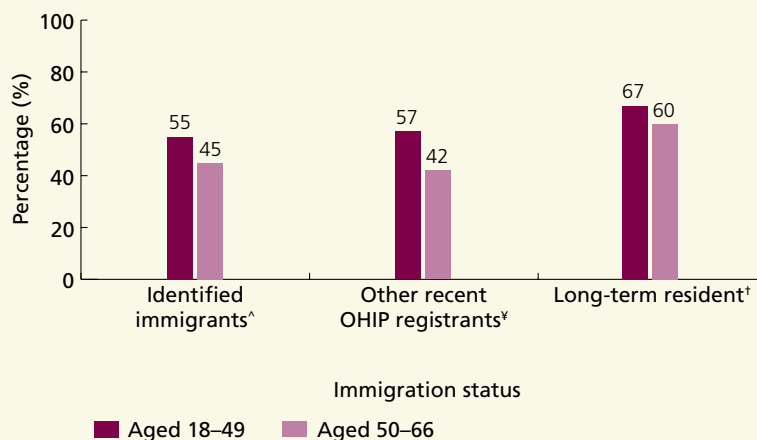
We report rates of cervical cancer screening among three groups of women who were eligible for the Ontario Health Insurance Plan (OHIP) from 2006–2008. Using data from the Landed Immigrant Data System (LIDS), women who obtained permanent resident status and settled in Ontario between 1985 and 2000 were categorized as “identified immigrants.” Because LIDS does not include all immigrants, a second group was defined to capture women who were not in the LIDS but had first registered for the Ontario Health Insurance Plan (OHIP) after April 1, 1993. In addition to new immigrants to Canada, this group also includes Canadian-born people who migrated to Ontario from another province. The third group includes all other women who were eligible for OHIP, consisting of Canadian-born women and long-term immigrants (who arrived before 1985). The percentage of women who had been appropriately screened for cervical cancer was established with a validated algorithm using Ontario health care databases.<sup>304</sup> This indicator is based on previously published analyses.<sup>305</sup> Rates are lower than those reported in the [POWER Study Cancer chapter](#) and by Cancer Care Ontario due to differences in data sources and methods. See [Appendix 12.2](#) for more detail on this indicator.

**Finding:** From 2006–2008, among urban residents of Ontario, 61 percent of screen-eligible women were appropriately screened (had at least one Pap test). Canadian-born and long-term residents had higher rates of cervical cancer screening than identified immigrants and recent OHIP registrants (65 percent versus 53 percent and 55 percent, respectively).

## Exhibit 12C.24 | Percentage of screen-eligible<sup>‡</sup> women living in urban areas who were appropriately screened for cervical cancer, by immigrant status and age group, 2006–2008

### FINDINGS

- Among urban-dwelling residents, irrespective of immigration status, older women (aged 50–66) were less likely to have had at least one Pap test in a three-year period than younger women (aged 18–49) (45 percent versus 55 percent among identified immigrants; 42 percent versus 57 percent among other recent OHIP registrants; 60 percent versus 67 percent among Canadian-born and long-term residents).
- Irrespective of age group, Canadian-born and long-term residents had higher rates of cervical cancer screening than identified immigrants and recent OHIP registrants.



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

<sup>‡</sup> excludes women with a history of gynecological cancer, colposcopy, total hysterectomy, or documented ineligibility for Pap test (tracking code Q140A)

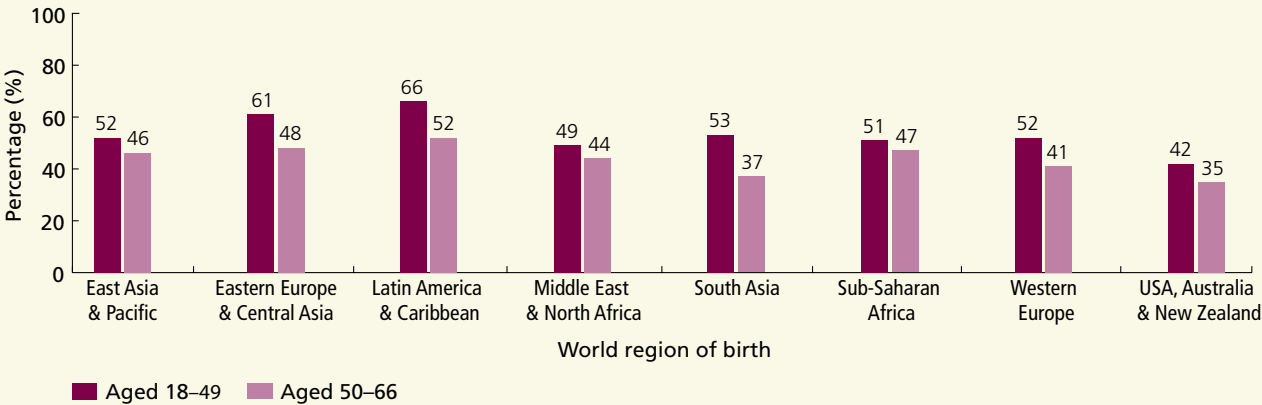
<sup>^</sup> includes women who were granted permanent residency status in Canada between 1985 and 2000 (identified by the LIDS)

<sup>¥</sup> includes women who were not identified by the LIDS, but who first registered for the Ontario Health Insurance Plan (OHIP) after April 1, 1993

<sup>†</sup> includes Canadian-born women, as well as women who were granted permanent residency status before 1985 (excluding recent OHIP registrants)

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**Exhibit 12C.25** | Percentage of screen-eligible‡ immigrant women^ living in urban areas who were appropriately screened for cervical cancer, by world region of birth and age group, 2006–2008



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

‡ excludes women with a history of gynecological cancer, colposcopy, total hysterectomy, or documented ineligibility for Pap test (tracking code Q140A)

^ includes women who were granted permanent residency status in Canada between 1985 and 2000 (identified by the LIDS)

**FINDINGS**

- The percentage of urban-dwelling immigrant women who had at least one Pap test in a three-year period varied by world region of birth.
- Among immigrant women aged 18–49, cervical cancer screening rates ranged from 42 percent among women from the U.S., Australia, and New Zealand to 66 percent among women from Latin America and the Caribbean.
- Among immigrant women aged 50–66, cervical cancer screening rates ranged from 35 percent among women from the U.S., Australia, and New Zealand to 52 percent of women from Latin American and the Caribbean.
- After adjusting for potential confounders, women from South Asia and the Middle East and North Africa had the lowest rates of cervical cancer screening and women from Latin America and the Caribbean had the highest rates of cervical cancer screening (adjusted for neighbourhood income quintile, patient enrolment model, prenatal visit during study period, community size, Aggregate Diagnosis Group, Resource Utilization Band, and age; see [Appendix 12.2](#) for more detail) (data not shown).

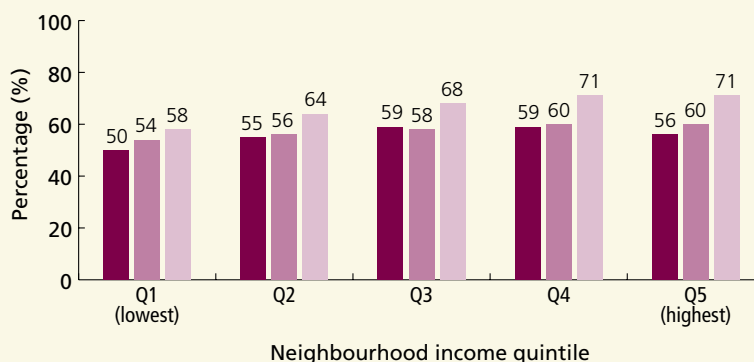
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## Exhibit 12C.26 | Age-specific percentage of screen-eligible<sup>‡</sup> women living in urban areas who were appropriately screened for cervical cancer, by immigrant status and neighbourhood income quintile, 2006-2008

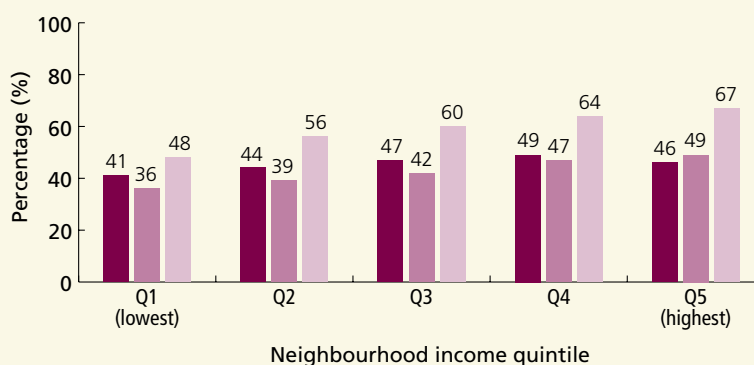
### FINDINGS

- Irrespective of age group and across all neighbourhood income quintiles, Canadian-born and long-term residents had higher rates of appropriate cervical cancer screening than identified immigrants and other recent OHIP registrants.
- For all three groups, women aged 18-49 who were living in the lowest-income neighbourhoods had lower rates of screening than women living in the highest-income neighbourhoods (50 percent versus 56 percent among identified immigrants; 54 percent versus 60 percent among recent OHIP registrants; 58 percent versus 71 percent among Canadian-born and long-term residents).
- A similar pattern was seen among older women. Women aged 50-66 who were living in the lowest-income neighbourhoods had lower rates of screening than women living in the highest-income neighbourhoods (41 percent versus 46 percent among identified immigrants; 36 percent versus 49 percent among recent OHIP registrants; 48 percent versus 67 percent among Canadian-born and long-term residents).
- The income differences were greater among Canadian-born and long-term residents than the other two groups.

### Women aged 18-49



### Women aged 50-66



■ Identified immigrants<sup>^</sup> ■ Other recent OHIP registrants<sup>¥</sup> ■ Long-term resident<sup>†</sup>

**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); Statistics Canada 2006 Census

<sup>‡</sup> excludes women with a history of gynecological cancer, colposcopy, total hysterectomy, or documented ineligibility for Pap test (tracking code Q140A)

<sup>^</sup> includes women who were granted permanent residency status in Canada between 1985 and 2000 (identified by the LIDS)

<sup>¥</sup> includes women who were not identified by the LIDS, but who first registered for the Ontario Health Insurance Plan (OHIP) after April 1, 1993

<sup>†</sup> includes Canadian-born residents, as well as women granted permanent residency status before 1985 (excluding recent OHIP registrants)

This graph has been adapted from: Lofters AK, Hwang SW, Moineddin R, Glazier RH. Cervical cancer screening among urban immigrants by region of origin: A population-based cohort study. *Preventive Medicine* 2010; 51(6):509-516.

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## PRETERM BIRTHS

**Indicator:** This indicator measures the percentage of infants born to mothers living in urban areas of Ontario that were delivered preterm (less than 37 weeks gestation). Rates were adjusted for maternal age and parity at delivery. Rates of preterm births are compared between infants born to mothers who were immigrants and long-term residents (see definitions below).

**Background:** Preterm delivery is associated with perinatal mortality, neonatal morbidity, and impaired health later in life. Preterm survivors are at higher risk of neurodevelopmental disabilities that in turn make them more prone to develop language disorders, and learning and behavioural problems. Thus, preterm infants are at increased risk of hospitalizations after birth, re-hospitalizations during the first few years of life, increased use of outpatient care, and more educational assistance compared to those who were not born preterm.<sup>306–308</sup> There is no single cause leading to preterm delivery, but multiple intertwined factors, many of which are related to maternal health and can be addressed through clinical management. There are large differences in maternal morbidity and mortality and perinatal indicators across countries.<sup>309, 310</sup> As Ontario receives immigrants from many regions of the world where adverse outcomes are more common than in Canada, it is important to monitor maternal and infant health according to maternal region of birth and time since immigration.

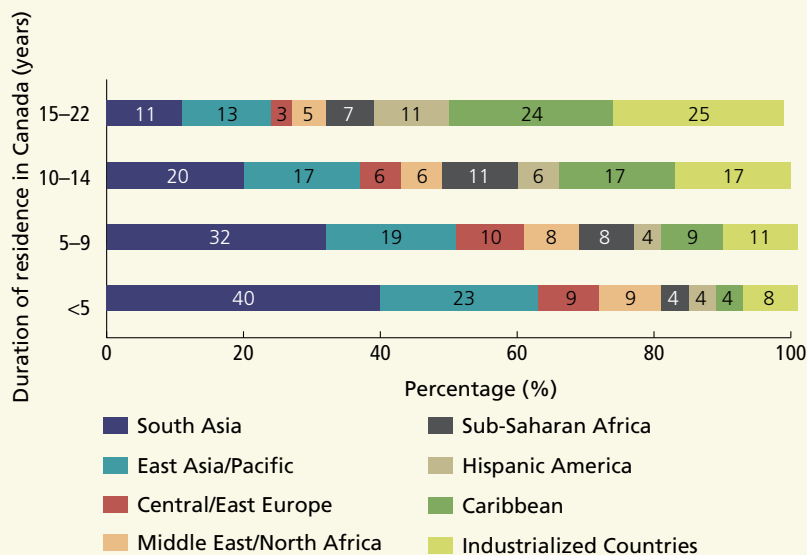
All singleton live births delivered between April 1, 2002 and March 31, 2007 to mothers with a valid Ontario health card number and living in a census metropolitan area at the time of delivery were included. Data from health care administrative databases were linked to the Landed Immigrant Data System (LIDS) in order to determine the rates of preterm births among identified immigrants and long-term residents of Canada. “Identified immigrants” are women identified through LIDS as having obtained permanent resident status and who settled in Ontario between 1985 and 2000. “Long-term residents” include all other women who were eligible for OHIP and would include Canadian-born women and long-term immigrants (who arrived before 1985) (See [Appendix 12.2](#) for more detail on these groups). This indicator is based on previously published analyses.<sup>311</sup>

**Finding:** In Ontario, after adjusting for maternal age and parity, 6.8 percent of deliveries among mothers who were long-term residents of Canada and 6.6 percent of deliveries among identified immigrants were preterm (less than 37 weeks gestation).

## Exhibit 12C.27 | Distribution of maternal world region of birth among infants born to urban-dwelling immigrant women,<sup>^</sup> by duration of residence, in Ontario, 2002–2007

### FINDINGS

- Immigrant women giving birth between 2002 and 2007 came from all regions of the world; the distribution of the mother's world region of birth varied by her duration of residence in Canada.
- Among immigrant women who gave birth between 2002 and 2007, those who had been in Canada for 15–22 years were more likely to have immigrated from industrialized countries, the Caribbean, and Hispanic America; whereas, women who had been in Canada for less than 5 years were more likely to have immigrated from South Asia, East Asia or the Pacific, the Middle East or North Africa, and Central or East Europe.



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

<sup>^</sup> includes all singleton live births delivered between April 1, 2002 and March 31, 2007 to urban-dwelling mothers who were granted permanent residency status in Canada between 1985 and 2000 and had a valid Ontario health card number at the time of delivery

This graph has been adapted from: Urquia ML, Frank JW, Moineddin R, and Glazier RH. Immigrants' duration of residence and adverse birth outcomes: a population-based study. *BJOG* 2010; 117(5):591-601

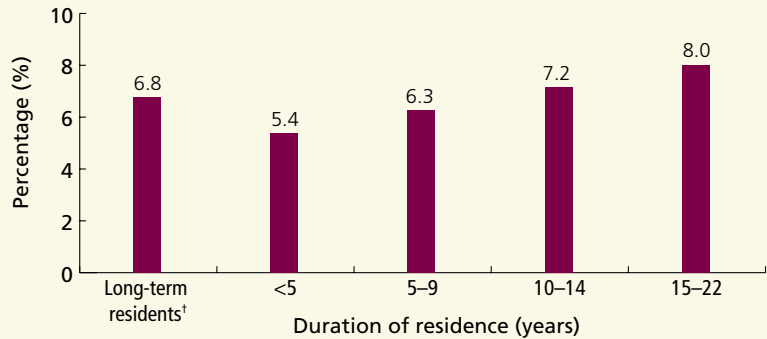
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**Exhibit 12C.28** | Risk-adjusted<sup>‡</sup> percentage of infants who were delivered preterm (<37 weeks gestation) among those born to urban-dwelling immigrant women,<sup>^</sup> by maternal duration of residence and among urban-dwelling long-term residents,<sup>†</sup> in Ontario, 2002–2007<sup>¥</sup>

**FINDINGS**

- Among identified immigrant women, risk-adjusted rates of preterm birth increased with the duration of residence in Canada, ranging from 5.4 percent of singleton live births to mothers who had been in Canada for less than 5 years to 8.0 percent of births to mothers who had been in Canada for 15–22 years.
- This pattern persisted even after controlling for additional factors, such as country and region of birth, language knowledge on arrival, secondary school graduation on arrival, and marital status on arrival (data not shown).<sup>311</sup>
- More recent immigrants (those who had been in Canada for less than 10 years) had lower rates of preterm births compared to long-term residents; this advantage was reversed with a longer duration in Canada, such that immigrants who had been in Canada for 10–22 years had higher rates of preterm births compared to long-term residents.



**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

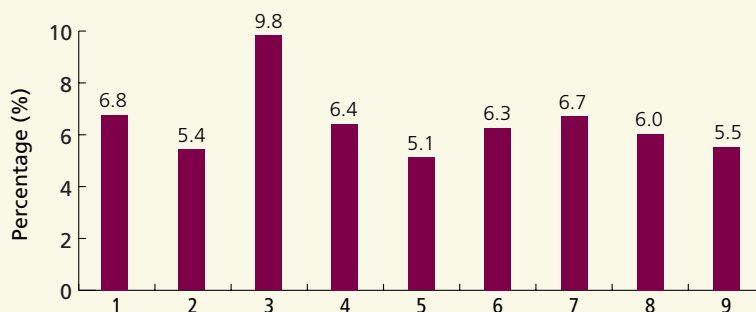
- <sup>‡</sup> adjusted for maternal age and parity at delivery
- <sup>^</sup> Mothers who were granted permanent residency status in Canada between 1985 and 2000
- <sup>†</sup> Mothers who were born in Canada or were granted permanent residency status before 1985
- <sup>¥</sup> included all singleton live births delivered between April 1, 2002 and March 31, 2007 to urban-dwelling mothers with a valid Ontario health card number at the time of delivery

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**Exhibit 12C.29** | Risk-adjusted<sup>‡</sup> percentage of infants born to urban-dwelling immigrant women<sup>^</sup> who were delivered preterm (<37 weeks gestation), by maternal world region of birth, and among those born to urban-dwelling long-term residents,<sup>†</sup> in Ontario, 2002–2007<sup>¥</sup>

### FINDINGS

- After adjusting for maternal age and parity at delivery, rates of preterm birth were higher among women born in the Caribbean compared to long-term residents of Canada; whereas, rates of preterm birth were lower among women born in Central or East Europe, the Middle East or North Africa, or other industrialized countries compared to long-term residents.
- After adjusting for maternal age and parity at delivery, immigrant women born in the Caribbean and South Asia had higher rates of preterm birth compared to immigrant women born in industrialized countries. Women from East Asia and the Pacific also had higher rates of preterm birth than women born in industrialized countries, though these differences were of borderline statistical significance. The observed pattern did not change after further adjusting for immigrant class, language knowledge on arrival, secondary school graduation on arrival, and unmarried status on arrival (data not shown).<sup>311</sup>
- Comparisons between immigrants from different regions of the world and long-term residents should be interpreted in the context that long-term residents constitute a diverse group in terms of ethnic background.



#### World Region of Birth

- |                                     |                             |
|-------------------------------------|-----------------------------|
| 1. Long-term residents <sup>†</sup> | 6. East Asia/Pacific        |
| 2. Central/East Europe              | 7. South Asia               |
| 3. Caribbean                        | 8. Sub-Saharan Africa       |
| 4. Hispanic America                 | 9. Industrialized Countries |
| 5. Middle East/North Africa         |                             |

**DATA SOURCES:** Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

<sup>‡</sup> adjusted for maternal age and parity at delivery

<sup>^</sup> Mothers who were granted permanent residency status in Canada between 1985 and 2000

<sup>†</sup> Mothers who were born in Canada or were granted permanent residency status before 1985

<sup>¥</sup> included all singleton live births delivered between April 1, 2002 and March 31, 2007 to urban-dwelling mothers with a valid Ontario health card number at the time of delivery

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# Discussion

In this chapter, we examine the social determinants of health and paint a picture of health inequities among low-income, immigrant, and minority populations.

The social determinants of health—the root causes of health inequities—are not evenly distributed throughout Ontario's population. For example, we found that women, recent immigrants, certain racial/ethnic groups, and linguistic minorities tended to have lower annual household income and lower rates of employment. Differences in income and employment, along with differences in other important social factors, contribute to the health inequities observed.

By synthesizing findings from across POWER Study chapters, we described patterns of income-related differences pertaining to health and health care in Ontario. We observed large income differences in how sick people were (health status, functioning, chronic disease prevalence, and comorbidity), their chronic disease risk factors and preventive care (behaviour-related factors, teen pregnancy, and cancer screening), and their health outcomes (including hospitalizations and mortality). We identified opportunities to improve access to primary care services. While the majority of Ontarians had a primary care provider, we found income differences in access to care, particularly for urgent, non-emergent health problems. Low-income Ontarians are more likely to be hospitalized for common chronic conditions that can often be effectively managed in primary care. Furthermore, low-income adults encounter financial barriers to accessing important services that are not universally covered including dental care, prescription drugs for those under age 65, and physiotherapy. However, income differences related to clinical management and quality of care—particularly in acute care settings—were much smaller and in many cases no income differences were

noted. We were less likely to find income differences in care when organized systems for improvement were in place, such as for cancer and stroke.

We also observed important differences in health status and access to care related to race/ethnicity, time since immigration, and languages spoken. Though our ability to measure these factors was limited, many important differences were found, highlighting the need to improve data capacity to more fully measure access, quality, and outcomes of care among Ontario's diverse communities. This can be accomplished through expanded collection of data on race and ethnicity, oversampling of minority populations in surveys, and facilitating data linkages to databases containing these data. In particular, Aboriginal women and men (living off-reserve) were more likely to report worse health and functional status than other ethnic groups. However, members of some racial/ethnic groups had better health and functional status than the White population. Consistent with the “healthy immigrant effect,” we found that recent immigrants were less likely than Canadian-born adults to report activity limitations or comorbidity, while immigrants who had been in Canada for 10 or more years were more similar to their Canadian-born counterparts. Chronic disease risk factors and access to health care services also varied by race/ethnicity and time since immigration. Recent immigrants were less likely to have a primary care physician than those who had been in Canada longer and were more likely to report difficulties accessing care. Access to primary care also varied by race and ethnicity, with South and West Asian and Arab women most likely to report difficulties with accessing needed

services. Diabetes prevalence was associated with ethnicity, with diabetes rates highest among South Asians. In further analyses, after adjusting for age, immigration category, education, income level and time since arrival, diabetes prevalence in immigrants increased with their duration of time in Canada; women who had been in Canada for 15 years or longer had rates that were 40 percent higher than women who had been in Canada for 5–9 years.<sup>297</sup> There were also important differences in rates of cervical cancer screening and birth outcomes associated with world region of origin. The development of interventions and models of care that address these differences is an important component of efforts to reduce health inequities.

It is not surprising that the POWER Study found inequities in health in Ontario, because health inequities associated with socioeconomic position unfortunately present a problem for all societies. What is surprising and of concern is the magnitude of these inequities. Modifiable health inequities among the women and men in Ontario were associated with socioeconomic position, ethnicity, and geography. Our findings illustrate how the social determinants of health impact women and men differently and highlight the need for gender-sensitive interventions to tackle them. It is not hard to make the case for making the reduction and ultimate elimination of health inequities a priority, as consequences of health inequities are large in their impact on human lives, increased demand on health system resources, lost productivity, and associated costs.

Importantly, we found that inequities in health and functional status were much larger than inequities in access to and quality of care, underscoring the importance of moving upstream to address their root causes, which are grounded in the social determinants of health. Health inequities are commonly manifested by a higher burden of chronic disease and disability, much of which is preventable. Furthermore, health inequities in chronic disease management were larger than those for acute care, highlighting the need for health system redesign prioritizing chronic disease

prevention and management to improve both population health and health equity. Poor living and working conditions produce illness. Socioeconomically disadvantaged women and men are further disadvantaged if they encounter barriers to accessing care or receive care of suboptimal quality. There were notable areas where care was equitable—including acute cancer and stroke care—illustrating how organized systems of care using evidence-based guidelines and ongoing performance measurement and improvement is one strategy that can help towards achieving health equity. Expanding these approaches to community settings and incorporating a focus on health equity into these efforts can help us accelerate progress in reducing inequities.

The POWER Study sought to provide evidence needed to improve the health of the women and men of Ontario and to reduce health inequities. The study was unique in employing a community engaged research model to inform both our indicator selection and interpretation of data, including indicators bridging population health and health care, and focusing on the interaction between gender and the social determinants of health. Common themes emerged across our chapters that helped us identify, in consultation with our stakeholders, multiple opportunities to make significant progress towards achieving health equity in Ontario. The POWER Study adds its voice to many scientific studies, reports, and calls to action to address health inequities. The evidence is clear and compelling. Now is the time for action. The enactment of Excellent Care for All legislation provides Ontario with a unique opportunity to implement change that truly improves the health of “all.”

In Canada and internationally, there is growing recognition of the importance of health equity. The World Health Organization’s (WHO) Commission on Social Determinants of Health has called on “the WHO and all governments to lead global action on the social determinants of health with the aim of achieving health equity.”<sup>1</sup> Equity is recognized as integral to improving

health and health care in Ontario. Health Quality Ontario (formerly the Ontario Health Quality Council) includes equitable care as a key attribute of a high-performing health system.<sup>312</sup> The Ministry of Health and Long-Term Care has developed a Health Equity Impact Assessment tool—a decision support tool which helps identify “how a program, policy, or similar initiative will impact population groups in different ways”<sup>313</sup>—in order to guide priority setting, planning, and program development and implementation. In Ontario, many people, communities, and organizations—in multiple settings and sites of care—have been working toward improving health equity. Local Health Integration Networks (LHINs) have developed health equity plans.

Hospitals are developing strategies to assure access to the diverse communities they serve. Health equity has been recognized as an important strategic objective of public health. Community health centres are implementing innovative strategies to address the social determinants of health in the context of primary care delivery. Furthermore, many others outside of the health care sector, including those involved in social services, community programs, and advocacy groups, are also playing an important role in addressing the social determinants of health. The goal of the POWER Study is to support these efforts by providing actionable data that can inform targeted efforts to reduce health disparities in Ontario.



## KEY FINDINGS

### Social Determinants of Health

#### Income and education

- Across all age groups, women were more likely to live in lower-income households than men, with gender differences in income greatest among those aged 65 and older. Forty-four percent of women aged 65–79 and 52 percent of women aged 80 and older reported lower income, compared to 33 percent and 35 percent of men in these age groups, respectively. While the proportion of low-income households varied by LHIN, women were more likely to live in low-income households across LHINs.
- There were large differences in income associated with race and ethnicity. White Ontarians were least likely to reside in lower-income households. Recent immigrants, members of racial and ethnic minority groups, and francophones who spoke French only were more likely to live in lower-income households than their counterparts.
- Among women and men aged 25–64, a similar proportion reported having a secondary school education or less. However, among adults aged 65 and older, women were much more likely than men to report lower levels of education.
- There were differences in educational attainment associated with race and ethnicity. East and Southeast Asians reported the highest levels of education. Among Black Ontarians, women had higher levels of education than men, whereas among South and West Asian or Arab adults, men reported higher levels of education than women. Forty-seven percent of Aboriginal women and 43 percent of Aboriginal men reported secondary school education or less.
- Languages spoken were also associated with education. Ontarians who spoke only French or neither French nor English were most likely to report having a secondary school education or less.

- Despite higher levels of education than the overall Ontario population, immigrants who lived in Canada for 0–9 years were much more likely to reside in households with lower incomes.

#### Employment

- Women continue to have lower rates of participation in the labour force. Women were less likely than men to report being employed, irrespective of household income, educational attainment, race/ethnicity, or time since immigration. Among those who were employed, women were less likely than men to report working full-time hours. Unemployment rates did not differ between women and men.
- The proportion of immigrant women who reported being employed in the past week increased with duration of residence in Canada, ranging from 44 percent among the most recent immigrants (0–4 years in Canada) to 65 percent among those who had lived in Canada for 10 or more years. Immigrant women who had been in Canada for 10 or more years were as likely to be employed as women who were born in Canada.
- The proportion of working age adults who reported being employed in the past week increased with higher levels of education, ranging from 40 percent of women and 65 percent of men with less than a secondary school diploma to 73 percent of women and 81 percent of men with a Bachelor's degree or higher.

#### Lone-parent households

- Eighty-five percent of all lone-parent families were led by women.
- Lone-parent households headed by women were twice as likely to have lower incomes as those headed by men (46 percent versus 22 percent, respectively).



### Food insecurity

- While overall five percent of Ontarians reported food insecurity, one in four low-income women and men reported that they did not have enough to eat, worried about there not being enough to eat, or did not eat the quality or variety of foods they desired due to a lack of money.

### Low-Income Populations

#### Health and functional status

- We consistently found that lower-income adults reported worse health than those with higher incomes. In the Ontario population, an income gradient was found for measures of both self-rated health and self-rated mental health. Lower-income adults were more than three times as likely to report their health as fair or poor and 3–5 times more likely to report fair or poor mental health as those with higher incomes.
- An income gradient was observed for all measures of functional status examined. Low-income adults were one and a half times more likely than higher-income adults to report activity limitations (37 percent versus 22 percent, respectively), two and a half times more likely to report activities prevented by pain or discomfort (25 percent versus 10 percent, respectively), and twice as likely to report limitations in carrying out instrumental activities of daily living (IADLs) and/or activities of daily living (ADLs) (25 percent versus 12 percent, respectively).
- An income gradient was observed for the prevalence of all common chronic conditions examined, as well as for probable depression. For all chronic conditions examined (hypertension, arthritis, back problems, obstructive lung disease, diabetes, and heart disease or stroke), low-income women and men had higher prevalence than those with higher income. For example, low-income women were more than twice as likely as higher-income women to report having diabetes or cardiovascular disease.

- There was also an income gradient in the prevalence of multiple chronic conditions (comorbidity). Irrespective of age, low-income women were more likely than higher-income women to report having two or more chronic conditions. Among those aged 25–64, low-income women were more likely to report two or more chronic conditions compared to higher-income women (34 percent versus 21 percent, respectively), and among those aged 65 and older, nearly three-quarters (70 percent) of low-income women reported having two or more chronic conditions.

#### Risk factors and prevention

- We found large and potentially modifiable differences in chronic disease risk factors and screening associated with income in Ontario. Low-income women were more likely than those with higher incomes to report physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, or smoking. They were also less likely to undergo recommended cancer screening. These behaviours are influenced by social and environmental factors.

#### Access to health care services

- Income differences were found in access to urgent, non-emergent care and satisfaction with the care provided. Women and men living in the lowest-income neighbourhoods were more likely to report difficulties making an appointment with their family doctor for an urgent, non-emergent health problem (i.e., less likely to report no difficulties). Women living in the lowest-income neighbourhoods were less likely than women living in higher-income neighbourhoods to report being very satisfied with their experience getting to see their doctor for an urgent, non-emergent health problem and the care their doctor provided for an urgent, non-emergent health problem.



- There was a large income gradient in access to dental care. Compared to higher-income adults, those with low household income were more than twice as likely to have not seen a dentist in the past year.
- An income gradient was observed for unmet health care needs. Overall, approximately one in eight Ontarians aged 25 and older (12 percent) reported having unmet health care needs in the past year. Low-income adults were more likely to report unmet health care needs than other Ontarians.

### **Clinical management**

- The POWER Study examined income-related differences in the clinical management of many common health conditions. In general, there were fewer income-related differences in the clinical management of health conditions than there were in health and functional status, risk behaviours, and preventive services. However, some notable income differences were found, particularly for certain types of specialist consultations and some types of diagnostic testing needed for evaluation or ongoing management.
- Among patients admitted to hospital for heart failure or an acute myocardial infarction, those from the lowest-income neighbourhoods were less likely to have a cardiologist as their most responsible physician than those from the highest-income neighbourhoods. Low-income women with rheumatoid arthritis were also less likely to have seen a rheumatologist than those with higher incomes.

### **Health outcomes**

- We found notable and potentially modifiable differences in health outcomes associated with income in Ontario. However, some outcomes (for example, readmissions and mortality among adults admitted to hospital for cardiovascular and cerebrovascular disease) directly related to medical management did not vary by neighbourhood income.

- Women and men from low-income neighbourhoods were much more likely to be hospitalized for specific ambulatory care sensitive conditions (for which effective ambulatory care can prevent or reduce the need for hospitalization), to be hospitalized and/or treated for a range of diabetes complications, and to visit an emergency department within 30 days of being discharged from hospital for depression compared to Ontarians living in higher-income neighbourhoods.
- Compared to Ontarians living in higher-income neighbourhoods, women and men living in low-income neighbourhoods had higher rates of all-cause and premature mortality and higher cause-specific mortality rates for many conditions.

### **Immigrant and Minority Populations**

#### **Health and functional status**

- Race/ethnicity, time since immigration, and language were associated with health and functional status.
- Aboriginal women and men (living off-reserve) were more likely to report fair or poor health, activity limitations, and two or more chronic conditions than other ethnic groups. Members of some ethnic groups had better health and functional status than the White population. This observation may be due to the healthy immigrant effect.<sup>221, 264</sup>
- Recent immigrants (those who had been in Canada for less than 10 years) were less likely than Canadian-born adults to report activity limitations (19 percent of women and 10 percent of men who were recent immigrants versus 28 percent of women and 27 percent of men who were Canadian born) or the presence of two or more chronic conditions (18 percent of women and 14 percent of men who were recent immigrants versus 34 percent of women and 27 percent of men who were Canadian born). This advantage was not observed among immigrants who had been in Canada for 10 or more years.

- Ontarians who did not speak English (i.e., spoke only French or spoke neither French nor English) were more likely to report fair or poor health than Ontarians who spoke English (i.e., spoke English only or spoke English and another language).

### Chronic disease risk factors

- East and Southeast Asian women had the lowest prevalence of being overweight or obese. East and Southeast Asian, South and West Asian, and Arab women were least likely to report that they were current smokers, while 39 percent of Aboriginal women reported smoking.
- Recent immigrants (less than 10 years in Canada) were more likely than Canadian-born adults to be physically inactive, but less likely to have inadequate intake of fruits and vegetables, to be overweight or obese, or to be current smokers. Immigrants who had been in Canada for 10 or more years had health behaviours that were more similar to Canadian-born adults.

### Access to health care services

- Immigrants who had been in Canada for less than five years were less likely to have a primary care doctor than those who had been in Canada for 10 or more years and Canadian-born respondents (85 percent versus 94 percent and 93 percent, respectively). Nearly one in six recent immigrants did not have a family doctor.
- Patient satisfaction with access to and experience with primary care varied by race/ethnicity, time since immigration, and language. Certain racial/ethnic groups (people of East and Southeast Asian, South and West Asian, and Arab ethnicity in particular), more recent immigrants (those who had been in Canada for less than 10 years), and those who spoke neither English nor French most often at home were less satisfied with their access to and experience with primary care than their counterparts.

- The percentage of people who reported having no difficulties accessing needed primary health care varied by race/ethnicity, with South and West Asian and Arab women being most likely to report difficulties obtaining monitoring of health problems from a family doctor and making an appointment for an urgent, non-emergent health problem.
- Immigrant women who had been in Canada for less than 10 years were more likely than Canadian-born women to report difficulties obtaining monitoring of health problems from a family doctor and making an appointment for an urgent, non-emergent health problem.
- Recent immigrants and certain racial/ethnic groups (Aboriginal and East and Southeast Asian adults) were more likely to report difficulties accessing specialists.
- The proportion of women who reported unmet health care needs varied by race/ethnicity and time since immigration. Twenty-four percent of Aboriginal women reported unmet health care needs compared to 14 percent of White women and 10 percent of East and Southeast Asian women. Women who had been in the country for less than 10 years were more likely to report having unmet health care needs than those who had been in the country longer (16 percent versus 11 percent, respectively).
- Access to dental care, a service not covered by the Ontario Health Insurance Plan (OHIP), is a problem for many Ontarians, particularly for immigrants who had been in Canada for less than 10 years and certain racial/ethnic groups.

### Prevalence of diabetes

- Compared to long-term residents of Ontario, prevalence of diabetes was higher among identified immigrants from South Asia, Latin America and the Caribbean, sub-Saharan Africa, and North Africa and the Middle East.
- Among long-term residents of Ontario, men were slightly more likely than women to have diabetes (6.5 percent versus 6.2 percent); however, with the exception of immigrants from sub-Saharan Africa, immigrant women from all other world regions had similar or higher rates of diabetes than immigrant men.

### Cervical cancer screening

- Canadian-born and long-term residents had higher rates of cervical cancer screening than identified immigrants and recent OHIP registrants (65 percent versus 53 percent and 55 percent, respectively).
- Among urban-dwelling residents, irrespective of immigration status, older women (aged 50–66) were less likely to have had at least one Pap test in a three-year period than younger women (aged 18–49) (45 percent versus 55 percent among identified immigrants; 42 percent versus 57 percent among other recent OHIP registrants; 60 percent versus 67 percent among Canadian-born and long-term residents).
- After adjusting for potential confounders, women from South Asia and the Middle East and North Africa had the lowest rates of cervical cancer screening and women from Latin America and the Caribbean had the highest rates of cervical cancer screening.

- Women living in the lowest-income neighbourhoods had lower rates of cervical cancer screening than women living in the highest-income neighbourhoods. Income differences were noted for Canadian-born and long-term residents, identified immigrants, and recent OHIP registrants.

### Preterm births

- Among identified immigrant women, risk-adjusted rates of preterm birth increased with the duration of residence in Canada, ranging from 5.4 percent of singleton live births to mothers who had been in Canada for less than 5 years to 8.0 percent of births to mothers who had been in Canada for 15–22 years.
- While recent immigrants (those who had been in Canada for less than 10 years) had lower rates of preterm births compared to long-term residents, this advantage was reversed with a longer duration in Canada, such that immigrants who had been in Canada for 10 or more years had higher rates of preterm births compared to long-term residents.
- After adjusting for maternal age and parity at delivery, rates of preterm birth were higher among women born in the Caribbean compared to long-term residents of Canada. Rates of preterm birth were lower among women born in Central or East Europe, the Middle East or North Africa, or other industrialized countries compared to long-term residents.

## LIMITATIONS

While the POWER Study reported on a large number of indicators, there were important limitations in both what we could measure as well as in the data used. Indicators reported in the POWER Study were assessed using a variety of secondary data sources. Data were drawn from routinely collected administrative health care databases (such as those which track hospitalizations and doctor visits), population health surveys, vital statistics datasets, and disease registries. The POWER Study added to the literature by examining differences among diverse groups of women in Ontario. However, income, education, ethnicity, language, and geography do not operate alone to influence health and well-being; rather, they operate together and interact to shape the health of women and men. As we were only able to examine these factors separately, we were unable to capture the impact of their intersectionality. In addition, timely data is critical for quality improvement activities, however, there is a time lag in the availability of administrative and secondary data. While we identify important gaps in care and sizable health inequities, more timely data is required to guide and assess the effectiveness of interventions targeting these gaps.

Administrative data in a universal health system have the advantage of capturing broad, population-level data, but have important limitations such as containing limited clinical information and the inability to determine when patient preference played a role in treatment decisions. Without knowing clinical or patient preference information, it is often difficult to ascertain whether provided care was appropriate or suboptimal. For indicators using administrative data, income level was assessed using neighbourhood income quintiles. This measure captures the impact of living in a low-income neighbourhood on health. This measure has been well-validated as a proxy for individual income, but it is subject to measurement error in neighbourhoods where households have a wide mix of income levels.

Many indicators were measured using large population-based surveys (Canadian Community Health Survey (CCHS) and the Primary Care Access Survey (PCAS)). While survey data can provide a wealth of information about individuals, they are based on self-report and may be influenced by reporting biases, recall biases, and subjective interpretation of the participants. Additionally, the way a question is asked can influence the accuracy of a response and can increase the risk of reporting or recall biases. Furthermore, culture may influence responses to questions. Expectations can differ by age, education, or culture and thus influence responses about difficulties obtaining care or satisfaction with care.

The CCHS includes only self-identified, off-reserve, Aboriginal adults (North American Indian, Métis, Inuit). Thus, many of our measures of Aboriginal health excluded those living on reserves and are not representative of the overall Aboriginal population in Ontario. If Aboriginal people living on reserves have worse health than those living off-reserves then the health gap between Aboriginal people and those of other ethnic groups would be larger than reported here.

The CCHS is administered in multiple languages. The PCAS is administered in English and French. It asks about language spoken most often at home, which may be a marker for recency of immigration, culture, preference, or facility with English or French. Thus, on indicators derived from the PCAS, we may underestimate differences in access associated with language spoken.

Indicators reported throughout the POWER Study have their own unique limitations. For limitations of indicators that have been reported in prior POWER Study chapters, please see the relevant prior chapter. Our indicator of 'low income' in Section A, derived from CCHS data, was defined as the two lowest annual household income categories (see [Appendix 12.2](#) for definitions). Due to small sample size in some groups,

we needed to combine the two lowest income categories in order to produce estimates. This two-level income variable was also used to stratify other indicators when sample size required. This may result in an underestimation of income differences. Additionally, all of our employment indicators were derived from the CCHS, 2007–2008, which asked respondents if they had worked in the last week. Since the survey was conducted over a two-year period, the referent date varied across respondents. Also, as employment indicators are sensitive to economic conditions, the 2007–2008 estimates provided in this chapter would likely be different than estimates obtained after the recession of the late 2000s.

In this chapter, we report three previously published indicators (prevalence of diabetes, rates of cervical cancer screening, and rates of preterm births among

immigrant populations) that were assessed by linking data from the Landed Immigrant Data System (LIDS) and administrative health care databases. Linked LIDS data were only available from 1985 to 2000. Therefore, permanent residents who came to Ontario before 1985 and immigrants who were not identified through the LIDS were included in the “long-term residents” category, along with Canadian-born adults. Permanent residents who arrived after 2000 could not be identified, but attempts to avoid misclassification were made by excluding recent OHIP registrants from the “long-term resident” categories. These limitations could result in small inaccuracies in the differences reported between these groups. Further detail on the limitations of these three indicators can be found in the original publications.<sup>297, 305, 311</sup>



## WHAT CAN'T BE MEASURED

While this chapter has focused on several important groups of women with unique health needs, there are important areas of women's health that we did not address. For example, the POWER Study provided only limited measures of First Nations, Inuit, and Métis women's health due to data limitations. We did not look at important vulnerable groups of Ontario women such as women with disabilities and Deaf women, lesbian and bisexual women, homeless women, and women who have experienced violence. Previous research and advocacy efforts suggest that these groups are more likely to experience poor health, to encounter barriers in accessing care, and report receiving poorer quality care.<sup>9–13</sup> Additionally, there are many issues that are particularly important to women's health—including specific barriers to care and social determinants of health, as well as women-specific health conditions—that we could not measure due to limited data. These include (but are not limited to) issues such as: caregiving responsibilities; domestic violence; inflexible work schedules as a barrier to care and work-life balance; conditions involving menstrual pain and bleeding; and quality of prenatal care.

Health-related data sources in Ontario provide limited information on race, ethnicity, language, or immigration, making it difficult to assess health disparities in immigrant and minority populations. Administrative health care databases do not contain information on these important characteristics.

The LIDS has recently been linked to administrative health care databases; however, at the time of this study, access to this linked data source was limited. Survey data generally include items to assess these characteristics; however, because recent immigrants and racial/ethnic minorities make up a relatively small proportion of survey participants, we were often unable to report data within certain groups because of insufficient sample size. Additionally, the CCHS is based on cross-sectional data and the immigrants who came to Canada over 10 years ago might have been a very different cohort compared to immigrants who immigrated more recently. Therefore, it is impossible to determine if differences associated with time since immigration were due to health transitions over time or due to cohort effects.

Due to data limitations, there were many other important aspects of health and health care that we were unable to measure. Many indicators of the quality of primary care and ambulatory care, which are routinely reported in other jurisdictions, cannot be assessed with currently available data in Ontario.<sup>206</sup> Data on prescription drug use among individuals under age 65 is also not available. This is a major limitation as individuals younger than age 65 do not have universal drug coverage and may encounter financial barriers to receiving needed medication. Data gaps and limitations have been discussed in more detail in previous POWER Study chapters.



## MOVING FORWARD: THE POWER HEALTH EQUITY ROAD MAP

Across POWER Study chapters, health inequities emerged as a major challenge in Ontario. However, there is also cause for optimism, as there are many opportunities for intervention and improvement. Innovative work is underway by many individuals and organizations across the province aimed at tackling these health inequities. We offer the following POWER Health Equity Road Map, a ten-point plan to move us forward. The road map emerged from our analyses and broad community consultation and dialogue. The time to move forward is now. What is needed is the will and commitment.

### **1. Equity, a major attribute of high-performing health systems and important dimension of health care quality, is key to health system sustainability and needs to be a priority.**

- Progress in achieving health equity can make important contributions to health system sustainability by reducing the incidence of costly and preventable illnesses such as late stage cancer (identified through screening) or hospitalizations for diabetes or heart failure (through better chronic disease management).
- Health systems can make important contributions to efforts to reduce inequities in health through health system redesign aimed at meeting the needs of populations at risk for poor health, as well as through cross-sectoral partnerships aimed at addressing the social determinants of health.

### **2. Health equity cannot be achieved without moving upstream and addressing the root causes of disease in the social determinants of health.**

- Focusing efforts upstream through cross-sectoral collaboration to address the root causes of health inequities (i.e., income, education, food security, housing, and environment) while reducing the burden of illness in the population is essential. A multifaceted

approach is required to tackle the many complex problems which contribute to greater chronic disease prevalence and poorer health outcomes in these groups.

- Policy approaches such as “Health in All Policies” encourage the consideration of the health impact of policies across all sectors. Tools to accomplish this, such as Health Impact Assessments, are available and currently being used by the Ontario Ministry of Health and Long-Term Care, some Local Health Integration Networks, and hospitals. These efforts should be encouraged.

### **3. Prioritize chronic disease prevention and management to improve overall population health and reduce health inequities.**

- Because chronic diseases and their risk factors contribute greatly to health inequities, the implementation of a comprehensive and coordinated chronic disease prevention and management strategy—one that addresses the needs of at-risk populations—is the key to improving population health and achieving health equity.
- Because socioeconomically disadvantaged populations have a higher burden of chronic illness and disability, the current mismatch between the way care is organized and the needs of people with chronic illness disproportionately impacts those who are disadvantaged. Health system redesign that supports chronic illness care and fosters patient empowerment and community partnership is an important strategy for driving health equity.

### **4. Focus on patient-centeredness to improve access to, satisfaction with, and outcomes of care for all.**

- Patient-centred care is care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions. It is care that addresses an individual’s constellation of problems rather than being disease specific. Patient-centred models of care that address the multiple health care needs of individuals and are sensitive



to gender and cultural differences can improve patients' experiences with care and increase satisfaction with access to care and the care received. Patient-centred models of care that integrate and coordinate care across care settings are central to improving satisfaction with health care access.

- Chronic disease management must also take into consideration that many Ontarians have multiple chronic conditions in part due to common risk factors for many of these conditions such as diabetes, heart disease, cancer, and arthritis. The adoption of a more patient-centred focus to chronic disease management that acknowledges this high prevalence of comorbidity and integrates care is essential. This can be accomplished through primary care-based medical homes with strong linkages to speciality services and community care.
- Improving access to and quality of care is dependent upon understanding access barriers as experienced by populations at risk and developing effective interventions to address them. Our findings highlight the need to address cultural and linguistic barriers to care among Ontario's diverse population. There are models to draw upon internationally and locally that, with wider implementation and adaptation to the needs of specific communities, can help meet this objective. Because barriers encountered by women and men in cultural and linguistic minority communities differ, these interventions need to be gender sensitive. Community engagement and partnership along with increased diversity in the health care workforce, with the explicit goal of addressing these barriers, can help to ensure access to effective care among Ontario's diverse communities.

### **5. Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.**

- We found few inequities in the delivery of acute cancer and stroke care—areas where organized, integrated, and coordinated strategies for guideline implementation, as well as quality improvement using performance

measurement and feedback with validated quality indicators, have been implemented. Expanding this approach across other health care sectors and especially to primary care practices can help foster health equity.

- Integrated, organized models of care can also help to make our complex and often fragmented system easy to navigate.

### **6. Coordinate population health, community, and clinical responses.**

- There are many important ongoing activities aimed at improving health in the province including: targeting population-based health promotion, enhancing the quality and capacity of community-based services, and improving the quality of care delivered in clinical settings. Efforts to integrate and coordinate these efforts could produce synergies to accelerate progress in improving health and reducing health inequities among Ontarians.
- It is especially important to identify specific opportunities to improve quality of life and functional status through both community-based and health care interventions. For example, community-based interventions combined with clinical preventive services such as for tobacco control and smoking cessation, together can be more effective. Falls prevention interventions in clinical practice can address medical factors to reduce falls, while community-based interventions such as activity promotion can also reduce the risk of falls.

### **7. Link community and health services to optimize outcomes and improve efficiency.**

- Both health services and community services are vital for maintaining and improving health. Strengthening linkages between these sectors can help assure that people can readily access needed care and services to promote, maintain, and improve health.

### **8. Implement a health equity measurement and monitoring strategy and routinely include gender and equity analysis in health indicator monitoring.**

- Equity analysis and reporting should be integrated into ongoing measurement efforts. We have identified a leading set of health equity indicators based on POWER Study findings and broad-based consultation that can be used for this purpose. Adoption of these indicators can provide the needed information to effectively target gender, socioeconomic, and ethnic inequities in health. Monitoring these indicators over time will allow us to assess progress in improving health and reducing inequities.
- Incentives to foster health equity can be created. For example, health equity indicators and targets can be included in accountability agreements for LHINs, hospitals, family health teams, and other care providers.
- Improvement in data quality, availability, and timeliness is needed to support monitoring and reporting strategies. There is a particular need for data on ethnicity to improve the capacity to measure, monitor, and improve health for Ontario's diverse communities.

### **9. Develop strategies for effective implementation by creating learning networks and designing innovations for scale up and spread.**

- There is a great deal of local innovation aimed at tackling the issues reported by the POWER Study. We now need to identify which innovations are most effective and promising for large scale adoption and design them for scale up and spread, and sustainability.
- Support of a health equity knowledge exchange infrastructure by creating learning networks for innovation and equity can accelerate the adoption of best practices.

### **10. Create a culture of innovation and learning while building the evidence base for accelerated improvement through rigorous evaluation and research.**

- Creation of a culture of innovation and learning across communities, sectors, and settings of care can play an important role in successfully implementing strategies aimed at achieving health equity.
- While there is much known about patterns of health inequities and their causes, there is a critical need for evidence specific to what works to close existing gaps. Critically evaluating health equity policies, strategies, and interventions to determine what works and what doesn't work is required to build the evidence base needed to accelerate progress and support wide-spread adoption of best practices.
- It will be important to take a continuous quality improvement approach to implementing this road map by identifying specific interim points to evaluate progress and making adjustments based on these assessments.

# Appendix 12.1

## INDICATORS AND THEIR SOURCES

### APPENDIX 12.1 | New Indicators^

Indicator	Indicator source(s)	Data source(s)
<b>Section 12A—Social Determinants of Health</b>		
Employment	<ul style="list-style-type: none"> <li>• Living Standards: A report of the Institute of Wellbeing, 2009<sup>314</sup></li> <li>• Statistics Canada. Women in Canada: a gender-based statistical report, 2006<sup>315</sup></li> <li>• A Profile of Women's Health Indicators in Canada, 2003<sup>30</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2007–08
Full-time employment	<ul style="list-style-type: none"> <li>• Statistics Canada. Women in Canada: a gender-based statistical report, 2006<sup>315</sup></li> <li>• A Profile of Women's Health Indicators in Canada, 2003<sup>30</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2007–08
Unemployment	<ul style="list-style-type: none"> <li>• Statistics Canada: Health Indicators 2008<sup>316</sup></li> <li>• Association of Public Health Epidemiologists in Ontario (APHEO)<sup>317</sup></li> <li>• Living Standards: A report of the Institute of Wellbeing, 2009<sup>314</sup></li> <li>• Statistics Canada. Women in Canada: a gender-based statistical report, 2006<sup>315</sup></li> <li>• A Profile of Women's Health Indicators in Canada, 2003<sup>30</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2007–08
Permanently unable to work	<ul style="list-style-type: none"> <li>• The POWER Study</li> </ul>	Canadian Community Health Survey (CCHS), 2007–08
Lone-parent families	<ul style="list-style-type: none"> <li>• Statistics Canada: Health Indicators 2008<sup>316</sup></li> <li>• Association of Public Health Epidemiologists in Ontario (APHEO)<sup>317</sup></li> <li>• A Profile of Women's Health Indicators in Canada, 2003<sup>30</sup></li> <li>• Statistics Canada. Women in Canada: a gender-based statistical report, 2006<sup>315</sup></li> </ul>	Canadian Community Health Survey (CCHS), 2007–08

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**APPENDIX 12.1 | New Indicators^ (Continued)**

Indicator	Indicator source(s)	Data source(s)
<b>Section 12C—Immigrant and Minority Populations</b>		
Prevalence of diabetes	<ul style="list-style-type: none"> <li>Health Canada. Responding to the challenge of diabetes in Canada: first report of the National Diabetes Surveillance System, 2003<sup>318</sup></li> <li>Health Canada. Diabetes in Canada 2nd edition, 2002<sup>319</sup></li> <li>ICES Atlas. Diabetes in Ontario, Chapter 1: Patterns of prevalence and incidence of diabetes, June 2003<sup>320</sup></li> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>317</sup></li> </ul>	Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Diabetes Database (ODD)
Cervical cancer screening	<ul style="list-style-type: none"> <li>Ontario Cancer System Quality Index (CSQI)<sup>208</sup></li> <li>Healthcare Effectiveness Data and Information Set (HEDIS)<sup>321</sup></li> </ul>	Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Ontario Health Insurance Plan (OHIP); Ontario Cancer Registry (OCR); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)
Preterm births	<ul style="list-style-type: none"> <li>Association of Public Health Epidemiologists of Ontario (APHEO)<sup>317</sup></li> </ul>	Landed Immigrant Data System (LIDS); Registered Persons Database (RPDB); Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); ICES Mother-Baby (MOMBABY) Linked Database

^ Only indicators that are being reported for the first time in the POWER Study are included in this table.  
Please see previous POWER chapters for details on indicators that have been reported earlier in the POWER Study.

# Appendix 12.2

## HOW THE RESEARCH WAS DONE

### 1. Indicator Selection and Reporting

Indicators reported in the POWER Study were the result of a rigorous selection process, which included an extensive literature review of peer-reviewed and grey literature (see [Introduction to the POWER Study, chapter 1](#)).<sup>322</sup> For each chapter, a literature review identified candidate indicators that were then reviewed by working groups using defined indicator selection criteria (see the [POWER Study Framework, chapter 2](#)).<sup>8</sup> Final lists containing potential indicators were prepared for review by Technical Expert Panels (TEP). Indicators were then selected through a modified Delphi process by the TEP using a two step process—first through an online questionnaire and then at a face-to-face meeting.

The majority of the indicators reported in this chapter were drawn from previous POWER Study chapters; in this chapter, we have re-examined and synthesized the findings specifically in relation to the social determinants of health and two at-risk populations—low-income populations and immigrant and minority populations. We also built on what was reported in previous chapters by incorporating some indicators that have not previously been reported in POWER studies. While it was beyond the scope of this chapter to examine indicators of all social determinants of health, we took a more detailed look at some of the social determinants of health that were previously reported in the POWER Study and supplemented these data with additional indicators derived from the Canadian Community Health Survey (CCHS), including several indicators related to employment and an indicator of lone-parent families. We also included three indicators of immigrant and minority women's health that were not previously reported by the POWER Study. These three indicators were created by linking data from the Landed Immigrant Data System (LIDS), which is maintained by Citizenship and Immigration Canada, to

health care administrative databases; this provides a unique opportunity to examine the health of people who have immigrated to Ontario. See [Appendix 12.1](#) for a complete list of new indicators reported in this chapter and their data sources.

All the indicators analyzed by the POWER Study were reported at the provincial level and at the Local Health Integration Network (LHIN) level when sample size allowed. At the provincial level, these indicators were first stratified by sex, and then further stratified by income, education, age, race/ethnicity, time since immigration, and rural/urban residence as allowed by sample size and data availability. At the LHIN level, indicators were stratified by sex and then by income, as allowed by sample size and data availability. Age- or risk-adjustment was done where appropriate. The three new indicators reported in the section on immigrant and minority populations—prevalence of diabetes, cervical cancer screening, and preterm births—were drawn from existing analyses and were not analysed specifically for the POWER Study. For this reason, some of the stratifications used for these analyses differ from those typically used for POWER Study indicators.

This appendix provides information on newly reported indicators. For more detail on indicators which were originally reported in previous POWER Study chapters, please see the Appendix 'How the Research Was Done' from the original chapter.

### 2. Datasets

#### 2A. Datasets—Survey or Research Data

##### Canadian Community Health Survey (CCHS)

The CCHS is a nationally representative, cross-sectional survey of the Canadian community-dwelling population conducted every two years by Statistics Canada. The

CCHS is offered in English and in French. To remove language as a barrier to conducting interviews, each of the Statistics Canada Regional Offices recruits interviewers with a wide range of language competencies. When necessary, cases are transferred to an interviewer with the language competency needed to complete an interview. In addition, the survey questions are translated into the following languages: Chinese, Punjabi, and Inuktitut. Chinese and Punjabi were the most common language barriers identified by the regional offices. The Inuktitut translation was used to facilitate collection in Nunavut. The survey is conducted via face-to-face interviews and covers material that alternates between a general overview of the health of Canadians (the x.1 cycle surveys) and more in-depth issues (the x.2 cycle surveys). In 2007, major changes were made to the CCHS design. Data are now collected on an ongoing basis with annual releases rather than every two years as was the case prior to 2007. As such, as of 2007, the naming convention has also changed to reflect the year of the survey rather than the cycle. Residents living on Indian Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Armed Forces, and residents of certain remote regions are excluded from the survey. The Ontario share files for the survey were used for all analyses.

For the overall population and for women and men we assessed the relationship between the indicators reported in this chapter and income, education, age, race/ethnicity, time since immigration, and rural/urban residence. The variable measuring rural/urban residency is a derived variable by Statistics Canada based on population density and size. In analyses that use the CCHS, income levels were based on information collected about annual household income, a variable derived by Statistics Canada that accounts for total household income and household size (see [Table 12.1](#) for more detail regarding variable categories). The studentized range test was used to assess the significance of differences in the rates. The standard errors and 95 percent confidence intervals were calculated using 500 bootstrap weights provided by Statistics Canada.

Statistics Canada rules were followed in the reporting of estimates using the Ontario share file as follows:

- Estimates should not be reported if the unweighted sample is less than 10 (or less than 30 for data from CCHS 2000/01 (Cycle 1.1)).
- Estimates are adequate and can be reported if the coefficient of variation is 16.5 or less.
- Estimates should be reported with caution if the coefficient of variation is between 16.6 and 33.3.
- Estimates should be suppressed if the coefficient of variation is greater than 33.3.

The results based on CCHS data should be interpreted with the following in mind:

- The survey relies on self-report and voluntary participation of randomly selected participants, and thus the data reflect individuals' interpretation of questions and how they perceive their own health. Hence, results may be an under- or over-estimation of the prevalence of some conditions.
- The CCHS does not survey Aboriginal people living on reserves, institutionalized individuals, people in the armed forces, or people with certain language restrictions (i.e., those who do not speak English or one of the languages the survey was translated to). While the findings pertain to a large proportion of Ontarians (those living in households), they may be biased if the groups not surveyed have significantly different needs or utilization rates.
- The CCHS survey sampling strategy is based on health regions and thus may not be fully representative of the LHINs and in some cases there is inadequate sample size for some measures for some LHINs. This prevents comparative analysis at the LHIN level for some indicators.

**Table 12.1. Stratifying variables for CCHS indicators**

<b>Sex</b>	
Female	
Male	
<b>Age (years)</b>	
<b>for employment-related indicators</b>	
20–44	
45–64	
65–75	
<b>Household income</b>	
<b>4-level variable</b>	
Lowest income	$< \$15,000$ if 1 or 2 people $< \$20,000$ if 3 or 4 people $< \$30,000$ if 5+ people
Lower middle income	$\$15,000$ to $\$29,999$ if 1 or 2 people $\$20,000$ to $\$39,999$ if 3 or 4 people $\$30,000$ to $\$59,999$ if 5+ people
Upper middle income	$\$30,000$ to $\$59,999$ if 1 or 2 people $\$40,000$ to $\$79,999$ if 3 or 4 people $\$60,000$ to $\$79,999$ if 5+ people
Highest income	$\geq \$60,000$ if 1 or 2 people $\geq \$80,000$ if 3+ people
<b>2-level variable</b>	
Lower income (Lowest/ Lower Middle)	$< \$30,000$ if 1 or 2 people $< \$40,000$ if 3 or 4 people $< \$60,000$ if 5+ people
Higher income (Upper Middle/Highest)	$\geq \$30,000$ if 1 or 2 people $\geq \$40,000$ if 3 or 4 people $\geq \$60,000$ if 5+ people
<b>Education</b>	
<b>4-level variable</b>	
Less than secondary school graduation	
Secondary school graduation	
At least some post-secondary school	
Bachelor's degree or higher	



<b>2-level variable</b>	
Lower education	Secondary school graduation or less
Higher education	At least some post-secondary school
<b>Immigration</b>	
<b>4-level variable</b>	
0-4 years of residency in Canada	
5-9 years of residency in Canada	
10+ years of residency in Canada	
Born in Canada	
<b>3-level variable</b>	
0-9 years of residency in Canada	
10+ years of residency in Canada	
Born in Canada	
<b>Ethnicity</b>	
<b>6-level variable</b>	
White	
Black	
East and Southeast Asian	Filipino, Japanese, Korean, Chinese, Southeast Asian
West and South Asian or Arab	South Asian, Arab, and West Asian
Other	Latin American, other racial or cultural origins, multiple racial origins
Aboriginal people	North American Indian, Métis or Inuit
<b>Knowledge of official languages</b>	
English only	
French only	
English and French only	
English or French with other languages	
Neither English nor French	
<b>Rural/urban residence</b>	
Urban	Urban core; Urban fringe; Urban area outside CMAs and CAs Secondary urban core
Rural	Missing; Rural fringe inside CMAs and CAs; Rural fringe outside CMAs and CAs

## 2B. Datasets—Administrative Data

### Landed Immigrant Data System (LIDS)

The LIDS, which is maintained by Citizenship and Immigration Canada, contains landing records on every landed immigrant to Canada since 1985. Information is collected from all individuals at the time of application for immigration. This database includes information on education level, intended occupation, language ability, immigration “class” (i.e., refugee, family, business, etc.), as well as name, sex, and date of birth.

### Ontario Diabetes Database (ODD)

The ODD employs a validated algorithm to identify people with diabetes using data on hospitalizations and physician visits. Hospital discharge abstracts, collected by the Canadian Institute for Health Information (CIHI) from April 1988 onwards were used to identify Ontarians with a valid health card number who had been hospitalized with a new or pre-existing diagnosis of diabetes, based on a specific code (ICD-9 code: 250.x; ICD10 code: any of E10, E11, E13, E14) in any diagnostic field. Physician claim records held by the Ontario Health Insurance Plan (OHIP) from July 1991 onwards were also used to identify individuals with visits to a physician for diabetes (diagnostic code 250). When there was a hospital record with a diagnosis of pregnancy care or delivery (ICD-9 code: 641-676, V27; ICD10 code: O10-O16; O21-O95, O98, O99, Z37) close to a diabetic record (i.e., diabetic record date between 120 days before and 180 days after a gestational admission date), the diabetic record was considered to be for gestational diabetes and was excluded. Individuals were considered to have diabetes if they had at least one hospitalization or two physician service claims over a two-year period. People enter the ODD as incident cases when they are defined as having diabetes (i.e., the first of CIHI admission date or OHIP service date over the two-year period as incident date). The database contains an encrypted patient identifier that can be linked to hospital discharge abstracts from CIHI, physician claims from OHIP, and demographic information from the Registered Persons Database (RPDB).

An analysis by Hux and colleagues reported that the current algorithm had a sensitivity of 86 percent and a specificity of 97 percent for identifying diabetes in the population. The positive predictive value of the algorithm was 80 percent.<sup>296</sup>

### Ontario Health Insurance Plan (OHIP)

The OHIP claims database covers all reimbursement claims to the Ontario Ministry of Health and Long-Term Care made by fee-for-service physicians, community-based laboratories and radiology facilities. The OHIP database at the Institute for Clinical Evaluative Sciences (ICES) contains encrypted patient and physician identifiers, codes for services provided, date of service, the associated diagnosis, and fee paid. Services which are missing from the OHIP data include: some lab services; services received in provincial psychiatric hospitals; services provided by health service organizations and other alternate providers; diagnostic procedures performed on an inpatient basis; and lab services performed at hospitals (both inpatient and same day). Also excluded is remuneration to physicians through alternate funding plans. Their concentration in certain specialties or geographic areas could distort analyses.

### Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD)

The CIHI-DAD is a database of information abstracted from hospital records. It includes patient-level data for acute- and chronic care hospitals, rehabilitation hospitals, and day surgery clinics in Ontario. The main data elements of the CIHI-DAD database are encrypted patient identifier, patient demographics (age, sex, and geographic location), diagnoses, procedures, and administrative information (institution number, admission category, length of stay).

### Registered Persons Database (RPDB)

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex,

address, date of death (where applicable), and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address are removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data from the RPDB are enhanced with available information through other administrative data sources at ICES; however, even the enhanced dataset overestimates the number of people living in Ontario for several reasons, including the source of death information and record linkage issues. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. As such, the RPDB will underestimate mortality.<sup>324</sup> To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada. The adjusted dataset was used to determine population denominators.

### **Ontario Cancer Registry (OCR)**

The OCR database includes all Ontario residents who have been diagnosed with cancer or have died from cancer. The OCR collects data from four major sources including: hospital discharge summaries with a diagnosis of cancer; pathology reports that identify cancer; records of patients from regional cancer centres or Princess Margaret Hospital; and/or death certificates that identify cancer as the underlying cause of death. Records are verified and the data are summarized into case records including several variables such as incident site, age at diagnosis, and residence at diagnosis. The Ontario Cancer Incidence Database is updated annually, although there is a two-year lag period before the data become available for analysis.

### **ICES Mother-Baby (MOMBABY) Linked Database**

The MOMBABY dataset is a cumulative database created by linking the CIHI-DAD inpatient admission records of delivering mothers to those of their newborns. The linking algorithm uses information from

the charts of the mother and the infant including: maternal and newborn chart numbers, institution numbers, postal code, admission/discharge dates, and procedure codes. The database includes additional information on maternal gestational age at admission and at delivery, newborn gestational age (in weeks) at delivery, and flags that identify multiple births and still births.

## **3. Analysis and Regional and Socioeconomic Variables**

### **Analysis**

For survey data (CCHS), analyses were conducted at the provincial level, first by sex and then by annual household income, educational attainment, age group, race/ethnicity, time since immigration, rural/urban residence, and LHIN. Where possible, relative rates were calculated for women-to-men, lowest-to-highest income groups, lowest-to-highest education level, and rural-to-urban residence. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. Depending on the indicator and its purpose, we reported crude or age-adjusted rates. When age-adjusted rates were reported, we used indirect standardization, which compares the age-specific rates to the standard population average for that age group. For the new indicators reported in this chapter (employment, unemployment, permanently unable to work, and full-time employment), the standard population was adults aged 25 and older in the CCHS 2007 and 2008 datasets. The lone-parent family indicator could not be age-standardized, as the unit of analysis was the family and therefore age data was not available. For information on age-standardization of indicators reported in previous POWER Study chapters, please see the Appendix "How the Research Was Done" in the previous POWER Study chapters. The age-standardized rates will differ from the crude rates, in a way that reflects: (i) how the indicator varies by age and (ii) how the strata differ by age. The observed over the expected rate tells us how a particular stratum compares to the overall population and the relative rate

tells us how a specific stratum compares to another (i.e., women versus men or low versus high income).

For administrative data, analyses were conducted at the provincial level, first by sex and then by neighbourhood income quintile, age group, and LHIN. Analyses at the LHIN level were stratified by sex. For indicators based on administrative data, indirect age-standardization was applied. Where numbers were too small, results were either not reported or were aggregated. Where possible, relative rates were calculated for women-to-men and lowest-to-highest-income groups. Ninety-five percent confidence intervals were calculated for all rates and rate comparisons. Although many indicators throughout this chapter are based on administrative data, we have not reported any newly analyzed indicators derived from administrative data. For more information on analyses used for previously reported POWER Study indicators, see the relevant POWER Study chapter.

Three previously published indicators were reported in the section on immigrant and minority populations: prevalence of diabetes, cervical cancer screening, and preterm births. These indicators were assessed by linking data from the LIDS and administrative health care databases. Because these indicators were not analyzed specifically for the POWER Study, the statistical methods and stratifications used are different from those described in the above paragraph. For detailed information on the statistical analyses used for these indicators, please see the original publications.<sup>297, 305, 311</sup>

### Neighbourhood Income Quintile

Average neighbourhood income is calculated by Statistics Canada and is updated every five years when new Census data become available. Income was calculated using the neighbourhood income per person equivalent (IPPE), which is a household size adjusted measure of household income based on either 2001 or 2006 census summary data at the dissemination area level and using person-equivalents implied by the 2001

or 2006 low income cut-offs. Average income estimates were calculated by dissemination area. Ontario neighbourhoods are classified into one of five approximately equal-sized groups (quintiles), ranked from poorest (Q1) to wealthiest (Q5). These income quintiles are used as a proxy for overall socioeconomic status, which has been shown to be related to population health status and levels of health care utilization. Individual geographic information from ICES databases was used to define the best known postal code for each person on July 1st of each year (available from 1991 to 2004). Postal codes were then used to assign people to enumerations areas or dissemination areas (using the Statistics Canada Postal Code Conversion File) and thus to one of the income quintiles. Two-level income data compare people from the first two income quintiles (Q1, Q2) against people from the remaining three quintiles (Q3, Q4, Q5). Enumeration areas and dissemination areas are small adjacent geographic areas, designated for collection of census data. Dissemination areas replaced enumeration areas in 2001 and have a population of 400–700 people.

### Location of Residence (Urban Versus Rural)

In the administrative data, rural/urban residency was assigned based on a Statistics Canada derived variable. Urban areas are those continuously built-up areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts. Areas are designated as rural, urban core, urban fringe, urban area outside CMAs and CAs, secondary urban code, and mix or urban/rural areas. This variable is further dichotomized into rural and urban location by Statistics Canada.

### Patients' Residence

For all analyses presented in the report, the definition of LHIN was based on the residence of the patient rather than where they received care.

## 4. Indicators

### Employment, unemployment, and permanently unable to work

Data from the Canadian Community Health Survey (CCHS), 2007–2008 were used to measure employment and unemployment rates, as well as the proportion of the population who reported being permanently unable to work. All survey participants were asked “Last week, did you work at a job or a business?” with the response options of “yes,” “no,” or “permanently unable to work.” If respondents reported that they did not work last week, they were asked “Last week, did you have a job or business from which you were absent?” Those who did not have a job last week were asked, “In the past four weeks, did you do anything to find work?”

The *employment rate* measures the percentage of the entire population aged 25–75 who reported having a job last week (i.e., those who worked and those who did not work but had a job or business). This indicator includes part-time jobs, seasonal work, contract work, self-employment, baby-sitting, and any other paid work, regardless of the number of hours worked. The *unemployment rate* measures the percentage of the labour force (those who were employed in the last week and those who were unemployed but looking for work) aged 25–75 who reported that they did not have a job last week but had looked for work in the past four weeks. We also calculated the percentage of all survey participants who reported that they were *permanently unable to work*. Although reasons for being unable to work were not specified, these reasons would include physical and mental illnesses and disability. Crude and age-adjusted rates and the associated 95 percent confidence intervals were calculated for these indicators.

### Full-time employment

Data from the CCHS, 2007–2008 were used to measure the percentage of employed adults aged 25–75 who reported that they usually work full-time (30 hours or more per week). All employed adults (see description of employment rate for definition of “employed”) were

asked how many hours a week they usually work, including any extra hours that they usually work (paid or unpaid). If they had more than one job, hours from all jobs were included. Crude and age-adjusted rates and the associated 95 percent confidence intervals were calculated.

### Lone-parent families

Data from the CCHS, 2007–2008 were used to measure the percentage of economic families including parents and children under age 25 that were lone-parent families. Economic families include a group of two or more people who live in the same dwelling and are related to each other by blood, marriage, common-law, or adoption. A couple could be of opposite or same sex. In the denominator, we included all economic families including couples or lone parents with at least one child under age 25, regardless of whether other people lived in the household. Crude rates and the associated 95 percent confidence intervals were calculated.

### Prevalence of diabetes

The number of people in Ontario with physician-diagnosed diabetes as of March 31, 2005 was established using the Ontario Diabetes Database (ODD), a population-based disease registry based on a validated algorithm that uses Ontario health care databases. Women with gestational diabetes were excluded (see the above description of the ODD for more detail). In order to report the prevalence of diabetes among immigrants, the Registered Persons Database (RPDB) was linked to the LIDS.

Using this linked data, all adults aged 20 and older who were eligible for the Ontario Health Insurance Plan (OHIP) on March 31, 2005 were included in the analyses if they had a valid health card number and their date of birth was available. Because the majority of immigrants settle in urban areas, people with rural residential postal codes were excluded. Crude and age-standardized rates along with 95 percent confidence intervals were calculated.

Rates were adjusted using direct age-standardization to the 1991 Canada Census population. Logistic regression was used to identify and quantify risk factors for diabetes among the urban-dwelling, immigrant population.

The prevalence of diabetes is reported among “identified immigrants” and “long-term residents of Canada.” “Identified immigrants” refers to people identified through the LIDS as having obtained permanent resident status and settled in Ontario between 1985 and 2000. “Long-term residents” include all other individuals who were eligible for OHIP, including Canadian-born women and men and immigrants who arrived before 1985. Note that the LIDS does not identify all immigrants (i.e., those who became permanent residents before 1985 or after 2000; those who declared they intended to move to another province but then moved to Ontario; those whose data could not be linked to OHIP) and non-identified immigrants may have been included in the “long-term residents” category. In order to avoid misclassification of immigrant status, people who first registered for OHIP after 1991—and therefore may have been new immigrants—were excluded from the “long-term residents” category (OHIP registration data is not available prior to 1991). Estimates of diabetes prevalence reported in this chapter differ somewhat from prior POWER Study chapters due to differences in data source and year of data. Further detail of the methods used to create this indicator have been previously published.<sup>297</sup>

### Cervical cancer screening

The percentage of screen-eligible women living in urban areas who had at least one Papanicolaou (Pap) test in a three-year period was calculated using data from several linked databases, including the LIDS. Women living in Ontario were included in this analysis if: 1) they were alive and eligible for OHIP between January 1, 2006 and December 31, 2008; 2) they were aged 18–66 for the entire study period; 3) their most recent postal code was in a census metropolitan area. In order to focus on Pap testing for screening purposes, this indicator excluded women who had a high likelihood of testing for diagnostic purposes (i.e., with a history of gynecological cancer or colposcopy) and women who were ineligible for cervical cancer screening (women

with a history of total hysterectomy or documented ineligibility (tracking code Q140A)). In order to determine if women had been appropriately screened, a previously validated algorithm was employed, which included all procedural and laboratory codes used to bill for performing or interpreting a Pap test.<sup>304</sup>

Based on immigration status, we report rates of appropriate cervical cancer screening among three groups of screen-eligible women. Using data from the LIDS, women who obtained permanent resident status and settled in Ontario between 1985 and 2000 were categorized as “identified immigrants.” Because the LIDS does not include all immigrants (i.e., those who became permanent resident after 2000 or who declared they intended to move to another province but then moved to Ontario), a second group was defined to capture women who were not in the LIDS but had first registered for OHIP after April 1, 1993. In addition to new immigrants to Canada, this group includes Canadian-born people who migrated to Ontario from another province. The third group includes all other women who were eligible for OHIP from 2006–2008, consisting of Canadian-born women and long-term immigrants (who arrived before 1985).

In addition to crude rates of appropriate cervical cancer screening, multivariate Poisson regression was used to examine the relationship between rates of screening and world region of birth. This model adjusted for age; neighbourhood income quintile; whether the woman lived in a small urban versus large urban setting; for the younger age group, whether the woman had a major prenatal visit in 2006–2008; the Johns Hopkins Resource Utilization Bands (RUBs) (to categorize women based on their expected use of health care resources) and Aggregated Diagnosis Groups (ADGs) (to categorize women based on their level of co-morbidity); and whether the woman was enrolled in a primary care enrolment model that provided financial incentives for cervical cancer screening as of July 1, 2007. Further detail of the methods used this indicator have been previously published.<sup>305</sup>



### Preterm births

The rate of preterm births in Ontario was calculated using data from several linked databases, including the LIDS. All singleton live births delivered between April 1, 2002 and March 31, 2007 to mothers with a valid Ontario health card number and living in a census metropolitan area at the time of delivery were included. Infants were excluded if: 1) their birth weight was less than 500 gram or more than 6000 grams (due to the high likelihood that these were data errors); 2) gestational age was less than 22 weeks or more than 43 weeks; or 3) the mother's immigration class at arrival was "other." Infants were also excluded if there was missing information for infant sex, parity, maternal age, maternal sociodemographic, and immigration characteristics; infants were excluded if census information could not be assigned. Preterm births were defined as a delivery before 37 weeks of gestation completed. Since April 2002, hospital records in Ontario have recorded gestational age based on the attending physician's best interpretation of clinical data, backed up by documentation from nursing staff as a secondary source.<sup>325</sup> Crude and risk-adjusted rates and their associated 95% confidence intervals were calculated. Risk-adjustments were made for maternal age at delivery and parity at delivery.

Rates of preterm birth were reported among "identified immigrants" and "long-term residents." "Identified immigrants" refers to women identified through the LIDS as having obtained permanent resident status and settled in Ontario between 1985 and 2000. "Long-term residents" include all other women who were eligible for OHIP, including Canadian-born women and immigrants who arrived before 1985. Note that the LIDS does not identify all immigrants (i.e., those who became permanent residents after 2000; those who declared they intended to move to another province but then moved to Ontario; those whose data could not be linked to OHIP) and non-identified immigrants may have been included in the "long-term residents" category. In order to avoid classifying recent immigrant (i.e., those arriving after 2000) in the "long-term resident" category, all women who first registered for OHIP after March 31, 2001 (to account for the three month waiting period for OHIP) were excluded from the analyses. Further detail of the methods used this indicator have been previously published.<sup>311</sup>





## REFERENCE LIST

- (1) Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization, 2008.
- (2) Mikkonen J, Raphael D. Social determinants of health: the Canadian facts. Toronto: York University School of Health Policy and Management, 2010.
- (3) National Collaborating Centre for Determinants of Health. Integrating social determinants of health and health equity into Canadian public health practice: environmental scan 2010. Antigonish: St. Francis Xavier University, 2010.
- (4) Raphael D. Escaping from the phantom zone: social determinants of health, public health units and public policy in Canada. *Health Promo Int* 2009;24(2):193-198.
- (5) World Health Organization. Poverty and social determinants. Accessed Feb 16, 2012 at: <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/urban-health/activities/poverty-and-social-determinants>, 2011.
- (6) Closing the gap: policy into practice on social determinants of health. A discussion paper. World Conference on Social Determinants of Health; October 19-21, 2011; Rio de Janeiro.
- (7) Marmot M, Allen J, Goldblatt P, Boyce T, McNeish D, Grady M, et al. Fair society, healthy lives: The Marmot Review. London, UK: University College London, 2010.
- (8) Clark JP, Bierman AS. The POWER Study Framework. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (9) Belanger A, Martel L, Berthelot JM, Wilkins R. Gender differences in disability-free life expectancy for selected risk factors and chronic conditions in Canada. *J Women Aging* 2002;14(1-2):61-83.
- (10) Bierman AS. Equity and women's health, measuring health inequalities among Canadian women: developing a basket of indicators. Ottawa: Report to Health Canada, 2007.
- (11) Bierman AS, Clancy CM. Health disparities among older women: identifying opportunities to improve quality of care and functional health outcomes. *J Am Med Womens Assoc* 2001;56(4):155-9, 188.
- (12) Health Canada. Economic burden of illness in Canada, 1998. Ottawa: Health Canada, 2002.
- (13) Katzmarzyk PT, Gledhill N, Shephard RJ. The economic burden of physical inactivity in Canada. *CMAJ* 2000;163(11):1435-40.
- (14) Mullings L, Schulz AJ. Gender, race, class, and health: an intersectional approach. San Francisco: John Wiley & Sons, Inc., 2006.
- (15) Adamson J, Ben-Shlomo Y, Chaturvedi N, Donovan J. Ethnicity, socio-economic position and gender - do they affect reported health-care seeking behaviour? *Soc Sci Med* 2003;57(5):895-904.
- (16) Kobayashi KM. Do intersections of diversity matter? An exploration of the relationship between identity markers and health for mid- to later-life Canadians. *Can Ethnic Stud* 2003;35(3):85.
- (17) Malmusi D, Borrell C, Benach J. Migration-related health inequalities: showing the complex interactions between gender, social class and place of origin. *Soc Sci Med* 2010;71(9):1610-1619.
- (18) Veenstra G. Race, gender, class, and sexual orientation: intersecting axes of inequality and self-rated health in Canada. *Int J Equity Health* 2011;10.
- (19) Vissandjee B, Hyman I, Spitzer DL, Apale A, Kamrun N. Integration, clarification, substantiation: sex, gender, ethnicity and migration as social determinants of women's health. *J of Int Women's Stud* 2007;8(4):32-48.
- (20) Wamala S, Ahnquist J, Mansdotter A. How do gender, class and ethnicity interact to determine health status? *J Gender Stud* 2009;18(2):115-129.
- (21) Hankivsky O, De Leeuw S, Lee J, Vissandjee B, Khanlou N. Introduction: purpose, overview, and contribution. In: O. Hankivsky et al., editor. Health inequities in Canada: intersectional frameworks and practices. Vancouver: UBC Press, 2011.
- (22) Bierman AS, Dunn JR. Swimming upstream. Access, health outcomes, and the social determinants of health. *J Gen Intern Med* 2006;21(1):99-100.

- (23) Marmot M. Social determinants of health inequalities. *Lancet* 2005;365(9464):1099-1104.
- (24) Raphael D, editor. Social determinants of health Canadian perspectives, 2nd edition. Toronto: Canadian Scholars' Press Inc., 2009.
- (25) World Health Organization. World conference on social determinants of health. Accessed Dec 23, 2011 at <http://www.who.int/sdhconference/declaration/en/>, 2011.
- (26) Bierman AS. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto, 2009/10.
- (27) Bierman AS. Project for an Ontario Women's Health Evidence-Based Report: Volume 2. Toronto, 2010-12.
- (28) Raphael D. Addressing the social determinants of health in Canada: bridging the gap between research findings and public policy. *Policy Options* 2003;March 2003:35-40.
- (29) Wilkins R, Tjepkema CM, Choinière R. The Canadian census mortality follow-up study, 1991 through 2001. *Health Reports: Statistics Canada*, 2008.
- (30) Colman R. A profile of women's health indicators in Canada. Prepared for the Women's Health Bureau, Health Canada. Halifax: GPI Atlantic, 2003.
- (31) Ross CE, Chia-Ling W. The links between education and health. *Am Sociol Rev* 1995;60(5):719-745.
- (32) Mirowsky J, Ross CE. Education, personal control, lifestyle and health: a human capital hypothesis. *Res Aging* 1998;20(4):415-449.
- (33) Chandola T, Clarke P, Morris JN, Blane D. Pathways between education and health: a causal modelling approach. *J Roy Stat Soc A Sta* 2006;169(2):337-359.
- (34) Robert Wood Johnson Foundation. Stress and health. Issue brief series: exploring the social determinants of health. Princeton: Robert Wood Johnson Foundation, March 2011.
- (35) Seeman TE, McEwen BS, Rowe JW, Singer BH. Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *P Natl Acad Sci Usa* 2001;98(8):4770-4775.
- (36) Seeman TE, Crimmins E, Huang MH, Singer B, Bucur A, Gruenewald T, et al. Cumulative biological risk and socio-economic differences in mortality: MacArthur studies of successful aging. *Soc Sci Med* 2004;58(10):1985-1997.
- (37) World Health Organization. Women and health: today's evidence, tomorrow's agenda. Accessed Jan 16, 2011 at [http://www.who.int/gender/women\\_health\\_report/en/index.html](http://www.who.int/gender/women_health_report/en/index.html), 2009.
- (38) World Health Organization. Mental health: strengthening our response. Fact sheet #220. Accessed Jan 16, 2011 at <http://www.who.int/mediacentre/factsheets/fs220/en/>, 2010.
- (39) Ferraro V. Paid work. In *Women in Canada: a gender-based statistical report, 2010-2011*. 6 ed. Ottawa: Statistics Canada, December 2010.
- (40) Neises G, Grüneberg C. Socioeconomic situation and health outcomes of single parents. *J of Public Health* 2005;13(5):270-278.
- (41) Williams C. Economic well-being. In *Women in Canada: a gender-based statistical report, 2010-2011*. 6 ed. Ottawa: Statistics Canada, December 2010.
- (42) Lindsay C. Are women spending more time on unpaid domestic work than men in Canada? *Matter of Fact: Statistics Canada*, September 2008.
- (43) Berntsson L, Lundberg U, Krantz G. Gender differences in work-home interplay and symptom perception among Swedish white-collar employees. *J Epidemiol Community Health* 2006;60(12):1070-1076.
- (44) Block S. Ontario's growing gap: the role of race and gender. Ottawa: Canadian Centre for Policy Alternatives 2010.
- (45) Block S, Galabuzi G-E. Canada's colour coded labour market-the gap for racialized workers. Ottawa: Canadian Centre for Policy Alternatives and The Wellesley Institute, 2011:1-20.
- (46) Paradies Y. A systematic review of empirical research on self-reported racism and health. *Int J Epidemiol* 2006;35(4):888-901.
- (47) Pascoe EA, Richman LS. Perceived discrimination and health: a meta-analytic review. *Psychol Bull* 2009;135(4):531-554.

- (48) Hyman I. Racism as a determinant of immigrant health: Public Health Agency of Canada, 2009:1-19.
- (49) De Maio FG, Kemp E. The deterioration of health status among immigrants to Canada. *Glob Public Health* 2010;5(5):462-478.
- (50) Wayland SV. Unsettled: legal and policy barriers for newcomers to Canada. Ottawa: Community Foundations of Canada (CFC) and the Law Commission of Canada (LCC), 2006.
- (51) Yalnizyan A. Ontario's growing gap: time for leadership. Toronto: Canadian Centre for Policy Alternatives, 2007.
- (52) Yalnizyan A. The rise of Canada's richest 1%. Toronto: Canadian Centre for Policy Alternatives, 2010.
- (53) Organization for Economic Co-operation and Development. OECD.StatExtracts. Accessed Jun 28, 2011 at [http://stats.oecd.org/Index.aspx?DatasetCode=SNA\\_TABLE1](http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1).
- (54) Lee M. Eroding tax fairness: tax incidence in Canada, 1990 to 2005. Toronto: Canadian Centre for Policy Alternatives, 2007.
- (55) Organization for Economic Co-operation and Development. Growing unequal? Income distribution and poverty in OECD countries. Paris: Organization for Economic Co-operation and Development, 2008.
- (56) Williams DR, Costa MV, Odunlami AO, Mohammed SA. Moving upstream: how interventions that address the social determinants of health can improve health and reduce disparities. *J Public Health Manag Pract* 2008; 14 Suppl.
- (57) Munro D. Healthy people, healthy performance, healthy profits: the case for business action on the socio-economic determinants of health. Ottawa: The Conference Board of Canada, 2008.
- (58) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C, et al. Burden of illness In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report. Toronto, 2009.
- (59) Benzeval M. The self-reported health status of lone parents. *Soc Sci Med* 1998;46(10):1337-1353.
- (60) Broussard CA. Research regarding low-income single mothers' mental and physical health: a decade in review. *J Pov* 2010;14(4):443-451.
- (61) Cairney J, Boyle M, Offord DR, Racine Y. Stress, social support and depression in single and married mothers. *Soc Psych Psych Epid* 2003;38(8):442-449.
- (62) Eamon MK, Wu CF. Effects of unemployment and underemployment on material hardship in single-mother families. *Child Youth Serv Rev* 2011;33(2):233-241.
- (63) Westin M, Westerling R. Social capital and inequality in health between single and couple parents in Sweden. *Scand J Public Health* 2007;35(6):609-617.
- (64) Young LE, Cunningham SL, Buist DS. Lone mothers are at higher risk for cardiovascular disease compared with partnered mothers. Data from the National Health and Nutrition Examination Survey III (NHANES III). *Health Care Women Int* 2005;26(7):604-621.
- (65) Wellesley Institute. Precarious housing in Canada 2010. Accessed Jan 16, 2012 at <http://www.wellesleyinstitute.com/wp-content/uploads/2011/11/povertyismakingussick.pdf> 2010.
- (66) Raphael D. About Canada: health and illness. Toronto: Fernwood Publishing, 2010.
- (67) Rootman I. Health literacy: where are the Canadian doctors? *Can Med Assoc J* 2006;175(6):606.
- (68) Crooks VC, Lubben J, Petitti DB, Little D, Chiu V. Social network, cognitive function, and dementia incidence among elderly women. *Am J Public Health* 2008;98(7):1221-1227.
- (69) Nordenmark M, Strandh M. Towards a sociological understanding of mental well-being among the unemployed: the role of economic and psychosocial factors. *Sociology* 1999;33(3):577-597.
- (70) Jahoda M. Employment and unemployment: A social-psychological analysis: Cambridge University Press 1982.
- (71) Employment Conditions Knowledge Network. Employment conditions and health inequities final report to the WHO Commission on Social Determinants of Health. Geneva: World Health Organization, 2007.

- (72) Marmot MG, Bosma H, Hemingway H, Brunner E, Stansfeld S. Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 1997;350(9073):235-239.
- (73) Kivimäki M, Leino-Arjas P, Luukkonen R, Riihimäki H, Vahtera J, Kirjonen J. Work stress and risk of cardiovascular mortality: prospective cohort study of industrial employees. *Brit Med J* 2002;325(7369):857.
- (74) Vosko L. Precarious employment: understanding labour market insecurity in Canada. Montreal and Kingston: McGill Queens University Press, 2005.
- (75) World Health Organization. Labour market changes and job insecurity: a challenge for social welfare and health promotion. In: Ferrie JE, Marmot M, Griffiths J, Ziglio E, editors. WHO Regional Publications/European Series, No. 81. Denmark: World Health Organization, 1999.
- (76) LaRochelle-Côté S, Dionne C. International differences in low-paid work. Ottawa: Statistics Canada, 2009.
- (77) Canadian Labour Congress. Recession watch bulletin. Issue 4. Accessed Dec 23, 2011 at [http://beta.images.theglobeandmail.com/archive/01028/CLC\\_on\\_Canadian\\_em\\_1028026a.pdf](http://beta.images.theglobeandmail.com/archive/01028/CLC_on_Canadian_em_1028026a.pdf) 2010.
- (78) Federal Labour Standards Review. Fairness at work: federal labour standards for the 21st century. Gatineau: Federal Labour Standards Review, 2006.
- (79) Food and Agriculture Organization of the United Nations. Rome Declaration on World Food Security and World Food Summit Plan of Action. World Food Summit. Rome: United Nations, 1996.
- (80) Food Banks Canada. Hunger count 2010. Accessed Dec 23, 2011 at [http://www.newswire.ca/en/releases/mmnr/smr/PDF/HungerCount%202010\\_FINAL\\_ENG.pdf](http://www.newswire.ca/en/releases/mmnr/smr/PDF/HungerCount%202010_FINAL_ENG.pdf), 2010.
- (81) Lewis R. 2006 Census housing series: issue 3. The adequacy, suitability, and affordability of Canadian housing, 1991-2006. Research Highlight. Ottawa: Canada Mortgage and Housing Corporation, 2009.
- (82) UN Human Rights Council. Report of the special rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context. Accessed Nov 1, 2011 at <http://www.unhcr.org/refworld/docid/49a54f4a2.html>, 2009.
- (83) Statistics Canada. Aboriginal people's survey 2001: initial findings: well-being of the non-reserve Aboriginal population. Ottawa: Statistics Canada, 2003.
- (84) Shaw M. Housing and public health. *Annu Rev Public Health* 2004;25:397-418.
- (85) Canadian Tuberculosis Committee. Canada communicable disease report: an Advisory Committee Statement. Housing conditions that serve as risk factors for tuberculosis infection and disease. Ottawa: Public Health Agency of Canada, 2007.
- (86) Cheung AM, Hwang SW. Risk of death among homeless women: a cohort study and review of the literature. *Can Med Assoc J* 2004;170(8):1243-7.
- (87) Ludwig J, Sanbonmatsu L, Gennetian L, Adam E, Duncan GJ, Katz LF, et al. Neighborhoods, obesity, and diabetes: a randomized social experiment. *N England J Med*;365(16):1509-1519.
- (88) Faelker T, Pickett W, Brison RJ. Socioeconomic differences in childhood injury: a population based epidemiologic study in Ontario, Canada. *Inj Prev* 2000;6(3):203-8.
- (89) Auchincloss AH, Diez Roux AV, Brown DG, Erdmann CA, Bertoni AG. Neighborhood resources for physical activity and healthy foods and their association with insulin resistance. *Epidemiology* 2008;19(1):146-157.
- (90) Auchincloss AH, Diez Roux AV, Mujahid MS, Shen M, Bertoni AG, Carnethon MR. Neighborhood resources for physical activity and healthy foods and incidence of type 2 diabetes mellitus: the multi-ethnic study of atherosclerosis. *Arch Int Med* 2009;169(18):1698-1704.
- (91) Frank LD, Andresen MA, Schmid TL. Obesity relationships with community design, physical activity, and time spent in cars. *Am J Prev Med* 2004;27(2):87-96.
- (92) Feng J, Glass TA, Curriero FC, Stewart WF, Schwartz BS. The built environment and obesity: a systematic review of the epidemiologic evidence. *Health and Place* 2010;16(2):175-190.
- (93) Glazier RH, Booth GL, Gozdyra P, Creatore MI, Tynan M, editors. Neighbourhood environments and resources for healthy living—a focus on diabetes in Toronto: ICES atlas. Toronto: Institute for Clinical Evaluative Sciences, 2007.

- (94) Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol* 2001;30(4):668-77.
- (95) Williams D. Race, socioeconomic status, and health. The added effects of racism and discrimination. *Ann NY Acad Sci* 1999;896:173-188.
- (96) Williams DR, Neighbors HW, Jackson JS. Racial/ethnic discrimination and health: findings from community studies. *Am J Public Health* 2003;93(2):200-8.
- (97) Galabuzi GE. Canada's economic apartheid: the social exclusion of racialized groups in the new century. Toronto: Canadian Scholars Press., 2005.
- (98) Statistics Canada. The changing profile of Canada's labour force. 2001 Census Analysis Series. Ottawa: Statistics Canada, 2003.
- (99) Clark SC. Work-family border theory: a new theory of work-family balance. *Hum Relat* 2000;53(6):747-770.
- (100) Emslie C, Hunt K. 'Live to work' or 'work to live'? A qualitative study of gender and work-life balance among men and women in mid-life. *Gend Work Organ* 2009;16(1):151-172.
- (101) Burke RJ. Work and family integration. *Equal Opp Int* 2004;23(1-2):1-5.
- (102) Anderson DM, Birkeland K, Giddings L. Employee opinion on work-family benefits: evidence from the US. *NZ J Emp Rel* 2010;34(3):26-41.
- (103) Costa G, Sartori S, Akerstedt T. Influence of flexibility and variability of working hours on health and well-being. *Chronobiol Int* 2006;23(6):1125-1137.
- (104) McDonald P, Brown K, Bradley L. Explanations for the provision utilisation gap in work-life policy. *Wom in Management Rev* 2005;20(1):37-55.
- (105) Gallie D. Work pressure in Europe 1996-2001: trends and determinants. *Br J Ind Relat* 2005;43(3):351-375.
- (106) Esping-Andersen G. Social Foundations of Postindustrial Economies. Oxford: Oxford University Press, 1999.
- (107) Gregory A, Milner S. Work-life balance: a matter of choice? *Gend Work Organ* 2009;16(1):1-13.
- (108) Barrera M. Distinctions between social support concepts, measures, and models. *Am J Community Psychol* 1986;14(4):413-445.
- (109) Berkman LF, Syme SL. Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. *Am J Epidemiol* 1979;109(2):186-204.
- (110) Uchino BN. Social support and health: a review of physiological processes potentially underlying links to disease outcomes. *J Behav Med* 2006;29(4):377-87.
- (111) Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol* 2000;68(5):748-66.
- (112) Lakey B, Cronin A. Low social support and major depression: research, theory and methodological issues. Risk factors in depression. Burlington: Elsevier, 2008:385-408.
- (113) Putnam R. Bowling alone: the collapse and revival of the American community. New York: Simon and Schuster, 2000.
- (114) Lin N, Cook K, Burt RS, editors. Building a network theory of social capital. New York: Aldine de Gruyter, 2003.
- (115) Schneiderman N, Ironson G, Siegel SD. Stress and health: psychological, behavioral, and biological determinants. *Annu Rev Clin Psychol* 2005;1:607-628.
- (116) Brunner EJ, Hemingway H, Walker BR, Page M, Clarke P, Juneja M, et al. Adrenocortical, autonomic, and inflammatory causes of the metabolic syndrome: nested case-control study. *Circulation* 2002;106(21):2659-65.
- (117) Shonkoff JP, Phillips DA, editors. From neurons to neighborhoods: the science of early childhood development Washington: National Academy Press, 2000.
- (118) Chandola T, Brunner E, Marmot M. Chronic stress at work and the metabolic syndrome: prospective study. *Brit Med J* 2006;332(7540):521-5.
- (119) Brunner E. Socioeconomic determinants of health: stress and the biology of inequality. *Brit Med J* 1997;314(1472).
- (120) James PD, Wilkins R, Detsky AS, Tugwell P, Manuel DG. Avoidable mortality by neighbourhood income in Canada: 25 years after the establishment of universal health insurance. *J Epidemiol Commun H* 2006;61(4):287-296.



- (121) Lightman E, Mitchell A, Wilson B. Poverty is making us sick: a comprehensive survey of income and health in Canada: Community Social Development Council of Toronto, the University of Toronto's Social Assistance in the New Economy Project and the Wellesley Institute, December 2008.
- (122) McIntosh CN, Finès P, Wilkins R, Wolfson MC. Income disparities in health adjusted life expectancy for Canadian adults, 1991 to 2001. *Health Rep* 2009;20(4).
- (123) Kennedy BP, Kawachi I, Glass R, Prothrow-Stith D. Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis. *Brit Med J* 1998;317(7163):917-921.
- (124) Kondo N, Sembajwe G, Kawachi I, van Dam RM, Subramanian SV, Yamagata Z. Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. *Brit Med J* 2009;339(7731):1178-1181.
- (125) Statistics Canada. Income in Canada 2007. Ottawa: Statistics Canada, 2009.
- (126) Canadian Council on Learning. Health literacy in Canada: a healthy understanding 2008. Ottawa, 2008.
- (127) Statistics Canada. The Canadian labour market at a glance: Statistics Canada, Labour Statistics Division, 2007.
- (128) Abramson Z. Masked symptoms: mid-life women, health, and work. *Can J Aging* 2007;26(4):295-303.
- (129) Bildt C, Michelsen H. Gender differences in the effects from working conditions on mental health: a 4-year follow-up. *Int Arch Occup Environ Health* 2002;75(4):252-258.
- (130) Burke R, Richardson A. Work experiences, stress and health among managerial women: research and practice. In: Cooper C, Quick J, Schabracq M, editor. *International Handbook of Work and Health Psychology*. 3rd ed. West Sussex: Wiley-Blackwell, 2009:147-169.
- (131) Forssen A, Carlstedt G. Work, health and ill health. New research makes women's experiences visible. *Scand J Prim Health Care* 2001;19(3):154-7.
- (132) Pavalko EK, Gong F, Long JS. Women's work, cohort change, and health. *J Health Soc Behav* 2007;48(4):352-68.
- (133) Public Health Agency of Canada. Working conditions as a determinant of health. Accessed Dec 15, 2011 at [http://www.phac-aspc.gc.ca/ph-sp/oi-ar/05\\_working-eng.php](http://www.phac-aspc.gc.ca/ph-sp/oi-ar/05_working-eng.php), 2004.
- (134) Broadbridge A. Sacrificing personal or professional life? A gender perspective on the accounts of retail managers. *Int Rev Retail Distribution Consumer Res* 2009;19(3):289-311.
- (135) Denmark F, Novick K, Pinto A. Women, work, and family: mental health issues. *Ann NY Acad Sci* 1996;789:101-17.
- (136) Kushner KE. Meaning and action in employed mothers' health work. *J Fam Nurs* 2007;13(1):33-55.
- (137) Morris M. Gender-sensitive home and community care and caregiving research: a synthesis paper. Ottawa: Health Canada, 2001.
- (138) Jin RL, Shab CP, Svoboda TJ. The impact of unemployment on health: a review of the evidence. *Can Med Assoc J* 1995;153(5):529-540.
- (139) Paul KI, Moser K. Unemployment impairs mental health: meta-analyses. *J Vocat Behav* 2009;74(3):264-282.
- (140) Roelfs DJ, Shor E, Davidson KW, Schwartz JE. Losing life and livelihood: a systematic review and meta-analysis of unemployment and all-cause mortality. *Soc Sci Med* 2011.
- (141) Statistics Canada. CANSIM Table 109-5324. Accessed Dec 15, 2011 at <http://www5.statcan.gc.ca/cansim/a05?id=1095324&pattern=unemployment&stByVal=1&paSer=&lang=eng>, 2011.
- (142) Jiang Y, Hesser J. A comparison of depression and mental distress indicators, Rhode Island Behavioural Risk Factor Surveillance System, 2006. *Prev Chronic Dis* 2011;8(2).
- (143) Uppal S. Health and employment. *Perspect Lab Income* 2009;10(9):5-13.
- (144) Wilkins R. The effects of disability on labour force status in Australia. *Aust Econ Rev* 2004;37(4):359-382.
- (145) Wynne-Jones G, Dunn KM, Main CJ. The impact of low back pain on work: a study in primary care consultants. *Eur J Pain* 2008;12(2):180-188.

- (146) Canadian Institute for Health Information. Reducing gaps in health: a focus on socio-economic status in urban Canada. Ottawa: Canadian Institute for Health Information, 2008:1-171.
- (147) Canadian Institute for Health Information. Injury hospitalizations and socio-economic status. Ottawa: Canadian Institute for Health Information, 2010.
- (148) Elwan A. Poverty and disability: a survey of the literature. Washington: World Bank, 1999.
- (149) Human Resources and Skills Development Canada. Advancing the inclusion of people with disabilities 2009. Gatineau: Human Resources and Skills Development Canada, 2009.
- (150) Morissette R, Ostrovsky Y. Income instability of lone parents, singles and two-parent families in Canada, 1984 to 2004: Statistics Canada, 2007.
- (151) Raphael D. Poverty, human development, and health in Canada: research, practice, and advocacy dilemmas. Can J Nurs Res 2009;41(2):7-18.
- (152) Bierman AS, Angus J, Ahmad F, Degani N, Vahabi M, Glazier R, et al. Access to health care services. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009/10.
- (153) Canadian Institute for Health Information. Health indicators 2010 Ottawa: Canadian Institute for Health Information, 2010.
- (154) Doyle S, Kelly-Schwartz A, Schlossberg M, Stockard J. Active community environments and health: the relationship of walkable and safe communities to individual health. J Am Planning Assoc 2006;72:19-31.
- (155) Grow HM, Saelens BE, Kerr J, Durant NH, Norman GJ, Sallis JF. Where are youth active? Roles of proximity, active transport, and built environment. Med Sci Sports Exercise 2008;40(12):2071-2079.
- (156) Sirgy MJ, Comwell T. How neighbourhood features affect quality of life. Soc Indicators Res 2002;59:79-114.
- (157) Statistics Canada. Income in Canada 2009. Ottawa: Statistics Canada, 2011.
- (158) Dunn J, Dyck I. Social determinants of health in Canada's immigrant population: results from the National Population Health Survey. Soc Sci Med 2000;51(11):1573-1593.
- (159) Canadian Institute for Health Information. Hospitalization disparities by socio-economic status for males and females. Ottawa: Canadian Institute for Health Information, 2010.
- (160) McGrail KM, van Doorslaer E, Ross NA, Sanmartin C. Income-related health inequalities in Canada and the United States: a decomposition analysis. Am J Public Health 2009;99(10):1856-63.
- (161) Vafaei A, Rosenberg MW, Pickett W. Relationships between income inequality and health: a study on rural and urban regions of Canada. Rural Remote Health 2010;10(2):1430.
- (162) Health Disparities Task Group. Reducing health disparities – roles of the health sector: recommended policy directions and activities, December 2004. Prepared by the Health Disparities Task Group of the Federal/Provincial/Territorial Advisory Committee on Population Health and Health Security. Ottawa: Public Health Agency of Canada, 2004.
- (163) Mackenbach JP. Can we reduce health inequalities? An analysis of the English strategy (1997-2010). J Epidemiol Commun H 2011;65:594-595.
- (164) Norwegian Ministry of Health and Care Services. National strategy to reduce social inequalities in health. Accessed Sep 18, 2010 at [http://ec.europa.eu/health/ph\\_determinants/socio\\_economics/documents/norway\\_rd01\\_en.pdf](http://ec.europa.eu/health/ph_determinants/socio_economics/documents/norway_rd01_en.pdf). Oslo, 2007.
- (165) Swedish National Institute of Public Health. The 2005 Public Health Policy Report. Accessed Sep 18, 2010 at <http://www.fhi.se/PageFiles/4385/r200544fhpsummary0511.pdf>. Stockholm, 2005.
- (166) Bierman AS, Lawrence WF, Haffer SC, Clancy CM. Functional health outcomes as a measure of health care quality for Medicare beneficiaries. Health Serv Res 2001;36(6 Pt 2):90-109.
- (167) Evans RG, Barer ML, Marmor TR. Why are some people healthy and others not?: the determinants of health of populations. New York: A de Gruyter, 1994.



- (168) Healthy Aging and Wellness Working Group. Healthy aging in Canada: a new vision, a vital investment—from evidence to action. A background paper prepared for the Federal, Provincial and Territorial Committee of Officials (Seniors). Ottawa, 2006.
- (169) Bierman AS, Bubolz TA, Fisher ES, Wasson JH. How well does a single question about health predict the financial health of Medicare managed care plans? *Eff Clin Pract* 1999;2(2):56-62.
- (170) DeSalvo KB, Bloser N, Reynolds K, He J, Muntner P. Mortality prediction with a single general self-rated health question: a meta-analysis. *J Gen Intern Med* 2006;21(3):267-275.
- (171) Shields M, Shooshtari S. Determinants of self-perceived health. *Health Rep* 2001;13(1):35-52.
- (172) World Health Organization. Preventing chronic diseases: a vital investment. Geneva: World Health Organization, 2005.
- (173) Wang L, Nie JX, Upshur REG. Determining use of preventive health care in Ontario: comparison of rates of 3 maneuvers in administrative and survey data. *Can Fam Physician* 2009;55(2):178-179 e5.
- (174) Qi V, Phillips SP, Hopman WM. Determinants of a healthy lifestyle and use of preventive screening in Canada. *BMC Public Health* 2006;6.
- (175) Drewnowski A, Specter SE. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutrition* 2004;79(1):6-16.
- (176) Weyers S, Dragano N, Richter M, Bosma H. How does socioeconomic position link to health behaviour? Sociological pathways and perspectives for health promotion. *Glob Health Promot* 2010;17(2):25-33.
- (177) Statistics Canada. Births, estimates, by province and territory. Accessed June 25, 2010 at <http://www40.statcan.ca/l01/cst01/demo04a-eng.htm>, 2011.
- (178) Martin JA, Hamilton B, Sutton PD, Ventura SJ, Menaker F, Kirmeyer S, et al. Births: final data for 2006. National Vital Statistics Reports. Washington: US Department of Health and Human Services, 2009.
- (179) Rotermann M. Second or subsequent births to teenagers. *Health Rep* 2007;18(1):39-42.
- (180) Hoffman SD, Maynard RA. Kids having kids: economic costs and social consequences of teen pregnancy. Washington: The Urban Institute Press, 2008.
- (181) Swann C, Bowe K, McCormick G, Kosmin M. Teenage pregnancy and parenthood: a review of reviews. London: National Health Service, 2003.
- (182) Smith P, Frank J. When aspirations and achievements don't meet. A longitudinal examination of the differential effect of education and occupational attainment on declines in self-rated health among Canadian labour force participants. *Int J Epidemiol* 2005;34:827-834.
- (183) Yach D, McKee M, Lopez AD, Novotny T. Improving diet and physical activity: 12 lessons from controlling tobacco smoking. *Brit Med J* 2005;330(7496):898-900.
- (184) Jutte D, Roos N, Brownell M, Briggs G, MacWilliam L, Roos LL. The ripples of adolescent motherhood: social, educational, and medical outcomes for children of teen and prior teen mothers. *Acad Pediatr* 2010;10:293-301.
- (185) Doyal L. Gender equity in health: debates and dilemmas. *Soc Sci Med* 2000;51(6):931-939.
- (186) Nelson CH, Park J. The nature and correlates of unmet health care needs in Ontario, Canada. *Soc Sci Med* 2006;62(9):2291-2300.
- (187) Dunlop S, Coyte PC, McIsaac W. Socio-economic status and the utilisation of physicians' services: results from the Canadian National Population Health Survey. *Soc Sci Med* 2000;51(1):123-133.
- (188) Finkelstein MM. Do factors other than need determine utilization of physicians' services in Ontario? *CMAJ* 2001;165(5):565-570.
- (189) Asanin J, Wilson K. "I spent nine years looking for a doctor": exploring access to health care among immigrants in Mississauga, Ontario, Canada. *Soc Sci Med* 2008;66(6):1271-1283.
- (190) Lofters A, Glazier RH, Agha MM, Creatore MI, Moineddin R. Inadequacy of cervical cancer screening among urban recent immigrants: a population-based study of physician and laboratory claims in Toronto, Canada. *Prev Med* 2007;44(6):536-542.

- (191) Kisely S, Smith M, Lawrence D, Cox M, Campbell LA, Maaten S. Inequitable access for mentally ill patients to some medically necessary procedures. *Can Med Assoc J* 2007;176(6):779-784.
- (192) Glazier RH, Creatore MI, Gozdyra P, Matheson FI, Steele LS, Boyle E, et al. Geographic methods for understanding and responding to disparities in mammography use in Toronto, Canada. *J Gen Intern Med* 2004;19(9):952-961.
- (193) Joy R, Druyts EF, Brandson EK, Lima VD, Rustad CA, Zhang W, et al. Impact of neighborhood-level socioeconomic status on HIV disease progression in a universal health care setting. *J Acq Immun Def Synd* 2008;47(4):500-5.
- (194) Heslop CL, Miller GE, Hill JS. Neighbourhood socioeconomic status predicts non-cardiovascular mortality in cardiac patients with access to universal health care. *PLoS One* 2009;4(1):e4120.
- (195) Bacon SL, Bouchard A, Loucks EB, Lavoie KL. Individual-level socioeconomic status is associated with worse asthma morbidity in patients with asthma. *Respir Res* 2009;10:125.
- (196) Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;83(3):457-502.
- (197) Sitzia J, Wood N. Patient satisfaction: a review of issues and concepts. *Soc Sci Med* 1997;45(12):1829-1843.
- (198) Thompson AGH, Sunol R. Expectations as determinants of patient satisfaction: concepts, theory and evidence. *Int J Qual Health C* 1995;7(2):127-141.
- (199) Muirhead V, Quinonez C, Figueiredo R, Locker D. Oral health disparities and food insecurity in working poor Canadians. *Community Dent Oral* 2009;37(4):294-304.
- (200) Schwartz B. Access to dental care: a social justice discussion. *Alpha Omegan* 2007;100(3):143-147.
- (201) U.S. Department of Health and Human Services. Oral health in America: a report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.
- (202) Allin S, Grignon M, Le Grand J. Subjective unmet need and utilization of health care services in Canada: what are the equity implications? *Soc Sci Med* 2009;70(2010):465-472.
- (203) Bryant T, Leaver C, Dunn J. Unmet healthcare need, gender, and health inequalities in Canada. *Health Policy* 2009;91(1):24-32.
- (204) Alter DA, Naylor CD, Austin P, Tu JV. Effects of socioeconomic status on access to invasive cardiac procedures and on mortality after acute myocardial infarction. *N Engl J Med* 1999;341(18):1359-67.
- (205) Ehrmann Feldman D, Xiao Y, Bernatsky S, Haggerty J, Leffondre K, Tousignant P, et al. Consultation with cardiologists for persons with new-onset chronic heart failure: a population-based study. *Can J Cardiol* 2009;25(12):690-4.
- (206) Institute for Clinical Evaluative Sciences. Improving health care data in Ontario. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2005.
- (207) Lacaille D, Anis AH, Guh DP, Esdaile JM. Gaps in care for rheumatoid arthritis: a population study. *Arthritis and Rheumatism* 2005;53(2):241-248.
- (208) Cancer Care Ontario. Cancer System Quality Index (CSQI): 2009. Accessed July 27, 2009 at <http://csqi.cancercare.on.ca/>.
- (209) Jollis J, DeLong E, Peterson E, Muhlbaier L, Fortin D, Califf R, et al. Outcome of acute myocardial infarction according to the specialty of the admitting physician. *N Engl J Med* 1996;335(25):1880-1887.
- (210) Antman E, Anbe D, Armstrong P, Bates E, Green L, Hand M, et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation* 2004;110:e82-e293.
- (211) Steinman MA, Hanlon JT. Managing medications in clinically complex elders: "There's got to be a happy medium". *JAMA* 2010;304(14):1592-1601.
- (212) Caminal J, Starfield B, Sanchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. *Eur J Public Health* 2004;14(3):246-51.

- (213) Statistics Canada. Canadian demographics at a glance. Ottawa: Statistics Canada, 2008.
- (214) Malenfant EC, Lebel A, Martel L. Projections of the diversity of the Canadian population, 2006 to 2031. Ottawa: Statistics Canada, 2010.
- (215) Bierman AS, Ahmad F, Mawani FN. Gender, migration, and health. In: Agnew V, editor. Racialized migrant women in Canada: essays in health, violence and equity. Toronto: University of Toronto Press, 2009:98-136.
- (216) Satzewich V, editor. Deconstructing a nation : immigration, multiculturalism and racism in '90s Canada. Halifax: Fernwood Publishing, 1992.
- (217) De Maio FG. Immigration as pathogenic: a systematic review of the health of immigrants to Canada. *Int J Equity Health* 2010;9(27).
- (218) Kennedy S, McDonald JT, Biddle N. The healthy immigrant effect and immigrant selection: evidence from four countries. *Social and Economic Dimensions of an Aging Population Research Papers*, 2006.
- (219) Beiser M. The health of immigrants and refugees in Canada. *Can J Public Health* 2005;96(SUPPL. 2):S30-S44.
- (220) Hyman I. Setting the stage: reviewing current knowledge on the health of Canadian immigrants: what is the evidence and where are the gaps? *Can J Public Health* 2004;95(3):I4-I8.
- (221) McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Soc Sci Med* 2004;59(8):1613-1627.
- (222) Oxman-Martinez J, Abdool SN, Loiselle-Leonard M. Immigration, women and health in Canada. *Can J Public Health* 2000;91(5):394-395.
- (223) Fuller-Thomson E, George U, Noack A. Health decline among recent immigrants to Canada: findings from a nationally-representative longitudinal survey. *Can J Public Health* 2011;102(4):273.
- (224) Dion K. Immigrants' perceptions of housing discrimination in Toronto: The Housing New Canadians Project. *J Soc Issues* 2001;57(3):523-539.
- (225) Health Canada. Household food insecurity in Canada in 2007-2008: key statistics and graphics. Accessed June 23, 2011 at <http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/insecurit/key-stats-cles-2007-2008-eng.php>.
- (226) King K. The geography of immigration in Canada: settlement, education, labour activity and occupation profiles. Working Paper Series: Ontario in the Creative Age. Toronto: Martin Prosperity Institute, 2009.
- (227) Teixeira C. Barriers and outcomes in the housing searches of new immigrants and refugees: a case study of "Black" Africans in Toronto's rental market. *J Housing Built Env* 2008;23(4):253-276.
- (228) Teixeira C. Finding a home of their own: immigrant housing experiences in Central Okanagan, British Columbia, and policy recommendations for change. *J Housing Built Env* 2011;12(2):173-197.
- (229) Newbold B. The short-term health of Canada's new immigrant arrivals: evidence from LSIC. *Ethnic Health* 2009;14(3):315-336.
- (230) Quan H, Fong A, De Coster C, Wang J, Musto R, Noseworthy TW, et al. Variation in health services utilization among ethnic populations. *Can Med Assoc J* 2006;174(6):787-791.
- (231) Gadalla TM. Comparison of users and non-users of mental health services among depressed women: a national study. *Women Health* 2008;47(1):1-19.
- (232) Newbold KB. Health care use and the Canadian immigrant population. *Int J Health Serv* 2009;39(3):545-565.
- (233) McKeary M, Newbold B. Barriers to care: the challenges for Canadian refugees and their health care providers. *J Refug Stud* 2010;23(4):523-545.
- (234) Pottie K. Misinterpretation: language proficiency, recent immigrants, and global health disparities. *Can Fam Physician* 2007;53(11):1899-1901.
- (235) Spitzer D, Henry C, Popp J. Back to basics: towards a consensus on health and translation. *Health & Cultures* 1998;13(2):5-6.

- (236) Williams CC, Massaquoi N, Redmond M, Chatterjee S, James L. Every woman matters: a report on accessing primary health care for black women and women of colour in Ontario. Toronto: University of Toronto, 2011:1-90.
- (237) Fung K, Wong Y-LR. Factors influencing attitudes towards seeking professional help among East and Southeast Asian immigrant and refugee women. *Int J Soc Psychiatr* 2007;53(3):216-231.
- (238) Masi R, Mensah L, McLeod K, editors. Health and cultures: exploring the relationships. Oakville: Mosaics Press, 1993.
- (239) Rubini P, Mills K, Gazeley S, Ridgley A, Kiran T. Health is a spiritual thing: perspectives of health care professionals and female Somali and Bangladeshi women on the health impacts of fasting during Ramadan. *Ethnic Health* 2011;16(1):43-56.
- (240) Weerasinghe S, Mitchell T. Connection between the meaning of health and interaction with health professionals: caring for immigrant women. *Health Care Women Int* 2007;28(4):309-328.
- (241) Anderson J. Perspectives on the health of immigrant women: a feminist analysis. *Advances Nursing Sci* 1991;8(1):61-76.
- (242) Boyd M. Immigrant women: language, socio-economic inequalities and policy issues. In: Halli S, Trovato F, Drieger L, editor. *Ethnic demography: Canadian immigrant, racial and cultural variations*. Ottawa: Carleton University Press, 1990.
- (243) Thurston WE, Vissandjee B. An ecological model for understanding culture as a determinant of women's health. *Critical Public Health* 2005;15(3):229-242.
- (244) Agnew V. Introduction. *Racialized migrant women in Canada: essays on health, violence and equity*. Toronto: University of Toronto Press, 2009.
- (245) Arat-Koc S. Immigration policies, migrant domestic workers and the definition of citizenship in Canada. In: Satzewich V, editor. *Deconstructing a nation : immigration, multiculturalism and racism in '90s Canada*. Halifax: Fernwood Publishing, 1992.
- (246) Basavarajappa KG, Verma R. The occupational composition of immigrant women. In: Halli S, Trovato F, Drieger L, editor. *Ethnic demography: Canadian immigrant, racial and cultural variations*. Ottawa: Carleton University Press, 1990.
- (247) Chui T. Immigrant women. In: Ferrao V, William C, editor. *Women in Canada: a gender-based statistical report*. 6 ed. Ottawa: Statistics Canada, 2011.
- (248) Mojab S. De-skilling immigrant women. *Can Women Stud* 1999;19(3):123-128.
- (249) Spitzer D, Torres S. Gender-based barriers to settlement and integration for live-in-caregivers: a review of the literature. In: Doucet MJ, editor. *The CERIS Working Paper Series*. Toronto: Ryerson University, 2008:1-49.
- (250) Stasiulis D, Bakan A. *Negotiating citizenship: migrant women in Canada and the global system*. Toronto: University of Toronto Press, 2005.
- (251) Anderson JM, Blue C, Holbrook A, Ng M. On chronic illness: immigrant women in Canada's work force--a feminist perspective. *Can J Nurs Res* 1993;25(2):7-22.
- (252) Dyck I. Putting chronic illness 'in place'. *Women immigrants' accounts of their health care*. *Geoforum* 1995;26(3):247-260.
- (253) Mulvihill MA, Mailloux L, Atkin W. Advancing policy and research responses to immigrant and refugee women's health in Canada. Prepared for the Centres of Excellence in Women's Health. Winnipeg: Canadian Women's Health Network, 2001.
- (254) Khanlou N. Migrant mental health in Canada. *Can Iss* 2010;Summer(9-16).
- (255) Anderson LM, Scrimshaw SC, Fullilove MT, Fielding JE, Normand J. Culturally competent healthcare systems: a systematic review. *Am J Prev Med* 2003;24(3S):68-79.
- (256) Beach MC, Gary TL, Price EG, Robinson K, Gozu A, Palacio A, et al. Improving health care quality for racial/ethnic minorities: a systematic review of the best evidence regarding provider and organization interventions. *BMC Public Health* 2006;6.
- (257) Brach C, Fraserirector I. Can cultural competency reduce racial and ethnic health disparities? A review and conceptual model. *Med Care Res Rev* 2000;57(SUPPL. 1):181-217.

- (258) Pollard T. Ethnic groups as migrant groups: Improving understanding of links between ethnicity/race and risk of type 2 diabetes and associated conditions. *Annu Rev Anthropol* 2011;40:145-158.
- (259) Meyer M, Estable AR, MacLean L, Peterson WE. Family home visitors: increasing minority women's access to health services. *J Health Disparities Res Pract* 2010;3(3):1-20.
- (260) Katz KS, Jarrett MH, El-Mohandes AA, Schneider S, McNeely-Johnson D, Kiely M. Effectiveness of a combined home visiting and group intervention for low income African mothers: the Pride in Parenting program. *Matern Child Health J* 2011;1:75-84.
- (261) Gagnon A. Responsiveness of the Canadian health care system towards newcomers: McGill University, 2002.
- (262) Williamson DL, Stewart MJ, Hayward K, Letourneau N, Makwarimba E, Masuda J, et al. Low-income Canadians' experiences with health-related services: implications for health care reform. *Health Policy* 2006;76(1):106-121.
- (263) Jylhä M, Guralnik JM, Ferrucci L, Jokela J, Heikkinen E. Is self-rated health comparable across cultures and genders? *J Gerontol B Psychol Sci Soc Sci* 1998;53(3):S144-S152.
- (264) Ng E, Wilkins R, Gendron F, Berthelot J. Dynamics of immigrants' health in Canada: evidence from a National Population Health Survey. Ottawa: Statistics Canada, 2005.
- (265) van Dam RM, Li T, Spiegelman D, Franco OH, Hu FB. Combined impact of lifestyle factors on mortality: prospective cohort study in US women. *Brit Med J* 2008;337:a1440.
- (266) Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. *Lancet* 2007;370(9604):2044-53.
- (267) Jaakkimainen L, Upshur R, Klein-Geltink JE, Leong A, Maaten S, Schultz SE, et al. Primary care in Ontario: overview. In: Jaakkimainen L, Upshur R, Klein-Geltink JE, Leong A, Maaten S, Schultz SE, et al., editors. *Primary care in Ontario: ICES atlas*. Toronto: Institute for Clinical Evaluative Sciences, 2006.
- (268) Martin CM, Sturmberg JP. General practice—chaos, complexity and innovation. *Med J Aust* 2005;183(2):106-109.
- (269) Franks P, Fiscella K. Primary care physicians and specialists as personal physicians. Health care expenditures and mortality experience. *J Fam Practice* 1998;47(2):105-109.
- (270) Dayton E, Zhan C, Sangl J, Darby C, Moy E. Racial and ethnic differences in patient assessments of interactions with providers: disparities or measurement biases? *Am J Med Qual* 2006;21(2):109-114.
- (271) Starfield B. Primary care: balancing health needs, services and technology. New York: Oxford University Press, 1998.
- (272) Khan S, McIntosh C, Sanmartin C, Watson D, Leeb K. Primary health care teams and their impact on processes and outcomes of care Ottawa: Statistics Canada, 2008.
- (273) Matthews DC. The two-way relationship between diabetes and periodontal disease. *Dispatch* 2005;Fall(suppl):1-17.
- (274) Gregg EW, Cadwell BL, Cheng YJ, Cowie CC, Williams DE, Geiss L, et al. Trends in the prevalence and ratio of diagnosed to undiagnosed diabetes according to obesity levels in the U.S. *Diabetes Care* 2004;27(12):2806-2812.
- (275) King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care* 1998;21(9):1414-1431.
- (276) Lipscombe LL, Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995-2005: a population-based study. *Lancet* 2007;369(9563):750-756.
- (277) Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-1053.
- (278) Mamdani M, Hux JE. The increasing burden of diabetes in Canada. *Can J Diabetes* 2004;28(2):112-113.
- (279) Young TK, Mustard CA. Undiagnosed diabetes: does it matter? *Can Med Assoc J* 2001;164(1):24-28.

- (280) Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346(6):393-403.
- (281) Ramachandran A, Mary S, Yamuna A, Murugesan N, Snehalatha C. High prevalence of diabetes and cardiovascular risk factors associated with urbanization in India. *Diabetes Care* 2008;31(5):893-8.
- (282) International Diabetes Federation (IDF). *Diabetes Atlas*, second edition. Brussels (Belgium): The Federation, 2003.
- (283) Citizenship and Immigration Canada. Facts and figures 2009 - Immigration overview: permanent and temporary residents. Accessed Dec 22, 2011 at <http://www.cic.gc.ca/english/resources/statistics/facts2009/permanent/07.asp>. Ottawa, 2008.
- (284) McBean AM, Li S, Gilbertson DT, Collins AJ. Differences in diabetes prevalence, incidence, and mortality among the elderly of four racial/ethnic groups: Whites, Blacks, Hispanics, and Asians. *Diabetes Care* 2004;27(10):2317-24.
- (285) Abate N, Chandalia M. Ethnicity and type 2 diabetes: focus on Asian Indians. *J Diabetes Complicat* 2001;15(6):320-7.
- (286) Anand SS, Yusuf S, Vuksan V, Devanese S, Teo KK, Montague PA, et al. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the Study of Health Assessment and Risk in Ethnic groups (SHARE). *Lancet* 2000;356(9226):279-284.
- (287) Borrell LN, Crawford ND, Dailo FJ. Race/ethnicity and self-reported diabetes among adults in the National Health Interview Survey: 2000-2003. *Public Health Rep* 2007;122(5):616-625.
- (288) Dowse GK, Gareeboo H, Zimmet PZ, Alberti KG, Tuomilehto J, Fareed D, et al. High prevalence of NIDDM and impaired glucose tolerance in Indian, Creole, and Chinese Mauritians. Mauritius Noncommunicable Disease Study Group. *Diabetes* 1990;39(3):390-6.
- (289) Franco LJ. Diabetes in Japanese-Brazilians - influence of the acculturation process. *Diabetes Res Clin Pr* 1996;34 Suppl:S51-7.
- (290) Fujimoto WY, Bergstrom RW, Boyko EJ, Kinyoun JL, Leonetti DL, Newell-Morris LL, et al. Diabetes and diabetes risk factors in second- and third-generation Japanese Americans in Seattle, Washington. *Diabetes Res Clin Pr* 1994;24 Suppl:S43-52.
- (291) Hara H, Egusa G, Yamakido M, Kawate R. The high prevalence of diabetes mellitus and hyperinsulinemia among the Japanese-Americans living in Hawaii and Los Angeles. *Diabetes Res Clin Pr* 1994;24 Suppl:S37-42.
- (292) Mather HM, Keen H. The Southall Diabetes Survey: prevalence of known diabetes in Asians and Europeans. *Brit Med J* 1985;291(6502):1081-4.
- (293) Mokdad AH, Ford ES, Bowman BA, Nelson DE, Engelgau MM, Vinicor F, et al. Diabetes trends in the US: 1990-1998. *Diabetes Care* 2000;23(9):1278-83.
- (294) Rotimi CN, Cooper RS, Okosun IS, Olatunbosun ST, Bella AF, Wilks R, et al. Prevalence of diabetes and impaired glucose tolerance in Nigerians, Jamaicans and US blacks. *Ethnic Dis* 1999;9(2):190-200.
- (295) Tillin T, Forouhi N, Johnston DG, McKeigue PM, Chaturvedi N, Godsland IF. Metabolic syndrome and coronary heart disease in South Asians, African-Caribbeans and white Europeans: a UK population-based cross-sectional study. *Diabetologia* 2005;48(4):649-656.
- (296) Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. *Diabetes Care* 2002;25(3):512-516.
- (297) Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. *Can Med Assoc J* 2010;182(8):781-789.
- (298) Manuel DG, Rosella LCA, Tuna M, Bennett C. How many Canadians will be diagnosed with diabetes between 2007 and 2017? Assessing population risk. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences, 2010.
- (299) Kamangar F, Dores GM, Anderson WF. Patterns of cancer incidence, mortality, and prevalence across five continents: defining priorities to reduce cancer disparities in different geographic regions of the world. *J Clin Oncol* 2006;24(14):2137-50.



- (300) McLachlin CM, Mai V, Murphy J, Fung Kee Fung M, Chambers A, et al. Cervical screening: a clinical practical guideline. Accessed 16 Feb 2012 at <https://www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=14278>. Toronto: Cancer Care Ontario, 2005.
- (301) Maxwell CJ, Bancej CM, Snider J, Vik SA. Factors important in promoting cervical cancer screening among Canadian women: findings from the 1996-97 National Population Health Survey (NPHS). *Can J Public Health* 2001;92(2):127-33.
- (302) McDonald JT, Kennedy S. Cervical cancer screening by immigrant and minority women in Canada. *J Immigr Minor Health* 2007;9(4):323-34.
- (303) Woltman KJ, Newbold KB. Immigrant women and cervical cancer screening uptake: a multilevel analysis. *Can J Public Health* 2007;98(6):470-5.
- (304) Lofters AK, Moineddin R, Hwang SW, Glazier RH. Low rates of cervical cancer screening among urban immigrants: a population-based study in Ontario, Canada. *Med Care* 2010;48(7):611-618.
- (305) Lofters AK, Hwang SW, Moineddin R, Glazier RH. Cervical cancer screening among urban immigrants by region of origin: a population-based cohort study. *Prev Med* 2010;51(6):509-516.
- (306) Committee on Understanding Premature Birth and Assuring Healthy Outcomes. Preterm birth: causes, consequences, and prevention. Washington: Institute of Medicine, 2007.
- (307) Petrou S, Mehta Z, Hockley C, Cook-Mozaffari P, Henderson J, Goldacre M. The impact of preterm birth on hospital inpatient admissions and costs during the first 5 years of life. *Pediatrics* 2003;112(6 Pt 1):1290-7.
- (308) Saigal S, Doyle LW. An overview of mortality and sequelae of preterm birth from infancy to adulthood. *Lancet* 2008;371(9608):261-9.
- (309) World Health Organization. Maternal mortality in 2005. Estimates developed by WHO, UNESCO, UNFPA and the World Bank. Geneva: World Health Organization, 2007.
- (310) World Health Organization. Neonatal and perinatal mortality. Country, regional and global estimates. Geneva: World Health Organization, 2006.
- (311) Urquia ML, Frank JW, Moineddin R, Glazier RH. Immigrants' duration of residence and adverse birth outcomes: a population-based study. *BJOG* 2010;117(5):591-601.
- (312) Ontario Health Quality Council. Reporting framework: the attributes of a high-performing health system. Accessed Feb 15, 2012 at [http://www.ohqc.ca/pdfs/ohqc\\_attributes\\_handout\\_-\\_english.pdf](http://www.ohqc.ca/pdfs/ohqc_attributes_handout_-_english.pdf).
- (313) Ministry of Health and Long-Term Care. Health equity impact assessment. Accessed Feb 15, 2012 at <http://www.health.gov.on.ca/en/pro/programs/hea/>. 2008.
- (314) Sharpe A, Arsenault J. Living standards: a report of the Institute of Wellbeing. Toronto: Institute of Wellbeing 2009.
- (315) Statistics Canada. Women in Canada: a gender-based statistical report. Fifth ed. Ottawa: Social and Aboriginal Statistics Division, Statistics Canada, 2006.
- (316) Statistics Canada. Health indicators 2008. Ottawa: Health Statistics Division, Statistics Canada, 2008.
- (317) Association of Public Health Epidemiologists in Ontario (APHEO). Core indicators. Last accessed August 26, 2010 at <http://www.apheo.ca/index.php?pid=55>.
- (318) Health Canada. Responding to the challenge of diabetes in Canada: first report of the National Diabetes Surveillance System (NDSS). Ottawa: Health Canada, 2003.
- (319) Center for Chronic Disease Prevention and Control, Population and Public Health Branch. Health Canada. Diabetes in Canada. 2nd ed. Ottawa: Health Canada, 2002.
- (320) Hux JE, Tang M. Patterns of prevalence and incidence of diabetes. In: Hux JE BG, Slaughter PM, Laupacis A, editor. Diabetes in Ontario: practice atlas. Toronto: Institute for Clinical Evaluative Sciences, 2003.
- (321) Association of Public Health Epidemiologists in Ontario. Core indicators. Accessed Aug 26, 2010 at <http://www.apheo.ca/index.php?pid=55>, 2011.



- (322) National Committee for Quality Assurance (NCQA). HEDIS and quality measurement. Last accessed February 16, 2012 at <http://www.ncqa.org/tabid/59/Default.aspx>.
- (323) Shiller SK, Bierman AS. Introduction to the POWER Study. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (324) Iron K, Zagorski BM, Sykora K, Manuel DG. Living and dying in Ontario: an opportunity for improved health information. ICES investigative report. Toronto: Institute for Clinical Evaluative Sciences, 2008.
- (325) Canadian Institute for Health Information. DAD abstracting manual 2006-2007. Ottawa: Canadian Institute for Health Information, 2006.



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### Echo: Improving Women's Health in Ontario

Echo's mission is to improve the health and well-being of Ontario women and to reduce health inequities. We believe that through knowledge transfer and gender-based analysis, Echo will improve the health of women and overall quality of life, relationships, families and communities in Ontario. Echo is an agency of the Ministry of Health and Long-Term Care and is working to ensure Ontario is at the forefront of improving women's health.



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ONTARIO WOMEN'S  
HEALTH EQUITY REPORT

# Achieving Health Equity in Ontario: Opportunities for Intervention and Improvement *Chapter 13*



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For the POWER Study

## INSIDE

- Bridging the Gaps
- Monitoring Health Equity
- Moving Forward
- Chapter Highlights



Project for an Ontario Women's Health Evidence-Based Report

## **June 2012 • Volume 2 Ontario Women's Health Equity Report Improving Health and Promoting Health Equity in Ontario**

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# Executive Summary

## ISSUE

### The Project for an Ontario Women's Health Evidence-Based Report (POWER) Study has produced a comprehensive Women's Health Equity Report.

The study examined gender, socioeconomic, race/ethnic, and regional differences in access, quality, and outcomes of care across the continuum of care for the leading causes of morbidity and mortality in the province. Using a community-engaged research model, the study was designed to provide actionable data for policy makers, providers, and consumers in their efforts to improve health and reduce health inequities in Ontario.

**The POWER Study has developed an approach that integrates clinical, public, and population health measures, emphasizing indicators that are modifiable and that can support efforts to link measurement to intervention and improvement.**

An overarching objective of the POWER Study was to use performance measurement and reporting as a mechanism for knowledge translation. Not only has the POWER Study contributed needed evidence for addressing health inequities in Ontario, our approach to health equity performance measurement and reporting serves as a model for other jurisdictions.

**The POWER Study identified many large and modifiable inequities in health and health care that are cause for concern.** Lower-income Ontarians had worse health and functional status, had more chronic disease risk factors, received less preventive care, and had worse health outcomes than those with higher incomes. While there were large differences in health and functional status, we found fewer and smaller income-related differences in clinical management and quality of care, particularly in acute care settings. Although universal access to health care services is a fundamental

principle of the Canadian health care system, we also identified many inequities in access to care that were associated with income, race/ethnicity, immigration, and language. The [last section](#) of this report includes a summary of the most important findings from all POWER Study data chapters.

**The impact of health inequities is large.** If all Ontarians had the same health as Ontarians with higher income, an estimated 318,000 fewer people would be in fair or poor health, an estimated 231,000 fewer people would be disabled, and there would be an estimated 3,373 fewer deaths each year among Ontarians living in metropolitan areas. We also estimated that 30 percent of hospitalizations for four common ambulatory care sensitive conditions (ACSCs) (heart failure, chronic obstructive pulmonary disease, diabetes, and asthma)—or almost 16,000 hospitalizations a year—could potentially be avoided if the hospitalization rates observed among adults living in the highest-income neighbourhoods could be achieved across all neighbourhood income levels. These findings illustrate the enormous opportunities to improve overall population health while reducing health inequities in Ontario.

## BRIDGING THE GAPS

A number of important lessons emerged from the POWER Study analyses. First, we found that inequities in health and functional status were much larger than inequities in access to and quality of care. This finding underscores the importance of moving upstream to address the root



causes of health inequities, which are grounded in the social determinants of health. Second, inequities in access to primary care and chronic disease management were larger than inequities in treatment of acute conditions, highlighting the need to focus on primary care and community services. Third, the observed gender differences highlight the need for gender-sensitive solutions. Fourth, where there was an organized strategy for quality improvement in place informed by performance measurement, few inequities were observed.

Our health system is at a crossroads. Improving population health and reducing health inequities will reduce demand and health system utilization, thus fostering health system sustainability. Redesigning our health system to create an effective, integrated, efficient, and patient-centred health care delivery system, while at the same time creating cross-sectoral interventions to address the social determinants of health, can lead to both excellent health and excellent care for all.

### **Moving Upstream: Targeting the Social Determinants of Health**

It is well known that most of the determinants of health lie outside the health system. Our findings highlight the need to prioritize efforts that address the social determinants of health, including: poverty reduction, assuring food security, enhancing education, and fostering healthy communities and workplaces. By taking significant action to promote a healthy population and address the broader determinants of health, costs can be more effectively contained by reducing health care needs, ensuring the sustainability of the public health care system.

### **Chronic Disease Prevention and Management**

Chronic illness caused much of the illness burden reported in the POWER Study and chronic disease risk factors were common. Furthermore, many of the health inequities we identified are manifested by

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- Older Women's Health

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chronic diseases and their risk factors. Health system redesign, which prioritizes chronic disease prevention and management and targets populations at greatest risk, is central to health system sustainability, improving population health, and reducing health inequities. Optimum prevention and management of chronic diseases requires interventions to address the social determinants of health. Primary care is the cornerstone of chronic disease management and must be delivered in a manner that is effective and accessible to Ontario's diverse communities. Widespread implementation of the Ontario Ministry of Health and Long-Term Care's Chronic Disease Prevention and Management Framework would foster improvements in the province that are needed to reduce the burden of chronic illness and disability.



## Patient-Centred Care

Patient-centred models of care—which aim to address an individual's constellation of health problems and increase patients' access to and satisfaction with care—are central to equitably improving health status and health outcomes. POWER Study findings underscore the need for patient-centred care that addresses and integrates care for an individual's multiple risk factors and conditions and is sensitive to their social context. There are models to draw upon internationally and locally that, with wider implementation and adaptation to the needs of specific communities, can help meet this objective. Tailoring interventions to the needs of the community being served can help improve access to care, as well as experiences of care, among culturally diverse communities.

## Integration and Care Coordination

Individuals with chronic conditions are likely to be treated by multiple physicians across different settings of care. A number of our indicators revealed the current fragmentation of our health system. Lack of service integration and care coordination places patients at risk for adverse events as they move between specialists and settings of care. Interventions to improve integration and coordination during care transitions have been shown to be effective in a number of settings. Integrated, organized models of care can help to make our complex and often fragmented system easier for people to navigate.

## Innovation, Learning, and Research

Establishing learning networks for innovation and improvement can play an important role in health system transformation. While there is much known about patterns of health inequities and their causes, there is a critical need for evidence for how to most effectively and efficiently close existing gaps. Creation of a culture of innovation and learning across communities, sectors, and settings of care can play an important role in successfully implementing strategies

aimed at achieving health equity. It will be important to take a continuous quality improvement approach to implementing change by identifying specific interim points to evaluate progress and making adjustments based on these assessments.

## MONITORING HEALTH EQUITY

Performance measurement and reporting are effective tools for achieving improvements in access, quality, and outcomes of care, as well as for reducing inequities in health and health care; however, a specific focus on equity (across sex, socioeconomic status, demographic characteristics, and geography) can ensure that access to and quality of health care are being equitably delivered across the province.

Quality improvement activities can narrow, maintain, or widen health inequities depending on the relative improvement in advantaged compared to disadvantaged populations. For many reasons it may be easier to improve performance among those who are advantaged. Overall improvement on health indicators can mask inequities. Therefore, gender and equity analysis needs to be a routine component of health indicator monitoring.

## Leading Set of Health Equity Indicators

Through a consensus process, we identified a core set of health equity indicators for monitoring health equity in the province. Ongoing monitoring of these indicators can guide efforts to target areas where care is less than optimal or where inequities exist. These equity indicators can also play an important role in evaluating the effectiveness of interventions designed to improve health and health care.

The Leading Set of Health Equity Indicators includes 27 indicators: five of prevention and population health (including health status, health behaviours, chronic disease prevalence, and cancer screening); twelve of chronic disease management (including potentially avoidable emergency department visits and hospitalizations, diabetes complications, and depression

care); three of access to health care services (access to ongoing care, urgent non-emergent care, and dental care); four of reproductive and gynaecological health (including teen pregnancy, caesarean section rates, and type of hysterectomy); and three of the social determinants of health (income, education, and food insecurity).

These indicators represent a beginning. As we improve data capacity and availability, it will be possible to close current measurement gaps and to develop and measure indicators in important areas that cannot be assessed with current data.

### **Enhancing Measurement Capacity: Data Development**

There were many important areas we wanted to assess but could not due to insufficient depth or quality of available data. Many key opportunities for data development were identified repeatedly across POWER Study chapters. Key areas requiring data development are:

**Gender Relevant Measures:** Data are not routinely available on many important measurable factors that influence women's health or create barriers to accessing care among women, including care giving responsibilities, violence against women, working conditions, women's experiences with care, and the interpersonal quality of care received. There are also insufficient data on several health issues that specifically affect women, including prenatal care delivered in the community, menstrual disorders, pelvic pain, and family planning. These data gaps could be closed by adding gender-relevant items to population surveys, routinely administering gender-relevant patient experience surveys across the care continuum, and enhancing data collection in ambulatory care settings to capture data on care for common women's health conditions.

**Data on Ethnicity and Language:** Data on ethnicity and language are limited in Ontario. When data were available, sample size was often insufficient to assess gender differences or regional variation in performance. To assess these issues, populations that are underrepre-

sented in survey data could be oversampled to produce adequate sample size. Additionally, demographic data could be routinely collected in administrative databases (e.g., Ontario Health Insurance Plan) and clinical settings.

**Prescription Drug Data:** Comprehensive population-based drug data are only available for individuals eligible for the Ontario Drug Benefit (ODB). The ODB provides drug coverage for all individuals aged 65 and older and selected individuals under age 65 who meet eligibility criteria. Prescription drug data for individuals under age 65 is needed. Other provinces have created drug databases by including data from pharmacies. A similar approach in Ontario would greatly enhance our ability to assess the quality of chronic disease management.

**Primary Care Data:** Data on care provided in ambulatory care settings, including primary care, are extremely limited. Therefore, many quality indicators routinely measured in other jurisdictions related to chronic disease prevention and management cannot be assessed in Ontario. In the short term, there is opportunity to enhance the quality of administrative data. Ultimately, data from electronic health records would allow us to measure and improve the quality of care in these settings. As electronic health records are adopted in the province, capacity for performance management should be built in.

**Enriched Clinical Data:** There is a lack of sufficiently detailed clinical data in both the primary and acute care settings. While existing administrative data allowed us to assess a wide range of measures in acute care settings, important clinical detail on diagnoses, severity of illness, and comorbidity were often missing. Enhancements to administrative data, along with data from electronic health records designed for this purpose, can improve the accuracy and relevance of quality indicators.

**Patient-Reported Outcomes:** Patient-reported outcomes are not routinely captured in Ontario. Patient-reported outcome measures (PROMs) could provide a

powerful tool for assessing health system performance and stimulating action to improve the quality of care. Patient-reported outcomes can be collected through surveys, integrated into electronic health records, and added to administrative data. The International Classification of Functioning, Disability and Health—known more commonly as ICF and developed by the World Health Organization—is a classification system that can be used to add information on functional status to administrative datasets. Validated surveys such as the Consumer Assessment of Healthcare Providers and Systems (CAHPS) capture a broad range of patient experiences including interpersonal quality of care. These approaches would make it possible to use quality indicators based on PROMs to accelerate improvement.

**Dataset Linkage:** Linking datasets from different sources provides important information that cannot be obtained from a single source. While some datasets have been successfully linked for specific studies, there are many more opportunities where linked data could provide enriched data sources, facilitate development of meaningful indicators, provide new information on Ontario's diverse populations, and supply critical information on health needs and health system performance. Analyses of health data linked to data from other sectors (e.g., education, environment, transportation) can enhance our understanding of the social determinants of health, facilitate health impact assessment, and be used to foster cross-sectoral collaborations to improve health.

## MOVING FORWARD

Across POWER Study chapters, health inequities emerged as a major challenge in Ontario. However, there is also cause for optimism, as there are many opportunities for intervention and improvement. Innovative work is underway by many individuals and organizations across the province aimed at tackling these health inequities. We offer the [POWER Health Equity Road Map](#), a ten-point plan to move us forward. The road map emerged from our analyses and broad community consultation and dialogue.

The POWER Study findings underscore the value, both social and economic, of achieving health equity. While the social determinants of health are well recognized as the primary drivers of health status, as a society we still do not have a clearly defined strategy to address them. Approaches such as Health in All Policies and tools such as Health Impact Assessment can help us make progress towards creating a healthier and more productive society. Likewise, it is also well recognized that effective primary care that is patient-centred, culturally responsive, and linked to the community can improve individual and population health as well as reduce health inequities. Despite large investments in primary care, there is still much room for improvement. In summary, the POWER Health Equity Road Map recognizes the centrality of health equity to health system goals, the primacy of the social determinants of health, and the need for sustained primary care reform. Success will require approaches and interventions built on “outside the box” thinking coupled with incentives and mechanisms for accountability. The following themes, drawn from the road map, provide a summary of overarching approaches that can drive change. For more detail, see the full [POWER Health Equity Road Map](#).

**Integration and Coordination:** Across Ontario there is growing attention to the need to integrate and coordinate health care delivery across settings of care. However, health system integration is essential but not sufficient for improving health and reducing inequities. It will also be important to integrate and coordinate social and community services with primary, secondary, and tertiary care delivery. Similarly, coordinating population health, public health, and health system efforts will help accelerate progress.

**Innovation and Learning:** In our stakeholder consultations, we learned of many excellent innovations in diverse settings across the province and heard from many who are working to improve health and health care in their communities. There is a need to scale up effective interventions so that all may benefit. There is also a need to adapt effective interventions developed

in other contexts to the Ontario setting and evaluate them. Creation of learning networks, support for rigorous evaluation, and research on implementation are all needed.

**Measurement and Monitoring:** Performance measurement and monitoring are an essential element of health system transformation. The POWER Study findings illustrate why gender and equity analysis needs

to be a routine and integral component of health system performance measurement. Routine monitoring of the POWER Study Leading Set of Health Equity Indicators can provide a powerful tool for guiding interventions, evaluating their effectiveness, and monitoring progress.

The time to move forward is now. What is needed is the will and commitment.



# Introduction

The Project for an Ontario Women's Health Evidence-Based Report (POWER) Study was designed to provide actionable data for policy makers, providers, and consumers in their efforts to improve health and reduce health inequities in Ontario.

The study examined gender, socioeconomic, race/ethnic, and regional differences in access, quality, and outcomes of care across the continuum of care for the leading causes of morbidity and mortality in the province. The study explicitly examined differences between diverse groups of women associated with socioeconomic status, race/ethnicity, and geography, so that the heterogeneity of women's experiences and needs could be explored. Furthermore, as the study used a gender-based lens that allows examination of the health and health needs of both women and men, it has provided needed evidence for improving men's health as well. The POWER Study has developed an approach that integrates clinical, public, and population health measures, emphasizing indicators that are modifiable and that can support efforts to link measurement to intervention and improvement. An overarching objective of the POWER Study was to use performance measurement and reporting as a mechanism for knowledge translation.

The POWER Study was produced through the collaboration of a multidisciplinary team of over 60 researchers with expertise in health services research, medicine, nursing, public health, the social sciences, and health care policy. A community-engaged research model was employed and a diverse community of stakeholders including policy makers, providers, non-governmental organizations, and community-based organizations informed the indicator selection process, interpretation of findings, and messaging. An Advisory

Council provided strategic guidance on the study's development and execution. Many of our stakeholders have become partners in our knowledge translation and dissemination activities (see [Introduction to the POWER Study, chapter 1](#)).

Not only has the POWER Study contributed needed evidence for addressing health inequities in Ontario, our community-engaged approach to health equity performance measurement is relevant for other jurisdictions. The study serves as a model for:

- incorporating gender and equity analysis as an integral component of performance measurement and reporting,
- using a community-engaged research approach in the context of a quantitative indicator report, and
- including indicators that bridge population health, public health, and health care.

As a result, we have garnered much international attention. At the time this chapter was published, our website had visitors from more than 140 countries/territories, all 50 U.S. states, and 400 cities and towns across all Canadian provinces and territories. There have been over 50,000 downloads of our materials since the first release in June 2009.

Important patterns emerged as we reviewed the findings across all of the POWER chapters. This final chapter describes these patterns and uses evidence from the POWER Study to identify opportunities to improve health equity in Ontario. In the section on



Bridging the Gaps, we discuss common themes identified across chapters and how this information can be used to inform priority setting and drive change. These themes became apparent in synthesis of the key findings from each of the POWER Study's comprehensive data reports. A summary of the key findings from each of the POWER reports can be found in the section titled Chapter Highlights at the end of this document. The section on Monitoring Health Equity presents the POWER Study's proposed Leading Set of Health Equity Indicators and describes the structured process, including extensive stakeholder consultation, used to identify these indicators. These indicators can help guide and evaluate interventions and monitor progress toward achieving the important goal of health equity. We also outline key opportunities for improving data capacity in the province. Finally, we provide the POWER Health Equity Road Map, a ten-step plan to support efforts to achieve health equity in the province. This road map emerged from the themes identified across the POWER Study chapters and from broad community consultation and dialogue.

**The first two chapters of the POWER Study provide an overview of the methods and women's health equity framework developed for the project:**

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## THE POWER STUDY GENDER AND EQUITY FRAMEWORK

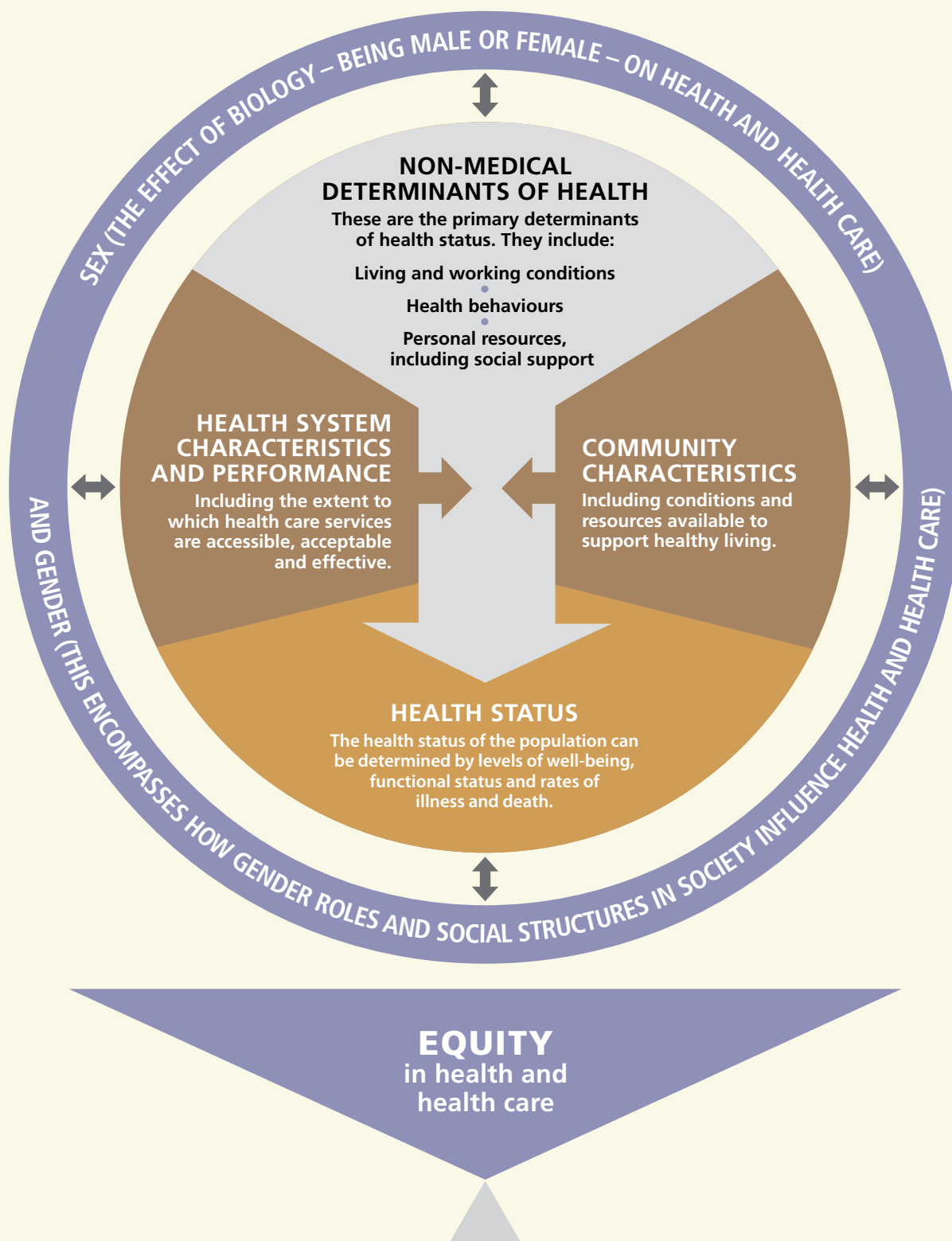
We set out to develop a Women's Health Equity Report that would be meaningful and actionable, both for decision makers and other stakeholders in women's health. To guide this process, we developed the POWER Study Gender and Equity Health Indicator Framework ([Figure 13.1](#)), which was built upon the Canadian Institute for Health Information (CIHI) health indicator framework. Women's health was conceptualized as holistic well-being determined by biology (sex) as well as by the social, political, and economic context of women's lives (gender). The framework recognizes that sex and gender influence how the framework domains impact on women's experiences and on their health outcomes (see [The POWER Study Framework, chapter 2](#)). The framework is dynamic, recognizing that the non-medical determinants of health are the primary determinants of health status, and that population and individual health outcomes are mediated by community characteristics and health system performance. Thus, while the social determinants of health increase the risk for poor health, effective health and community services can play an important role in reducing resultant health inequities, whereas inaccessible or ineffective services can exacerbate these inequities. For example, poverty

increases the risk of developing diabetes. Once a person develops diabetes, policies and services that improve access to healthy food and safe places to exercise, along with effective medical care, are needed to prevent complications from the disease. Health inequities are widened when these resources and services are not available.

The framework informed the selection and interpretation of a comprehensive set of evidence-based indicators for the leading causes of morbidity and mortality in the province. The framework also guided data analysis, interpretation of findings, reporting of results, and identification of gaps in existing data. In addition to being scientifically valid and feasible, selected indicators needed to be modifiable and able to assess differences between diverse groups of women. The indicators reported were the result of a rigorous selection process that included an extensive literature review of existing indicators, stakeholder consultation, and a series of technical expert panels using a rigorous modified Delphi process and well-defined selection criteria (see [Introduction to the POWER Study, chapter 1](#)).



**Figure 13.1** | POWER Study Gender and Equity Health Indicator Framework



**SOURCE:** Clark JP, Bierman AS. The POWER Study Framework. In: Bierman AS, editor. Project for an Ontario Women's Health Evidence-Based Report: Volume 1: Toronto; 2009.

POWER Study

# Bridging the Gaps: *Opportunities for Innovation and Improvement*

There is currently considerable focus on improving health and health care in Ontario.

The Excellent Care for All legislation enacted in 2010 provides a framework and support for improving the accessibility and quality of care for all Ontarians.<sup>1</sup> The Ministry of Health and Long-Term Care's new Action Plan for Health Care also emphasizes evidence-based reform and is aimed at improving access to and quality of care.<sup>2</sup> The Ontario Health Quality Council (now Health Quality Ontario) identified nine attributes of a high-performing health system: safe, effective, patient-centred, accessible, efficient, equitable, integrated, appropriately resourced, and focused on population health.<sup>3</sup> Indicators used in the POWER Study were strategically selected to reflect these attributes. One of the major goals of the POWER Study was to provide evidence that could be used to stimulate and inform health system change and promote greater accountability. The POWER Study findings and indicators can be used to inform priority setting, as well as support efforts to improve population health and reduce health inequities.

**The sizable health inequities identified in the POWER Study are cause for concern.** Lower-income Ontarians had worse health and functional status, had more chronic disease risk factors, received less preventive care, and had worse health outcomes than those with higher incomes. The impact of health inequities is large. If all Ontarians had the same health as Ontarians with higher income, an estimated 318,000 fewer people (166,000 women and 152,000 men) would be in fair or poor health, an estimated 231,000 fewer people (110,000 women and 121,000 men) would be disabled, and there would be an estimated 3,373 fewer deaths

each year (947 women and 2,426 men) among Ontarians living in metropolitan areas. We also estimated that 30 percent of hospitalizations for four common ambulatory care sensitive conditions (ACSCs) (heart failure, chronic obstructive pulmonary disease, diabetes, and asthma)—or almost 16,000 hospitalizations a year—could potentially be avoided if the hospitalization rates observed among adults living in the highest-income neighbourhoods could be achieved across all neighbourhood income levels. In Canada, it has been estimated that two-fifths of costs for acute care hospitalizations due to ACSCs could be avoided by narrowing income-related inequities.<sup>4</sup> These findings illustrate the enormous opportunities to improve overall population health while reducing health inequities in Ontario.

**While there were large differences in health and functional status, we found fewer and smaller income-related differences in clinical management and quality of care, particularly in acute care settings.**

Although the majority of Ontarians had a primary care provider, people living in lower-income neighbourhoods and recent immigrants were less likely to have one. Recent immigrants, certain racial/ethnic groups, and linguistic minorities were more likely to report difficulty accessing primary care and were less satisfied with their experiences getting care. Furthermore, low-income adults had less access to important services that are not universally insured. Performance on many indicators was worse for low-income and minority women, while low-income and minority men fared worse on other indicators.

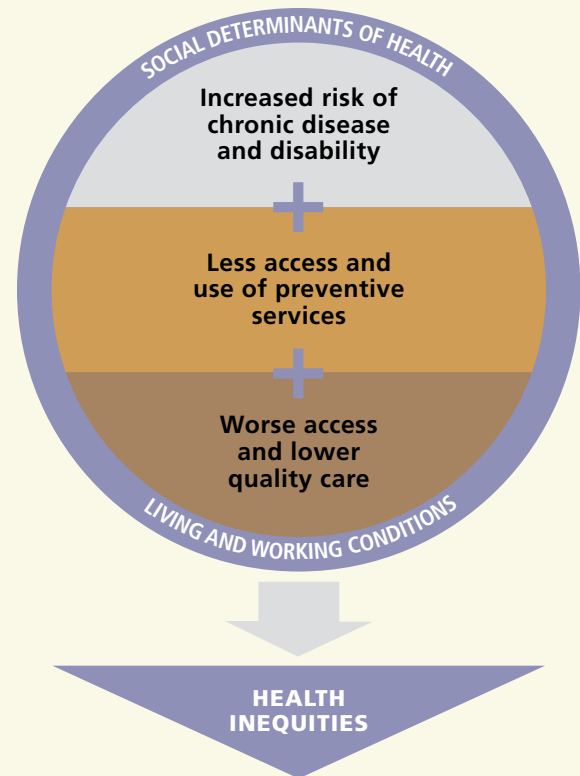
### Poor living and working conditions produce illness.

Socioeconomically disadvantaged women and men are further disadvantaged if they encounter barriers to accessing care or receive care of suboptimal quality. [Figure 13.2](#) illustrates the pathway through which the increased risk of chronic illness and disability created by the social determinants of health is compounded by less access to and use of preventive services, together with worse access to and lower quality of care, to exacerbate health inequities.

**A number of important lessons emerged from the POWER Study analyses.** First, we found that inequities in health and functional status were much larger than inequities in access to and quality of care. This finding underscores the importance of moving upstream to address the root causes of health inequities, which are grounded in the social determinants of health. Second, inequities in access to primary care and chronic disease management were larger than inequities in treatment of acute conditions, highlighting the need to focus on primary care and community services. Third, the observed gender differences highlight the need for gender-sensitive solutions. Fourth, where there was an organized strategy for quality improvement in place informed by performance measurement, few inequities were observed.

**Targeting improvements to specific areas of identified inequity can help assure that high quality care is provided to, and meets the needs of, all of the diverse communities in Ontario.** Many of the health inequities we identified are attributable to chronic diseases and their risk factors, and generate preventable demand and costs for the health system. Thus, a strengthened focus on chronic disease prevention and management that targets populations at greatest risk is central to health system sustainability. There were notable areas where care was equitable—including acute cancer and stroke care—illustrating how organized systems of care that use evidence-based guidelines and ongoing performance measurement and improvement can help achieve health equity. Expanding these approaches to community settings and incorporating a focus on health equity into these efforts can help us accelerate progress in reducing inequities.

**Figure 13.2** | Pathway to Health Inequities



POWER Study

**Effective patient-centred primary care is central to making progress.** Progress will require removing barriers to accessing effective care. Our current system is fragmented. This fragmentation makes it hard for individuals to navigate the health system and often results in suboptimal health outcomes. It also can lead to duplication of services and increased costs. Patient-centred primary care can facilitate access to needed services and help individuals and their families navigate the health care system. Care coordination is an important function of high quality primary care. Care integration and coordination is needed not only within the health system, but also between health and community services.

**Creating a culture of innovation and learning can play an important role in successfully developing and implementing strategies aimed at achieving health equity.** While we now have evidence of the patterns of health inequities in Ontario, there is much less evidence about how to most effectively and efficiently close these gaps. There are many pockets of innovation and excellence across the system; however, effective models are not often widely implemented. Health equity policies, strategies, and interventions must be critically evaluated to determine what works and what doesn't work. The knowledge generated from these research and evaluation efforts will build the evidence base needed to accelerate progress and support wide-spread adoption of best practices. In order for this to happen, interventions need to be implemented so that they can be studied rigorously, and support for this research and evaluation must be made available.

In this section, we synthesize the common themes that emerged as we examined access, quality, and outcomes of care across all of our reports. We identified important gaps in the way health care is organized and delivered in the province along with approaches to bridge these gaps. Interventions to close these gaps may be implemented at the policy, population health, community, and practice levels. By coordinating these efforts, it will be possible to enhance their effectiveness and accelerate progress toward reducing health inequities. These themes guided the development of the [POWER Study Health Equity Road Map](#).

Our health system is at a crossroads. Improving population health and reducing health inequities will reduce demand and health system utilization, thus fostering health system sustainability. Redesigning our health system to create an effective, integrated, efficient, and patient-centred health care delivery system, while at the same time creating cross-sectoral interventions to address the social determinants of health, can lead to both excellent health and excellent care for all.

## MOVING UPSTREAM: TARGETING THE SOCIAL DETERMINANTS OF HEALTH

It is well known that most of the determinants of health lie outside the health system. In fact, it has been estimated that the health care system accounts for only about 25 percent of the factors that influence Canadians' health, while the other 75 percent of health determinants fall outside of the health care system.<sup>5</sup> Throughout our reports, we consistently found that people with lower income and less education had worse health and functional status than those who were more advantaged. The fact that inequities in health and functional status were much larger than inequities in access to and quality of care underscores the importance of tackling the upstream causes of health inequities. Our findings highlight the need to prioritize efforts that address the social determinants of health, including: poverty reduction, assuring food security, enhancing education, and fostering healthy communities and workplaces.

Policies that improve people's living and working conditions can improve health. Such policies include those aimed at ensuring housing is safe and affordable; healthy foods are affordable and conveniently accessible; appealing, affordable and safe opportunities for physical activity are readily available; and individual employment conditions provide sufficient money and time for healthy lifestyles and community engagement. Policy decisions and interventions—at the national, community, or workplace level—can affect health positively or negatively by reducing or increasing poverty rates and income inequality, facilitating or constraining people's ability to make healthy choices, and lessening or worsening social exclusion. The government of Quebec enacted strong legislation in 2002 to address these factors, and saw a decline in the number of adults and children living in poverty, as well as a reduction in the number of persons requiring social assistance.<sup>6</sup> While cross-sectoral collaboration has proved challenging, it is essential if we are to make progress in improving population health and

reducing health inequities. By taking significant action to promote a healthy population and address the broader determinants of health, costs can be more effectively contained by reducing health care needs, ensuring the sustainability of the public health care system.

## **CHRONIC DISEASE PREVENTION AND MANAGEMENT**

Chronic illness caused much of the illness burden reported in the POWER Study. With the aging of the population, the burden of chronic illness is expected to grow. Furthermore, women and socioeconomically disadvantaged individuals were more likely to have multiple chronic conditions and disability. They are therefore disproportionately affected by the mismatch between the way care is currently organized and the needs of those with chronic illnesses,<sup>7,8</sup> which contributes to worse health status and health inequities. Many of the health inequities we identified are manifested by chronic diseases and their risk factors. Therefore, health system redesign, which prioritizes chronic disease prevention and management and targets populations at greatest risk, is central to health system sustainability, improving population health, and reducing health inequities.

Chronic disease prevention is provided by both public health and clinical services. Prevention has been typically under-resourced, while there has been little coordination between community-based and health sector interventions. Optimum prevention and management of chronic diseases requires interventions to address the social determinants of health, together with the integration of population health, community, and clinical approaches to this problem.

There is considerable evidence that chronic disease prevention and management can be improved through implementation of the Chronic Care Model together with performance measurement and quality improvement.<sup>9-11</sup> The Ontario Ministry of Health and Long-Term Care has adopted a Chronic Disease Prevention and Management Framework based on the Chronic Care Model ([Figure 13.3](#)).

This framework provides a road map for creating a patient-centred delivery system that meets the needs of individuals with chronic illness. This model has guided efforts to improve healthcare quality using a health systems approach that includes the role of community resources and policy in improving health outcomes. It has been used to improve the quality of care in diverse practice settings in many countries. Primary care is at the centre of the chronic disease model. Widespread implementation of this framework would foster improvements in the province that are needed to reduce the burden of chronic illness and disability.

Strategies have already been established in some Local Health Integration Networks (LHINs) to improve and integrate chronic disease prevention and management. For example, the Champlain region has introduced a Cardiovascular Disease Prevention Network aimed at reducing the burden of cardiovascular disease through the implementation of evidence-based best practice approaches.<sup>12</sup> This strategy involves partners from public health, specialty care, primary care, hospitals, community health, and academia. Initiatives have targeted community-based health promotion; improved delivery of cardiovascular disease care in primary care; promoted secondary prevention through hospital-based smoking cessation programs; and improved care of acute coronary events through guidelines implementation in hospitals. This model can inform other efforts to implement integrated approaches to improving chronic disease prevention and management.

### **Health Promotion and Disease Prevention**

A high proportion of Ontarians across all levels of education and income reported having four major chronic disease risk factors: physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, and smoking. These modifiable factors increase the risk for many chronic conditions, including hypertension and cardiovascular disease, arthritis and other musculoskeletal conditions, diabetes, depression, obstructive lung disease, and cancer. Reducing modifiable risks in the population

**Figure 13.3** | Ontario’s Chronic Disease Prevention and Management Framework



**SOURCE:** Ontario Ministry of Health and Long Term Care-Chronic Disease Prevention and Management Framework

POWER Study

can greatly reduce the prevalence of chronic conditions. For example, lifestyle changes promoting weight loss have demonstrated the delay or prevention of diabetes onset in high-risk populations.<sup>13, 14</sup> Reducing modifiable risks in those who already have a chronic condition will prevent complications, improve health outcomes, and reduce the need for hospitalization and other costly medical services. Unfortunately, prevention through public health and clinical services has traditionally been under-resourced.

Ontario has had some success in health promotion. The Smoke-Free Ontario Strategy has achieved success by reducing the number of Ontarians who smoke, leading

to a 31.8 percent decline in tobacco consumption between 2003 and 2006.<sup>15, 16</sup> Nevertheless, we found that 40 percent of men and 20 percent of women with less than a secondary school education, as well as 39 percent of Aboriginal women and 43 percent of Aboriginal men (living off-reserve) were current smokers, suggesting that prevention and improvement efforts must specifically target vulnerable populations in order to be most effective. Such efforts must acknowledge and address the constraints to certain healthier behaviours that these populations are likely to experience.<sup>17</sup> To maximize the effectiveness of health promotion efforts, it is important to target population groups at elevated risk,



while addressing barriers to adopting healthy behaviour and using culturally-appropriate messaging.

### **Effective Primary Care**

Internationally, health systems centred around accessible primary care have been shown to both improve population health and reduce health inequities.<sup>18</sup> Effective primary care is the cornerstone of effective chronic disease management. Much attention has been focused on the role of primary care as a “medical home” that provides the majority of needed care, is responsible for the integration and coordination of care across specialists and settings, and delivers care through an interdisciplinary team. Effective primary care provides support to patients and their families and facilitates patient self-management skills. Effective primary care can reduce the rate of potentially avoidable hospital admissions and readmissions for common chronic conditions. Despite more visits to primary care physicians, adults with diabetes living in lower-income neighbourhoods suffered more complications from diabetes than those from higher-income neighbourhoods, suggesting that the care received by lower-income adults did not adequately optimize health outcomes. Community Health Centres (CHCs) provide comprehensive primary care to socioeconomically disadvantaged populations. Many CHCs have also implemented strategies to address the social determinants of health in the context of service delivery. In Ontario, CHCs have been found to provide higher quality of care than other primary care models, and result in lower than expected rates of emergency department use.<sup>19, 20</sup> Expansion of family health teams in the province provides an infrastructure upon which to further enhance the quality of primary care provided.

Other jurisdictions provide examples that Ontario can draw upon to improve the quality and accessibility of primary care at the system level. In the United Kingdom, the Quality and Outcomes Framework provides financial incentives for primary care physicians to improve quality of care as measured by a standard set of quality

indicators. This framework has led to overall improvement in chronic disease management while narrowing inequities in performance between practices in the most- and least-deprived communities.<sup>21</sup> The U.S. Department of Veterans Affairs dramatically improved the quality of care it delivers by linking performance measurement and reporting to targeted quality improvement activities. The Department of Veterans Affairs is now seeking further improvement through implementation and expansion of the medical home model. Regulatory approaches combined with guidelines have also been used to facilitate access to culturally and linguistically appropriate services for disadvantaged populations in the United States.<sup>22</sup>

### **Improved Access to Effective Care**

We found that certain population groups encounter greater barriers to access and are at greater risk for receiving less effective care. Women encounter barriers to care due to their lower incomes, competing demands on their time, and a mismatch between their needs and the way the health system is currently organized.<sup>23-25</sup> Immigrants who had been living in Canada less than 10 years, members of specific ethnic groups, and individuals who did not speak English or French were more likely to report difficulties accessing care. Of note, South and West Asian and Arab women were particularly likely to report difficulties accessing care on a number of measures. As noted earlier, there is opportunity to improve chronic disease outcomes among low-income and minority Ontarians by facilitating access to effective care.

There are many examples of interventions that facilitate access to effective care in diverse communities. A variety of different approaches being used across the province can help improve the accessibility and effectiveness of primary care. Community Health Centres in Ontario, such as Women’s Health in Women’s Hands,<sup>26</sup> have developed models of care that address the social determinants of health and foster cultural and linguistic access to services. Health Care Connect, a program of the Ontario Ministry of Health and Long-Term Care, aims to help people who



do not have a regular primary care provider to find one.<sup>27</sup> Ensuring this program reaches low-income individuals, recent immigrants, and others living in communities where access to a primary care provider is more challenging could help further reduce inequities in access. Practice-based measures such as advanced access and practice redesign can facilitate more timely access,<sup>28, 29</sup> while telemedicine can facilitate specialty outpatient consultation and help to improve chronic disease management.<sup>30, 31</sup> Providing accessible care of an evenly high quality is difficult where specific resources and expertise are unevenly distributed. Regions of Ontario that have smaller population densities, lower concentrations of health care professionals, and fewer institutions and practices providing specialized care experience distinct challenges in addressing barriers to care.

## PATIENT-CENTRED CARE

Patient-centredness, an important attribute of effective care, is recognized by Health Quality Ontario as one of the key attributes of a high-performing health system. POWER Study findings underscore the need for patient-centred care that addresses and integrates care for an individual's multiple risk factors and conditions (related to both physical and mental health) and is sensitive to their social context. This care needs to be culturally appropriate and linguistically accessible. Patient-centred models of care that integrate and coordinate care across care settings are central to equitably improving health status and health outcomes. A patient-centred model aims to address an individual's constellation of problems rather than being disease-specific, with the additional orientation of increasing patients' satisfaction with access to care and the care received. Social context can facilitate or inhibit proper management of chronic diseases and effective reduction of chronic disease risks. A patient-centred approach recognizes and addresses the social context of disease. Improving the patient-centredness of care may increase patient satisfaction, and higher patient satisfaction is associated with better adherence to treatment.<sup>32, 33</sup> In order to adequately meet patients' health care needs and ensure their satisfaction, providers

must be able to understand the diversity of these needs, communicate clearly with patients about their care, and ensure that patient values guide all clinical decisions.<sup>34</sup>

Factors such as linguistic access and cultural appropriateness may also influence patients' satisfaction with access to care and the effectiveness of care received. The POWER Study found that access to and satisfaction with care varied across racial/ethnic groups. Linguistic and cultural barriers to care affect the quality of care delivered, patient safety, and health outcomes. Even in densely populated urban centres, there are areas where a consistent source of primary care is unavailable, particularly to immigrants with language barriers or sociocultural preferences for male or female providers.<sup>35</sup> Use of walk-in clinics or emergency departments for an acute illness may lead to discontinuities in care and lost opportunities for health promotion.<sup>35</sup> Immigrant women or those from non-dominant ethnic groups describe a lack of fit between their own cultural health practices and beliefs and those of health providers; this undermines communication, information exchange, and satisfaction with care.<sup>36-41</sup> Providing patient-centred care includes "providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions."<sup>42</sup> There are models to draw upon internationally and locally that, with wider implementation and adaptation to the needs of specific communities, can help meet this objective. For example, the U.S. National Standards on Culturally and Linguistically Appropriate Services (CLAS) have been developed to improve access to care for diverse populations.<sup>22</sup> Tailoring interventions to the needs of the community being served can help improve access to care, as well as experiences of care, among culturally diverse communities.

## INTEGRATION AND CARE COORDINATION

Individuals with chronic conditions are likely to be treated by multiple physicians across different settings of care. Lack of service integration and care coordination places

patients at risk for adverse events as they move between specialists and settings of care. A number of our indicators revealed the current fragmentation of our health system. For example, one in three adults hospitalized for major depression did not have a follow up visit within thirty days of discharge, many women did not receive recommended follow up of Papanicolaou (Pap) test results, and rates of potentially avoidable hospitalizations and readmissions for common chronic conditions were high. Commonly, there is a lack of integration of care for physical and mental health problems. Ideally, primary care should provide the locus of care coordination of individuals, their families, and their care givers.

Interventions to improve integration and coordination during care transitions have been shown to be effective in a number of settings. A number of interventions focused on the transition from hospital to home have shown improved outcomes and reduced readmission rates, specifically when particular at-risk groups are identified and targeted for support. One successful approach uses comprehensive discharge planning and home follow up, specifically targeting elderly patients; in this approach, an advance practice nurse coordinates care, monitors patients' status post-discharge, and educates patients in self-management.<sup>43, 44</sup> Another approach focuses on patient activation and empowerment; in a randomized control trial, intervention patients received tools to promote cross-site communication, encouragement to take a more active role in their care and to assert their preferences, and guidance from a "transition coach" to ensure continuity across settings. Intervention patients had lower readmission rates at 30 and 90 days post-discharge.<sup>45</sup> Integrated, organized models of care can also help to make our complex and often fragmented system easier to navigate.

## **INNOVATION, LEARNING, AND RESEARCH**

There is a great deal of local innovation across the province addressing the gaps identified by the POWER Study. Promising innovations in both health care delivery

and public health are also being implemented nationally and internationally. We now need to identify which innovations are most effective and promising for large scale adoption, and design them for "scale up and spread" and sustainability. Establishing learning networks for innovation and improvement can play an important role in health system transformation. Establishing health equity knowledge exchange networks could facilitate the spread of innovative ideas and accelerate the adoption of best practices. These networks will require commitment of adequate resources and an infrastructure to support their work.

While there is much known about patterns of health inequities and their causes, there is a critical need for evidence for how to most effectively and efficiently close existing gaps. Critically evaluating health equity policies, strategies, and interventions to determine what works and what doesn't work is required to build the evidence base needed to support wide-spread adoption of best practices. Creation of a culture of innovation and learning across communities, sectors, and settings of care can play an important role in successfully implementing strategies aimed at achieving health equity. Support for rigorous research, both on the effectiveness of specific interventions as well as for implementation strategies, is critical to building the evidence base. It will be important to take a continuous quality improvement approach to implementing change by identifying specific interim points to evaluate progress and making adjustments based on these assessments.

When aligned with strategic quality improvement interventions to target areas where care is suboptimal, performance measurement and reporting can provide a powerful tool to help achieve the objective of improving health while reducing health inequities. Our findings underscore the value of routinely incorporating gender and equity analysis into health system measurement and reporting. In the next section, we describe the development of a leading set of health equity indicators to facilitate this process and to drive needed change.

# Monitoring Health Equity:

## *Mainstreaming Gender and Equity Analysis into Performance Measurement and Reporting*

Ontario passed the Excellent Care for All Act in 2010 with the intent “to improve the quality and value of the patient experience through the application of evidence-based health care.”<sup>1</sup>

To ensure that this legislation is effective and that it is working for all Ontarians will require the identification of important quality indicators, standardization of the methods of measurement, and regular monitoring of indicators across gender, demographic, and socioeconomic characteristics of the population. Performance measurement and reporting are effective tools for achieving improvements in access, quality, and outcomes of care, as well as for reducing inequities in health and health care; however, a specific focus on equity (across sex, socioeconomic status, demographic characteristics, and geography) can ensure that access to and quality of health care are being equitably delivered across the province.

The Cancer System Quality Index<sup>46</sup> and Ontario Stroke System<sup>47</sup> are two recent examples of organized approaches to improving the quality of care across the province. In the Ontario cancer system, performance measurement and reporting provides baseline information on performance at the population level, identifying areas where cancer care has improved and where cancer care needs improvement, and provides an ongoing metric of how quality of cancer care is changing

in the province.<sup>46</sup> The Ontario Stroke Strategy has designated regional centres to coordinate and manage stroke care. Regional quality improvement initiatives coordinated with national and local evaluation bodies help advance strategic goals for continued improvement.<sup>47-49</sup> Our findings suggest that this focus on quality improvement resulted in more equitable care.

Quality improvement activities can narrow, maintain, or widen health inequities depending on the relative improvement in advantaged compared to disadvantaged populations. For many reasons it may be easier to improve performance among those who are advantaged. Overall improvement on health indicators can mask inequities. Therefore, gender and equity analysis needs to be a routine component of health indicator monitoring. Through a consensus process, we identified a core set of health equity indicators for monitoring health equity in the province. Ongoing monitoring of these indicators can guide efforts to target areas where care is less than optimal or where inequities exist. These equity indicators can also play an important role in evaluating the effectiveness of interventions designed to improve health and health care.

## POWER STUDY LEADING SET OF HEALTH EQUITY INDICATORS

Based upon POWER Study findings, chapter working groups used a set of explicit criteria to identify a short-list of 44 indicators that were important and relevant to be considered as candidates for ongoing monitoring. The indicators were grouped into broad domains:

- Prevention and population health (including cancer screening)
- Chronic disease management
- Access to care
- Reproductive health
- Social determinants of health

An online survey was then conducted in order to inform the selection of a leading set of equity indicators for routine monitoring. Sixty-seven participants (including policymakers, stakeholders, community members, and researchers) rated the short-list of indicators based on three indicator selection criteria (importance/usefulness, amenable to action, and consideration of equity and health disparities). Participants were then asked to identify if the indicator should be routinely monitored and how frequently. Finally, participants were asked to consider how the indicators would reflect the government's strategies, policies, and priorities; support health system performance management; integrate with current score cards; and be meaningful to end users of the data. Participants were able to limit their input to those for which they felt confident providing feedback. They were also provided with a reference manual that defined each indicator, presented a rationale for its inclusion, and described the POWER Study findings on that indicator. Stakeholders were invited to attend the POWER Study Summit in September 2010. Summit

participants also received the short list of 44 indicators and were asked to provide feedback in one of two different hour-long sessions. The final set of indicators was selected based on survey responses and consultation at the Summit.

The final set includes 27 indicators: five of prevention and population health (including health status, health behaviours, chronic disease prevalence, and cancer screening); twelve of chronic disease management (including potentially avoidable emergency department visits and hospitalizations, diabetes complications, and depression care); three of access to health care services (access to ongoing care, urgent non-emergent care, and dental care); four of reproductive and gynaecological health (including teen pregnancy, caesarean section rates, and type of hysterectomy); and three of the social determinants of health (income, education, and food insecurity). All of these indicators are modifiable. By bridging the gaps discussed in this report, it is possible to improve overall performance on these indicators while at the same time reducing inequities in performance. See [Table 13.1](#) for a full list of indicators. This leading set of health equity indicators has been incorporated into the Ontario Women's Health Framework, which was developed for the province by *Echo: Improving Women's Health in Ontario*.

These indicators represent a beginning. As we improve data capacity and availability, it will be possible to close current measurement gaps and to develop and measure indicators in important areas that cannot be assessed with current data. The next section discusses some straightforward approaches to closing current gaps in data capacity.

**Table 13.1 | POWER Study Leading Set of Health Equity Indicators<sup>†</sup>**
**Prevention and Population Health**
**1. Activity limitations**

Percentage of adults aged 25 and older who reported that their activities at home, school, or work had been limited due to a long-term physical condition, mental condition, or health problem

**2. Fall-related hospitalizations among seniors**

Rate of fall-related hospitalizations per 100,000 adults aged 65 and older

**3. Health behaviours that increase the risk of chronic disease**

Percentage of adults aged 25 and older who reported the following health behaviours that increase the risk of chronic diseases:

- Physical inactivity
- Inadequate fruit and vegetable intake
- Being overweight or obese
- Smoking

**4. Diabetes prevalence**

Prevalence of diabetes among adults aged 20 and older in Ontario

**5. Cancer screening**
**• Screening for breast cancer**

Percentage of women aged 50–69 with no history of breast cancer who had a mammogram in the last two years

**• Screening for colorectal cancer**

Percentage of adults aged 50–74 with no history of colorectal cancer who had one or more fecal occult blood tests (FOBT) in the last two years

**• Screening for cervical cancer**

Percentage of women aged 18–70 with no history of cervical cancer, and who have not had a hysterectomy, who had at least one Papanicolaou (Pap) test in the last three years

**• Follow up of abnormal Pap tests**

Percentage of patients whose Pap test showed a low-grade lesion (ASCUS or LGSIL) and who had either a repeat Pap test or colposcopy within six months of the initial Pap test

**Chronic Disease Management**
**6. Mental health: integrated depression care**
**• Physician visits for depression after a hospitalization for depression**

Percentage of patients aged 15 and older hospitalized for depression who had a physician visit for depression within 30 days of discharge

**• Emergency department visits for any reason within 30 days after a hospitalization for depression**

Percentage of Ontarians aged 15 and older who were hospitalized for depression who had an emergency department visit (but were not readmitted) within 30 days of being discharged

**• Hospital readmission for depression within 30 days after a hospitalization for depression**

Percentage of Ontarians aged 15 and older who were readmitted to hospital for depression in the 30 days post-discharge after a hospital stay for depression

**Table 13.1 | POWER Study Leading Set of Health Equity Indicators<sup>†</sup> (Continued)****Chronic Disease Management (continued)****7. Emergency department visits after a hospitalization for heart failure**

Percentage of patients aged 45 and older admitted to hospital for heart failure who visited an emergency department within 30 days and within one year following hospital discharge

- All-cause emergency department visits
- Cardiovascular disease-related emergency department visits
- Heart failure-specific emergency department visits

**8. Hospital readmission after a hospitalization for heart failure**

Percentage of patients aged 45 and older admitted to hospital for heart failure who had a non-elective readmission within 30 days and within one year following hospital discharge

- All-cause readmissions
- Cardiovascular disease-related readmissions
- Heart failure-specific readmissions

**9. Angiography for acute myocardial infarction**

Percentage of patients aged 45 and older admitted to hospital for an acute myocardial infarction who underwent or were referred for coronary angiography within three months of hospital discharge

**10. Hospital admission rates for ambulatory care sensitive conditions**

The rates of acute care hospitalizations per 100,000 adults aged 25 and older for the following conditions where effective ambulatory care can prevent or reduce the need for admission to hospital:

- Heart failure
- Chronic obstructive pulmonary disease
- Asthma
- Diabetes

**11. Emergency department visits for ambulatory care sensitive conditions**

The rates of emergency department visits per 100,000 adults aged 25 and older for the following conditions where effective ambulatory care can prevent or reduce the need for emergency care:

- Heart failure
- Chronic obstructive pulmonary disease
- Asthma
- Diabetes

**12. Specialist care for adults with rheumatoid arthritis**

Percentage of people aged 25 and older with rheumatoid arthritis who were seen by a specialist (rheumatologist, orthopaedic surgeon, general internist, or physical medicine specialist) in a one-year period

**13. Diagnosis and treatment post-fracture for older adults**

Percentage of adults aged 66 and older who suffered a low-trauma fracture who received neither a bone mineral density (BMD) test nor prescription drug treatment within one year after their fracture

**14. Baseline bone mineral density (BMD) testing in older adults**

Percentage of adults aged 68–70 who had not had a BMD test between the ages of 55–65 and who received a BMD test after they turned age 65

**Table 13.1 | POWER Study Leading Set of Health Equity Indicators<sup>†</sup> (Continued)**
**Chronic Disease Management (continued)**
**15. Eye examination for adults with new onset diabetes**

Percentage of adults aged 30 and older with newly diagnosed diabetes who had a visit to a general practitioner/family physician, optometrist, or ophthalmologist for an eye examination within two years of diagnosis

**16. Hospitalizations related to diabetes complications**

Number of adults (per 100,000) aged 20 and older with diabetes who had at least one hospitalization over a one year period for:

- Hyper or hypoglycemia
- Acute myocardial infarction
- Heart failure
- Stroke
- Major lower-extremity amputation (below hip and above ankle)
- Minor lower-extremity amputation (ankle or lower)

**17. Chronic dialysis for adults with diabetes**

Number of adults (per 100,000) aged 20 and older with diabetes who received chronic dialysis (dialysis duration of 90 days or more) over a one-year period

**Access to Care**
**18. Difficulty accessing routine or ongoing health care**

Percentage of the population aged 25 and older who reported no difficulties obtaining routine or ongoing primary health care for themselves or their family members over the past 12 months

**19. Difficulties accessing primary care for an urgent, non-emergent health problem**

Percentage of the population aged 25 and older who reported no difficulties making an appointment for immediate care for an urgent, non-emergent health problem from their family doctor over the past 12 months

**20. Dental care**

Percentage of the population aged 25 and older who did not visit a dentist in the past 12 months

**Reproductive Health**
**21. Rate of caesarean section**

Rate of caesarean section per 100 women:

- who gave birth
- who had a previous caesarean section
- with full-term (37 and more weeks of gestation), singleton, vertex deliveries

**22. Live births to teenage women**

Live births to teenage women (per 1,000 women aged 15–19)

**23. Proportion of hysterectomies for benign conditions that are performed vaginally or laparoscopically**

Percentage of women aged 15–84 who had a hysterectomy for a benign gynaecological condition who had either a vaginal or a laparoscopically-assisted hysterectomy



**Table 13.1 | POWER Study Leading Set of Health Equity Indicators<sup>†</sup> (Continued)****Reproductive Health (continued)****24. Obstetrical complications among pregnant women with diabetes**

Percentage of pregnant women aged 20 and older with pregestational diabetes, gestational diabetes, and no diabetes who delivered over a five-year period who had the following obstetrical complications:

- A diagnosis of hypertension (pre-existing or pregnancy-induced) in the six months before or at delivery
- Preeclampsia/eclampsia in the six months before or at delivery
- Any obstructed labour (including shoulder dystocia)
- Shoulder dystocia at delivery
- Caesarean section

**Social Determinants of Health****25. Low income**

Percentage of adults aged 25 and older who reported a low annual household income

**26. Low education**

Percentage of adults aged 25 and older who reported lower levels of educational attainment

**27. Food insecurity**

Percentage of adults aged 25 and older who reported food insecurity

<sup>†</sup> For detailed definitions of these indicators, please refer to the relevant POWER Study chapters.

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## ENHANCING MEASUREMENT CAPACITY: DATA DEVELOPMENT

There were many important areas we wanted to assess but could not due to insufficient depth or quality of available data. Below we outline key opportunities for data development that were identified repeatedly across chapters, along with approaches to enhance data capacity and close identified data gaps.

**Gender Relevant Measures:** Data are not routinely available on many important measurable factors that influence women's health or create barriers to accessing care, including: care giving responsibilities, violence against women, working conditions, women's experiences with care, and the interpersonal quality of care received. There are also insufficient data on some health issues that affect women specifically including prenatal care delivered in the community, menstrual

disorders, pelvic pain, and family planning. A number of approaches could provide the data required to assess these issues. Inclusion of existing validated items to assess these factors on population surveys could provide critical information. While patient experience surveys are routinely administered in some settings, these surveys should be redesigned to ensure they capture factors that are important to women; additionally, the routine administration of gender-relevant patient experience surveys should be expanded across the care continuum. Finally, enhanced data collection in ambulatory care settings, as discussed below, could also serve to capture data on care for common health conditions specific to women.

**Data on Ethnicity and Language:** Where data were available, we identified important differences in health status, chronic disease risk factors, and access

to health care services associated with race/ethnicity, immigration, and language spoken. World region of birth was associated with cancer screening and birth outcomes. These findings underscore the importance of these data in understanding health and health system performance in order to optimize health and health care for all. However, data on ethnicity and language are limited in Ontario. When data were available, sample size was often insufficient to assess gender differences or regional variation in performance. A number of approaches could provide the data required to assess these issues. Populations that are underrepresented in survey data could be oversampled to produce adequate sample size. Demographic data could be added to administrative data routinely collected by the Ontario Health Insurance Plan (OHIP). Demographic data could also be routinely collected in clinical settings and included in electronic health records or patient charts.

**Prescription Drug Data:** In Ontario, comprehensive population-based drug data are only available for individuals eligible for the Ontario Drug Benefit (ODB). The ODB provides drug coverage for all individuals aged 65 and older and selected individuals under age 65 who meet eligibility criteria.<sup>50</sup> Therefore, while we were able to assess guideline concordant care for drug therapy for individuals aged 65 and older, we have no prescription drug data for individuals under age 65. This is a major data gap as pharmacotherapy plays a critical role in the management of chronic conditions. Lack of drug insurance coverage has been associated with decreased adherence to recommended drug regimens, which in turn is associated with suboptimal health outcomes. While we found few inequities in the use of recommended drugs for common chronic conditions, we do not know whether this would be the case for individuals under age 65. Other provinces have been able to create drug databases by including data from pharmacies. A similar approach in Ontario would greatly enhance our ability to assess the quality of chronic disease management for all Ontarians and to determine whether inequities exist.

**Primary Care Data:** Effective primary care is associated with improved health outcomes and a reduction of health inequities. Currently, data on care provided in ambulatory care settings, including primary care, are extremely limited. Therefore, many quality indicators routinely measured in other jurisdictions related to chronic disease prevention and management cannot be assessed in Ontario. Inequities in access to and quality of care in these settings have been well documented. In the short term, there is opportunity to enhance the quality of administrative data, including more specific diagnoses, markers of illness severity, and multiple conditions in diagnosis fields from primary care and ambulatory care settings. Inclusion of codes for functional status would allow better assessment of disease severity and health outcomes. Ultimately, data from electronic health records would allow us to measure and improve the quality of care in these settings. Standardized data collection within electronic health records to measure and improve quality has been successfully implemented in the UK through the Quality and Outcomes Framework.<sup>21</sup> As electronic health records are adopted in the province, capacity for performance management should be built in.

**Enriched Clinical Data:** There is a lack of sufficiently detailed clinical data in both the primary and acute care settings. While existing administrative data allowed us to assess a wide range of measures in acute care settings, important clinical detail on diagnoses, severity of illness, and comorbidity were often missing. For example, recommendations for treatment of heart failure vary depending on whether the patient has heart failure with impaired or preserved systolic function. These diagnoses cannot currently be distinguished in administrative data. Similarly, it is currently not possible to distinguish between two types of myocardial infarction (STEMI/nonSTEMI) with different management recommendations. Efforts are underway to better capture data on the stage of cancer at diagnosis, another important type of information for performance measurement and quality improvement.

Many conditions that are common in older adults—such as dementia, falls, and urinary incontinence—are also difficult to assess reliably from administrative data, and alternative data sources are not available. An example of the availability of better clinical data is the Ontario Stroke Audit. At specified intervals, the Ontario Stroke Audit provides enhanced clinical data through chart audits of a random sample of 20 percent of all patients with stroke or transient ischemic attack who were seen in an emergency department or admitted to hospital at any acute care institution across the province.<sup>51</sup> Enhancements to administrative data, along with data from electronic health records designed for this purpose, can improve the accuracy and relevance of quality indicators.

**Patient-Reported Outcomes:** A major objective of health care, particularly for individuals with chronic disease and disability, is to improve health-related quality of life (including functional status) and to maintain independence with age and disease progression. Patient reports of their symptoms and functional status over time can allow us to assess the effectiveness of care over time. Quality indicators based on these patient-reported outcome measures (PROMs) capture unique dimensions of quality and also can reflect the effectiveness of care provided for multiple conditions by multiple providers in multiple settings. In addition, patient reports of their experiences with care can provide critical information to help us redesign the health system to reduce barriers to care, facilitate system navigation, and provide culturally sensitive care for diverse communities. However, patient-reported outcomes are not routinely captured in Ontario. Patient-reported outcome measures could provide a powerful tool for assessing health system performance and stimulating action to improve the quality of care. Patient-reported outcomes can be collected through surveys, integrated into electronic health records, and

added to administrative data. The International Classification of Functioning, Disability and Health—known more commonly as ICF and developed by the World Health Organization—is a classification system that can be used to add information on functional status to administrative datasets. Validated surveys such as the Consumer Assessment of Healthcare Providers and Systems (CAHPS) capture a broad range of patient experiences including interpersonal quality of care. These approaches would make it possible to use quality indicators based on PROMs to accelerate improvement.

**Dataset Linkage:** Linking datasets from different sources provides important information that cannot be obtained from a single source. Some datasets have been successfully linked for specific studies. For example, by linking Cytobase—a dataset that includes results of Pap tests—to administrative data, we were able to determine that many women were not receiving indicated follow up of abnormal or unsatisfactory tests within the recommended time frame. Linking the Landed Immigrant Data System (LIDS) to administrative data provided important information on how cancer screening, diabetes prevalence, and birth outcomes varied among immigrants from different world regions. However, there are many more opportunities where linked data could provide enriched data sources. There are often many barriers to accessing and linking datasets for analysis. Facilitating access and data linkages for the purposes of public health and quality improvement can facilitate development of meaningful indicators, provide new information on Ontario's diverse populations, and supply critical information on health needs and health system performance. Analyses of health data linked to data from other sectors (e.g., education, environment, transportation) can enhance our understanding of the social determinants of health, facilitate health impact assessment, and be used to foster cross-sectoral collaborations to improve health.

# Moving Forward:

## *The POWER Health Equity Road Map*

Across POWER Study chapters, health inequities emerged as a major challenge in Ontario. However, there is also cause for optimism, as there are many opportunities for intervention and improvement.

Innovative work is underway by many individuals and organizations across the province aimed at tackling these health inequities. We offer the [POWER Health Equity Road Map](#), a ten-point plan to move us forward. The road map emerged from our analyses and broad community consultation and dialogue.

The POWER Study findings underscore the value, both social and economic, of achieving health equity. While the social determinants of health are well recognized as the primary drivers of health status, as a society we still do not have a clearly defined strategy to address them. Approaches such as Health in All Policies and tools such as Health Impact Assessment can help us make progress towards creating a healthier and more productive society.<sup>52, 53</sup> Likewise, it is also well recognized that effective primary care that is patient-centred, culturally responsive, and linked to the community can improve individual and population health as well as reduce health inequities. Despite large investments in primary care, there is still much room for improvement.<sup>20</sup> In summary, the POWER Health Equity Road Map recognizes the centrality of health equity to health system goals, the primacy of the social determinants of health, and the need for sustained primary care reform. Success will require approaches and interventions built on “outside the box” thinking coupled with incentives and mechanisms for accountability. The following themes, drawn from the road map, provide a summary of overarching approaches that can drive change.

**Integration and Coordination:** Across Ontario there is growing attention to the need to integrate and coordinate health care delivery across settings of care. However, health system integration is essential but not sufficient for improving health and reducing inequities. It will also be important to integrate and coordinate social and community services with primary, secondary, and tertiary care delivery. Similarly, coordinating population health, public health, and health system efforts will help accelerate progress.

**Innovation and Learning:** In our stakeholder consultations, we learned of many excellent innovations in diverse settings across the province and heard from many who are working to improve health and health care in their communities. There is a need to scale up effective interventions so that all may benefit. There is also a need to adapt effective interventions developed in other contexts to the Ontario setting and evaluate them. Creation of learning networks, support for rigorous evaluation, and research on implementation are all needed.

**Measurement and Monitoring:** Performance measurement and monitoring are an essential element of health system transformation. The POWER Study findings illustrate why gender and equity analysis needs to be a routine and integral component of health system performance measurement. Routine monitoring of the POWER Study Leading Set of Health Equity Indicators can provide a powerful tool for guiding interventions, evaluating their effectiveness, and monitoring progress.

The time to move forward is now. What is needed is the will and commitment.

## **POWER HEALTH EQUITY ROAD MAP**

### **1. Equity, a major attribute of high-performing health systems and important dimension of health care quality, is key to health system sustainability and needs to be a priority.**

- Progress in achieving health equity can make important contributions to health system sustainability by reducing the incidence of costly and preventable illnesses such as late stage cancer (identified through screening) or hospitalizations for diabetes or heart failure (through better chronic disease management).
- Health systems can make important contributions to efforts to reduce inequities in health through health system redesign aimed at meeting the needs of populations at risk for poor health, as well as through cross-sectoral partnerships aimed at addressing the social determinants of health.

### **2. Health equity cannot be achieved without moving upstream and addressing the root causes of disease in the social determinants of health.**

- Focusing efforts upstream through cross-sectoral collaboration to address the root causes of health inequities (i.e., income, education, food security, housing, and environment) while reducing the burden of illness in the population is essential. A multifaceted approach is required to tackle the many complex problems which contribute to greater chronic disease prevalence and poorer health outcomes in these groups.
- Policy approaches such as Health in All Policies encourage the consideration of the health impact of policies across all sectors. Tools to accomplish this, such as Health Impact Assessments, are available and currently being used by the Ontario Ministry of Health and Long-Term Care, some Local Health Integration Networks, and hospitals. These efforts should be encouraged.

### **3. Prioritize chronic disease prevention and management to improve overall population health and reduce health inequities.**

- Because chronic diseases and their risk factors contribute greatly to health inequities, the implementation of a comprehensive and coordinated chronic disease prevention and management strategy—one that addresses the needs of at-risk populations—is the key to improving population health and achieving health equity.
- Because socioeconomically disadvantaged populations have a higher burden of chronic illness and disability, the current mismatch between the way care is organized and the needs of people with chronic illness disproportionately impacts those who are disadvantaged. Health system redesign that supports chronic illness care and fosters patient empowerment and community partnership is an important strategy for driving health equity.

### **4. Focus on patient-centredness to improve access to, satisfaction with, and outcomes of care for all.**

- Patient-centred care is care that is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions. It is care that addresses an individual's constellation of problems rather than being disease specific. Patient-centred models of care that address the multiple health care needs of individuals and are sensitive to gender and cultural differences can improve patients' experiences with care and increase satisfaction with access to care and the care received. Patient-centred models of care that integrate and coordinate care across care settings are central to improving satisfaction with health care access.

- Chronic disease management must also take into consideration that many Ontarians have multiple chronic conditions in part due to common risk factors for many of these conditions such as diabetes, heart disease, cancer, and arthritis. The adoption of a more patient-centred focus to chronic disease management that acknowledges this high prevalence of comorbidity and integrates care is essential. This can be accomplished through primary care-based medical homes with strong linkages to speciality services and community care.
- Improving access to and quality of care is dependent upon understanding access barriers as experienced by populations at risk and developing effective interventions to address them. Our findings highlight the need to address cultural and linguistic barriers to care among Ontario's diverse population. There are models to draw upon internationally and locally that, with wider implementation and adaptation to the needs of specific communities, can help meet this objective. Because barriers encountered by women and men in cultural and linguistic minority communities differ, these interventions need to be gender sensitive. Community engagement and partnership along with increased diversity in the health care workforce, with the explicit goal of addressing these barriers, can help to ensure access to effective care among Ontario's diverse communities.

#### **5. Province-wide, integrated, organized models of care delivery can improve health outcomes and reduce inequities in care.**

- We found few inequities in the delivery of acute cancer and stroke care—areas where organized, integrated, and coordinated strategies for guideline implementation, as well as quality improvement using performance measurement and feedback with validated quality

indicators, have been implemented. Expanding this approach across other health care sectors and especially to primary care practices can help foster health equity.

- Integrated, organized models of care can also help to make our complex and often fragmented system easier to navigate.

#### **6. Coordinate population health, community, and clinical responses.**

- There are many important ongoing activities aimed at improving health in the province including: targeting population-based health promotion, enhancing the quality and capacity of community-based services, and improving the quality of care delivered in clinical settings. Efforts to integrate and coordinate these efforts could produce synergies to accelerate progress in improving health and reducing health inequities among Ontarians.
- It is especially important to identify specific opportunities to improve quality of life and functional status through both community-based and health care interventions. For example, community-based interventions combined with clinical preventive services, such as for tobacco control and smoking cessation, together can be more effective. Falls prevention interventions in clinical practice can address medical factors to reduce falls, while community-based interventions such as activity promotion can also reduce the risk of falls.

#### **7. Link community and health services to optimize outcomes and improve efficiency.**

- Both health services and community services are vital for maintaining and improving health. Strengthening linkages between these sectors can help assure that people can readily access needed care and services to promote, maintain, and improve health.



### **8. Implement a health equity measurement and monitoring strategy and routinely include gender and equity analysis in health indicator monitoring.**

- Equity analysis and reporting should be integrated into ongoing measurement efforts. We have identified a leading set of health equity indicators based on POWER Study findings and broad-based consultation that can be used for this purpose. Adoption of these indicators can provide the needed information to effectively target gender, socioeconomic, and ethnic inequities in health. Monitoring these indicators over time will allow us to assess progress in improving health and reducing inequities.
- Incentives to foster health equity can be created. For example, health equity indicators and targets can be included in accountability agreements for Local Health Integration Networks, hospitals, family health teams, and other care providers.
- Improvement in data quality, availability, and timeliness is needed to support monitoring and reporting strategies. There is a particular need for data on ethnicity to improve the capacity to measure, monitor, and improve health for Ontario's diverse communities.

### **9. Develop strategies for effective implementation by creating learning networks and designing innovations for scale up and spread.**

- There is a great deal of local innovation aimed at tackling the issues reported by the POWER Study. We now need to identify which innovations are most effective and promising for large scale adoption and design them for "scale up and spread" and sustainability.
- Support of a health equity knowledge exchange infrastructure by creating learning networks for innovation and equity can accelerate the adoption of best practices.

### **10. Create a culture of innovation and learning while building the evidence base for accelerated improvement through rigorous evaluation and research.**

- Creation of a culture of innovation and learning across communities, sectors, and settings of care can play an important role in successfully implementing strategies aimed at achieving health equity.
- While there is much known about patterns of health inequities and their causes, there is a critical need for evidence specific to what works to close existing gaps. Critically evaluating health equity policies, strategies, and interventions to determine what works and what doesn't work is required to build the evidence base needed to accelerate progress and support wide-spread adoption of best practices.
- It will be important to take a continuous quality improvement approach to implementing this road map by identifying specific interim points to evaluate progress and making adjustments based on these assessments.



# Chapter Highlights

Throughout the POWER Study, we found many large and modifiable differences in health and health care associated with gender, income, education, age, race/ethnicity, immigration status, and geography. There were also several important areas where we found no differences.

This section highlights important findings from each of the POWER chapters. As we summarize each chapter, we also discuss relevant findings from other chapters in order to integrate findings and provide context. To illustrate the key findings, we reference exhibits (which show graphs, tables, or maps) from previous POWER chapters. Note that the first digit in the exhibit number refers to the chapter in which the exhibit was presented and the letter refers to the section (i.e., Exhibit 3C.7 can be found section C of chapter 3).

To create the Women's Health Equity Report, POWER Study researchers used a variety of secondary data sources. Data were drawn from routinely collected administrative health care databases (such as those which track hospitalizations and visits to doctors), population health surveys, vital statistics datasets, and disease registries. For further detail on indicators and their data sources, study limitations, and important areas that we could not measure, please refer to the relevant POWER chapters.

The full chapters, as well as shorter English and French-language highlights documents, can be downloaded from [www.powerstudy.ca](http://www.powerstudy.ca).

## BURDEN OF ILLNESS (CHAPTER 3)

The ultimate goal of health care is to improve the health and functional status of the population. The burden of illness in the population is influenced by social factors. In this chapter, we assessed the burden of illness in the Ontario population and how it varies by gender, socioeconomic status, ethnicity, and where one lives.

**We found important sex and gender differences in burden of illness.** Overall, women were more likely to report comorbidity (multiple chronic conditions) (Exhibit 3C.7), disability (Exhibit 3A.12), and chronic pain than men (Exhibit 3A.16), while men had higher rates of potentially avoidable mortality (Exhibit 3E.1) and premature death (Exhibit 3E.2). Women were also more likely to have low incomes than men (Exhibit 3B.1), further increasing their risk for chronic illness and disability. Importantly, health and functional status differed greatly between diverse groups of women. The differences in health status between women who

### The impact of health inequities was large.

**If all Ontarians had the same health as Ontarians with higher income, it is estimated that:**

- 318,000 fewer people (166,000 women and 152,000 men) would be in fair or poor health,
- 231,000 fewer people (110,000 women and 121,000 men) would be disabled, and
- 3,373 fewer deaths would occur each year among Ontarians living in metropolitan areas (947 women and 2,426 men).

had different incomes, levels of education, or ethnic and racial backgrounds were often larger than the overall differences between women and men.

**Ontarians of lower socioeconomic status have a disproportionately high burden of illness.**

Low-income women and men were more likely to report fair or poor health (Exhibit 3A.1), chronic conditions (Exhibit 3C.1), comorbidity (Exhibit 3C.8), activity limitations (Exhibit 3A.9), disability (Exhibit 3A.12), and chronic pain (Exhibit 3A.17) than those with higher incomes. Lower-income adults also had higher mortality rates (Exhibits 3E.1, 3E.2). Low-income women were particularly at risk for disability, chronic pain, and comorbidity, while low-income men were particularly at risk for premature mortality. Since health and functional status tend to decline with age, low-income women aged 65 and older had the highest burden of illness. For example, 52 percent of low-income women aged 65 and older reported disability and 35 percent reported that their activities were prevented due to pain or discomfort.

**Women and men with lower levels of income and education have higher levels of modifiable chronic disease risk factors**, including lack of physical activity, inadequate fruit and vegetable intake, being overweight or obese, and smoking (Exhibit 3B.5). It has been well-established that these risk factors are heavily influenced by one's living and working conditions.<sup>54</sup> For example, food insecurity is clearly linked to one's ability to obtain a healthy diet. Yet, in Ontario, one in four low-income women and men reported that they did not have enough to eat, worried about there not being enough to eat, or did not eat the quality and variety of foods desired due to a lack of money (Exhibit 3B.4). Therefore, general population-based interventions to improve health behaviours may be less effective in disadvantaged populations. Despite progress in reducing overall smoking rates in Ontario, women and men with less than a secondary school education were three times more likely to smoke than those who had a

Bachelor's degree or higher. Thus, prevention and health promotion efforts must specifically address social contexts and target at-risk populations.

**Ethnicity and language are also associated with health and functional status and chronic disease risk factors.** In particular, Aboriginal women and men (living off-reserve) were more likely to report fair or poor health and activity limitations (Exhibits 3A.4, 3A.10) than other ethnic groups. Aboriginal women and men also reported the highest smoking rates (39 percent of Aboriginal women and 43 percent of Aboriginal men living off-reserve) (Exhibit 3B.6). Ontarians who spoke French only or who spoke neither French nor English also reported worse health than those who spoke English only or were bilingual (French and English) (Exhibit 3A.5). See the [Social Determinants of Health and Populations at Risk Chapter Summary](#) for more information.

## CANCER (CHAPTER 4)

Cancer is a leading cause of illness and death among the women and men of Ontario. This chapter focused on the two most common cancers affecting both sexes (lung and colorectal), as well as common cancers that occur primarily or only in women (breast, cervical, ovarian, and uterine). We reported indicators across the continuum of care—from cancer screening to end-of-life care.<sup>55</sup>

**There are income disparities in rates of cancer screening for all indicated screening tests.**

Province-wide screening rates for colorectal (fecal occult blood test), breast, and cervical cancers were all below provincial targets.<sup>56</sup> Ontarians living in lower-income neighbourhoods had lower rates of screening for colorectal, breast, and cervical cancers than those living in higher-income neighbourhoods (Exhibits 4B.1, 4B.3, 4B.5). For example, 61 percent of screen eligible women living in the lowest-income neighbourhoods were screened for cervical cancer in the last three years compared to 75 percent among those in the highest-

income neighbourhoods. Among all women there was suboptimal follow up of Papanicolaou (Pap) tests that showed a low-grade lesion or that had inadequate samples. Less than half of women with such results received a repeat Pap test or colposcopy within the recommended time frame (Exhibits 4B.8, 4B.11).<sup>57</sup> Low-income women were somewhat less likely to receive follow up for a low-grade, abnormal Pap test result than higher-income women.

**Many of the risk factors for cancer, including smoking, sedentary lifestyle, unhealthy diets, and obesity, are the same as for other common chronic conditions.** Thus, coordinated strategies to reduce population risk may contribute to reducing the incidence of common cancers.<sup>58</sup> As noted in the Burden of Illness chapter, these risk factors were more prevalent among women and men with low levels of income and education than those with higher levels of income and education (Exhibit 3B.5). Not surprisingly, we found higher rates of lung cancer among women and men living in the lowest-income neighbourhoods (who also had much higher rates of smoking) compared to those living in higher-income neighbourhoods (Exhibit 4A.4). Higher rates of lung cancer incidence were also noted in regions with higher rates of smoking prevalence (Exhibits 3B.10, 4A.5). To be effective, health promotion interventions must address the contextual factors that influence these behaviours (including socioeconomic, social, and environmental factors) and target the specific needs of at-risk communities.

**While there are disparities in cancer screening, the quality of acute cancer care following diagnosis varies little by sex and income.** Unlike specialty referral for other conditions (diabetes, heart disease, rheumatoid arthritis) that varied by income, referrals to oncology and/or radiation therapy for rectal, colon, and breast cancer (Exhibits 4E.4, 4E.6) did not vary by income. Most cancer treatment indicators did not vary by income; while a few sex differences were observed, these differences were not pronounced. Most measures

of end of life care did not vary by neighbourhood income, although women and men living in low-income neighbourhoods were less likely to have a physician house call in the last two weeks of life than those living in higher-income neighbourhoods (Exhibit 4G.12).<sup>59</sup>

**There are many challenges to optimizing care for the growing number of cancer patients aged 80 and older.** Cancer patients aged 80 and older were less likely to receive radiation or chemotherapy for specific cancers (Exhibits 4C.2, 4C.3, 4D.7, 4E.5, 4E.7, 4F.3) and had lower survival rates (Exhibits 4A.11, 4A.12, 4A.15). This may be due to higher death rates from other causes, patient preferences (i.e., some older patients may choose not to have aggressive treatment), and informed decision making. However, undertreatment of those who could benefit from treatment may also contribute.<sup>60</sup> Emerging data suggest physicians may have a bias toward undertreating the elderly, perhaps due to a lack of direct evidence that the treatment will be beneficial (most clinical trials enrol younger and fitter patients) or out of concern that treatments may be more harmful to older patients.<sup>61</sup> While more evidence is needed to determine optimal management of older cancer patients, current evidence suggests the relative benefits of treatment for the elderly are similar to those seen for cancer patients in general. Decision making for treatment becomes more complex in the very old as life expectancy, co-existing illnesses, and functional status all need to be considered.<sup>62</sup>

**Where you live in Ontario affects all aspects of cancer care.** Rates for all types of cancer care, from screening to treatment to end of life care, varied depending on where one lived in the province. For example, regional differences were seen in surgical treatment and referral to medical oncology (Exhibits 4C.4, 4D.3, 4E.2, 4F.2). The percentage of breast cancer patients who were seen by a medical oncologist within three months of diagnosis ranged from 51 percent to 83 percent across Local Health Integration Networks (LHINs) (Exhibit 4E.8).

## DEPRESSION (CHAPTER 5)

Depression—a leading cause of disease-related disability among women<sup>63</sup>—places a large financial, emotional, and health burden on the people who experience it, their families, and society. This chapter examined the need and use of health care services in Ontario, as well as the patterns and quality of depression care in outpatient and inpatient settings.

**Women have a higher prevalence of depression than men; rates of probable depression are highest among low-income women.** Overall, 7.4 percent of Ontario's population aged 15 and older had probable depression and the rate of probable depression was twice as high among women as men. Among women, those living in lower-income neighbourhoods had higher rates of probable depression than those living in higher-income neighbourhoods (Exhibit 5A.1). Probable depression was assessed using the Composite International Diagnostic Interview-Short Form for Major Depression, which was included in the Canadian Community Health Survey.

**Patterns of mental health service use and supply do not match the patterns of need.** Despite having a higher prevalence of probable depression, women living in lower-income neighbourhoods had similar usage rates of core mental health services that are covered by Ontario Health Insurance Plan (OHIP) (Exhibit 5A.5) and lower core mental health costs per capita (Exhibit 5A.6) compared to those from higher-income neighbourhoods. These patterns suggest underuse of these services by women living in lower-income neighbourhoods.

**There are also large differences in use of depression care depending on where one lives** (Exhibits 5A.10, 5A.13); again, these differences did not reflect differences in need (Exhibit 5A.2). Women and men living in rural areas were less likely to have had OHIP core mental health visits, but more likely to be hospitalized for depression than those living in urban areas (Exhibit 5A.10). In the 30 days following a hospitalization for depression, rural residents were less likely than urban

residents to visit a physician for depression (Exhibit 5C.2) and more likely to visit an emergency department. In addition, the number of general practitioners/family physicians (GP/FPs) and psychiatrists varied by Local Health Integration Networks (LHINs) (ranging from 72 to 168 GP/FPs per 100,000 population aged 15 and older and 6 to 72 psychiatrists per 100,000 population aged 15 and older) (Exhibit 5A.11).

**Suboptimal follow up care after a hospitalization for depression suggests inadequate integration and coordination of mental health services for all Ontarians.** More than a third of those who were hospitalized for depression did not have a follow up physician visit within 30 days of being discharged (Exhibit 5C.5). Among those hospitalized for depression, 17 percent were seen in an emergency department within 30 days of hospital discharge (Exhibit 5C.8) and an additional 7.6 percent were readmitted to hospital for depression (Exhibit 5C.12). There were significant geographic differences in 30-day readmission rates for depression among patients aged 15 and older admitted to hospital for depression, ranging from 2.9 percent in the Erie St. Clair LHIN to 11.9 percent in the North East LHIN (Exhibit 5C.13). Those living in higher-income neighbourhoods were more likely than those living in lower-income neighbourhoods to have a post-discharge physician visit for depression (Exhibit 5C.1) and to do so within a shorter period of time (Exhibit 5C.6).<sup>64</sup>

## CARDIOVASCULAR DISEASE (CVD) (CHAPTER 6)

CVD is a leading cause of death and disability among Canadian women and men.<sup>65, 66</sup> While CVD-related mortality rates have been declining in recent decades, women account for a growing proportion of these deaths.<sup>67</sup> The prevention and treatment of CVD is of major importance to women's health. This chapter examined the health and functional status of women and men with CVD, as well as the clinical management and health outcomes of people with heart failure (HF), ischemic heart disease, and cerebrovascular disease.

**Lower socioeconomic status is associated with a higher prevalence of CVD and its modifiable risk factors.** Low-income women and men were about twice as likely to report having heart disease or having had a stroke as higher-income women and men (Exhibit 3C.1). Low socioeconomic status was also associated with physical inactivity, inadequate fruit and vegetable intake, being overweight or obese, and smoking (Exhibit 3B.5)—all of which contribute to higher rates of CVD. Irrespective of income, the prevalence of these risk factors was high among women and men with CVD (Exhibit 6A.11), underscoring the need for secondary prevention (lifestyle modification among those who have CVD). Lower-income adults with CVD were less likely than higher-income adults with CVD to have made changes to improve their health in the previous year (Exhibit 6A.12). Among adults who had heart disease or experienced a stroke, women were more likely to report lower income and lower educational attainment than men (Exhibit 6A.8). Lower socioeconomic status can create barriers to accessing health care services and effective chronic disease management.

**While there are few disparities in acute care for CVD, there are important sex and income-related differences in health and functional status among people with CVD.** Among those who reported heart disease or stroke, women consistently reported worse functional status and higher disability rates than men (Exhibits 6A.4–6A.7). Individuals with CVD who had low levels of income or education were more likely to report fair or poor health compared to those with higher levels of income or education (Exhibits 6A.1, 6A.2). Low income was also associated with worse functional status, with income differences greater among men (Exhibits 6A.4–6A.6). Lower levels of income were associated with worsening health (Exhibit 6A.3).

**Rates of potentially avoidable emergency department use and hospital readmission are high for both women and men after a hospital admission for HF.** Within 30 days of discharge, 30 percent of patients hospitalized for HF visited an emergency

department (Exhibit 6B.15) and 20 percent were readmitted to hospital (Exhibit 6B.17). Within one year, 75 percent visited an emergency department and 59 percent were readmitted. About a third of all hospital readmissions were for non-CVD related causes. Implementation of effective chronic disease management programs that are integrated across settings of care could reduce emergency department use and hospital admissions, relieving the burden on hospitals and contributing to health system sustainability.

### **Despite progress, gender gaps in care persist.**

There were several areas where there were no sex differences in the quality of cardiovascular care. Women and men were equally likely to see a physician within four weeks of discharge after a hospitalization for HF or acute myocardial infarction (AMI) (Exhibits 6B.4, 6C.5) and had similar wait times for cardiac procedures (Exhibits 6C.18, 6C.20, 6C.21). There were also no sex differences in the majority of acute stroke care quality indicators (Exhibits 6D.1, 6D.2, 6D.13, 6D.18, 6D.19, 6D.21, 6D.23).<sup>68</sup> Medication use for chronic disease management generally did not vary by sex among people aged 65 and older with HF, AMI, or a history of stroke (Exhibits 6B.5, 6B.8, 6B.9, 6C.8, 6C.9, 6D.5, 6D.12) with the exception of statin use. Women were less likely than men to fill a prescription for a statin following an AMI or stroke (Exhibits 6C.6, 6D.10). Despite progress in many areas, some notable sex differences were observed. Women with CVD were less likely than men to be seen by a cardiologist (Exhibits 6B.1, 6B.26, 6C.1). Women were also less likely than men to undergo specific cardiac testing for HF (Exhibits 6B.10–6B.13) or to undergo or be referred for an angiography following an AMI (Exhibit 6C.11). Additionally, women who had an AMI had higher hospital readmission rates than men (Exhibit 6C.14). Following an AMI, women had higher unadjusted mortality rates than men, but this sex difference disappeared after adjusting for risk (Exhibit 6C.15).

**Quality of care for CVD varies across the province** (Exhibits 6B.3, 6B.7, 6B.14, 6B.28, 6C.4, 6C.7, 6C.13, 6C.19, 6C.25, 6D.7, 6D.9, 6D.13, 6D.15, 6D.18, 6D.20,



6D.22, 6D.25, 6D.26, 6D.28). For example, less than one percent of patients in the Toronto Central Local Health Integration Network (LHIN) were under the sole care of a general practitioner/family physician during a hospitalization for AMI compared to 36 percent of patients in the North West LHIN (Exhibit 6C.4), which reflects regional differences in the types of physicians providing in-hospital care, as well as access to cardiologists. While most measures of medication management for HF and AMI did not differ by sex or income, there were regional variations in use of these medications (Exhibits 6B.7, 6C.7). While development and implementation of the Ontario Stroke System has improved stroke care in the province, regional variations have persisted for many indicators of stroke care including access to stroke units (Exhibit 6D.18), medication management (Exhibit 6D.9), referral to stroke prevention clinics (Exhibit 6D.26), and access to rehabilitation (Exhibit 6D.28). There is a need to develop, implement, and evaluate innovative interventions to standardize care across the province, taking into account regional needs and differences.

## ACCESS TO HEALTH CARE SERVICES (CHAPTER 7)

Universal access to health care services is a fundamental principle of the Canadian health care system. While the system is based on the premise of equal access for all people, there are a wide range of constraining, enabling, and need-related factors that affect access to care. This chapter examined access to health care in Ontario and assessed how access to care differed between diverse population groups.

**While the overwhelming majority of Ontarians have a primary care physician, many do not.** Based on survey data collected between 2006 and 2008, 93 percent of Ontarians reported having a primary care doctor. However, some groups had worse access to primary care: only 85 percent of recent immigrants (less than five years in Canada) (Exhibit 7A.4) and 87 percent of men living in low-income neighbourhoods (Exhibit 7A.1)

reported having a primary care physician. There was also regional variation in the percentage of adults who reported having a primary care doctor (Exhibit 7A.5).

**Women and men who have a regular primary care provider report difficulty getting care when they needed it.** Immigrants who had lived in Canada for less than 10 years (Exhibits 7A.9, 7A.16, 7A.21, 7A.25, 7A.28), certain racial/ethnic groups (Exhibits 7A.8, 7A.15, 7A.20, 7A.24, 7A.27), and those who spoke a language other than English or French most often at home (Exhibits 7A.10, 7A.17, 7A.26, 7A.29) were more likely to report difficulty accessing primary care and were less satisfied with their experiences getting care. In addition, one in four women and men who required specialist care reported difficulty accessing this care (Exhibit 7C.1). Immigrants who had lived in Canada less than ten years (Exhibit 7C.3), as well as East and Southeast Asian and Aboriginal adults (living off-reserve) (Exhibit 7C.2), were more likely to report difficulty accessing specialized services than their counterparts. Access to specialized services also varied across Local Health Integration Networks (LHINs) (Exhibits 7C.4, 7C.6, 7C.9). Finally, unmet health care needs were reported more often by women, individuals with lower income (Exhibit 7A.33), immigrants who had lived in the country for less than 10 years, and Aboriginal adults (living off-reserve) (Exhibit 7A.35).

**Access to dental care, a service not covered by the Ontario Health Insurance Plan (OHIP), is a problem for many Ontarians,** particularly for low-income women and men, older adults, immigrants, and certain racial/ethnic groups. Oral health is an important component of general health and well-being. Poor oral health can lead to systemic infections, and has been associated with chronic diseases (e.g., heart disease) and poor pregnancy outcomes.<sup>69, 70</sup> More than half of lower-income adults had not seen a dentist in the last year compared to one in five higher-income adults (Exhibit 7A.38). The percentage of adults who had not seen a dentist in the previous 12 months also varied significantly by time since immigration (Exhibit 7A.40).

About half of women who had been living in Canada for less than 10 years reported not having seen a dentist in the previous 12 months. Access to dental care also varied across racial/ethnic groups (Exhibit 7A.39).

**There was substantial variation in hospitalization rates for the four Ambulatory Care Sensitive Conditions (ACSCs) examined.**

**There were 51,930 hospital admissions for these conditions in 2006/07.**

- If people from all income groups had the same admissions rates as those from the highest-income group, there would have been **15,709 (30.3 percent) fewer** hospitalizations for ACSCs.
- If all LHINs had achieved the same admissions rates as the LHINs with the lowest rates, there would have been **15,482 (29.8 percent) fewer** hospitalizations for ACSCs.

**Low income is associated with higher rates of potentially avoidable hospitalizations.** Effective primary care—which provides opportunities for chronic disease prevention, disease management, and patient education—is associated with reduced hospitalization rates for many chronic conditions. High hospitalization rates for these ambulatory care sensitive conditions (ACSCs) suggest suboptimal chronic disease management.<sup>71</sup> This chapter examined hospitalization rates for four ACSCs: heart failure (HF), chronic obstructive pulmonary disease (COPD), asthma, and diabetes. For all four ACSCs, women and men living in the lowest-income neighbourhoods were significantly more likely to be hospitalized than those living in the highest-income neighbourhoods (Exhibits 7B.5, 7B.9, 7B.13, 7B.17). For example, women and men from the lowest-income neighbourhoods were over 50 percent more likely to be hospitalized for HF than those from the highest-income neighbourhoods. In Canada, it has been estimated that two-fifths of costs for acute care hospitalizations due to ACSCs could be avoided by narrowing income-related inequities.<sup>4</sup> Potentially avoidable hospitalization rates also varied by sex; women had higher rates of hospitalization for asthma

than men, while men were more likely than women to be hospitalized for HF, COPD, and diabetes.

**Most potentially avoidable hospitalizations for HF and COPD occur in people aged 65 and older.**

Hospitalization rates for ACSCs increased significantly with age for HF, COPD, and diabetes (Exhibits 7B.6, 7B.10, 7B.14, 7B.18); age variation was most pronounced among women and men hospitalized for HF or COPD. Among women, 90 percent of HF admissions (Exhibit 7B.7), 78 percent of COPD admissions (Exhibit 7B.11), and 50 percent of diabetes admissions (Exhibit 7B.19) occurred among those aged 65 and older. Among men, 81 percent of HF admissions, 80 percent of COPD admissions, and 42 percent of diabetes admissions occurred among those aged 65 and older. Conversely, most asthma admissions occurred among those under age 65 (Exhibit 7B.15).

## MUSCULOSKELETAL (MSK) CONDITIONS (CHAPTER 8)

MSK conditions include diseases that affect the bones, ligaments, tendons, muscles, and joints. MSK conditions limit physical functioning, impose significant pain and suffering, and are the number one cause of disability for Ontarians. In this chapter, we looked at MSK conditions as a group, as well as at the most common MSK conditions: osteoarthritis, rheumatoid arthritis, osteoporosis, and back pain.

**MSK conditions are a significant cause of pain and disability in Ontario.** MSK conditions affect over one-third of Ontario adults (Figure 4 in the MSK chapter). These conditions have a considerable impact on functional status: half of women and men who reported having an MSK condition reported limitations in their activities at home, work, or school (Exhibit 8A.6). While proper management can lessen their effects, MSK conditions are often suboptimally managed. Management of these conditions is complicated by high rates of comorbidity (Exhibit 8A.1) and depression (Exhibits 8A.4), which can impact the management of both the MSK condition and coexisting illnesses.



**Women are disproportionately affected by MSK conditions.** Women were more likely than men to have an MSK condition. Moreover, among those with an MSK condition, women were more likely than men to have a disability (Exhibit 8A.9). Not unexpectedly, the prevalence of MSK conditions increased with age (Exhibits 8B.2, 8B.12, 8C.1, 8D.2). Women aged 65 and older with an MSK conditions had the highest rates of disability (Exhibit 8A.11).

**Low-income adults have a high prevalence of MSK conditions and encounter barriers to accessing needed care.** Low-income women and men were more likely to report having MSK conditions than those with higher incomes (Exhibits 8B.1, 8B.11, 8D.1); they were also more likely to report disability (Exhibit 8A.10). These income disparities may indicate differential risk for developing these conditions (e.g., due to exposure to occupational risk or obesity), differences in disease severity or the availability of social support, or inequities in access to and quality of health care. Low-income adults with MSK conditions had less access to important services that are not covered by universal health insurance. Over one-third of low-income Ontarians under age 65 with an MSK condition did not have prescription drug coverage to offset the cost of needed prescription drugs (Exhibit 8A.37). Half as many lower-income people with an MSK condition visited a physiotherapist or chiropractor in the previous year as those with higher incomes (Exhibit 8A.32).

**Rheumatoid arthritis is a serious MSK condition that is undertreated in Ontario.** Rheumatoid arthritis is a chronic, systemic, autoimmune disease characterized by joint swelling, joint tenderness, and destruction of synovial joints, leading to severe disability and premature mortality.<sup>72-74</sup> An estimated 0.9 percent of Ontarians aged 25 and older had rheumatoid arthritis and the rate among women was twice that among men (Exhibit 8C.1). Only 40 percent of people with rheumatoid arthritis had been seen by a specialist during a one-year period, likely representing a

substantial care gap for these individuals. Adults living in low-income neighbourhoods were less likely to receive care from a specialist than those from higher-income neighbourhoods (Exhibit 8C.2). Among people aged 65 and older with rheumatoid arthritis, many were not receiving currently recommended first line therapy for this condition (Exhibit 8C.4).

**There are substantial gaps in care for osteoporosis.** Within a year of experiencing a low-trauma fracture, only one-third of women and men aged 66 and older received a bone mineral density test to assess for low bone mass and fracture risk or a prescription for an effective bone-sparing agent (Exhibit 8D.6). Even among those for whom treatment was initiated, only 38 percent of those aged 66 and older remained continually on medication one year following first prescription (Exhibit 8D.10).

## DIABETES (CHAPTER 9)

Diabetes is one of the leading causes of blindness,<sup>75</sup> the most common cause of end-stage renal disease in the developed world,<sup>76</sup> and a major cause of cardiovascular complications such as heart attack and stroke.<sup>77, 78</sup> The number of people with diabetes has increased dramatically over the last 20 years.<sup>79-81</sup> This chapter examined the burden of diabetes in Ontario, with a focus on indicators of diabetes care and potential gender, income, and regional disparities.

**Prevalence of diabetes is high and people with diabetes have worse health and functional status than those without diabetes.** Nearly one in ten Ontario adults had been diagnosed with diabetes. People who reported having diabetes were more likely to report being in fair or poor health (Exhibit 9A.7), having limitations in activities of daily living (ADLs) and/or instrumental activities of daily living (IADLs), and multiple chronic conditions (Exhibit 9A.4). This higher burden of illness among people with diabetes increases the complexity of care delivery.

**Sex matters when it comes to diabetes prevalence and complications.** Overall, men were more likely than women to have diabetes (Exhibit 9A.1). Men also had higher rates of diabetes complications than women, including hospitalizations for acute myocardial infarction (AMI), heart failure (HF), and stroke (Exhibits 9E.8, 9E.11); amputations (Exhibit 9E.14); and chronic dialysis (Exhibit 9E.16). While men had higher rates of diabetes and diabetes complications, women with diabetes reported higher rates of comorbidity (at least two additional chronic conditions) (Exhibit 9A.4), depression (Exhibit 9A.5), and disability (Exhibit 9A.8) than men.

**Income matters when it comes to diabetes prevalence and complications.** Lower-income Ontarians had higher rates of diabetes than those with higher incomes (Exhibit 9A.1). Furthermore, among those with diabetes, lower-income adults had worse health and functional status (Exhibits 9A.7, 9A.8) and more diabetes complications (Exhibits 9E.1, 9E.5, 9E.7, 9E.13, 9E.16). Income differences were more pronounced among men for hyper- or hypoglycemic emergencies (Exhibit 9E.1), amputations (Exhibit 9E.13), and end-stage renal disease requiring dialysis (Exhibit 9E.16). For example, among adults with diabetes aged 20 and older, 827 per 100,000 men and 567 per 100,000 women living in the lowest-income neighbourhoods received chronic dialysis compared to 512 per 100,000 men and 421 per 100,000 women living in the highest-income neighbourhoods.

**Diabetes prevalence also varies by race/ethnicity and immigration status.** The prevalence of self-reported diabetes was almost twice as high among Black, Aboriginal (living off-reserve), and South and West Asian and Arab adults compared to White adults. In the Social Determinants of Health and Populations at Risk chapter, the prevalence of diabetes (based on physician diagnosis) was examined among urban-dwelling immigrants, with diabetes prevalence varying greatly by world region of birth (Exhibit 12C.21).

**Performance on many measures varies across the province.** In addition to regional variation in diabetes prevalence (Exhibit 9A.3), we found that where you live

in Ontario matters with respect to the risk of diabetes complications. The highest rates of complications were found in northern and rural areas of the province where access to care is more challenging (Exhibits 9E.4, 9E.9, 9E.15, 9E.18). In addition to regional differences in prevalence, population characteristics and risk factors may have contributed to these findings. The proportion of people with no visits to a primary care physician or specialist within a two-year period varied across Local Health Integration Networks (LHINs) (Exhibit 9B.7).

**Diabetes in pregnancy is associated with higher rates of complications.** Pregestational and gestational diabetes significantly increased the risk of complications for mother and fetus (Exhibits 9F.4, 9F.8). These complications can be largely prevented through optimal control of glucose and blood pressure at the time of conception and during pregnancy. Infants born to women aged 20–29 with pregestational diabetes experienced the highest rates of fetal complications (Exhibit 9F.10), reflecting a need in this group for more targeted pre-pregnancy counselling and better pregnancy care.

**Despite growing evidence on best practices for diabetes, gaps in care persist.** Lower-income women and men with diabetes had more visits to primary care physicians than those with higher incomes (Exhibit 9B.2). However, lower-income women and men with diabetes income were as likely to visit a specialist as those with higher incomes, despite potentially higher need. Additionally, eight percent of men with diabetes living in the lowest-income neighbourhoods did not receive any primary or specialist care within a two-year period (Exhibit 9B.5). Among adults with diabetes, the percentage who received a recommended foot exam from a health professional was suboptimal (Exhibit 9C.4). Rates of eye examination in the two years following diagnosis of diabetes were low in women and men (Exhibit 9C.2). The percentage who reported receiving dental care was also low, particularly for older, lower-income, and less educated groups (Exhibit 9C.5).

## REPRODUCTIVE AND GYNAECOLOGICAL HEALTH (CHAPTER 10)

This chapter focused on the health of women as it specifically relates to their reproductive system. Unlike other POWER chapters that have focused on the differences in care between women and men, this chapter looked predominantly at care provided to women and how it varied by income, education, and where one lives. The issues covered in this chapter span the life course from teenage pregnancy to hysterectomy.

**Ontario is a safe place for women to give birth and babies to be born.** Overall rates of adverse outcomes related to childbirth were low and did not vary by neighbourhood income or average neighbourhood educational attainment (Exhibits 10B.16, 10B.19, 10B.20). Among women who gave birth in an Ontario hospital, 80 percent received prenatal care from obstetricians, 27 percent from general practitioners/family physicians, and six percent from midwives (women may have received care from more than one type of provider) (Exhibit 10A.1).

**Caesarean section rates are high.** Caesarean sections were performed in 28 percent of all hospital deliveries and 23 percent of deliveries among women who had full-term, singleton, vertex presentations. Women who delivered by caesarean section had higher maternal readmission rates than women who delivered vaginally (Exhibits 10C.4, 10C.7). While caesarean sections are necessary in specific clinical situations, in many cases, the use of these interventions involves complex trade-offs between risks and benefits.

**Low income is associated with higher rates of teenage pregnancy and abortion.** The rate of live births to teenage women (aged 15–19) was over five times higher (Exhibit 10B.1) and the induced abortion rate was more than two times higher (Exhibit 10D.1) among women living in the lowest-income neighbourhoods compared to the highest-income neighbourhoods.

**There is regional variation on most measures of gynaecologic and reproductive health.** Across Local Health Integration Networks (LHINs), we observed differences in the type of health care professionals providing prenatal care and attending in-hospital births (Exhibits 10A.2, 10B.5); the use of childbirth interventions (Exhibits 10B.7, 10B.9, 10B.11); maternal and neonatal health outcomes (Exhibits 10B.15, 10B.18); postpartum care (Exhibits 10C.3, 10C.6, 10C.8, 10C.10); abortion rates (Exhibits 10D.4, 10D.8); hysterectomy rates for benign gynaecological conditions (Exhibit 10E.4); and the type of hysterectomy procedure used (Exhibit 10E.6). Part of the regional variation in reproductive care in Ontario may be the result of differences in women's health needs or preferences; however, it is unlikely that these differences explain all the observed variation. Other factors, such as access to care or provider practice patterns, likely contribute to regional variation.

## HIV INFECTION (CHAPTER 11)

The Human Immunodeficiency Virus (HIV) attacks and kills vital white blood cells leading to immune suppression. Left untreated, HIV will lead to premature mortality. However, clinical advances in the last 15 years have resulted in markedly improved survival, functional status, and quality of life for those living with HIV.<sup>82</sup> This chapter addressed access and quality of care issues for women and men living with HIV infection or at risk for HIV infection.

**Women accounted for nearly one-quarter of all new HIV infections.** In 2008, an estimated 4,750 women were living with HIV in Ontario (representing 18 percent of the population living with HIV); most of these women acquired HIV through heterosexual contact (Exhibit 11A.1). Between 2006 and 2008, it was estimated that women who immigrated to Canada from a country where HIV is endemic accounted for 58 percent of all new infections among women, 35 percent were attributed to heterosexual non-endemic exposure, and seven percent were attributed to injection drug use.

(Exhibit 11A.4). Despite the fact that women accounted for only 18 percent of the HIV-positive population in Ontario, approximately one-third of the users of community-based HIV services were women (Exhibits 11B.2, 11B.3), suggesting that women are higher users of community-based services than men.

**Women report lower rates of condom use and riskier injection behaviour than men.** Among those aged 15–49 with multiple sex partners in the past year, women reported lower rates of condom use than men. Younger women and men (aged 15–24) (Exhibit 11A.6), certain racial/ethnic groups (Exhibit 11A.7), and recent immigrants (less than 10 years in Canada) (Exhibit 11A.8) reported higher rates of condom use than their counterparts. Women who inject drugs reported riskier injection behaviours than men (Exhibit 11A.9) and had the highest population-specific incidence of HIV (Exhibit 11A.4).

**People living with HIV have worse health-related quality of life than the general population, especially with respect to mental health.** Among participants in the Ontario HIV Treatment Network Cohort Study, mean physical and mental health summary scores from the Medical Outcomes Survey Short Form 12 varied by educational attainment (Exhibit 11C.5), age (Exhibit 11C.6), and HIV exposure category (Exhibit 11C.7). Overall, women with HIV reported a higher symptom burden than men (Exhibit 11C.8); for example, 45 percent of women with HIV reported being bothered by sadness compared to 31 percent of men with HIV (Exhibit 11C.9).

**A significant proportion of people living with HIV do not receive recommended viral load testing.** Following HIV diagnosis, timely and ongoing viral load testing is necessary in order to track the course of infection. Almost 20 percent of those newly diagnosed with HIV had not had a first viral load test within three months of testing positive; seven percent of women and ten percent of men had not had a viral load test within 12 months of testing positive for HIV (Exhibit 11C.13). HIV-positive women waited longer on average for their first viral load test than men. Furthermore, nearly one in five HIV-positive adults did not undergo viral load

testing at recommended intervals (Exhibit 11C.15), suggesting that many people who are HIV-positive do not receive guideline-concordant health care for their HIV infection on a regular basis.

**The vast majority of pregnant women are screened for HIV and most HIV-positive women received antiretroviral therapy during pregnancy.**

Ninety-five percent of pregnant women in Ontario were screened for HIV in 2009 (Exhibit 11C.1), and over 90 percent of those who tested positive received antiretroviral therapy to prevent mother-to-child transmission (Exhibit 11C.3). The very high testing rates during pregnancy and the dramatic fall in the number of infants born with HIV infection in Ontario indicate important areas where coordinated intervention and clinical practice guidelines have changed care and improved health outcomes.

## SOCIAL DETERMINANTS OF HEALTH AND POPULATIONS AT RISK (CHAPTER 12)

It is well-known that social factors—rather than medical care or health behaviours—are the primary drivers of health and health inequities.<sup>83–88</sup> Furthermore, the social determinants of health, which work through many complex and intertwining pathways, are not evenly distributed across the population. In this chapter, we synthesized prior analyses that examined the health of low-income, ethnic and racial minority, and immigrant populations, and enriched these data by reporting additional indicators of the social determinants of health and immigrant women's health.

**The social determinants of health—the root causes of health inequities—are not evenly distributed throughout Ontario's population.** We found that women, people with lower levels of education (Exhibit 12A.1), certain racial/ethnic groups (Exhibit 12A.3), recent immigrants (Exhibit 12A.4), and linguistic minorities (Exhibit 12A.5) tended to have lower annual household income. Similarly, people with lower levels of education (Exhibit 12A.15) and certain

racial/ethnic groups (Exhibit 12A.16) had lower rates of employment. Recent immigrant women (less than five years in Canada) had lower employment rates than Canadian-born women, but employment rates were similar between immigrant women who had been in Canada for 10 or more years and Canadian-born women (Exhibit 12A.17). Among those aged 65 and older, women were much more likely than men to report lower levels of educational attainment (Exhibit 12A.9). About one-quarter of low-income women and men experienced food insecurity compared to one percent of those with higher income (Exhibit 12A.24). Households headed by single mothers were twice as likely to have lower income as those headed by single fathers (Exhibit 12A.22). The unequal distribution of these social determinants of health—along with many other important social factors that were not examined in this chapter, such as housing, neighbourhood characteristics, racism and discrimination, etc.—contributes to the health inequities observed in Ontario.

**Income-related differences in health and functional status were much greater than income-related differences in quality of care.** Lower-income Ontarians had worse health and functional status (Table 12B.1), more chronic disease risk factors (Table 12B.2), less preventive care (Table 12B.2), and worse health outcomes (Table 12B.5) than those with higher incomes. However, there were fewer and smaller income-related differences in clinical management and quality of care, particularly in acute care settings (Table 12B.4). We found fewer income differences in care when system-level reforms to improve the quality of care were in place, such as for cancer and stroke. Despite the Canadian health care system being based on the premise of equal access for all, income-related disparities in access persist (Table 12B.3). While the majority of Ontarians had a primary care provider, low-income adults were more likely than those with higher incomes to report difficulties accessing care—particularly for urgent, non-emergent health problems (Exhibit 12B.14)—and unmet health care needs

(Exhibit 12B.18). Low-income Ontarians were more likely to be hospitalized for common chronic conditions that can often be managed effectively in primary care (Exhibits 12B.28, 12B.29). Furthermore, low-income adults had less access to important services that are not universally insured (Exhibits 12B.16, 12B.17).

**Race/ethnicity, time since immigration, and languages spoken are associated with differences in health status and access to care.**

In particular, Aboriginal women and men (living off-reserve) were more likely to report worse health and functional status than other ethnic groups. However, members of some racial/ethnic groups had better health and functional status than the White population (Exhibit 12C.1). Consistent with the “healthy immigrant effect,” we found that recent immigrants were less likely than Canadian-born adults to have activity limitations, multiple chronic conditions (Exhibit 12C.2), or adverse birth outcomes (Exhibit 12C.28), while immigrants who had been in Canada for 10 or more years had more similar (or worse) health outcomes than their Canadian-born counterparts. Recent immigrants were also less likely to be overweight or obese or to be current smokers than Canadian-born adults; however, they were more likely to be physically inactive (Exhibit 12C.5). In contrast to the “healthy immigrant” phenomenon, many immigrant groups were found to have higher rates of diabetes compared with the general Ontario population (Exhibit 12C.21). Immigrant women also reported lower rates of cervical cancer screening (Exhibits 12C.24, 12C.25). Access to health care services also varied by race/ethnicity and time since immigration. Recent immigrants were less likely to have a primary care physician, less likely to be satisfied with care, and more likely to report difficulties accessing care compared to those who had been in Canada longer (Exhibits 12C.8, 12C.10, 12C.13). Compared to other racial/ethnic groups, South and West Asian and Arab women were most likely to report difficulties accessing needed services (Exhibit 12C.12). Linguistic minorities reported being in worse health (Exhibit 12C.3) and were



less satisfied with their access to and experience with primary care than their counterparts (Exhibit 12C.11). Efforts to improve health among immigrant and minority populations must take into account the considerable heterogeneity in risk factors, health needs, and cultural practices observed across these diverse groups. Development of culturally-appropriate interventions and models of care that address the specific issues and needs of these communities is essential to reducing health inequities.

## OLDER WOMEN'S HEALTH

Aging is an important women's health issue. Women comprise the majority of the older population and have different patterns of illness and health needs than men. We reported selected indicators from previous POWER Study chapters, as well as new indicators on home care and long-term care. Bringing together and synthesizing findings from across POWER Study chapters allowed us to paint a picture of the health needs of older women so as to inform needed changes in practice and policy.

**Women are disproportionately represented in the older population and have unique needs.** Older women outnumber older men, particularly in the oldest age groups and among those living in long-term care homes.<sup>89, 90</sup> Therefore, even when rates of an event were similar between women and men (or in some cases higher in men than in women), the predominance of women in the older population meant that more women than men in the population experienced the event. Additionally, women and men experience different health needs. Older women were more likely than older men to have multiple chronic conditions, disability, and chronic pain (Exhibits A.4, A.17 in the Older Women's Health report). Older women were more likely than men to use home care services and to report unmet need for these services (Exhibits C.2, C.6).

**Most older adults report modifiable risk factors for developing chronic conditions and their associated complications.** A healthy lifestyle is important for people of all ages, including older adults.

For example, exercise and physical activity can maintain or improve functional status, preserve independence, and prevent falls among older adults.<sup>91, 92</sup> However, the prevalence of physical inactivity, inadequate fruit and vegetable intake, and being overweight or obese was high among older adults, and less than half of adults aged 65 and older (45 percent) reported taking steps to improve their health in the past year (Exhibit A.13). Additionally, many older adults had low incomes, which are strongly associated with poor health, functional limitations, and barriers to accessing care. While the prevalence of these risk factors was high for everyone, there were important differences related to sex and income. For example, older women were more likely than older men to report physical inactivity (Exhibit A.10) and low income (Exhibit A.8). Among older women, those with lower household income were more likely to report health behaviours that increase the risk of chronic disease compared to those with higher household income (Exhibit A.11). Additionally, poor oral health in older adults is associated with poor health outcomes, malnutrition, and chronic pain,<sup>69</sup> but close to half of older adults (45 percent) did not visit a dentist in the past 12 months; this percentage rose in the older age group (to 55 percent of women and 54 percent of men aged 80 and older) (Exhibit A.20).

**Among those receiving home care, there are opportunities to improve care for both women and men.** An important goal of home care is to optimize independence and to decrease the rate of both physical and cognitive decline. In unadjusted analyses among home care clients, women were more likely than men to experience inadequate pain control (Exhibit C.10) and injuries (Exhibit C.13). Meanwhile, men were more likely than women to experience a new ADL impairment or one that failed to improve (Exhibit C.7). Men were also more likely to experience a new cognitive impairment or one that failed to improve (Exhibit C.12). Women aged 65–79 were more likely to have depressed mood than men, but these differences narrowed among those aged 80 and older (Exhibit

C.11). These differences were eliminated with risk adjustment, indicating that women and men receiving home care have different health needs, but experience similar health outcomes when these differences are taken into account. Therefore, gender-sensitive interventions that account for differences in these underlying factors may be needed to improve health outcomes in the home care setting.

**There are also many opportunities to improve care in long-term care homes.** Potentially preventable emergency department visits were common among long-term care residents aged 65 and older, with men having higher rates than women (27 emergency department visits per 100 men per year versus 19 emergency department visits per 100 women per year) (Exhibit C.15). Improvements to chronic disease management in long-term care could

help prevent some of these emergency department visits. Antipsychotics and anti-anxiety or hypnotic drugs were frequently prescribed to long-term care residents aged 65 and older: antipsychotic use without a diagnosis of psychosis was recorded on almost a third of assessments (Exhibit C.23) and use of anti-anxiety or hypnotic drugs was recorded on almost a quarter (Exhibit C.24). Further, nearly one in five assessments among long-term care residents showed that the resident was in daily physical restraints (Exhibit C.22). This represents an opportunity for intervention, as physical restraints have been linked to an increased risk of falls, behavioural problems, and even death.<sup>93, 94</sup> Given that women outnumber men in long-term care homes, there are far more women than men affected by all of these issues, which makes these issues a particular concern for older women.





## REFERENCE LIST

- (1) Ministry of Health and Long-Term Care. The Excellent Care for All Act, 2010. Accessed May 25, 2012 at [http://www.health.gov.on.ca/en/ms/ecfa/pro/legislation/ecfa\\_notice.aspx](http://www.health.gov.on.ca/en/ms/ecfa/pro/legislation/ecfa_notice.aspx).
- (2) Ministry of Health and Long-Term Care. Ontario's action plan for health care. Accessed February 8, 2012 at [http://health.gov.on.ca/en/ms/ecfa/healthy\\_change/docs/rep\\_healthychange.pdf](http://health.gov.on.ca/en/ms/ecfa/healthy_change/docs/rep_healthychange.pdf).
- (3) Ontario Health Quality Council. 2006 First yearly report. Toronto: Ontario Health Quality Council, 2006.
- (4) Canadian Institute for Health Information. Hospitalization disparities by socio-economic status for males and females. Ottawa: Canadian Institute for Health Information, October 2010.
- (5) Keon WJ, Pépin L. A healthy, productive Canada: a determinant of health approach. Final report of the Senate Subcommittee on Population Health. Ottawa: Standing Senate Committee on Social Affairs, Science and Technology, 2009.
- (6) Patra J, Popova S, Rehm J, Bondy S, Flint R, Giesbrecht N. Reconciling freedom and social justice: a challenge for the future. Quebec: Government of Quebec, 2008.
- (7) Bierman AS, Clancy CM. Making capitated Medicare work for women: policy and research challenges. *Women's Health Issues* 2000;10(2):59-69.
- (8) Clancy CM, Bierman AS. Quality and outcomes of care for older women with chronic disease. *Women's Health Issues* 2000;10(4):178-91.
- (9) Barr VJ, Robinson S, Marin-Link B, Underhill L, Dotts A, Ravensdale D, et al. The expanded Chronic Care Model: an integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hosp Q* 2003;7(1):73-82.
- (10) Jha AK, Perlin JB, Kizer KW, Dudley RA. Effect of the transformation of the veterans affairs health care system on the quality of care. *N Engl J Med* 2003;348(22):2218-27.
- (11) Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood)* 2001;20(6):64-78.
- (12) The Champlain Cardiovascular Disease Prevention Network. Accessed June 7, 2012 at <http://www.ccpnetwork.ca>.
- (13) Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346(6):393-403.
- (14) Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001;344(18):1343-50.
- (15) Ministry of Health Promotion. Creating a smoke-free Ontario. Accessed May 25, 2012 at [http://www.mhp.gov.on.ca/en/smoke-free/SFO\\_Backgrounder.pdf](http://www.mhp.gov.on.ca/en/smoke-free/SFO_Backgrounder.pdf).
- (16) Ottawa Council on Smoking and Health. Smoke-free Ottawa strategy: Ottawa Council on Smoking and Health, 2008.
- (17) Bird CE, Rieker PP. Gender and health: the effects of constrained choices and social policies. New York: Cambridge University Press, 2008.
- (18) Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;83(3):457-502.
- (19) Russell GM, Dahrouge S, Hogg W, Geneau R, Muldoon L, Tuna M. Managing chronic disease in Ontario primary care: the impact of organizational factors. *Annals of Family Medicine* 2009;7(4):309-18.
- (20) Glazier RH, Zagorski BM, Rayner J. Comparison of primary care models in Ontario by demographics, case mix and emergency department use, 2008/09 to 2009/10. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences, 2012.
- (21) Doran T, Fullwood C, Gravelle H, Reeves D, Kontopantelis E, Hiroeh U, et al. Pay-for-performance programs in family practices in the United Kingdom. *N Engl J Med* 2006;355(4):375-84.
- (22) U.S. Department of Health and Human Services Office of Minority Health. National standards on culturally and linguistically appropriate services (CLAS). Accessed March 8, 2010 at <http://raceandhealth.hhs.gov/templates/browse.aspx?lvl=2&lvlID=15>.

- (23) Rosenberg MW, Wilson K. Gender, poverty and location: how much difference do they make in the geography of health inequalities? *Soc Sci Med* 2000;51(2):275-87.
- (24) Trypuc J. Women's health. In: Bolaria B, Dickenson H, editors. *Health, illness and health care in Canada* (2nd ed.). Toronto: Harcourt Brace Canada, 1994.
- (25) Doyal L. Gender equity in health: debates and dilemmas. *Soc Sci Med* 2000;51(6):931-39.
- (26) Women's Health in Women's Hands Community Health Centre. Accessed April 18, 2005 at <http://www.whiwh.com>.
- (27) Ministry of Health and Long-Term Care. Health care connect. Accessed March 19, 2010 at <http://www.health.gov.on.ca/en/ms/healthcareconnect/public/default.aspx>.
- (28) Rose KD, Ross JS, Horwitz LI. Advanced access scheduling outcomes: a systematic review. *Arch Intern Med* 2011;171(13):1150-59.
- (29) Murray M, Berwick DM. Advanced access: reducing waiting and delays in primary care. *JAMA* 2003;289(8):1035-40.
- (30) Dickson L, Cameron C, Hawker G, Ratansi A, Radziunas I, Bansod V, et al. Development of a multidisciplinary osteoporosis telehealth program. *Telemed J E Health* 2008;14(5):473-78.
- (31) Ontario Telemedicine Network (OTN). About OTN. Accessed March 19, 2010 at <http://www.otn.ca/en/otn/about-otn>.
- (32) Sitzia J, Wood N. Patient satisfaction: a review of issues and concepts. *Soc Sci Med* 1997;45(12):1829-43.
- (33) Hsieh MO, Kagle JD. Understanding patient satisfaction and dissatisfaction with health care. *Health Soc Work* 1991;16(4):281-90.
- (34) Agency for Healthcare Research and Quality. National healthcare quality report, 2005. Rockville, MD: Agency for Healthcare Research and Quality, 2005.
- (35) Asanin J, Wilson K. "I spent nine years looking for a doctor": exploring access to health care among immigrants in Mississauga, Ontario, Canada. *Soc Sci Med* 2008;66(6):1271-83.
- (36) Brathwaite AC, Williams CC. Childbirth experiences of professional Chinese Canadian women. *J Obstet Gynecol Neonatal Nurs* 2004;33(6):748-55.
- (37) Dodgson JE, Struthers R. Indigenous women's voices: marginalization and health. *J Transcult Nurs* 2005;16(4):339-46.
- (38) Meana M, Bunston T, George U, Wells L, Rosser W. Older immigrant Tamil women and their doctors: attitudes toward breast cancer screening. *J Immigr Health* 2001;3(1):5-13.
- (39) Meana M, Bunston T, George U, Wells L, Rosser W. Influences on breast cancer screening behaviors in Tamil immigrant women 50 years old and over. *Ethn Health* 2001;6(3-4):179-88.
- (40) Steven D, Fitch M, Dhaliwal H, Kirk-Gardner R, Sevean P, Jamieson J, et al. Knowledge, attitudes, beliefs, and practices regarding breast and cervical cancer screening in selected ethnocultural groups in Northwestern Ontario. *Oncol Nurs Forum* 2004;31(2):305-11.
- (41) Wong YL, Tsang AK. When Asian immigrant women speak: from mental health to strategies of being. *Am J Orthopsychiatry* 2004;74(4):456-66.
- (42) Institute of Medicine. *Crossing the quality chasm: a new health system for the 21st century*. Washington, DC: National Academy Press, 2001.
- (43) Naylor M, Brooten D, Campbell R, Jacobsen B, Mezey M, Pauly M, et al. Comprehensive discharge planning and home follow up of hospitalized elders: a randomized clinical trial. *JAMA* 1999;281(7):613-20.
- (44) Naylor M, Brooten D, Campbell R, Maislin G, McCauley K, Schwartz J. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc* 2004;52(5):675-84.
- (45) Coleman EA, Parry C, Chalmers S, Min SJ. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006;166(17):1822-28.
- (46) Cancer Care Ontario. Cancer System Quality Index. Accessed May 18, 2010 at <http://www.cancercare.on.ca/cms/One.aspx?portalId=1377&pageId=8813>.

- (47) Ontario Stroke System (OSS) Stroke Evaluation Advisory Committee. Ontario stroke evaluation report 2006: technical report. Ottawa: Canadian Stroke Network and the Heart and Stroke Foundation of Ontario, 2007.
- (48) Lindsay MP, Kapral MK, Gladstone D, Holloway R, Tu JV, Laupacis A, et al. The Canadian Stroke Quality of Care Study: establishing indicators for optimal acute stroke care. *CMAJ* 2005;172(3):363-65.
- (49) Provincial Stroke Steering Committee. Ontario Stroke System Strategic Plan: 2007-2012. Accessed June 19, 2012 at [http://www.heartandstroke.on.ca/atf/cf/%7B33C6FA68-B56B-4760-ABC6-D85B2D02EE71%7D/Strategic\\_Plan\\_\(Approved\)\\_June\\_19\\_2007.pdf](http://www.heartandstroke.on.ca/atf/cf/%7B33C6FA68-B56B-4760-ABC6-D85B2D02EE71%7D/Strategic_Plan_(Approved)_June_19_2007.pdf).
- (50) Ministry of Health and Long Term Care. Ontario Drug Benefit (ODB) Program. Accessed June 19, 2012 at: <http://www.health.gov.on.ca/en/public/programs/drugs/programs/odb/odb.aspx>.
- (51) Kapral MK, Hall RE, Silver FL, Lindsay MP, Richards J, Robertson AC, et al. Registry of the Canadian Stroke Network. Report on the 2004/05 Ontario stroke audit. Toronto: Institute for Clinical Evaluative Sciences, 2009.
- (52) Ministry of Health and Long-Term Care. Health equity impact assessment. Accessed June 19, 2012 at <http://www.health.gov.on.ca/en/pro/programs/hea/>.
- (53) The Wellesley Institute. Health equity roadmap. Accessed June 19, 2012 at <http://www.wellesleyinstitute.com/publication/health-equity-roadmap-2/>.
- (54) Glazier RH, Booth GL, Gozdyra P, Creatore MI, Tynan A-M. Neighbourhood environments and resources for healthy living: a focus on diabetes in Toronto. Toronto: Institute for Clinical Evaluative Sciences, 2007.
- (55) Krzyzanowska MK, Barbera L, Elit L, Razzaq A, Saskin R, Yeritsyan N, et al. Identifying population-level indicators to measure the quality of cancer care for women. *Int J Qual Health C* 2011;23(5):554-64.
- (56) Cancer Care Ontario. Screening for life. Accessed June 19, 2012 at <https://www.cancercare.on.ca/pcs/screening/>.
- (57) Elit L, Krzyzanowska M, Saskin R, Barbera L, Razzaq A, Lofters A, et al. Sociodemographic factors associated with cervical cancer screening and follow-up of abnormal results. *Can Fam Physician* 2012;58(1):e22-e31.
- (58) The Provincial Cancer Prevention and Screening Council. Report on Cancer 2020: a call for renewed action on cancer prevention and detection in Ontario. Toronto: Canadian Cancer Society and Cancer Care Ontario, 2006.
- (59) Barbera L, Elit L, Krzyzanowska M, Saskin R, Bierman AS. End of life care for women with gynecologic cancers. *Gynecol Oncol* 2010;118(2):196-201.
- (60) Krzyzanowska MK, Barbera L, Elit L, Kwon J, Lofters A, Saskin R, et al. Cancer. In: Bierman AS, editor. Project for an Ontario women's health evidence-based report: volume 1. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences, 2009.
- (61) Krzyzanowska MK, Regan MM, Powell M, Earle CC, Weeks JC. Impact of patient age and comorbidity on surgeon versus oncologist preferences for adjuvant chemotherapy for stage III colon cancer. *J Am Col Surgeons* 2009;208(2):202-09.
- (62) Sargent DJ, Goldberg RM, Jacobson SD, Macdonald JS, Labianca R, Haller DG, et al. A pooled analysis of adjuvant chemotherapy for resected colon cancer in elderly patients. *N Engl J Med* 2001;345(15):1091-97.
- (63) Adams H, Thibault P, Davidson N, Simmonds M, Velly A, Sullivan MJ. Depression augments activity-related pain in women but not in men with chronic musculoskeletal conditions. *Pain Res Manag* 2008;13(3):236-42.
- (64) Lin E, Diaz-Granados N, Stewart DE, Bierman AS. Postdischarge care for depression in Ontario. *Can J Psychiat* 2011;56(8):481-89.
- (65) Manuel D, Leung M, Nguyen K, Tanuseputro P, Johansen H. Burden of cardiovascular disease in Canada. *Can J Cardiol* 2003;9(9):997-1004.
- (66) Statistics Canada. Table 102-0561 - Leading causes of death, total population, by age group and sex, Canada, annual, CANSIM (database). Accessed April 26, 2012 at <http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&searchTypeByValue=1&id=1020561>
- (67) Tu JV, Nardi L, Fang J, Liu J, Khalid L, Johansen H. National trends in rates of death and hospital admissions related to acute myocardial infarction, heart failure and stroke, 1994-2004. *CMAJ* 2009;180(13):E118-E25.

- (68) Kapral MK, Degani N, Hall R, Fang J, Saposnik G, Richards J, et al. Gender Differences in stroke care and outcomes in Ontario. *Women Health* 2011;21(2):171-76.
- (69) Bailey R, Gueldner S, Ledikwe J, Smiciklas-Wright H. The oral health of older adults: an interdisciplinary mandate. *J Gerontol Nurs* 2005;7(31):11-17.
- (70) U.S. Department of Health and Human Services. Oral health in America: a report of the surgeon general. Rockville: National Institute of Dental and Craniofacial Research, National Institute of Health, 2000.
- (71) Caminal J, Starfield B, Sanchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. *Eur J Public Health* 2004;14(3):246-51.
- (72) Isomaki H. Long-term outcome of rheumatoid arthritis. *Scand J Rheumatol Suppl* 1992;95:3-8.
- (73) Mitchell DM, Spitz PW, Young DY, Bloch DA, McShane DJ, Fries JF. Survival, prognosis, and causes of death in rheumatoid arthritis. *Arthritis Rheum* 1986;29(6):706-14.
- (74) Pincus T, Callahan LF, Sale WG, Brooks AL, Payne LE, Vaughn WK. Severe functional declines, work disability, and increased mortality in seventy-five rheumatoid arthritis patients studied over nine years. *Arthritis Rheum* 1984;27(8):864-72.
- (75) Congdon NG, Friedman DS, Lietman T. Important causes of visual impairment in the world today. *JAMA* 2003;290(15):2057-60.
- (76) Atkins RC. The epidemiology of chronic kidney disease. *Kidney Int* 2005;67(Suppl 94):S14-S18.
- (77) Barzilay JI, Spiekerman CF, Kuller LH, Burke GL, Bittner V, Gottdiener JS, et al. Prevalence of clinical and isolated subclinical cardiovascular disease in older adults with glucose disorders: the Cardiovascular Health Study. *Diabetes Care* 2001;24(7):1233-39.
- (78) Tavani A, Bertuzzi M, Gallus S, Negri E, La Vecchia C. Diabetes mellitus as a contributor to the risk of acute myocardial infarction. *J Clin Epidemiol* 2002;55(11):1082-87.
- (79) Gregg EW, Cadwell BL, Cheng YJ, Cowie CC, Williams DE, Geiss L, et al. Trends in the prevalence and ratio of diagnosed to undiagnosed diabetes according to obesity levels in the U.S. *Diabetes Care* 2004;27(12):2806-12.
- (80) King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care* 1998;21(9):1414-31.
- (81) Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27(5):1047-53.
- (82) Mocroft A, Ledergerber B, Katlama C, Kirk O, Reiss P, d'Arminio Monforte A, et al. Decline in the AIDS and death rates in the EuroSIDA study: an observational study. *Lancet* 2003;362(9377):22-29.
- (83) Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization, 2008.
- (84) Marmot M, Allen J, Goldblatt P, Boyce T, McNeish D, Grady M, et al. Fair society, healthy lives: The Marmot Review. London, UK: University College London, 2010.
- (85) Mikkonen J, Raphael D. Social determinants of health: the Canadian facts. Toronto: York University School of Health Policy and Management, 2010.
- (86) National Collaborating Centre for Determinants of Health. Integrating social determinants of health and health equity into Canadian public health practice: environmental scan 2010. Antigonish, NS: St. Francis Xavier University, 2010.
- (87) Raphael D. Escaping from the phantom zone: social determinants of health, public health units and public policy in Canada. *Health Promo Int* 2009;24(2):193-98.
- (88) Closing the gap: policy into practice on social determinants of health. A discussion paper. World Conference on Social Determinants of Health; October 19-21, 2011; Rio de Janeiro.
- (89) Bronskill SE, Carter MW, Costa AP, Esensoy AV, Gill SS, Gruneir A, et al. Aging in Ontario: an ICES chartbook of health service use by older adults. Toronto: Institute for Clinical Evaluative Sciences, 2010.

- (90) Canadian Union of Public Employees. Residential long-term care in Canada: our vision for better seniors' care - summary. Ottawa: Canadian Union of Public Employees, 2009.
- (91) Paterson DH, Warburton DE. Physical activity and functional limitations in older adults: a systematic review related to Canada's Physical Activity Guidelines. *Int J Behav Nutr Phys Act* 2010;7:38.
- (92) Taylor AH, Cable NT, Faulkner G, Hillsdon M, Narici M, Van Der Bij AK. Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *J Sports Sci* 2004;22(8):703-25.
- (93) Miles SH, Irvine P. Deaths caused by physical restraints. *Gerontologist* 1992;32(6):762-6.
- (94) Capezuti E, Evans L, Strumpf N, Maislin G. Physical restraint use and falls in nursing home residents. *J Am Geriatr Soc* 1996;44(6):627-33.





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