

An aerial photograph of a suburban landscape. In the foreground, there are green and brown agricultural fields, a winding river, and a line of trees. In the background, a dense suburban neighborhood with houses and commercial buildings is visible under a clear sky.

Cancer Care Ontario
Action Cancer Ontario

2015

Prevention System Quality Index

An inaugural report evaluating Ontario's efforts in cancer prevention

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Foreword

The *2015 Prevention System Quality Index (PSQI)* report begins Cancer Care Ontario's (CCO's) annual monitoring and evaluation of the cancer prevention system in Ontario. The PSQI reports on the effects of system-level policies and programs in Ontario, which encompass all large-scale initiatives taking place across the province. The PSQI identifies achievements, as well as gaps at the system level to encourage system improvement.

This focus on system-level policies and programs stems from evidence showing that healthy public policy and community-wide programs facilitating healthier individual choices are more effective in reducing the prevalence of modifiable risk factors at a population level than trying to change behaviours one person at a time. It also recognizes that all levels of government, a range of government ministries and divisions, policy-makers, decision-makers and sectors have a role in influencing cancer prevention.

Four of the seven risk domains that CCO has chosen to examine — tobacco use, excess alcohol consumption, physical inactivity and unhealthy eating — are shared with major chronic diseases other than cancer. Cancer, cardiovascular disease, chronic respiratory disease and diabetes are responsible for two-thirds of all deaths in Ontario, so targeting their common risk factors has the potential to improve overall health in Ontario. Research has shown that at least 50 per cent of all cancer cases can be prevented

through the elimination of modifiable risk factors, such as tobacco use, excess alcohol consumption, physical inactivity and unhealthy eating, as well as harmful environmental and occupational exposures, including pollution and ultraviolet radiation. Ontario's organized cancer screening programs also play an important role in the prevention of cervical and some colorectal cancers and the early detection of breast cancer.

The indicators in this report measure the system-level effects of these risk factors and exposures, which were selected based primarily on current data availability and validity, followed by a summary of current policies, programs and implementers that have a role in influencing cancer prevention in Ontario. In future PSQI reports, new indicators will likely be developed as opportunities for enhancements

through structured consultation with partners and stakeholders emerge, and selection criteria are applied.

The PSQI seeks to build on existing population health monitoring of individual cancer risk factors, and increase attention on the system-level policies and programs that influence cancer prevention in Ontario. By creating a single resource for policy-makers, planners and public health and health professionals that provides information on a range of cancer risk factors and exposures, the PSQI supports the development of policies and broad-scale programs that could make the healthy choice the easier choice for Ontarians.

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Cancer Care Ontario

Healthy public policy and community-wide programs facilitating healthier individual choices are more effective in reducing the prevalence of modifiable risk factors at a population level than trying to change behaviours one person at a time.

Table of contents

Foreword	3	Alcohol programs and program implementers in Ontario	30	Ultraviolet radiation	54
Index of tables and figures	5	Discussion and future directions	31	Tanning bed use	54
Highlights	6			Ultraviolet radiation policies and policy implementers in Ontario	56
Introduction	10	Healthy eating	32	Ultraviolet radiation programs and program implementers in Ontario	56
The need for improved cancer prevention	11	Household food insecurity	33	Discussion and future directions	57
Cancer Care Ontario's Prevention System Quality Index	12	Cost of a Nutritious Food Basket	37		
The PSQI framework	13	Healthy eating policies and policy implementers in Ontario	37	Cancer screening	58
PSQI indicators	14	Healthy eating programs and program implementers in Ontario	38	Breast cancer screening participation rate	58
About this report	15	Discussion and future directions	39	Cervical cancer screening participation rate	60
				Colorectal cancer screening overdue rate	60
Tobacco	16	Physical activity	40	Regional variation in cancer screening participation rates	62
Tax as a percentage of tobacco retail price	17	Physical education specialists in schools	41	Cancer screening programs and program implementers in Ontario	62
Physician-led smoking cessation counselling	18	Enrolment in health and physical education	45	Screening correspondence	64
Exposure to second-hand smoke	20	Physical activity policies and policy implementers in Ontario	46	Physician reports	64
Comprehensive tobacco control	22	Physical activity programs and program implementers in Ontario	47	Under-/never-screened populations	64
Tobacco policies and policy implementers in Ontario	22	Discussion and future directions	48	Discussion and future directions	65
Tobacco programs and program implementers in Ontario	22				
Discussion and future directions	23	Environment	50	Conclusion	66
		Air Quality Index exceedance	51	References	68
Alcohol	24	Outdoor air pollution policies and policy implementers in Ontario	52		
Minimum retail price of alcohol	25	Outdoor air pollution programs and program implementers in Ontario	53		
Publicly owned and run off-premise alcohol retail outlets	26	Discussion and future directions	53		
Alcohol outlet density (on- and off-premise)	28				
Alcohol policies and policy implementers in Ontario	28				

Index of tables and figures

FIGURE 1. Percentage of Ontario adults with selected modifiable risk factors, 2003–2012	11	FIGURE 7. Number of alcohol outlets for every 10,000 people aged 15+ in Ontario, overall and by premise type, by public health unit, October 2014	29	FIGURE 14. Trend in percentage of days per year with Air Quality Index exceedance (readings > 49) for 43 locations in Ontario, 2002–2012	52
BOX 1. Healthy public policy: The North Karelia Project	12	FIGURE 8. Trends in the percentage of Ontario households that were food insecure, by level of food insecurity, 2005–2013	33	FIGURE 15. Percentage of middle and high school students who reported using a tanning bed in the previous years, overall and by grade, 2012 and 2014	55
FIGURE 2. Schematic model of the framework for the Prevention System Quality Index	14	FIGURE 9. Percentage of Ontario households that are food insecure, overall and by public health unit, 2011–2013 combined	34	FIGURE 16. Percentage of Ontario screen-eligible women, aged 50–74, who completed at least one mammogram within a two-year period, overall and by public health unit, 2012–2013	59
TABLE 1. Domains and indicators belonging to the Prevention System Quality Index	15	FIGURE 10. Average weekly cost of a Nutritious Food Basket, by public health unit, Ontario, 2014	36	FIGURE 17. Percentage of Ontario screen-eligible women, aged 21–69, who completed at least one Pap test in a three-year period, overall and by public health unit, 2011–2013	61
TABLE 2. Tobacco taxes as a percentage of total retail price per carton of 200 cigarettes, by province, June 2014	17	BOX 2. Active transportation	41	FIGURE 18. Percentage of Ontario screen-eligible individuals, aged 50–74, who are overdue for colorectal screening, overall and by public health unit, 2013	63
TABLE 3. Percentage of adult smokers (aged 18+) in Ontario who had a physician consult for smoking cessation, 2008–2013	18	FIGURE 11. Proportion of publicly funded elementary and secondary schools in Ontario with specialist teachers assigned to teach health and physical education, 2006/2007 school year to 2012/2013 school year	42	TABLE 5. Ontario prevention system quality according to Prevention System Quality Index indicators	67
FIGURE 3. Percentage of adults smokers (aged 18+) in Ontario who had a physician consult for smoking cessation, overall and by public health unit, 2013	19	FIGURE 12a. Proportion of publicly funded elementary schools in Ontario with specialist teachers assigned to teach health and physical education, overall and by teacher status, by public health unit, 2012/2013 school year	43		
FIGURE 4. Trends in second-hand smoke exposure among non-smoking adults (aged 20+) in Ontario, 2003–2013	20	FIGURE 12b. Proportion of publicly funded secondary schools in Ontario with specialist teachers assigned to teach health and physical education, overall and by teacher status, by public health unit, 2012/2013 school year	44		
FIGURE 5. Trends in second-hand smoke exposure among non-smoking teens (aged 12–19) in Ontario, 2003–2013	21	BOX 3. Physical literacy	45		
TABLE 4. Minimum retail price of alcohol set by the Liquor Control Board of Ontario (LCBO) in Ontario, by alcohol type, 2013–2014	25	FIGURE 13. Percentage of secondary school students in Ontario who earned a credit in one or more physical education courses, by grade, 2005/2006 school year to 2012/2013 school year	46		
FIGURE 6. Percentage of off-premise alcohol retail outlets in Ontario that are publicly owned and run, overall and by public health unit, October 2014	27				

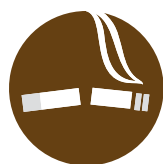


Highlights

Prevention of chronic disease over the long term is often seen as the responsibility of individuals to make healthy lifestyle choices.

There is however strong evidence that system-level initiatives, such as healthy public policy and community-wide programs that facilitate healthier individual choices, are more effective in reducing the prevalence of modifiable risk factors than changing behaviours one person at a time.

This report, for the first time, attempts to measure the effect of cancer prevention system-level initiatives in Ontario by way of 15 indicators spanning seven domains: tobacco, alcohol, healthy eating, physical activity, environment, ultraviolet radiation (UVR) exposure and cancer screening. It also discusses current programs and policies of significance among these domains, and where gaps in data and measurement exist to evaluate progress.



Tobacco

- The percentage of the total tobacco retail price attributed to taxes in Ontario in June 2014 was 66.8 per cent, which is the second-lowest in the country and below the World Health Organization recommendation of 75 per cent.
- Tobacco dependence treatment is a key element of a comprehensive tobacco control strategy, and cessation counselling delivered by primary care physicians is an important form of treatment. Only 9.5 per cent of smokers in Ontario had a physician consult for smoking cessation in 2013, and this percentage varied by public health unit.
- Smoke-free policies and legislation are important levers to reduce exposure to second-hand smoke, a known carcinogen. Exposure to second-hand smoke has decreased in Ontario since 2003, but remains high in public places.
- A strong and dynamic policy agenda at all levels of government and coordinated advocacy efforts by non-governmental organizations have been instrumental in achieving success in tobacco control. The alignment, coordination and well-funded programming infrastructure at local, regional and provincial levels have also played a critical role and will continue to be important to drive down the prevalence of smoking in Ontario.
- Further work should be done to monitor policies and programs that may have important effects on specific sub-populations with a higher prevalence of smoking and priority settings that have a higher exposure to second-hand smoke, such as multi-unit dwellings.



Alcohol

- The minimum retail price for spirits, beer and coolers increased from 2013 to 2014 by approximately 2 per cent across categories, and the minimum retail price for table wine, both imported and from Ontario, increased by 5 cents.
- The percentage of off-premise alcohol retail outlets (i.e., retail alcohol stores) in Ontario that were public in October 2014 was 24.9 per cent, down from 26 per cent the year before, with variation by public health unit.
- In 2014, the overall density of alcohol outlets in Ontario was 17.4 for every 10,000 people aged 15 and older, with variation by public health unit.
- Alcohol policies in Ontario, centred on a government control system, include a partial government retail monopoly, a minimum pricing policy, a pricing structure based on the alcohol content of different beverages and limits on hours of sale. There are current policy trends towards expansion of private alcohol retail sales — Ontario wineries are now sold at farmers' markets and there is strong indication of government support for beer and wine sales in large grocery stores.
- Alcohol programs in Ontario include prevention, counselling services, tools and guidelines supporting health professionals, and community capacity-building.
- Areas for future Prevention System Quality Index (PSQI) reporting include on-premise (e.g., bars, restaurants) minimum pricing, the pricing structure based on alcohol content of different beverages, hours of sale, sales through ferment-on-premise outlets, extended commercial events with special occasion permits, alcohol delivery services and online sales.



Healthy eating

- Food insecurity is the strongest predictor of nutritional inadequacies because it affects the quantity and quality of food that is consumed. In 2013, 12.4 per cent of Ontarian households were food insecure, similar to rates experienced over the 10 years prior.
- The Nutritious Food Basket is a tool that measures the affordability of nutritious food in Ontario; nutritious food needs to be affordable to allow for healthy eating behaviours at a population level. In 2014, the average weekly cost of a Nutritious Food Basket in Ontario was \$195.40 for a reference family of four, translating to an annual cost of \$10,160.80.
- Addressing provincial food insecurity should be a priority so that all Ontarians benefit from policies and programs directed at individual behaviour and the food environment.
- Evaluating additional system-level healthy eating indicators, such as compliance to mandatory menu labelling among large chain restaurants — a currently proposed bill — should be a focus for future PSQI indicator development.



Physical activity

- Physical education specialists are the preferred teachers of physical education in school settings — they may be more effective at promoting active lifestyles during and after the school years. Between 2006/2007 and 2012/2013, the proportion of Ontario schools at the elementary and secondary levels with part-time and full-time specialist teachers increased.
- School-based physical activity interventions, including classes have been demonstrated to be effective in increasing physical activity duration and reducing time spent watching television. Approximately 87.4 per cent of grade 9 students in Ontario in 2012/2013 earned one or more physical education credits, while only 26.2 per cent of grade 12 students earned one or more physical education credits during the same year. These rates were relatively stable over time.
- Physical activity programming is offered by a host of government and non-governmental organizations. School-based policy, such as the health and physical education curriculum, daily physical activity and mandatory credits for secondary school students are important for addressing physical activity among children and youth.
- In future years, the PSQI will endeavor to evaluate indicators relevant to physical activity, expanding the focus beyond school-aged children and youth.



Environment

- The Air Quality Index measures the concentrations of ozone, fine particulate matter, nitrogen dioxide, sulphur dioxide, carbon monoxide and total reduced sulphur compounds from sites across the province and provides a value based on scientifically established air quality standards. The percentage of days per year with an Air Quality Index value exceeding 49, the level at which there may be adverse effects to sensitive populations, has fallen from 11.2 per cent in 2002 to 8.0 per cent in 2012.
- The Ontario government has used a range of province-wide policies and programs targeted at reducing mobile and stationary air pollution sources to address air pollution. In April 2014, Ontario eliminated all coal-fired power generation in the province, making it the first jurisdiction in North America to do so. In July 2014, the Ontario government reintroduced Bill 138, Ending Coal for Cleaner Air Act, 2013. If passed, the act will permanently prohibit coal-fired electricity generation at stand-alone facilities in Ontario.
- Future PSQI reports will aim to include other indicators that monitor the effect of environmental policies and programs that could be introduced to improve the health of Ontarians.



Ultraviolet radiation

- Adolescents and young adults under the age of 30 who use tanning equipment are 75 per cent more likely than never-users to be diagnosed with melanoma. In 2014, 7.0 per cent of middle and high school students reported using a tanning bed in the previous year, a decrease of only 1.0 per cent from 2012.
- System-level efforts to reduce exposure to UVR, a known carcinogen, are currently limited. Policies and programs are currently directed towards legislation banning tanning equipment, shade policies, protection for outdoor workers and public education campaigns.
- Indicators to monitor the development and implementation of shade policies, protection for outdoor workers and mass public education may be reported on in future versions of the PSQI.



Cancer screening

- Organized cancer screening is a key component of Ontario's prevention and cancer control system. It can detect breast cancer at an early stage and prevent cervical cancer and some colorectal cancers. In 2012–2013, 59.0 per cent of eligible women in Ontario aged 50–74 at average risk for breast cancer were screened with at least one mammogram in a two-year period. Meanwhile, 61.8 per cent of eligible women in Ontario, aged 21–69, were screened for cervical cancer with a Pap test in a three year period from 2011–2013. In 2012–2013, 41.5 per cent of Ontarians aged 50–74 at average risk for colorectal cancer was overdue for either a fecal occult blood test, flexible sigmoidoscopy or colonoscopy.
- A variety of efforts have been undertaken by Cancer Care Ontario, the Regional Cancer Programs and public health units to increase screening participation and retention in the regions, such as screening correspondence, physician report initiatives, and a focus on under-/never-screened populations, including Ontarians with low incomes, immigrants, ethnic minorities and other minority groups.
- The value of screening in terms of reducing mortality relies on people receiving adequate and appropriate follow-up, and returning for screening tests regularly for as long as they are eligible. Future versions of the PSQI will continue to report on screening participation, and will start to report on retention.

This report shows that strides are being made in some areas, such as smoke-free policies, investments in high quality physical education instruction in schools and commitments to reduce air pollution among certain sectors in Ontario. This report also reveals that there is clearly work to be done in several risk factor domains. Indicators for cancer screening, tobacco taxation, smoking cessation counselling by physicians, and food insecurity demonstrate that there is much work to do and many opportunities for improvement in the cancer prevention system.

In future years, the indicators reported on in this inaugural report will be measured again, allowing readers to see whether policy and program recommendations are being implemented. This set of indicators is also likely to be expanded as different data sources become available.



Introduction

An effective cancer prevention system requires policies and programs to support overall health.

A large body of evidence shows that more than half of all cancer cases can be prevented through the elimination of smoking, unhealthy body weight, poor diet, excess alcohol consumption, lack of physical activity and harmful environmental and occupational exposures¹—risk factors that cancer shares with other major chronic diseases, such as diabetes, cardiovascular disease and chronic respiratory disease. Cancer screening also plays an important role in the prevention and early detection of some common cancers.

Prevention of chronic disease over the long term is often seen as the responsibility of individuals to make healthy lifestyle choices. There is, however, strong evidence that system-level initiatives, such as healthy public policy and community-wide programs that facilitate healthier individual choices, are more effective in reducing the prevalence of modifiable risk factors than changing behaviours one person at a time.²⁻⁴

Internationally, governments have addressed population health through policies and community wide programs, such as widespread cross-sector policy change in Finland (see Box 1), increasing infrastructure for physical activity in Brazil,⁵

strengthening alcohol policies in Scotland through the introduction of minimum pricing for alcoholic beverages,⁶ implementing regulations to limit the salt content of food in Argentina⁷ and requiring plain packaging of tobacco products in Australia.⁸ In the United States, some states, such as California, Georgia and Texas, have undertaken policies to improve nutrition and physical activity, and to reduce smoking rates. For example, the goal of the Healthy, Texas initiative is “to create an environment where healthy living is the easy choice.”⁹

Some Canadian provinces are actively working towards making health a whole-of-government priority by adopting a health-in-all policies approach. In British Columbia and Newfoundland and Labrador, the focus on intersectoral collaboration has been strengthened through the creation of partnerships across ministries, while Quebec routinely uses health impact assessments in government decision-making.^{10–12}

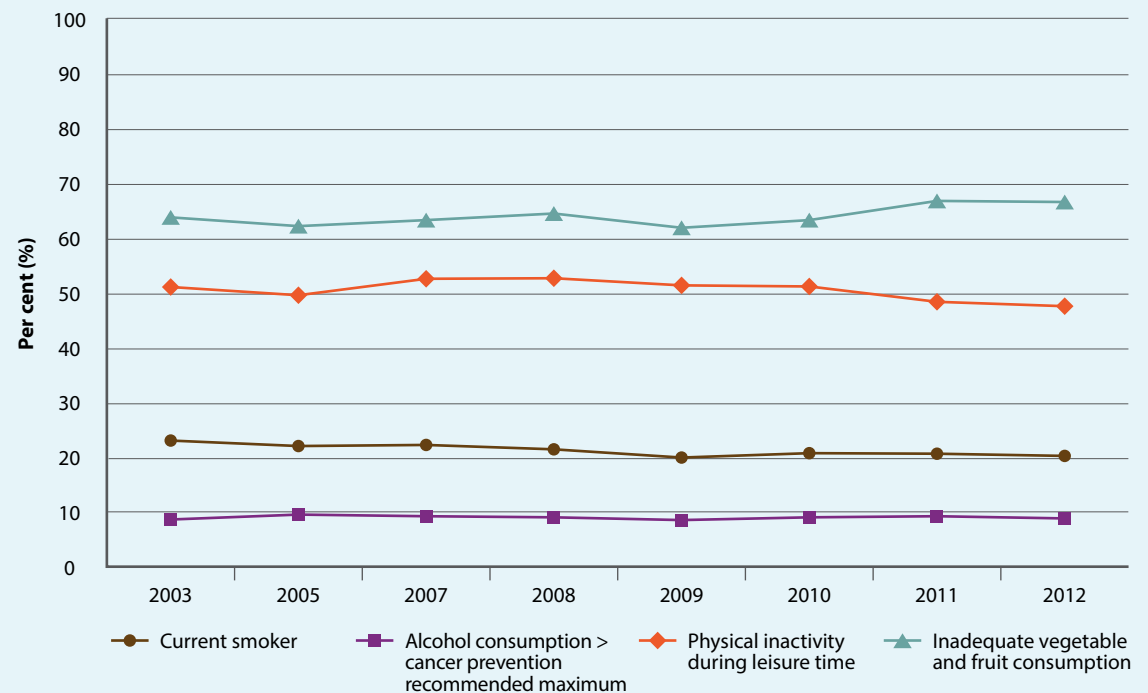
Ontario has had some success historically in building healthy public policy and addressing system-level determinants related to cancer prevention. For example, provincial smoking rates and rates of exposure to second-hand smoke have shown substantial declines since the period following the introduction of the Ontario Tobacco Act in 1994, which increased the number of smoke-free places.^{13–16} Ontario’s organized cancer screening programs for breast cancer and cervical cancer have contributed to reduced breast cancer mortality and reduced cervical cancer incidence and mortality.^{17,18} There remains, however, considerable room for improved healthy public policies, more broad-scale programs and other initiatives in Ontario.

The need for improved cancer prevention

Over the past decade, the prevalence of cancer risk factors and exposures in Ontario have shown little or no improvement (Figure 1). For the period between 2003 and 2012, the year for which the most recent data are available:

- Current daily or occasional smoking, which has declined from 23.0 per cent in 2003 to 20.2 per cent in 2012, which means that one out of five Ontarians continues to smoke¹⁹
- The percentage of Ontarians consuming alcohol in excess of recommended limits for cancer prevention, that is more than two drinks a day for men and one drink a day for women, remained at around 9 per cent¹⁹
- The percentage of Ontarians who were not getting enough physical activity during leisure time showed a slight but non-significant decline from 51.0 to 47.5 per cent¹⁹
- The percentage of Ontarians who consumed fewer than five servings of vegetables and fruit per day increased slightly from 63.7 to 66.5 per cent¹⁹

FIGURE 1
Percentage of Ontario adults with selected modifiable risk factors, 2003–2012



Source: Canadian Community Health Survey, 2003–2012 (Statistics Canada)

Note: Estimates are age-standardized to the 2006 Canadian population.

The most recent data for ultraviolet radiation show no improvement in protective behaviours* reported by Ontarians between 1996 and 2006.²⁰

Between 2002 and 2011, some progress was made in reducing emissions of air pollutants. In 2002, 1.1 million tons of total releases in Ontario were reported to the National Pollutant Release Inventory (NPRI) compared to 591,569 tons reported in 2011.²¹ Emissions for a

number of specific pollutants, such as particulate matter and polycyclic aromatic hydrocarbons, have not declined in recent years.²²

The lack of improvement in the prevalence of risk factors and exposures, such as air pollution and ultraviolet radiation, supports the need for a strengthened system for cancer prevention in Ontario. With the exception of system-level interventions, such as alcohol control,

tobacco control, environmental regulation and organized cancer screening programs — each of which are addressed by a number of system-level initiatives — interventions to reduce the prevalence of modifiable risk factors in Ontario have more frequently addressed behaviours through small-scale programs. Correspondingly, population health monitoring in the province has focused largely on the behaviours of individuals. Monitoring of system-level performance is needed to demonstrate the need for stronger healthy public policies and broad-scale programs.

BOX 1

Healthy public policy: The North Karelia Project

Finland is often presented as the ideal case study of national health policy development, having undertaken an integrated approach with important health outcomes for the last four decades.²³ In the early 1970s, Finland had the highest rate of deaths due to heart disease in the world. The rate in the eastern region of North Karelia was even higher. In 1972, North Karelia residents agreed that urgent action was needed and undertook a ground-breaking project. A local petition initiated a cooperative response among local and national authorities, community organizations, schools, media and a range of sectors, including food and health.²⁴ Policy-makers worked with food producers to

reduce the fat and salt content of foods, introduced anti-smoking legislation, increased public places for physical activity, increased vegetables and fruit in school and workplace meals, and mobilized community organizations and the local media to promote better health to the public.²⁵

The success of the North Karelia Project was dramatic. By 2006, death rates in North Karelia, among men aged 35 to 64 years plunged by 62% compared to 1969–1971, with the rate of cancer deaths declining by 65%.²⁵ In 1977, the strategies developed through the North Karelia Project were extended nationwide, and over the same period, Finland's rate of cancer deaths declined by 54%.²⁶

Since the North Karelia Project began, jurisdictions around the world have recognized the need for healthy public policy and community-wide programs to improve population health. The development of the Ottawa Charter for Health Promotion in 1986 at an international conference prioritized the need to “build healthy public policy,” “create supportive environments,” and “strengthen community action,” along with the need to “develop personal skills” and “reorient health services” towards health promotion. The Ottawa Charter remains a key reference point for health promotion strategies worldwide.²⁷

Cancer Care Ontario's Prevention System Quality Index

Cancer Care Ontario (CCO), the Government of Ontario's advisor on improving quality in the cancer and renal care and prevention systems, has developed a Prevention System Quality Index (PSQI) to measure the performance of system-level efforts to reduce the prevalence of modifiable cancer risk factors in Ontario. CCO has identified reducing the prevalence of the risk factors that cancer shares with three other major chronic diseases as a strategic priority because of the potential impact in improving the health of the Ontario population. The PSQI focuses attention on system-level initiatives that affect the prevalence of the shared modifiable risk factors, and other major modifiable cancer risk factors and exposures. The goal of the PSQI is to support CCO and its partners in chronic disease prevention. By providing a single information resource to summarize reporting on system-level conditions related to risk factors and exposures, the PSQI will support the development of policies and broad-scale programs that will aim to make the healthy choice the easier choice for Ontarians.

*Defined by survey data as: spends less than 30 minutes per day in the sun during leisure time, always/often seeks shade, wears protective clothing and head covering, sunscreen with a sun protection factor of 15 or greater, on the face and body, and sunglasses.

The PSQI serves to identify achievements, as well as gaps at the system-level to encourage system improvement. This in turn will make the healthy choice the easier choice for Ontarians.

The PSQI has at its core a health-in-all-policies approach. It integrates indicators for measuring the success of policies and programs that address health and health equity, and supports decision-makers across sectors with evidence to help maximize and improve the health of Ontarians across sectors. The PSQI uses a systems perspective to understand the relationship between initiatives across the province and their contribution to reducing the burden of cancer in Ontario. A systems perspective considers work occurring in the province as a whole, and recognizes that all levels of government, including a range of government ministries and divisions, policy-makers, sectors and decision-makers in the province and municipalities can play a role in influencing cancer prevention. The PSQI serves to identify achievements, as well as gaps at the system-level to encourage system improvement.

The method used to develop the PSQI was consistent with other work to develop system performance indicators, including the Cancer System Quality Index, an annual product since 2005 that is currently used as a mechanism to drive quality in the cancer system.²⁸ The stages of development for the PSQI included the development of a framework, review of the evidence, consultation with subject matter experts, and the identification and assessment of indicators based on the framework.

This inaugural PSQI report focuses on indicators for which data are readily available. CCO will work with provincial experts and partners to assess opportunities for developing new indicators and gathering new data for future reports.

The PSQI framework

The framework for the PSQI was created to define the process for identifying and measuring the impact of priority system-level initiatives (e.g., government policies, broad-scale programs) for analysis within each of the risk factor and exposure domains.

Existing frameworks for measuring system-level determinants of population health provided a foundation for the development of the PSQI framework.^{29–31} All of the frameworks reviewed traced the factors that influence population health along a gradient of increasing potential to impact the overall population. The gradients begin with individual behaviours and move towards coordinated actions that shape public policy and create healthier settings and environments through broad-based programs and initiatives. These actions, taken together, were considered to make up a system. Each of these frameworks recognize that large-scale policy and system-level initiatives have the broadest potential impact.

The PSQI framework focuses on monitoring areas with the broadest scope of impact. The PSQI examines the system-level activities of:

1. **Public policies**, which for the purposes of the PSQI include government policies, legislation, regulations, bylaws and plans at the federal, provincial, regional and municipal levels.
2. **Broad-scale programs and initiatives**, which are those that have been implemented, or are appropriate for implementation, across Ontario, but may be tailored for different communities.
3. **Activities by individual organizations to implement policies and broad-scale programs, or activity by “implementers.”** Implementers may include, but are not limited to, regulatory bodies, community organizations, healthcare service providers and the non-profit sector. Implementers, within the current PSQI are considered primarily in the context of policies and programs assessed in the report.

The framework recognizes these three types of system-level activities as distinct but closely related and overlapping. A schematic model (Figure 2) depicts the components of the PSQI framework.

In this framework, it is assumed that neither the prevalence of cancers nor the risk factors that contribute to them can be influenced in the near term. It therefore becomes necessary to examine the factors that can influence the prevalence of risk factors and the development of cancer. As the model shows, the system-level activities are examined in relation to the goal of reducing the

prevalence of a specific cancer risk factor or exposure. The effects of the system-level activities in shaping the conditions that influence this goal are measured by selected indicators, and analysis of these indicators can inform improvements in the prevention system. Indicators can measure the resources that go into the programs or policies, (i.e., the components of the programs or policies), what the resources and activities produced, and, finally, the desired results of the programs or policies.

The PSQI framework's process for monitoring and measuring prevention system quality integrates the

components depicted in the schematic model. The following describes the PSQI framework's process for monitoring and measurement:

1. Identify a **cancer risk factor or an exposure prioritized for action**. Prioritization is informed by a set of criteria that includes current opportunities for action, reporting and collaboration; scope of population impact, and the extent to which the risk factor or exposure is modifiable.
2. Identify **system-level activities** related to the identified risk factor or exposure, describing the

implementation of policies and broad-scale programs and initiatives related to the identified risk factor or exposure. A full analysis of policies and programs according to a range of considerations will be the focus of future PSQI reports. For the PSQI's first year, existing reviews of the evidence were used, such as the joint CCO-Public Health Ontario report, *Taking Action to Prevent Chronic Disease: Recommendations for a Healthier Ontario*,³² to identify the system-level activities included in this report.

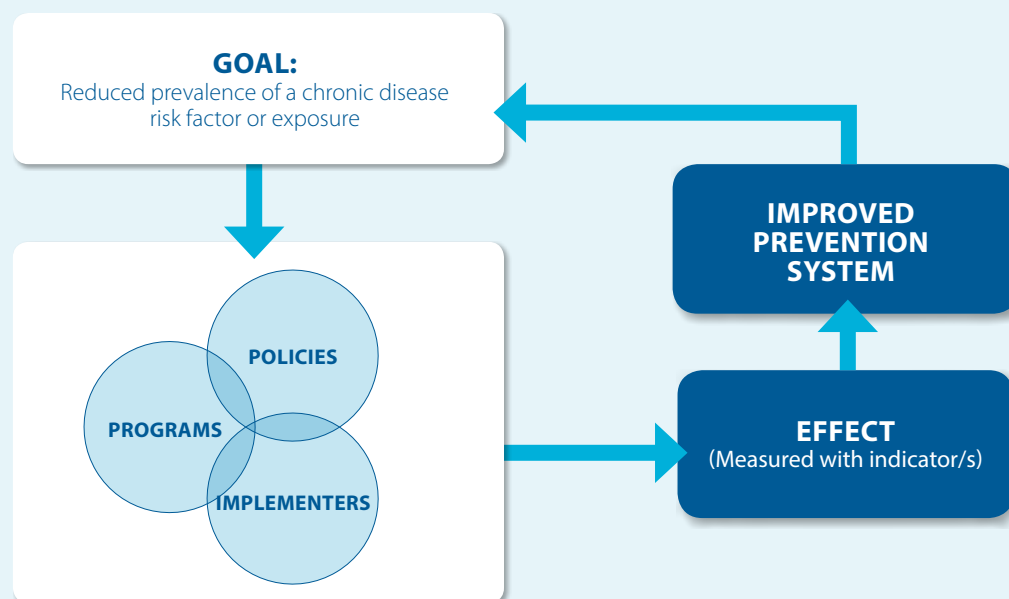
3. Consider **implementers** in relation to policies and programs, and their role or capacity for supporting successful implementation of policies and programs.
4. Select (where available) indicators to **measure the effect** of identified system-level activities.

PSQI indicators

For the PSQI, indicators were selected based on their ability to measure, in the near term, efforts being made to influence individual behaviours in the longer term. Trends for prevalence related to changes in system-level indicators would need to be observed over a longer period of time. For example, the goal of reducing current smoking could be addressed by increasing the tax on tobacco or other system-level policies and programs. The effect of such initiatives would be reduced access to cigarettes and changes in knowledge, attitudes and beliefs, with the intent of reducing smoking rates over a longer term.

Some indicators that describe both individual-level behaviours and exposures and the near-term impact of system-level activities may also be included in the

FIGURE 2
Schematic model of the framework for the Prevention System Quality Index



PSQI. For example, rates of exposure to second-hand smoke could be expected to change soon after the introduction of smoking bans in outdoor public places. Similarly, participation rates in organized cancer screening programs could be immediately influenced by a large-scale outreach campaign.

About this report

The initial system-level activities that are evaluated and measured for the 2015 PSQI, as presented in the following sections, were identified based on the above-noted process, beginning with current data availability as a primary consideration for inclusion in this inaugural report. Indicators were reviewed by external expert advisors when possible. In future PSQI reports, new indicators will likely be developed as opportunities for enhancements through structured consultation with partners and stakeholders emerge and selection criteria are applied.

The initial priority domains for measurement and monitoring in this first PSQI report were tobacco, alcohol, healthy eating and physical activity, which are addressed in the *Taking Action to Prevent Chronic Disease* report. Ultraviolet radiation and toxic exposures in the environment, as described in the *Cancer Risk Factors in Ontario: Evidence Summary* report, and the performance of Ontario's organized cancer screening programs, are also included in this PSQI report. Table 1 shows the full list of domains and corresponding indicators.

Each section of this report presents a summary of the relationship of the domain to cancer in Ontario, the findings of the PSQI indicator analysis measuring current system-level impacts, and is followed by a

review section that includes a report on current policies, programs and implementers in Ontario. Methods and indicator definitions are included in technical appendix posted online at cancercare.on.ca/PSQI. Unless otherwise noted, all analyses were performed by the Population Health and Prevention Unit, Cancer Care Ontario.

TABLE 1
Domains and indicators belonging to the Prevention System Quality Index

Domain	Indicator
Tobacco	• Tax as a percentage of tobacco retail price • Physician-led smoking cessation counselling • Exposure to second-hand smoke
Alcohol	• Minimum retail price of alcohol • Publicly owned and run off-premise alcohol retail outlets • Alcohol outlet density (on- and off-premise)
Healthy eating	• Household food insecurity • Cost of a Nutritious Food Basket
Physical activity	• Physical education specialists in schools • Enrolment in health and physical education
Environment	• Air Quality Index exceedance
Ultraviolet radiation	• Tanning bed use
Cancer screening	• Breast cancer screening participation rate • Cervical cancer screening participation rate • Colorectal cancer screening overdue rate



Tobacco

INDICATORS:

Tax as a percentage of tobacco retail price

Physician-led smoking cessation counselling

Exposure to second-hand smoke

Tobacco kills up to half of its users; nearly 6 million people globally each year.

More than five million of those deaths are the result of direct tobacco use while more than 600,000 are the result of non-smokers being exposed to second-hand smoke.^{33,34}

In 2009, approximately 9,800 new cases of cancer (equivalent to 15 per cent of all new cancer cases) diagnosed in Ontario were estimated to be attributable to smoking cigarettes.³⁵ Second-hand smoke exposure is carcinogenic to humans,³⁶ and is a cause of death and disease in children and adults who do not smoke.³⁷ Exposure to second-hand smoke is causally associated with lung cancer³⁸ and ischemic heart disease.³⁹ Limited evidence suggests an association between second-hand smoke and stroke,³⁷ as well as cancers of the larynx and pharynx.³⁸ Tobacco use is a cause of many other chronic conditions, including respiratory and cardiovascular disease. Compared to people who have never smoked, current smokers have a substantially increased risk of chronic disease.

In Ontario, tobacco-related health care costs amount to \$6.1 billion annually, or about \$502 per capita and account for 1.4 per cent of the provincial gross domestic product.⁴⁰ Health care was the biggest single direct cost associated with tobacco use in Ontario and Canada in 2002.⁴⁰

According to the Canadian Community Health Survey, in 2013, 17 per cent of Ontarians aged 12 years and older reported smoking in the previous 30 days (and smoking at least 100 cigarettes in their lifetime).⁴¹ This rate has remained relatively stable since 2008.

The indicators in this section were selected based on Cancer Care Ontario and Public Health Ontario's recommendations for tobacco control,³² the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) guidelines⁴² and the World Health Organization's six measures for implementing the FCTC guidelines, which are: monitor tobacco use and prevention policies; protect people from tobacco smoke; offer help to quit tobacco use; warn people about tobacco; enforce bans on advertising; and, raise the price of tobacco ("MPOWER").⁴³

Tax as a percentage of tobacco retail price

Increasing tobacco tax, and thereby tobacco price, is the single most effective way to decrease consumption, encourage tobacco users to quit and prevent youth from becoming regular smokers.⁴⁴⁻⁴⁷ Tobacco taxes are an effective policy measure that limits accessibility to tobacco products.⁴⁷ The WHO recommends that tobacco taxes should be more than 75 per cent of the total price, and of the total tobacco taxes, at least 70 per cent should be excise tax.^{48,49} In high-income countries, a 10 per cent increase in tobacco prices will reduce consumption by about 4 per cent.⁵⁰⁻⁵² The effect of tobacco taxation on reducing youth consumption is even more pronounced, as youth are two to three times more price-sensitive than adults.⁵¹ Taxes should be indexed for inflation and increased regularly to correct for consumer purchasing power.^{32,48}

A recent report from the Ontario Tobacco Research Unit demonstrated that increasing tobacco taxes does not cause a substantial shift to contraband tobacco and the benefits of increased taxation outweigh any minor increase in contraband use that may occur. Evidence indicates that increases in contraband can be restricted by combining tobacco taxes with enhanced enforcement and control.⁵³ The same report showed that despite Ontario and Quebec having the lowest tobacco taxes in Canada, these two provinces have the largest number of consumers of contraband tobacco in the country.⁵³

This indicator presents data on the percentage of the total retail price of tobacco that is accounted for by

excise tax levied on tobacco, by province. Tobacco taxes are a composite of provincial/territorial excise tax, federal excise duty, provincial/territorial sales tax or harmonized sales tax and federal government sales tax.

In Ontario, the percentage of the total tobacco retail price attributed to taxes in June 2014 was 66.8 per cent which is the second lowest in the country (Table 2).

Tobacco taxes as a percentage of the total retail price varied across the provinces from a low of 64.3 per cent in Quebec to a high of 78.1 per cent in New Brunswick. The total retail price of a carton of 200 cigarettes as of June 2014 ranged from \$85.39 in Quebec to \$125.80 in Manitoba.

TABLE 2
Tobacco taxes as a percentage of total retail price per carton of 200 cigarettes, by province, June 2014

Province	Tobacco taxes as a percentage of total retail price (%)	Total tobacco taxes (\$)	Total retail price (average price of a carton of 200 cigarettes as of June 2014) (\$)
New Brunswick	78.1	69.23	88.65
Nunavut	74.8	75.86	101.40
Newfoundland	74.3	80.50	108.40
Manitoba	74.3	93.51	125.80
Nova Scotia	73.8	82.68	112.03
Prince Edward Island	73.8	79.21	107.32
Saskatchewan	73.5	81.05	110.22
Yukon Territories	72.5	67.46	93.00
Northwest Territories	71.1	83.84	117.86
Alberta	70.4	65.46	92.94
British Columbia	70.3	73.83	104.96
Ontario	66.8	59.18	88.64
Quebec	64.3	54.90	85.39

Sources: Cigarette Prices in Canada Map and Table, 2014 (Non-Smokers' Rights Association); Canadian Community Health Survey, 2013 (Statistics Canada)

Note: Provinces highlighted in brown have total tobacco taxes of 75 per cent or greater.



Tobacco treatment advice incorporated into routine health-care services coupled with cessation support and medication increases the likelihood of a smoker quitting successfully.

Data for this indicator came from the cigarette prices for Canada, as compiled by the Non-Smokers' Rights Association.⁵⁴

Physician-led smoking cessation counselling

Cessation of tobacco use is a pillar of the Ontario government's Smoke-Free Ontario Strategy, and a vital element of comprehensive tobacco control.^{55,56} Cessation interventions include media campaigns to motivate quit attempts, province-wide tobacco user support, and cessation advice incorporated into primary care and other health care settings.⁵⁷

Tobacco treatment advice incorporated into routine health-care services coupled with cessation support and medication increases the likelihood of a smoker quitting successfully.^{59–61} In 2006, the Ministry of Health and Long-Term Care introduced a set of billing codes to promote smoking cessation intervention by family physicians. These codes were assigned for cessation counselling services, including initial and

follow-up counselling. However, only a subset of physicians — those belonging to patient enrolment group models — was eligible to use these billing codes.⁶² In 2008, the billing codes were modified and extended to include all family physicians. This indicator presents the percentage of adult smokers aged 18 years and older having at least one consult with primary care physicians (family physician or general practitioner) where a smoking cessation-related fee code was billed.

Data for this indicator came from claims to the Ontario Health Insurance Program (OHIP) and were analyzed by the Ministry of Health and Long-Term Care Health Analytics Branch. This indicator has been created and validated by the Health Analytics Branch and published in the Resource for Indicator Standards.

Between 2008 and 2013, the percentage of adult smokers who had a physician consult for smoking cessation remained close to 10 per cent (Table 3).

TABLE 3
Percentage of adult smokers (aged 18+) in Ontario who had a physician consult for smoking cessation, 2008–2013

Year	Number of adult smokers	Number receiving physician consult	Percentage receiving physician consult (%)
2008	2,226,400	223,500	10.0
2009	2,094,700	212,200	10.1
2010	2,126,600	214,200	10.1
2011	2,145,700	214,300	10.0
2012	2,176,000	215,000	9.9
2013	2,109,200	199,900	9.5

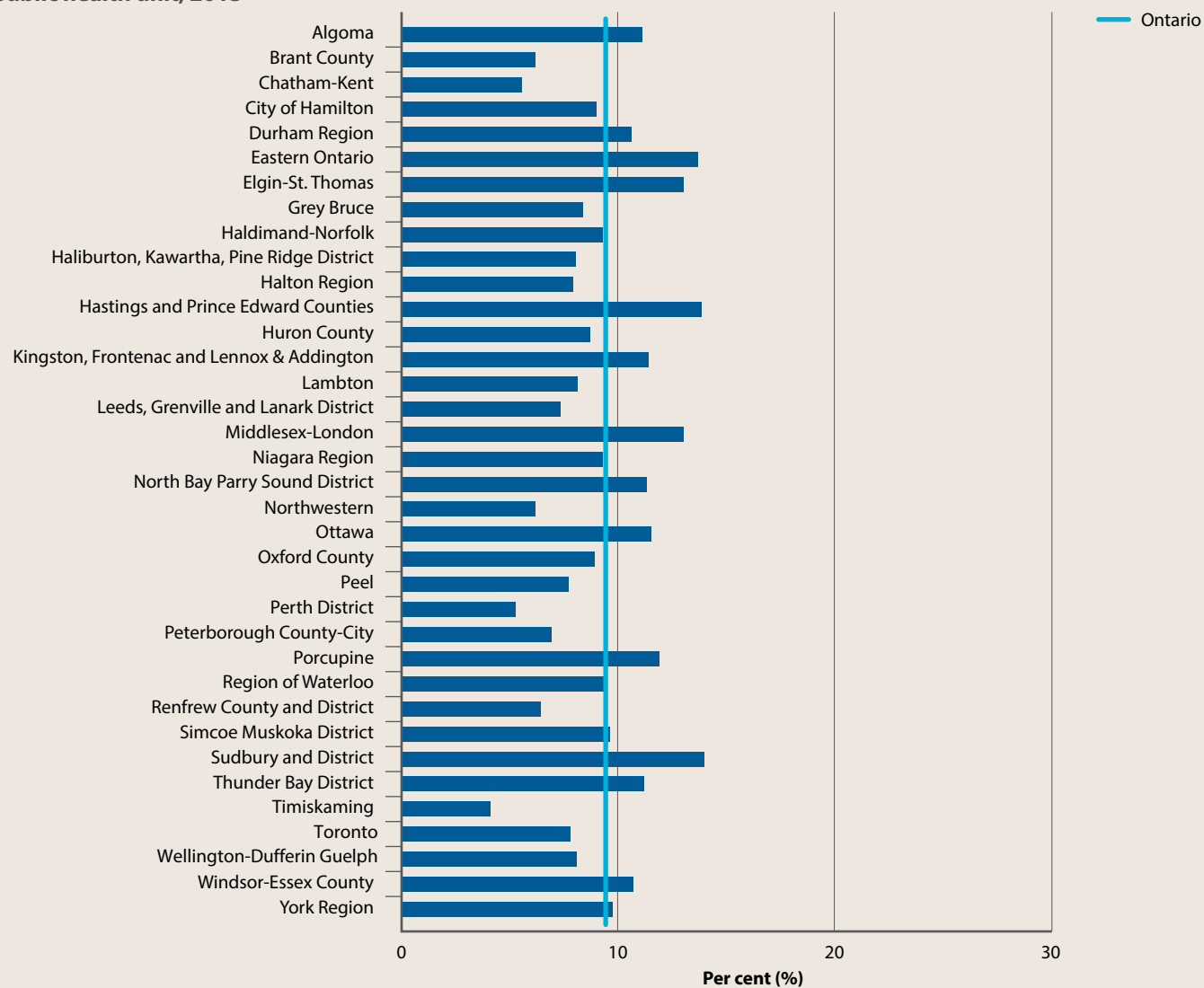
Sources: Claims History Database, 2008–2013 (Ministry of Health and Long-Term Care); Canadian Community Health Survey, 2008–2013 (Statistics Canada).

Prepared by: Health Analytics Branch, Ministry of Health and Long-Term Care

Note: Estimates are rounded to the nearest hundred units using the normal rounding technique.

FIGURE 3

Percentage of adults smokers (aged 18+) in Ontario who had a physician consult for smoking cessation, overall and by public health unit, 2013



Sources: Claims History Database, 2013 (Ministry of Health and Long-Term Care); Canadian Community Health Survey, 2013 (Statistics Canada).

Prepared by: Health Analytics Branch, Ministry of Health and Long-Term Care



The percentage of adult smokers who had a physician consult for smoking cessation varied by public health unit, ranging from 4.1 per cent in Timiskaming to 14.0 per cent in Sudbury (Figure 3).

These data show that few smokers receive assistance from a primary care physician which has been shown to be effective in overcoming tobacco dependence. Cessation guidelines developed for use by physicians recommend using a 5As model (Ask, Advise, Assess, Assist, and Arrange) for brief smoking cessation intervention.⁶¹ During initial counselling, physicians determine a patient's smoking status, establish readiness to quit, assist him or her in setting a quit date and discuss strategies for quitting.⁵⁵ Follow-up counselling is expected to assess successes and challenges in quitting, discuss reasons for relapse and how to cope with relapse and develop strategies to prevent future relapses, including revisions to the quit plan.⁵⁵ Only a small portion of smokers who received initial smoking cessation counselling from their physician proceed to receive follow-up counselling. In 2010, only 22 per cent of those who received an initial consult participated in a follow-up counselling session. Also, this proportion represents just 4 per cent of Ontario smokers who visited a physician, according to data from the Canadian Tobacco Use Monitoring Survey.⁵⁵

A lack of information on the quality or type of cessation activities offered by the physicians who bill for them should be considered a limitation of this analysis. An additional limitation of this indicator is that it does not include cessation services that physicians may not be billing for; population-level data show that about 60 per cent of smokers who

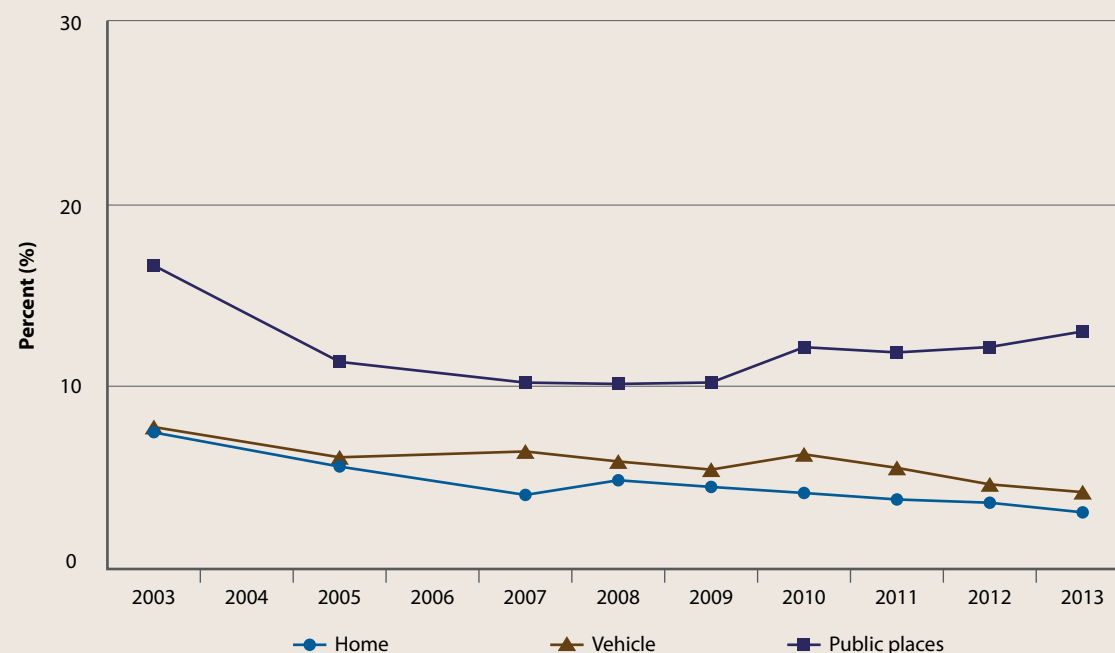
saw a physician in the past year were advised to quit, and among those, 56 per cent received information on quit smoking aids or a counseling program.⁴¹ It also fails to capture the level of activity of other key providers who are integral to Ontario's tobacco cessation system. The activities of these other cessation actors are reported on regularly in the Ontario Tobacco Research Unit's Smoke-Free Ontario Strategy Monitoring Report.⁴¹

Exposure to second-hand smoke

Second-hand smoke exposure is carcinogenic to humans³⁶ and causes premature death⁶³ and disease in children and adult nonsmokers.³⁹ Conclusive evidence of the harms caused by second-hand smoke exposure has led to the development of laws and regulations to protect the public from second-hand smoke exposure across a range of settings. Policies designating smoke-free places can also

FIGURE 4

Trends in second-hand smoke exposure among non-smoking adults (aged 20+) in Ontario, 2003–2013



Source: Canadian Community Health Survey, 2003–2013 (Statistics Canada)

Note: Estimates are age-standardized to the 2006 Canadian population.

reduce the social norm of smoking, reduce cigarette consumption and increase quit attempts.^{64,65} The Smoke-Free Ontario Act, enacted in 2006, prohibits smoking in all indoor and workplaces and public places; other amendments prohibit smoking in motor vehicles with children under 16 years of age present (2009), and, most recently, regulatory amendments were implemented banning smoking on outdoor bar and restaurant patios, playgrounds, public sports fields and surfaces.

Trends in second-hand smoke exposure among non-smoking adults aged 20 years and older and among teens aged 12–19 years in Ontario from 2003–2013 were analyzed using self-reported survey data from the Canadian Community Health Survey.

Between 2003 and 2011, the proportion of non-smokers reporting that they were regularly exposed to second-hand smoke at home and in vehicles generally declined. In public places there was also a decline until 2009, with a slight rise from 2010 to 2013 (Figure 4).³⁵ In 2013, 13.0 per cent of non-smoking adults reported being exposed to second-hand smoke in public places. Exposure at home in 2013 was 3.1%, while exposure in vehicles in 2013 was 4.2% (Figure 4).

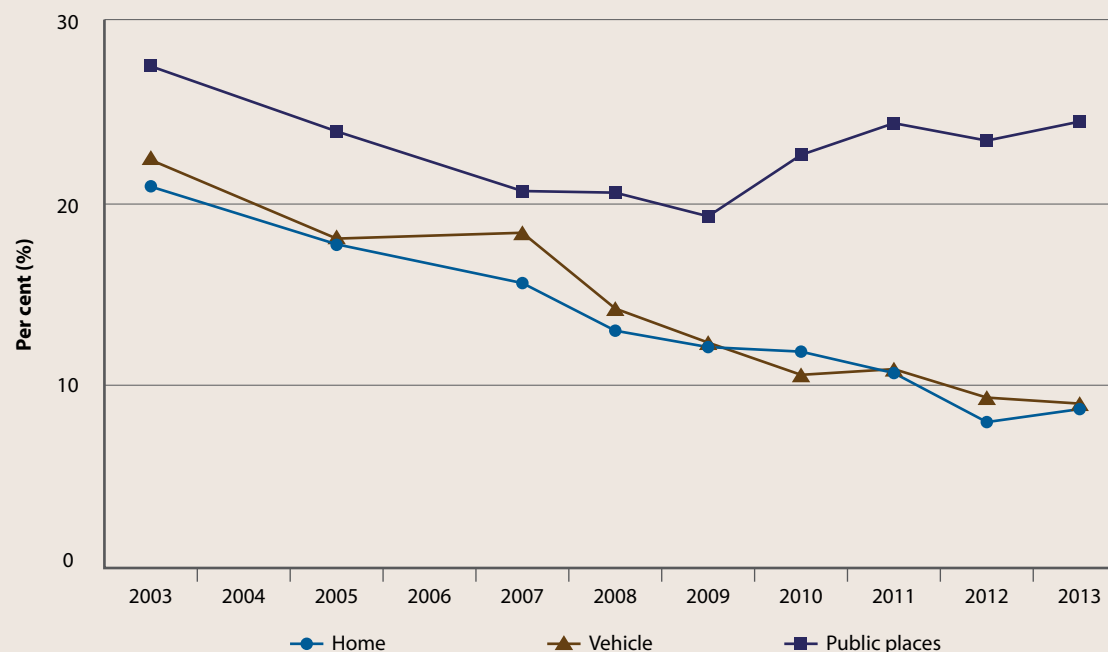
The proportion of non-smoking teens regularly exposed to second-hand smoke generally decreased between 2003 and 2013, with the exception of exposure in public places, where an increase was seen between 2009 and 2013. Exposure at home in 2013 was 8.7 per cent, while exposure in vehicles was 9.0 per cent (Figure 5). Second-hand smoke exposure among teens in Ontario was highest in public places; while it dropped from 27.5 per cent in 2003 to 19.2 per cent in 2009, it increased again to 24.4 per cent in 2013.

The decline in second-hand smoke exposure is likely due to smoke-free bylaws passed by Ontario municipalities between 1998 and 2004 and before the implementation of the Smoke-Free Ontario Act.³⁵ The rise in exposure to second-hand smoke in public places since 2009 may have been due to an increased exposure in unregulated outdoor settings, such as entrance ways, bar and restaurant patios, and other public outdoor places. The implementation of recent

provincial regulatory amendments that include smoking prohibitions on bar and restaurant patios is anticipated to further reduce self-reported exposure in public places.

Declines in second-hand smoke exposure among teens at home and in a vehicle are likely due to more people voluntarily adopting smoke-free homes, increasing awareness of the harms of second-hand

FIGURE 5
Trends in second-hand smoke exposure among non-smoking teens (aged 12–19) in Ontario, 2003–2013



Source: Canadian Community Health Survey, 2003–2013 (Statistics Canada)

Note: Estimates are age-standardized to the 2006 Canadian population.



smoke exposure and the 2009 ban on smoking in vehicles when children under age 16 are present.³² Increased exposure in public places may reflect increased exposure in unregulated outdoor settings.

Comprehensive tobacco control

Comprehensive tobacco control is a multifaceted system of interventions and coordinated strategies designed to reduce the prevalence of tobacco use. Coordinated efforts are required by many different organizations working across several levels of government and civil society.⁵⁷ Comprehensive tobacco control typically focuses on the prevention of the experimentation and escalation of tobacco use among children, youth and young adults; the protection of non-smokers from the harms of second-hand smoke; and the support for cessation by motivating and assisting people to quit tobacco use.⁵⁷ Despite a mostly stagnant prevalence rate of about 17–18 per cent since 2008 for current smoking in the province,⁴¹ Ontario has been a leader in comprehensive tobacco control programming and saw significant reductions in the prevalence of tobacco use among Ontarians between 2000 and 2008.³²

Tobacco policies and policy implementers in Ontario

Critical to the success of tobacco control in Ontario has been a strong and dynamic policy agenda at all levels of government and coordinated advocacy efforts by non-governmental organizations.

At the local level, public health units have worked in concert with local smoke-free councils and non-governmental organizations to support the development and implementation of smoke-free

municipal bylaws across the province. Enabled by provincial legislation, municipalities passed more than 100 bylaws that increase protection from second-hand smoke exposure indoors for the public, and workers in bars, restaurants and other settings. This proliferation of smoke-free bylaws is often credited for laying the groundwork for the passage of the Smoke-Free Ontario Act.

Ontario's provincial tobacco legislation, or the Smoke-Free Ontario Act, was implemented in the spring of 2006, and created an equal playing field across the province. It prohibits smoking in all indoor public places and workplaces, and includes a ban on the retail display of tobacco products, which took effect in 2008. This legislation and its associated regulations have been progressively strengthened over the past several years, advancing the agenda for tobacco control. In 2009, an amendment was made to prohibit smoking in motor vehicles with children under 16 years of age. Most recently, in January of 2015, further amendments took effect banning smoking on bar and restaurant patios, smoking on playgrounds and publicly-owned sport fields and surfaces and the sale of tobacco on postsecondary education campuses.⁶⁶ In November 2014, new legislation was proposed to restrict the sale and use of electronic cigarettes in Ontario and to ban the sale of flavoured tobacco products.⁶⁷

Federal tobacco control legislation provides a comprehensive policy framework that complements and extends regulations at other levels of government. The Federal Tobacco Act and its accompanying regulations restrict the manufacture, sale, packaging and promotion of tobacco products in Canada. In the

fall of 2011, amendments were made to the Tobacco Products Labelling Regulations requiring tobacco companies to include graphic warning messages covering at least 75 per cent of the front and back of cigarette and little cigar packages, and a toll-free pan-Canadian quit line number.⁶⁸

Policies at the municipal, provincial and federal levels act synergistically to help lower smoking rates. Tobacco control policies at all levels of government are important and provide the public with more comprehensive protection from the tobacco industry and its products. These policies are also mutually reinforcing as demonstrated by the example of local smoke-free bylaws described earlier.

Tobacco programs and program implementers in Ontario

Tobacco control has a long history in Ontario with the first dedicated strategy, the Ontario Tobacco Strategy, implemented in the early 1990s. The government of Ontario rededicated itself to comprehensive tobacco control by investing in the expanded Smoke-Free Ontario Strategy, which was first implemented in 2004. This multifaceted strategy includes new and enhanced programming at the local and provincial levels.

At the local level, dedicated funding was provided for tobacco control at the 36 public health units to plan and implement community-based tobacco control programs. A regional network infrastructure (Tobacco Control Area Networks) was also established at this time.

Provincial level programming coordinated through the Smoke-Free Ontario Strategy includes several provincial resource centres that provide training and capacity-

building for professionals working in tobacco control, a research evaluation and surveillance component, and a range of provincial programs that support increased access to smoking cessation services across a range of settings. Tailored interventions have also been funded to serve Ontario's Aboriginal populations. Individual programs are administered by a variety of government agencies, non-governmental organizations and academic institutions.

Comprehensive tobacco control programs with sustained and sufficient funding are critical to reducing the prevalence of tobacco use. The U.S. Centers for Disease Control and Prevention publish evidence-based guidelines related to the types of programming and level of funding that is appropriate based on the population of the jurisdiction. The estimated annual investment recommended ranges from \$7.41 to \$10.53 per capita.⁶⁹

Discussion and future directions

Ontario has been a leader in tobacco control by introducing substantial and progressive policy changes and investing in a provincial tobacco control strategy. Substantial decreases in tobacco use have been achieved, but rates of decline have slowed, and two million Ontarians are still addicted to tobacco products. A continued commitment to comprehensive tobacco control and ongoing policy action are clearly needed to reduce the burden of tobacco use.

Ontario is lagging behind other jurisdictions in tobacco taxation rates. Although increases have been made at both the provincial and federal level within the past year, Ontario continues to have one of the lowest total tobacco taxes of any Canadian jurisdiction, where tax accounts for 67 per cent of the price of

tobacco; still eight percentage points below the WHO's recommended level of 75 per cent. Tobacco taxes should continue to be increased on a regular basis in line with the Consumer Price Index to deter increases in tobacco consumption in future years.

Legislation and policy changes over the years have greatly influenced exposure to second-hand smoke, which has declined considerably in Ontario. However, for some segments of the population, exposure remains high in public places. A slight increase in exposure in public places in recent years may be an unintended consequence of recent regulatory changes and requires additional exploration. Efforts should be continued to be made to monitor and limit exposure to second-hand smoke for Ontarians, particularly for population segments with much higher rates of exposure (e.g., blue collar workers, residents of apartments and other multi-unit dwellings).^{41,70}

Physician fee codes for smoking cessation are not routinely used by Ontario's primary care physicians, resulting in only about 10 per cent of Ontario's smokers receiving counselling, based on population level estimates. Given the impact that brief advice by a physician and other health-care professionals can have on population-level cessation outcomes, additional efforts need to be made to increase the proportion of health care providers who routinely counsel their patients to quit.

Finally, in future years the Prevention System Quality Index will endeavor to evaluate additional system-level indicators, potentially addressing specific sub-populations and priority settings, such as individuals living in multi-unit dwellings.

67%

Ontario continues to have one of the lowest total tobacco taxes of any Canadian jurisdiction, where tax accounts for 67 per cent of the price of tobacco; below the WHO's recommended level of 75 per cent.

Increasing tobacco tax, and thereby tobacco price, is the single most effective way to decrease consumption, encourage tobacco users to quit and prevent youth from becoming regular smokers.



Alcohol

INDICATORS:

Minimum retail price of alcohol

Publicly owned and run
off-premise alcohol retail outlets

Alcohol outlet density
(on- and off-premise)

Alcohol consumption is a recognized cause of several cancers, with increasing risk at higher levels of consumption of all beverage types: beer, wine and spirits.^{38,71–74}

Regular heavy alcohol consumption is also causally associated with type 2 diabetes and adverse cardiovascular outcomes, including cardiomyopathy, systemic hypertension, hemorrhagic stroke, some forms of heart failure and overall cardiovascular mortality.^{75–77}

As many as 3,000 new cases of cancer in Ontario in 2010 were estimated to be attributable to alcohol consumption and could therefore be considered preventable.⁷⁸ In 2012, 8.8 per cent of Ontario adults aged 19 years and older (equivalent to nearly 1 million people) reported drinking more alcohol than the maximum amount recommended for cancer prevention by the World Cancer Research Fund, which is no more than one drink a day for women and no more than two drinks a day for men.⁷⁸

The indicators in this section describe the status of alcohol policies in Ontario based on analyses from the Giesbrecht et al. report *Strategies to Reduce Alcohol-Related Harm and Costs in Canada: A Comparison of*

*Provincial Policies.*⁷⁹ Giesbrecht and his colleagues rank specific policies in terms of the evidence supporting their effectiveness and their potential to reach the entire population, drawing on previous evaluations of alcohol policy and programs^{80,81} to develop their scoring system. Their report ranks pricing, control system and physical availability policies highest in terms of having the greatest potential for impact to reduce consumption and other alcohol-related harms that correspond to the three indicators included in this section. Changes in these indicators can therefore be expected to influence levels of alcohol consumption in Ontario based on the strong association identified in the evidence.

The minimum retail price indicator set by the Liquor Control Board of Ontario (LCBO) does not include minimum prices for bars, restaurants and other “on-premise” alcohol outlets, which are places for purchasing alcoholic beverages for consumption on the premises, as opposed to “off-premise” outlets, which are retail stores for purchasing alcohol for consumption off the premises.

Cancer Care Ontario first reported on these alcohol policy indicators in the Cancer System Quality Index (CSQI) for 2014, with the exception of the density of on-premise alcohol outlets. However, the breakdown of publicly owned and run retail outlets and density of retail outlets was by Local Health Integration Network rather than by public health unit as presented here. A comparison of the CSQI 2014 indicators for 2013 data, with data for 2014 is therefore included where available in this section, specifically for the minimum retail price of alcohol in Ontario and the percentage of off-premise alcohol retail outlets in Ontario that are publicly owned and run.

Minimum retail price of alcohol

A minimum retail pricing policy for alcohol requires that alcohol at the retail level be sold for no less than the policy’s specified price per unit. Minimum pricing reduces the economic availability of low-cost alcohol products that evidence indicates are favoured by heavy drinkers.^{82–85} The same is true regarding evidence for the impact of minimum pricing on overall consumption.^{83,86}

A minimum retail pricing policy is only one component of an effective overall alcohol pricing policy. Other components, as recommended in the *Taking Action to Prevent Chronic Disease* report, are maintaining average

prices at or above the Consumer Price Index and pricing policies for higher alcohol content beverages to create disincentives for the production and consumption of higher-strength alcoholic beverages.³²

Ontario has legislation that specifies the minimum retail price that the LCBO can set for alcoholic beverages, with the exception of products purchased from ferment-on-premise outlets, which are outlets that provide individuals with equipment to make their own beer or wine on the premises.⁸⁷ There is no minimum price for ferment-on-premise beverages. Legislated minimum retail prices are adjusted annually based on a three-year average of changes in

TABLE 4
Minimum retail price of alcohol set by the Liquor Control Board of Ontario (LCBO) in Ontario, by alcohol type, 2013–2014

Alcohol type (selected types listed)	Quantity	LCBO minimum price, 2013 (\$)	LCBO minimum price, 2014 (\$)	Price per standard drink (17.05 ml ethanol), 2014	
				Price, 2014 (\$)	Alcohol by volume used for price calculation
Spirits	750 mL bottle	24.45	24.95	1.42	40.0%
Table wine (from Ontario)	750 mL bottle	5.10	5.15	0.93	12.5%
Table wine (imported)	750 mL bottle	6.15	6.20	1.12	12.5%
Beer and coolers (alcohol content between 4.9% and 5.59%)	341 mL bottle	1.15	1.17	1.19 to 1.05	4.9% to 5.59%
Beer and coolers (alcohol content 5.6% or more)	Per 1 L of absolute alcohol (LAA)	62.47	63.66	1.09	per 17.05 ml ethanol

Source: Liquor Control Board of Ontario (LCBO)^{91,92}

Note: Minimum retail prices in this table includes container deposit.



the Consumer Price Index for Ontario.⁸⁸ The LCBO sets the second layer of policy for minimum prices, which are generally higher than the prices defined by the minimum pricing legislation and which the legislation directs other retailers to follow.^{89,90} Table 4 shows the 2013 and 2014 minimum retail price of alcohol for selected types of alcoholic beverages set by the LCBO in Ontario and published on the LCBO website.^{91,92}

The minimum retail price for spirits, beer and coolers increased between 2013 and 2014, and the minimum retail price for table wine, both imported and from Ontario, increased by 5 cents. (Table 4). The minimum retail price for spirits increased by 2.0 per cent, for beer and coolers with alcohol content between 4.9 per cent and 5.59 per cent by 1.7 per cent, and for beer and coolers with alcohol content of 5.6 per cent or more, by 1.9 per cent (Table 4).

A Canadian standard drink amount (17.05 mL ethanol) is commonly used to measure alcohol consumption across different types of drinks⁹³ and is used here to highlight the relative minimum price for the same amount of alcohol. Spirits, containing a greater amount of alcohol by volume, have a higher price per standard drink compared to beer, coolers and table wine, representing a specific disincentive towards the purchase of this category of beverages.

Ontario and most other Canadian provinces are among only a few jurisdictions internationally with a minimum pricing policy for alcohol. The requirement to regularly adjust minimum retail prices in accordance with the Consumer Price Index is also an important component of the policy, since it provides a check

against the minimum price declining relative to increasing costs of other products. However, the year-to-year changes in minimum prices set by the LCBO do not necessarily correspond to the Consumer Price Index. For example, when the previous year's prices are already above the legislated minimum prices, there may not be an increase in minimum prices the following year.

Publicly owned and run off-premise alcohol retail outlets

There is extensive evidence of increased alcohol consumption in jurisdictions that have moved away from publicly owned and run retail outlets towards whole or partial privatization of their alcohol retail systems.^{94–96} A systematic review of 17 studies in jurisdictions that underwent privatization found a 44 per cent median increase of alcohol sales for privatized alcoholic beverages during the years following privatization. The review also included seven settings that measured a small median decrease of just over 2 per cent in sales for non-privatized alcoholic beverages during the same time frame.⁹⁴ (Changes in sales have been validated for monitoring changes in alcohol consumption in the population.⁹⁷)

Ontario currently has a partial government monopoly on alcohol retail sales through the LCBO. The LCBO oversees the network of stores that have the sole authority to sell spirits and wines from outside of the province, and authorizes stores in rural areas, called Agency Stores, to sell on its behalf. Privately operated retail outlets in Ontario include the Agency Stores, stores operated by Brewers Retail (i.e., The Beer Store), stores on the site of wineries, breweries and

distilleries, stores operated by Ontario wineries away from the site of production (e.g., Wine Rack), fermentation-premise outlets and Vintners' Quality Alliance Ontario wine vendors at farmers' markets.

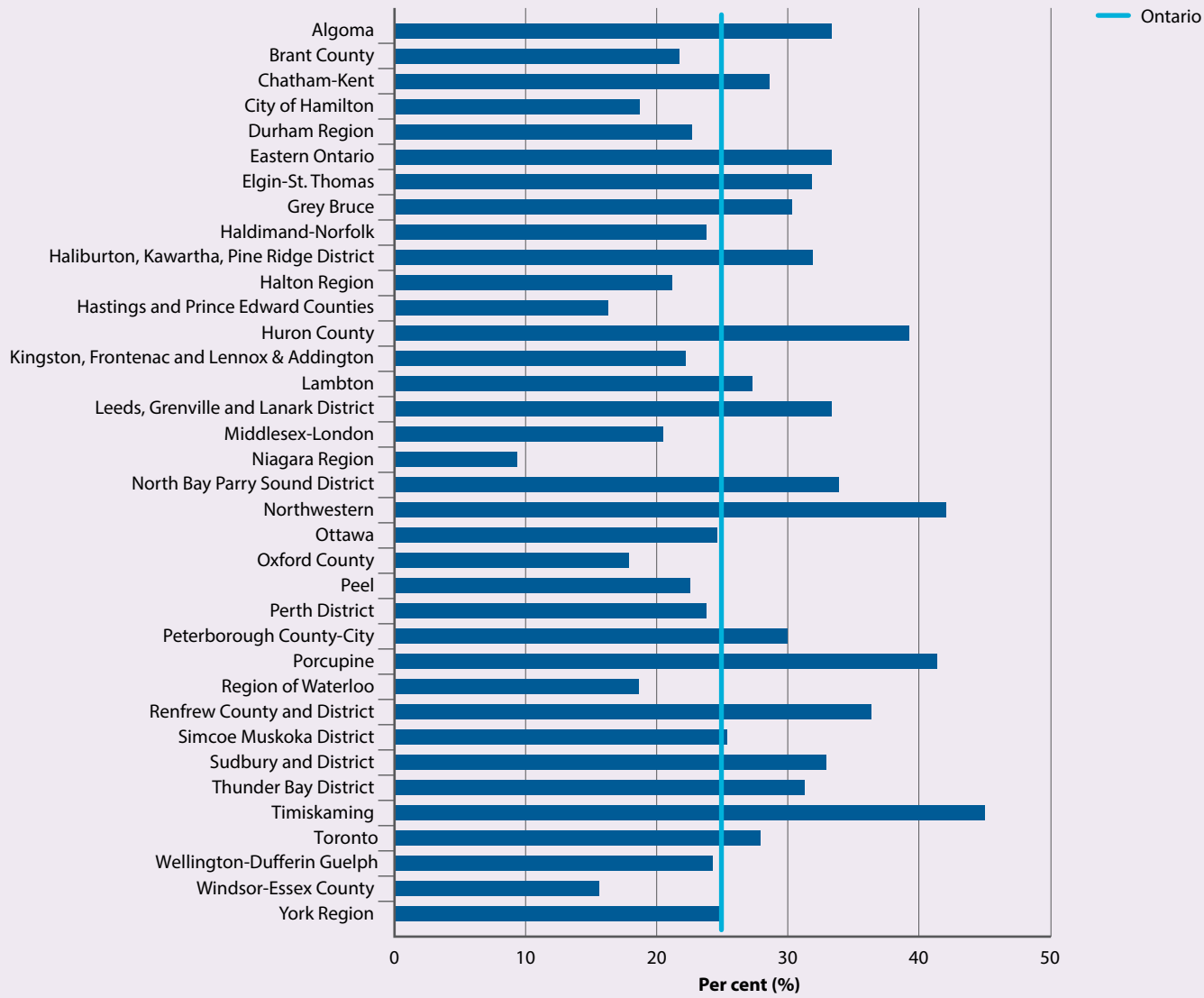
Figure 6 presents the percentage of off-premise alcohol retail outlets that are publicly owned and run, by public health unit for 2014. The figure is based on address lists provided by the LCBO and the Alcohol and Gaming Commission of Ontario.

As of October 2014, the publicly owned and run retail outlets of the LCBO accounted for 24.9 per cent of all off-premise outlets in the province (Figure 6). This represents a decrease from 26.0 per cent in 2013. The percentage of public off-premise outlets ranged from a low of 9.3 per cent in Niagara to a high of 45.0 per cent in Timiskaming in 2014.

The bulk of the decrease in the percentage of public off-premise alcohol retail outlets was due to the introduction of new licensing regulations that allow Vintners' Quality Alliance Ontario wineries to sell at farmers' markets, which added 93 additional locations in Ontario for alcohol purchase based on a count of all alcohol outlets in October 2014. A portion of the decrease in the percentage of publicly owned and run retail stores was due to an increase in the number of Ontario breweries with retail operations on site, which increased by 38.8 per cent, from 67 to 93 outlets.

A potential limitation of this indicator could be that alcohol sales permits for special events, including those that take place over an extended period of time, online alcohol sales, delivery services and duty-free

FIGURE 6
Percentage of off-premise alcohol retail outlets in Ontario that are publicly owned and run, overall and by public health unit, October 2014



Sources: Lists of ferment-on-premise, The Beer Store, distillery, brewery, on- and off-site winery locations, 2014 (Alcohol and Gaming Commission of Ontario); Agency Store List and Store Managers List, 2014 (Liquor Control Board of Ontario)



shops have not been included in the analysis. Whether these sales channels present an issue for consumption has not been assessed.

Alcohol outlet density (on- and off-premise)

This indicator looks at the density of alcohol outlets, specifically the number of alcohol outlets within a public health unit, relative to its population of people 15 years of age and older.

There is good evidence that increasing the density of alcohol outlets results in higher alcohol consumption and greater alcohol-related harms.^{80,81,98–101} Some findings indicate that off-premise outlet density may have a greater impact on levels of alcohol consumption.⁹⁹ An association between outlet density and alcohol consumption at the population level has been reported in studies in Canada, the United Kingdom, the United States and New Zealand.^{98,99} The U.S. Community Preventive Services Task Force recommends regulations to limit alcohol outlet density.¹⁰²

Ontario does not currently have a provincial policy limiting the density of alcohol outlets. The Alcohol and Gaming Commission of Ontario's oversight for private alcohol retail outlet locations may have some effect on density, where private retailers and licensed establishments must apply for authorization from the Alcohol and Gaming Commission of Ontario to open or relocate an outlet. Applications require a period for citizen input on the proposed outlet location.

Figure 7 shows the number of alcohol outlets (on- and off-premise) for every 10,000 people aged 15 and older, by public health unit, 2014.

In 2014, the overall density of alcohol outlets in Ontario was 17.4 for every 10,000 people aged 15 and older (Figure 7). The on-premise density was 15.1 outlets and the off-premise density was 2.3 outlets.

Northwestern had the highest overall density at 29.5 outlets and the highest on-premise density at 23.8 outlets. Timiskaming had the highest off-premise density at 6.9 outlets. Peel had the lowest overall, on- and off-premise densities in 2014 at 9.1, 8.1 and 1.0 respectively.

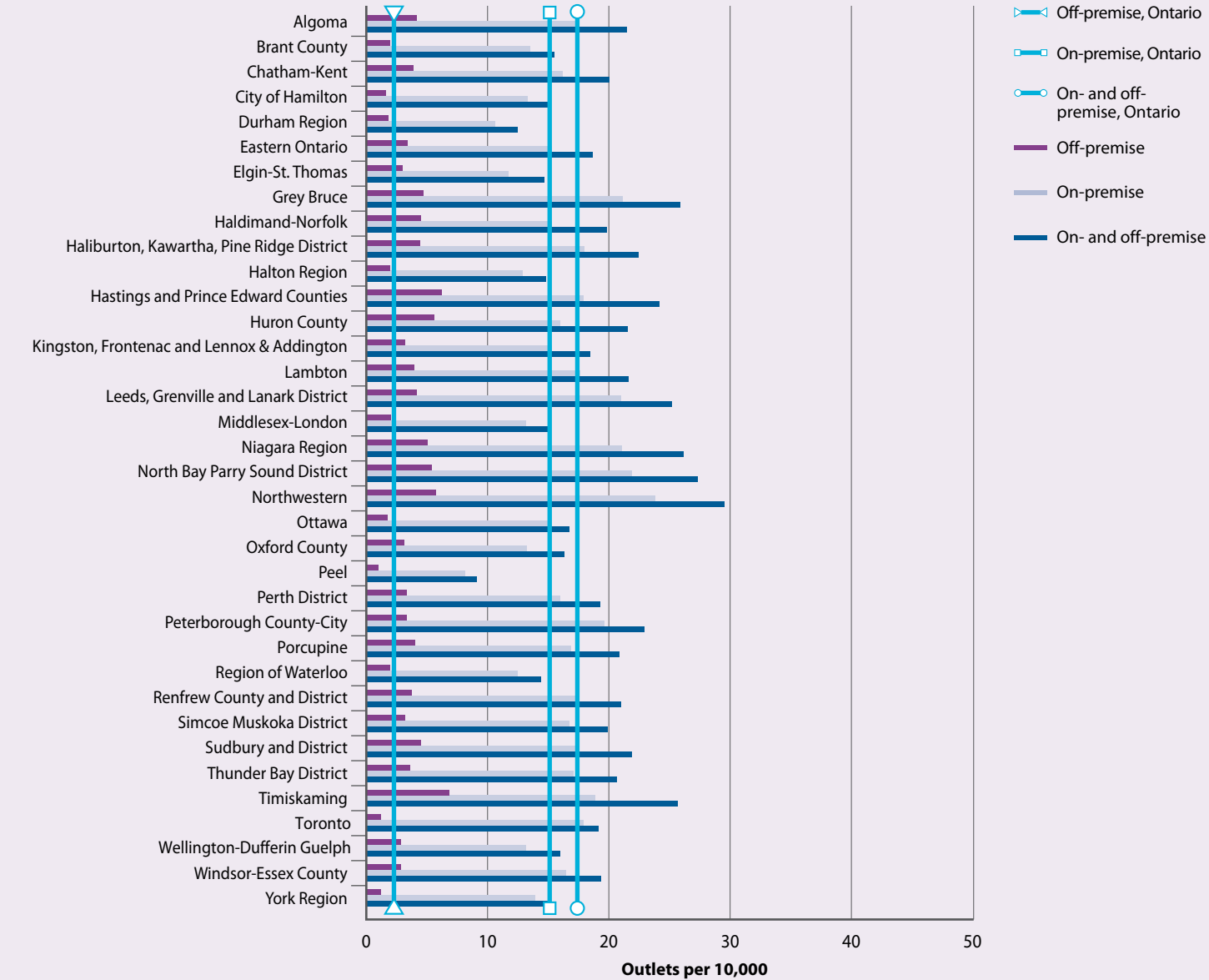
This figure is meant to show outlet density in each public health unit and is not intended to infer variations in alcohol consumption based on outlet density. Although some relationship may be apparent, various social, geographic, cultural, religious and economic factors within a region interact to affect its overall consumption rates compared to other regions, and therefore, the correlation between density and consumption rates across regions may not necessarily be consistent. Comparisons of levels of alcohol outlet density across public health units and the effect on alcohol consumption will be undertaken in future reports to measure density changes within a public health unit and the resulting changes in its alcohol consumption.

Alcohol policies and policy implementers in Ontario

The Liquor Control Act and the Liquor Licence Act comprise the principal regulatory framework for the sale and distribution of alcoholic beverages in Ontario. Among its regulations, the Liquor Control Act sets out the mandate of the LCBO. The Alcohol and Gaming Commission of Ontario is responsible for administering the Liquor Licence Act, overseeing licencing, including to establishments selling alcohol for immediate consumption on-site (e.g., bars, restaurants) and to ferment-on-premise outlets. The Alcohol and Gaming Commission of Ontario also oversees authorization for manufacturers to operate private alcohol retail stores. In addition, as of 2014, the Alcohol and Gaming Commission of Ontario oversees authorization of Ontario wineries to sell wine at farmers' markets.¹⁰³

There is extensive evidence of increased alcohol consumption in jurisdictions that have moved away from publicly owned and run retail outlets towards whole or partial privatization of their alcohol retail systems.

FIGURE 7
Number of alcohol outlets for every 10,000 people aged 15+ in Ontario, overall and by premise type, by public health unit, October 2014



Sources: Lists of ferment-on-premise, The Beer Store, distillery, brewery, on- and off-site winery locations, 2014 (Alcohol and Gaming Commission of Ontario); Agency Store List and Store Managers List, 2014 (Liquor Control Board of Ontario)



Specific policies limiting alcohol consumption in Ontario, as supported by the evidence, are the minimum retail pricing policy and partial government monopoly as reported in this section. In Ontario, there is no provincial policy setting limits on alcohol outlet density in place.

Other policies that are related to limiting alcohol consumption that are in place in Ontario, but have not been reported on in this section, are a minimum pricing policy for on-premise alcohol sales, a pricing structure based on the alcohol content of different beverages and limits on hours of sale. These policies may be examined in future reports.

Current policies that shift away from those recommended by the evidence to limit consumption include allowing Vintners' Quality Alliance wine sales at farmers' markets and the current pricing policy that does not tie the average alcohol price to the Consumer Price Index.

A possible further shift away from policies that limit consumption is outlined in the initial report of the Premier's Advisory Council on Government Assets, which includes recommendations for greater competition in the beverage alcohol market by expanding private sales, maintaining beverage alcohol prices below the Canadian average, and expanding the LCBO store network in addition to new private beer and wine stores.¹⁰⁴ As of this report, there has also been strong indication of government support for consideration by the Premier's Advisory Council on Government Assets for the sale of beer

Interventions for individuals who consume alcohol at levels that increase their risk of cancer (i.e., no more than two drinks a day for men and one drink a day for women) are needed.

and wine in large grocery stores, potentially adding hundreds of off-premise alcohol retail outlets and further decreasing the percentage of publicly owned and run alcohol retail outlets in the province.¹⁰⁵

Evidence suggests that alcohol marketing and promotion is associated with increased alcohol consumption, primarily among youth, and targeted control policies on alcohol marketing and promotion have been recommended as part of preventing further increases in alcohol consumption.^{80,106} The evidence supporting the effectiveness of alcohol marketing control policies in reducing harmful alcohol consumption, however, is not as strong as for policies regulating pricing and availability. A recent Cochrane systematic review concludes that further research is required to assess the impact of restrictions on alcohol marketing in order to determine which specific policies would be most effective in reducing alcohol consumption and related harms.¹⁰⁷

Alcohol programs and program implementers in Ontario

Alcohol programs in Ontario include prevention, counselling services, tools and guidelines supporting health professionals and community capacity building.

Community organizations, health centres, clinics, and primary care providers across Ontario offer counselling for individuals experiencing problems with excessive alcohol consumption. ConnexOntario offers the toll-free Drug and Alcohol Helpline. Public health units offer a range of educational and support programs, as well as referrals at the local level regarding alcohol consumption.

Tools addressing alcohol consumption are also available to assist health professionals in intervening early with high-risk drinkers. For example, the College of Family Physicians of Canada and the Canadian Centre on Substance Abuse offer a web resource — including a screening, brief intervention and referral clinical guide — for healthcare professionals to help patients assess and manage their alcohol consumption. This tool is based on *Canada's Low-Risk Alcohol Drinking Guidelines*, published by the Canadian Centre on Substance Abuse. The Canadian Centre on Substance Abuse has also published the evidence summary, *Cancer & Alcohol*, which promotes the Canadian Cancer Society alcohol consumption recommendation for cancer risk reduction and acknowledges that alcohol amounts in their cancer prevention guidelines are lower than those in

Canada's Low-Risk Alcohol Drinking Guidelines, which address a range of health effects.^{108,109}

Provincial programs supporting community capacity building to promote responsible and moderate drinking, or no drinking where warranted, exist through the Centre for Addiction and Mental Health, the Ontario Public Health Association and Public Health Ontario, which houses the Health Promotion Capacity Building Alcohol Policy Resource Centre (previously the Alcohol Policy Network).

Interventions for individuals who consume alcohol at levels that increase their risk of cancer, but who do not have an identified alcohol consumption disorder, is one program area that may be strengthened in Ontario. In the *Taking Action* report, CCO and PHO recommend increasing access to brief counselling interventions through healthcare providers to increase early intervention among moderate and heavy drinkers.³²

The Ontario Public Health Standards (2008, revised May 1, 2014), under the Chronic Diseases and Injury Prevention and Prevention of Injury and Substance Misuse Standards, mandate public health units and boards of health to engage in surveillance, health promotion and policy development work around alcohol misuse and reduced alcohol use across a range of settings.

Discussion and future directions

Ontario has in place a number of evidence-supported policies, including pricing and control

system policies, associated with promoting responsible and moderate alcohol consumption. Through government regulation, it has a direct role in setting the percentage of off-premise alcohol retail outlets that are publicly owned and run, and the density of alcohol outlets in the province.

Notable activities in 2014, as measured by the indicators in this section, include the introduction of Ontario wine sales at farmers' markets, which represents a specific shift away from the public alcohol retail system.

As recommended in the *Taking Action to Prevent Chronic Disease* report additional policies that would prevent increases in alcohol consumption in future years should:

- **Ensure that average alcohol prices do not decrease relative to the rate of inflation**
- **Adopt pricing policies for higher alcohol content beverages to create disincentives for the production and consumption of higher-strength alcoholic beverages**
- **Move away from the current trend of greater privatization in the alcohol retail system**
- **Ensure that the overall population density of on- and off-premise outlets per capita does not increase**

Further programs to increase early intervention among moderate and heavy drinkers are another way to prevent cancer related to alcohol consumption among the population currently at increased risk.

One area for improved measurement of system-level activity in future PSQI reports is expanded monitoring of alcohol sales from sources such as ferment-on-premise outlets, extended commercial events with special occasion permits, alcohol delivery services and online sales.



Healthy eating

INDICATORS:

Household food insecurity

Cost of a Nutritious Food Basket

The type, quantity and nutritional quality of food that people consume can greatly affect health outcomes.

Healthy eating is characterized by consumption patterns that are high in unprocessed foods, fibre, vegetables and fruit; low in sodium, trans fats and red and processed meats; and that balance consumption of calories with energy expenditure.^{110–113}

Specific components of healthy eating patterns are associated with reduced risk for a number of cancers, including colorectal, stomach, esophageal and post-menopausal breast cancers; cardiovascular disease; and type 2 diabetes. For example, there is probable evidence that non-starchy vegetables and fruit are associated with reduced risk of oral and esophageal cancers¹¹¹ and ischemic heart disease.¹¹² Alternatively, over-consumption of calories unbalanced by energy expenditure leads to increased body fatness, and may result in overweight and obesity. Overweight and obesity, classified as a body mass index of 25.0–29.9 kg/m² and 30.0+ kg/m² respectively,¹¹⁴ are associated with an increased risk of post-menopausal breast, esophageal, colorectal, pancreatic and kidney cancers,¹¹¹ ischemic heart disease and type 2 diabetes.¹¹³ As of 2013, 36.2 per cent of Ontario adults were overweight and 24.7 per cent were obese based on self-reported Canadian

Community Health Survey data that were adjusted for reporting bias.¹¹⁵

Vegetable and fruit consumption of five or more servings per day is used as an indicator of overall diet quality.¹¹⁶ In 2013, 34.8 per cent of Ontario adults met this target, a proportion that has been decreasing over the past decade.¹¹⁵

Many factors contribute to a person's dietary intake, including the food environment, which encompasses the availability of and access to food, individual preferences and behaviours, and financial resources. The two indicators in this section were selected to demonstrate the proportion of the Ontario population that does not meet a threshold for being "food secure," and the affordability of nutritious food in the province. These measures are related to the economic accessibility of healthy foods, which affects the ability to follow a healthy eating pattern. Ontarians must have physical and economic access to sufficient food before being able to prioritize the nutritional quality of food choices.

Household food insecurity

Food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."¹¹⁷ Food insecurity occurs when these requirements are not met and is predominantly a product of insufficient financial resources.¹¹⁸ Food insecurity is the strongest predictor for nutritional inadequacies¹¹⁹ because it affects the quality and quantity of food consumed. Adults experiencing food insecurity consume significantly fewer servings of

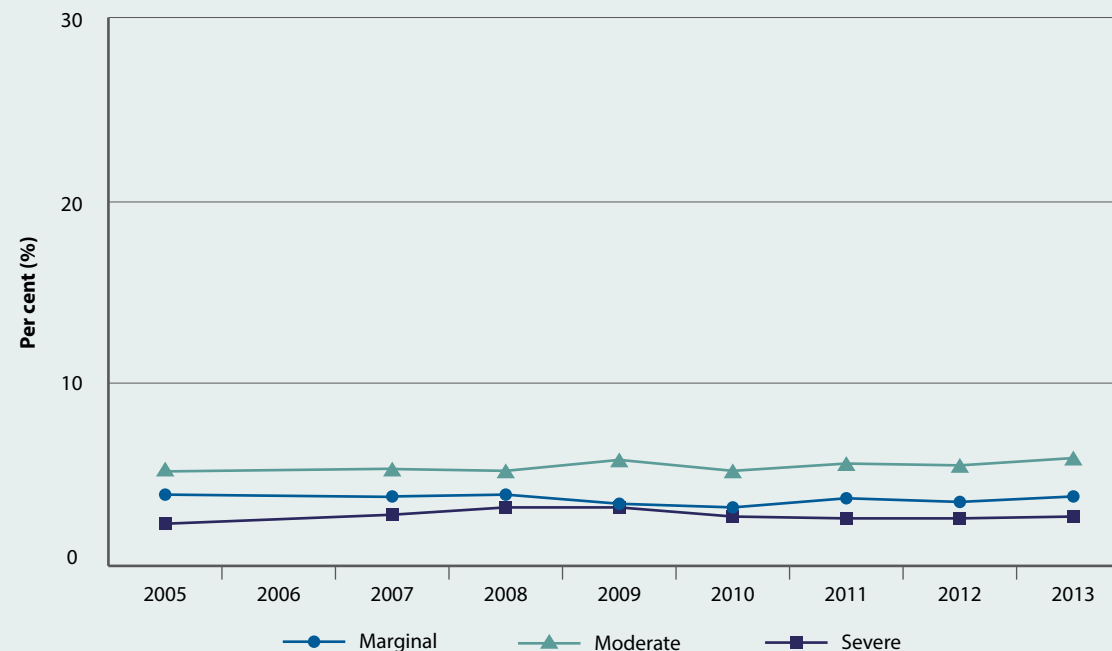
vegetables and fruit compared to adults who are food secure,¹²⁰ indicating poorer overall diet quality.¹¹⁶

The household food insecurity data are derived from the Household Food Security Survey Module

administered within the Canadian Community Health Survey.¹¹⁸ The module contains 18 questions that track the severity of food insecurity experiences for adults and children in relation to household income.¹²¹ Because adults often try to mitigate the

FIGURE 8

Trends in the percentage of Ontario households that were food insecure, by level of food insecurity, 2005–2013



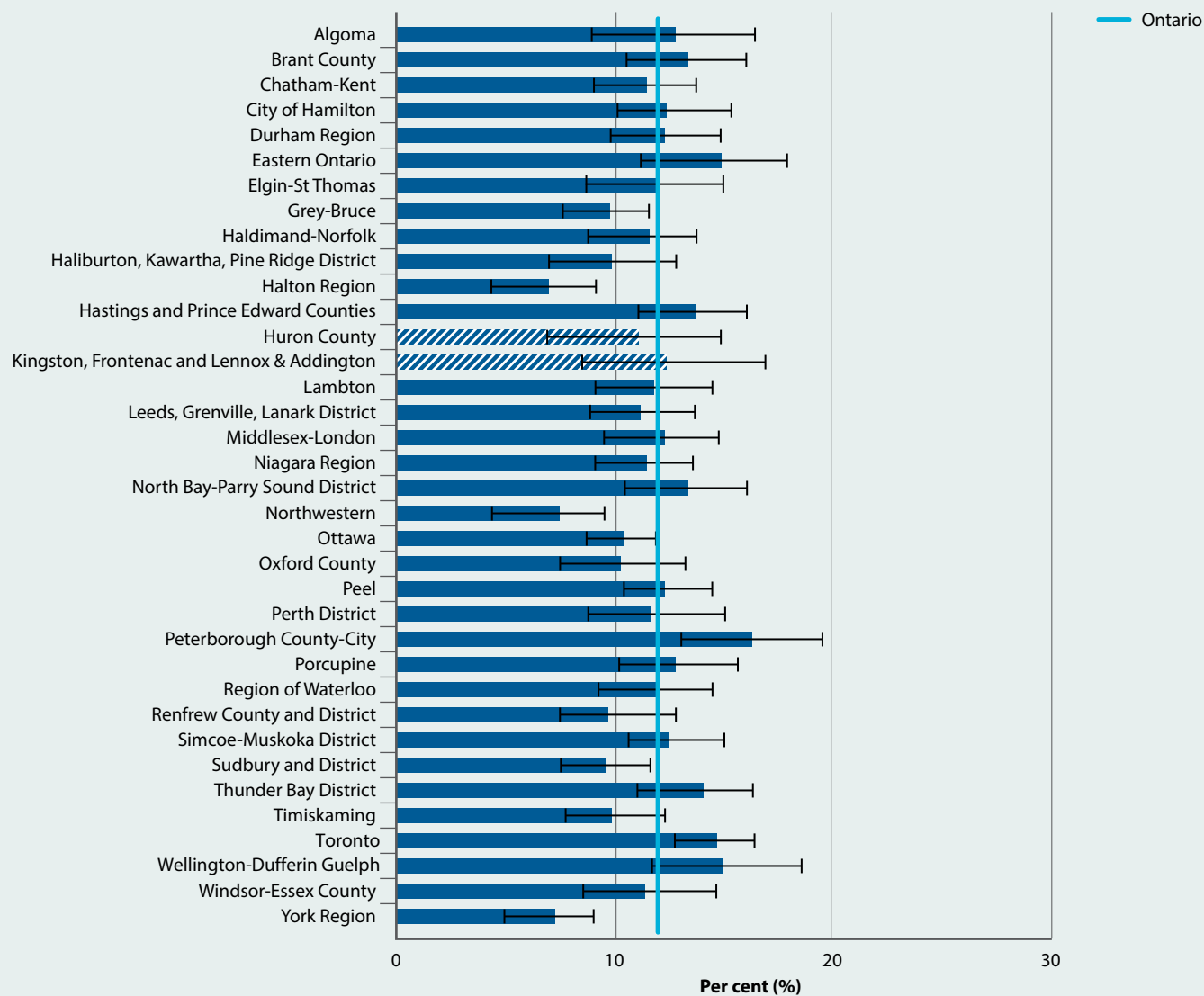
Source: Canadian Community Health Survey, 2005–2013 (Statistics Canada)

Note: Estimates are adjusted for Canadian Community Health Survey household weights.



FIGURE 9

Percentage of Ontario households that are food insecure, overall and by public health unit, 2011–2013 combined



Source: Canadian Community Health Survey, 2011–2013 (Statistics Canada)

Notes: — represent 95 per cent confidence intervals. E — Interpret cross-hatched estimates with caution due to high sampling variability. Data from Canadian Community Health Survey cycles 2011 through 2013 combined to increase sample size for analyses by public health unit.

effects of food insecurity for children, responses that show high food insecurity for youth indicate increased food scarcity in that household. Based on affirmative survey responses, household food insecurity is classified as marginal, moderate or severe. This represents the range of people's behaviours and experiences, which includes worrying about accessing food (marginal), compromising food quality and/or quantity (moderate), and reducing food consumption (severe), all due to insufficient funds.¹¹⁸ The Household Food Security Survey Module was not implemented in 2006 but has been administered consistently in Ontario from 2007 onwards, allowing for household food insecurity trends to be evaluated.

In 2013, 12.4 per cent of Ontario households experienced some degree of food insecurity. Particularly, 3.8 per cent were marginally, 5.9 per cent moderately and 2.7 per cent severely food insecure (Figure 8). Between 2005 and 2013, the overall prevalence of household food insecurity in Ontario remained relatively stable (Figure 8). The proportion of moderately food insecure households was consistently higher than those marginally or severely food insecure.

The prevalence of household food insecurity varied across Ontario's 36 public health units, ranging from 7.0 per cent in the Haliburton, Kawartha, Pine Ridge District public health unit to 16.3 per cent in the Haldimand-Norfolk public health unit (Figure 9). Compared to the 2011–2013 Ontario average (12.0 per cent), the prevalence of household food insecurity was significantly higher in the Haldimand-Norfolk (16.3 per cent), Grey Bruce (15.0 per cent) and

Windsor-Essex County (14.7 per cent) public health units; and were significantly lower in the Haliburton, Kawartha, Pine Ridge District (7.0 per cent), Eastern Ontario (7.5 per cent), Ottawa (7.3 per cent) and Durham Region (9.6 per cent) public health units (Figure 9).

The steady trend in household food insecurity in Ontario may indicate a gap in present provincial policies and programs. In 2012, 58.6 per cent of food insecure households in Ontario relied on wages and salaries as the main source of income.¹¹⁸ Additionally, rates of food insecurity are higher in households where the survey respondent identifies as Aboriginal or black, rents rather than owns a home, or is a recent immigrant.¹¹⁸ Regional needs and population-specific characteristics should be taken into consideration when planning initiatives to address the variations across public health units. Canadian Community Health Survey data likely underestimate the true prevalence of household food insecurity due to the exclusion of certain populations from data collection, including individuals living on First Nations reserves or Crown lands, homeless persons, people in prisons or care facilities, and full time members of the Canadian Forces.¹¹⁸

This indicator highlights a need for more programs and policies that target food insecurity and for comprehensive approaches to reducing poverty; declining food insecurity rates should be used as a measure of success in the implementation of programs and policies. Household food security needs to be ensured before healthy eating interventions can be effectively implemented.

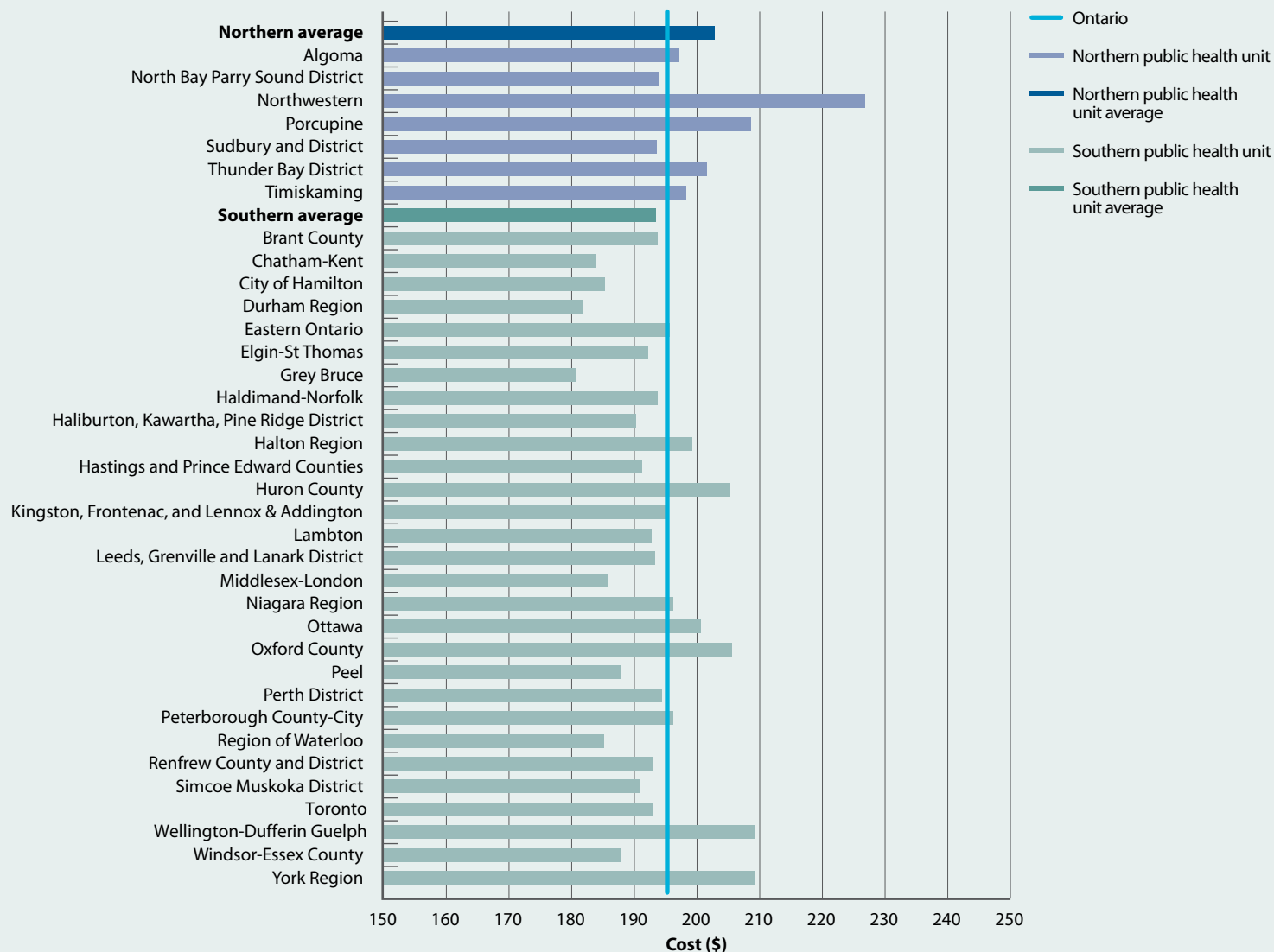
12.4%

In 2013, 12.4 per cent of Ontario households experienced some degree of food insecurity.



FIGURE 10

Average weekly cost of a Nutritious Food Basket, by public health unit, Ontario, 2014



Source: Nutrition Food Basket Reports, 2014 (Ministry of Health and Long-Term Care)

Cost of a Nutritious Food Basket

The Nutritious Food Basket is a tool used to measure the affordability of nutritious food in Ontario. Nutritious food needs to be economically accessible if healthy eating patterns of Ontarians are to improve. The Nutritious Food Basket shows changes in food costs, cost disparities across regions and the accessibility of food relative to social assistance and minimum wage levels.¹²² This indicator presents data on the cost of the Nutritious Food Basket, in Ontario, by public health unit in 2014 and Nutritious Food Basket trends between 2009 and 2014.

Public health units are mandated by the Ministry of Health and Long-Term Care's Ontario Public Health Standards to monitor food affordability in accordance with the Nutritious Food Basket Protocol, 2014 (or as current).¹²³ The Nutritious Food Basket data are collected by public health units and assess 67 foods. These foods are selected based on eating patterns that meet *Eating Well with Canada's Food Guide* recommendations and are reflective of behaviours identified through the Canadian Community Health Survey Cycle 2.2 (2004) results.¹²² Public health units are required to assess a minimum of six grocery stores within their boundaries to obtain the average cost of food in their region.¹²²

In 2014, the average weekly cost of a Nutritious Food Basket in Ontario was \$195.40 for a reference family of four, ranging from \$180.79 (Grey Bruce) to \$226.93 (Northwestern) across the public health units (Figure 10). Based on the provincial weekly average, the annual cost of a Nutritious Food Basket is \$10,160.80 for a family of four. The average weekly cost of a Nutritious Food Basket was higher within the northern region compared to the southern region of the

province in 2014. The northern average was \$203.02, while the southern average was \$193.56; this is a difference of \$9.46 per week or \$491.92 over the course of the year (Figure 10).

Between 2009 and 2014, the average weekly cost of a Nutritious Food Basket in Ontario for a family of four increased from \$168.50 to \$195.40 (data not shown). The annual per cent change in the cost of the Nutritious Food Basket from 2009–2014 was similar to the annual per cent change in the Ontario Consumer Price Index for food purchased in stores (data not shown). This indicates that the observed increases in the cost of the Nutritious Food Basket are consistent with increases in the cost of food in the province as a whole.

The Nutritious Food Basket data show rising prices of nutritious food in Ontario and that nutritious food is more expensive in northern Ontario communities. Individuals receiving social assistance, in minimum wage jobs or with insufficient financial resources are most likely to be affected by these costs, making healthy eating less accessible. At present, the Nutritious Food Basket is not used to calculate social assistance or minimum wages rates and these rates are not adjusted yearly to reflect inflation. The Nutritious Food Basket may underestimate costs because it does not include infant formula or baby foods, religious or cultural foods, or special diets for chronic conditions, and assumes people have the ability and skills to cook.¹²² A limitation with this indicator is that the Nutritious Food Basket was not designed as a quality performance indicator. Its intent was to provide individual public health units with information that measures food affordability in

their region compared to Ontario overall. Data must therefore be interpreted with this in mind.

Annual monitoring of the Nutritious Food Basket cost provides critical data that are used by individual health units to advocate for liveable social assistance rates and minimum wages. Ideally, the Nutritious Food Basket should be incorporated into these rates to ensure nutritious food is economically accessible to the population.

Healthy eating policies and policy implementers in Ontario

Policies affecting healthy eating in Ontario span the portfolios of numerous ministries and different levels of government.

At the provincial level, ministries playing a central role in healthy eating include the Ministry of Health and Long-Term Care, the Ministry of Education and the Ministry of Agriculture, Food and Rural Affairs. The Ontario Public Health Standards mandate healthy eating policies and programs delivered by Ontario's 36 boards of health to prevent chronic disease and promote child health, including the requirement that food affordability be monitored and reported annually with the Nutritious Food Basket survey tool.¹²⁴ The Healthy Foods for Healthy Schools Act from the Ministry of Education ensures guidelines on nutritional standards are instituted for all food and beverages provided in Ontario schools.¹²⁵ The newly passed Local Food Act (2013) from the Ministry of Agriculture, Food and Rural Affairs, which supports the production and consumption of Ontario-produced foods, aims to bring awareness to this sector and supports food literacy for local food.¹²⁶



Policies affecting healthy eating in Ontario span the portfolios of numerous ministries and different levels of government.

In addition, the Ministry of Health and Long-Term Care recently introduced the Making Healthier Choices Act, 2014, a proposed menu labelling bill. If passed, this bill will require chain restaurants with 20 or more outlets to post calorie content of food items on menus and menu boards.⁶⁷

Federally, Health Canada's Office of Nutrition Policy and Promotion sets policies and standards related to nutrition and healthy eating. As of 2007, nutrition labelling has been mandatory for all pre-packaged foods to inform consumers of their nutrient content.¹²⁷ Additionally, the office is responsible for *Canada's Food Guide*, which is the foundation of numerous policies and programs.¹²⁸ The Canadian Food Inspection Agency¹²⁹ is responsible for regulating all health claims on food packaging.

Locally, numerous municipalities have formed food policy councils to address food issues in their communities.

Many groups are currently researching policy options to promote healthy eating. Food labelling (the Propel Centre for Population Health Impact, University of Waterloo, and Public Health Ontario), food insecurity (Research to Identify Policy Options to Reduce Food Insecurity, or PROOF), food and eating behaviours (Promoting Optimal Weights through Ecological Research, or POWER University of Alberta), and reducing the sodium content of foods are all areas of active research relevant to policy development.

Policies implemented at different jurisdictional levels are therefore in place, and address Ontarians' ability to eat healthfully. However, few policies address the

availability and affordability of healthy foods and have yet to be evaluated for effectiveness.

Healthy eating programs and program implementers in Ontario

Numerous community organizations, health centres and public health units offer food and nutrition programming, such as cooking classes and educational workshops that are often tailored to target high-risk populations. Types of broad-scale healthy eating programs in Ontario include food provision, knowledge transfer and funding programs.

Food provision programs include the Ontario Student Nutrition Program, supported by the Ministry of Children and Youth Services. As part of the Poverty Reduction Strategy (2014–2019) the province is investing an additional \$32 million over three years to expand the program, helping an additional 340 schools run breakfast or morning meal programs.¹³⁰ The Northern Fruit and Vegetable Program, funded by the Ministry of Health and Long-Term Care and the Ontario Fruit and Vegetable Growers' Association, provides two servings of fresh vegetables and fruit each week in northern Ontario schools.¹³¹ This program reaches 36,000 students, including 6,600 Aboriginal students, in 191 schools.^{131,132}

Knowledge transfer programs include EatRight Ontario, a nutrition resource for Ontarians operated by the Dietitians of Canada and funded through the Ministry of Health and Long-Term Care. It allows individuals to ask nutrition-related questions and receive feedback by phone or email from a registered dietitian.¹³³ The Community Food Advisor Program uses trained volunteers in a peer facilitated program to improve food skills and healthy eating. In 2013, the program

reached 21,785 people throughout 14 areas of Ontario with the help of 247 Community Food Advisors.¹³⁴ Presently, funding has been discontinued, with future funding yet to be confirmed.¹³⁵ The Ontario Federation of Indigenous Friendship Centres, supported by the Ministry of Health and Long-Term Care, facilitates the Urban Aboriginal Healthy Living Program. This program promotes and supports healthy eating and lifestyles in the urban Aboriginal community through a variety of workshops, information sessions and activities.^{132,136}

The Healthy Kids Community Challenge and Healthy Community Fund, through the Ministry of Health and Long-Term Care, and the Local Food Fund, through the Ministry of Agriculture, Food and Rural Affairs, are three provincial funding programs. The Healthy Kids Community Challenge provides funding from 2014–2018 to communities delivering local programs and activities, including those that support healthy eating among children and youth.¹³⁷ The Healthy Community Fund supports the development of provincial programming, community partnerships and community capacity-building.¹³⁸ The Local Food Fund provides funding to community-level projects that support local food, including those that focus on improving food literacy, storage and transportation of local foods to communities, food distribution and other programs to improve local food access.¹³⁹ The Ministry of Agriculture, Food and Rural Affairs, along with the Dietitians of Canada, the Ontario Fruit and Vegetable Growers' Association and the Ministry of Education, also coordinates Fresh from the Farm. This fundraising program sells local fresh produce from schools, while raising money and supporting local farmers.¹⁴⁰

Ontario's current array of healthy eating programs focuses on education and the provision of food in schools. These programs rely heavily on individual-level interventions and will likely have limited success if the food environment is not conducive to healthy eating. In terms of affecting food affordability, these programs do not alter the outcome of households' experiences of food insecurity. Like food provision programs, student nutrition programs can be beneficial in improving children's learning outcomes and could potentially reduce the intergenerational cycle of poverty;¹⁴¹ however, their ability to reduce household food insecurity is minimal because they do not address root causes. The initiatives supported through the funding programs may have the potential to alter the food environment and address community-specific barriers; however, the outcomes of these initiatives have yet to be determined.

Discussion and future directions

Ontario has a number of policies and programs addressing individual behaviours and the food environment, with a strong emphasis on the provision of healthy foods for children. In addition, numerous programs are directed at increasing healthy eating knowledge and healthy food preparation skills. With the majority of Ontario residents consuming less than five servings of vegetables and fruit per day, these policies and programs alone are not enough to greatly improve healthy eating in the population. Additionally, the impact of these policies and programs on ensuring healthy food is affordable and accessible to all people in Ontario is minimal. Addressing provincial food insecurity should be a priority so that all Ontarians

can benefit from policies and programs directed at individual behaviours and the food environment.

To improve food security and affordability of food in future years, the Ontario government should:

- **Ensure the cost of food is accounted for in the provincial budget by using the Nutritious Food Basket when determining rates for social assistance and minimum wage incomes**
- **Implement poverty reduction and affordable housing strategies that use improvements in food insecurity rates as a measure of success**

Policies that would increase healthy eating in future years should:

- **Expand and harmonize food environment policies, such as enforcing nutrition standards on foods provided at all publicly funded institutions and implementing mandatory menu labelling in food service operations**
- **Include mandatory food literacy and skills development in the publicly funded school curriculum and in community-based initiatives**
- **Integrate a whole of government approach to align and address food and healthy eating programs and policies, as called for in the Ontario Food and Nutrition Strategy¹⁴²**

In future years, the Prevention System Quality Index will endeavour to evaluate additional system-level healthy eating indicators, such as the compliance to mandatory menu labelling among large chain restaurants, should the proposed bill be passed.



Physical activity

INDICATORS:

Physical education specialists in schools

Enrolment in health and physical education

Physical activity at recommended levels, such as moderate physical activity (e.g., brisk walking) for at least 30 minutes every day, reduces the risk of colon cancer and probably reduces the risk of cancers of the breast and endometrium.^{111,143}

It also reduces the risk of developing type 2 diabetes, ischemic heart disease and overall cardiovascular disease.^{144,145} On average, physical activity decreases the risk of type 2 diabetes by 42 per cent and cardiovascular disease by 33 per cent, with risk reduction estimates reaching 50 per cent or higher in studies that use an objective measure of aerobic fitness. Active transportation is one classification of physical activity that can have additional positive impacts on the population (see Box 2). Increasing modes of active transportation as a source of physical activity can replace car travel and offer other public

health benefits, including reductions in air pollution and emissions, urban noise and vehicle collisions.¹⁴⁶

Data from the Canadian Community Health Survey show that in 2013, only 52.9 per cent of Ontario adults aged 18 years and older were either moderately active or active in their leisure time.¹¹⁵ This statistic has not changed significantly since 2003.¹¹⁵ Expenditures attributed to physical inactivity cost Ontario close to \$1 billion in direct healthcare costs and \$2 billion in indirect costs in 2011, totalling almost \$3 billion.³²

It is well known that physical activity among children and adolescents is important to health and has important potential cognitive-emotional benefits.^{153,154} Participation rates are partly influenced by opportunities to engage in regular physical activity.¹⁵⁵ Physical activity patterns may be set in childhood and adolescence¹⁵⁶ and may be transferred over to the adult years.^{157–159} School-based settings are ideal in providing structured opportunities for physical activity among students.¹⁵⁴

Physical education specialists in schools

Research supports that physical education specialists are the preferred teachers of physical education in school settings. A physical education specialist has either majored or minored in physical education, often three to five years, before completing a Bachelor of Education degree or having received specialized training during pre-service education.¹⁶⁰ The Active Healthy Kids Canada report card on physical activity for children and youth states that only 42 per cent of elementary schools have a formal policy in place to hire trained physical education specialists.¹⁶¹ Ontario's Chief Medical Officer of Health recommended in a 2004 report that schools and school boards ensure that physical education is taught by teachers who have appropriate training in physical education.¹⁶²

Studies have shown that physical education specialists who have received more extensive and subject-specific training than generalist teachers are more likely to teach all realms of a physical education curriculum with confidence and accuracy.¹⁶³

Researchers in southern California found that children taught by a non-specialist elementary physical education teacher had limited opportunities to either develop physical skills or improve their fitness levels during class time.¹⁶⁴ In addition, non-specialist teachers often allowed children to participate in free play or dropped physical education classes from the day's schedule. Compared with generalist teachers, physical education specialists have also been found to teach longer lessons, spend more time developing skills, provide more opportunities for moderate and

BOX 2

Active transportation

Active transportation is generally defined as using human-powered travel to move between destinations, usually with an emphasis on walking and bicycling. There is some variation in how active transportation is defined and measured, such as the inclusion of motorized mobility devices, recreational movement and public transit.

Active transportation is a convenient and routine way to increase daily physical activity. Both brisk walking and cycling, two popular modes of active transportation, contribute to meeting the Canadian Physical Activity Guidelines for children, youth and adults.¹⁴⁷

Numerous studies have pointed to overall higher levels of measured and self-reported physical activity for adults and youth who use active transportation, as well as public transit, because of the associated travel to transit nodes.^{148–151}

Active transportation also decreases the amount of sedentary time Ontarians spend in cars. The Canadian Sedentary Behaviour Guidelines¹⁴⁷ for children and youth call for limits on motorized transport and extended sitting.

According to the 2011 National Household Survey, private vehicles were used by 78.7 per cent of people travelling to work in Ontario,

and of these people 82.7 per cent were driving alone. The share of public transit commuters is 14 per cent, 5.1 per cent of Ontario commuters walked to work and 1.2 per cent cycled.¹⁵²

In recent years, notable progress has been made in the area of active transportation at the provincial and municipal levels. Public health units and community stakeholders working in this area should be applauded for their innovative approaches. Future versions of this report will seek to identify and evaluate an active transportation indicator.



vigorous physical activity, and use optimal physical education teaching practices.¹⁶⁵

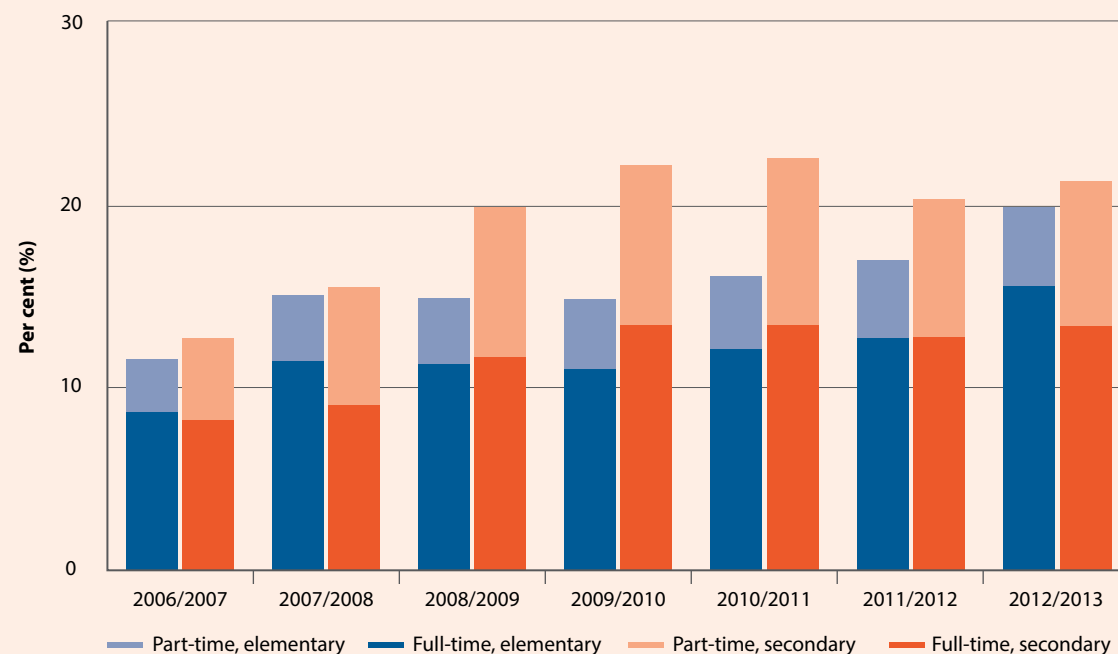
When examining specialist versus non-specialist physical education teachers in Ontario elementary schools, there was no difference noted in the quantity of physical education and physical activity provided by specialists or generalists. However, the quality of the physical activity experiences provided was not assessed.¹⁶⁶ Research does suggest that the lessons taught by specialists were more enjoyable for students¹⁶³ and included more effective instructional behaviours.¹⁶⁵ These qualities may be more significant than quantity in promoting active lifestyles during and after school years by promoting physical activity outside of the school setting.¹⁶⁷

Specialist teachers also contribute in other ways. Schools with specialist teachers reported a higher student participation rate in intramural sports, but not inter-school sports. When it comes to developing, promoting and accessing resources for various opportunities for their students, specialist teachers may have greater commitment and passion. Therefore, specialists can play an essential role in facilitating a school climate that supports an “active school” environment.¹⁶⁸

For all of these reasons, it is important to assess the proportion of publicly funded elementary and secondary schools that have full-time and part-time health and physical education specialist teachers in Ontario. Data on this indicator were obtained from the Ministry of Education.

FIGURE 11

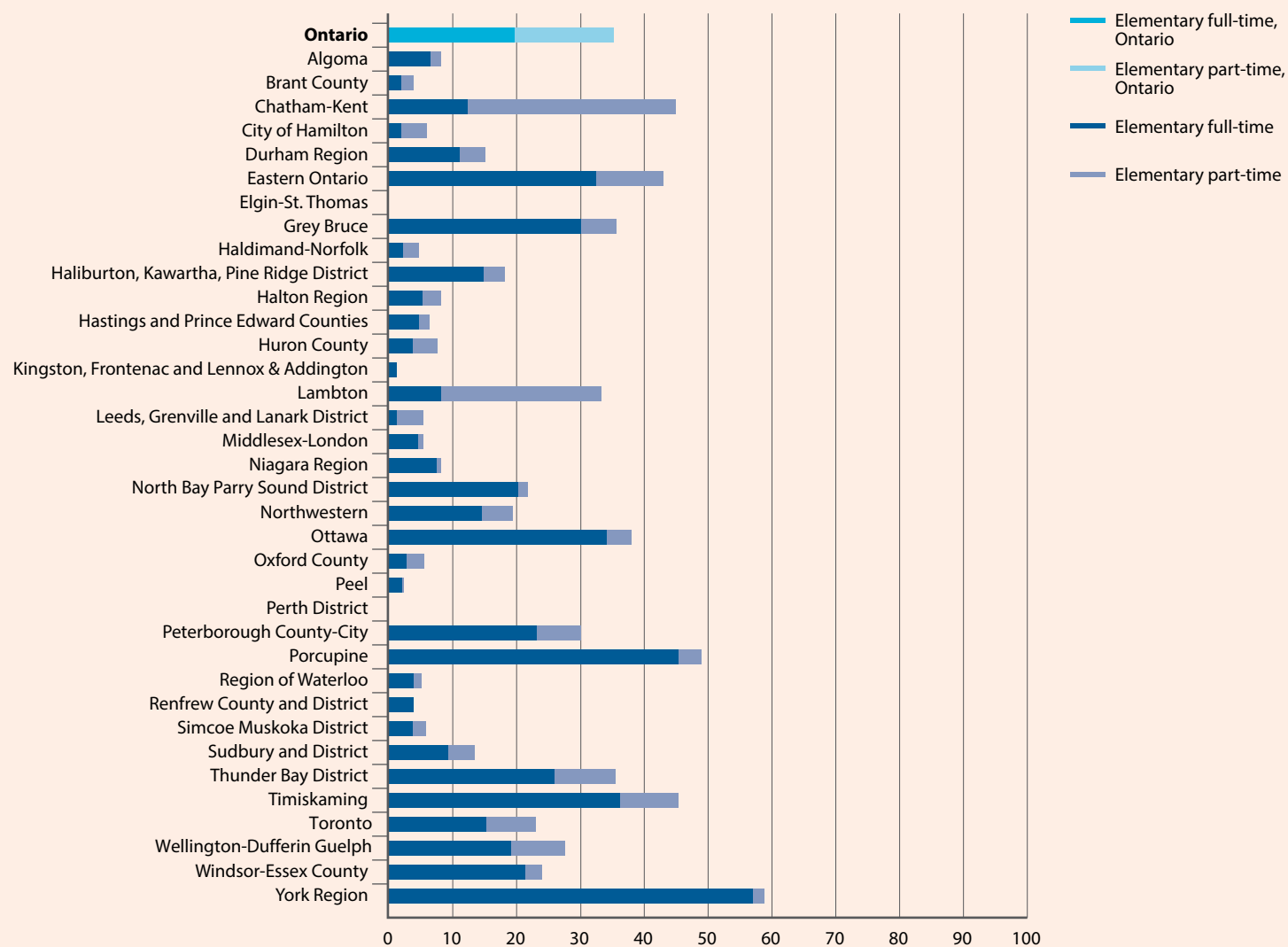
Proportion of publicly funded elementary and secondary schools in Ontario with specialist teachers assigned to teach health and physical education, 2006/2007 school year to 2012/2013 school year



Source: Ontario School Information System, selected years, March submission for 2006/2007 and October submission for 2007/2008 through 2012/2013 (Ministry of Education)

FIGURE 12a

Proportion of publicly funded elementary schools in Ontario with specialist teachers assigned to teach health and physical education, overall and by teacher status, by public health unit, 2012/2013 school year

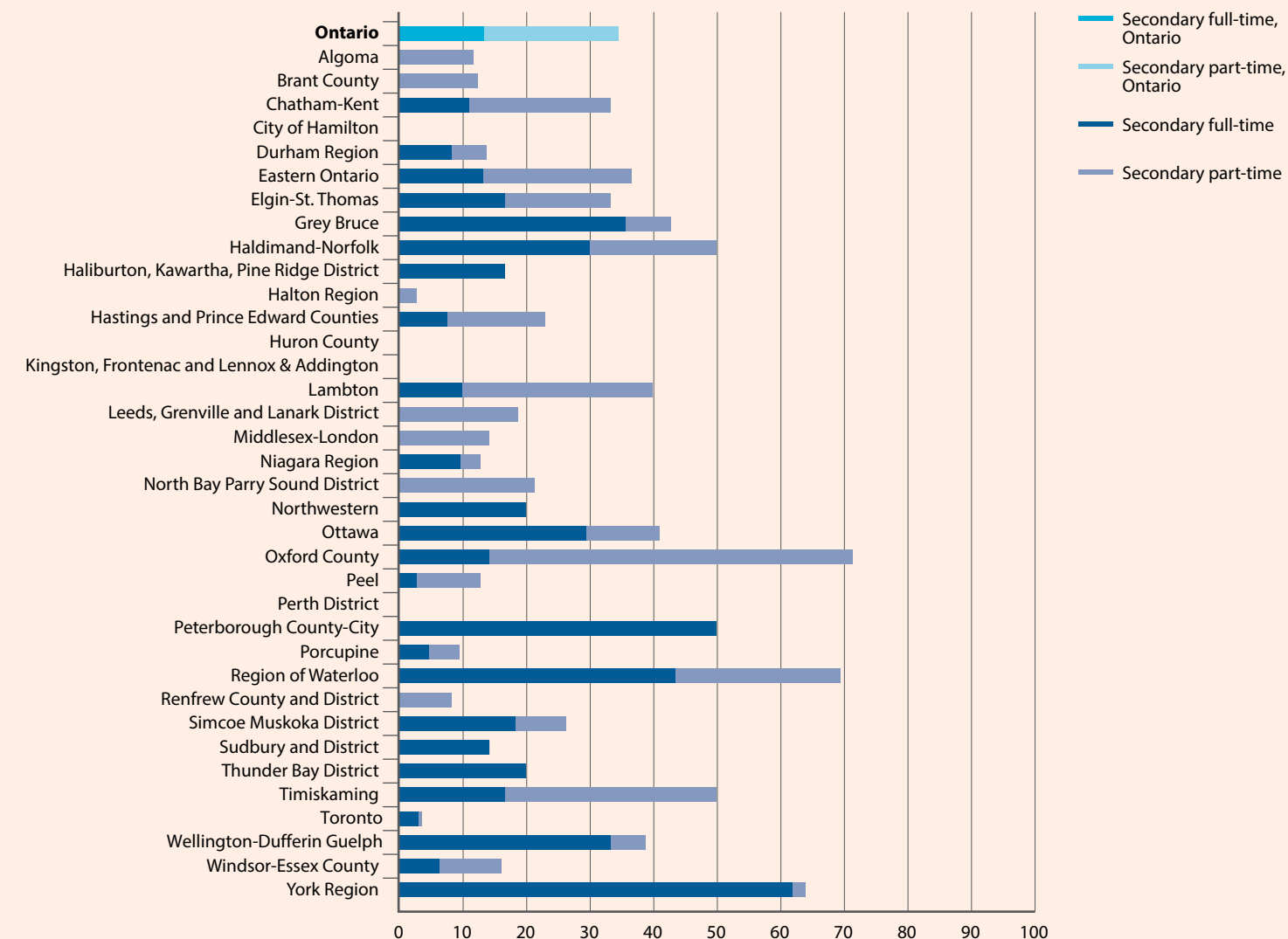


Source: Ontario School Information System, 2012/2013 (Ministry of Education)



FIGURE 12b

Proportion of publicly funded secondary schools in Ontario with specialist teachers assigned to teach health and physical education, overall and by teacher status, by public health unit, 2012/2013 school year



Source: Ontario School Information System, 2012/2013 (Ministry of Education)

In elementary schools, the proportion of Ontario schools with part-time and full-time specialist teachers has increased from 11.5 per cent in the 2006/2007 school year to 19.9 per cent in the 2012/2013 school year (Figure 11). Among secondary schools, the proportion of Ontario schools with part-time and full-time specialist teachers has increased from 12.7 per cent in the 2006/2007 school year to 21.2 per cent in the 2012/2013 school year (Figure 11).

The proportion of publicly funded elementary schools with part-time and full-time specialist teachers varied widely by health unit during the 2012/2013 school year (Figure 12a). York Region (59.0 per cent), Porcupine (49.1 per cent), Timiskaming (45.5 per cent) and Chatham-Kent (45.0 per cent) had the highest overall proportion of schools with specialist teachers (full- and part-time) while Elgin-St Thomas (0 per cent), Perth (0 per cent), Kingston, Frontenac and Lennox & Addington (1.3 per cent) and Peel (2.4 per cent). Across health units, the majority of specialist teachers within publicly funded schools with specialist teachers were full-time, with the exceptions being Lambton and Chatham-Kent.

BOX 3

Physical literacy

Physical literacy can be described as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life.¹⁷⁰

The proportion of publicly funded secondary schools with part-time and full-time specialist teachers also varied widely by health unit during the 2012/2013 school year (Figure 12b). Oxford (71.4 per cent), Waterloo (69.6 per cent) and York Region (64.0 per cent) had the highest overall proportion of schools with specialist teachers (full- and part-time) while Hamilton (0 per cent), Huron (0 per cent), Perth (0 per cent) and Kingston, Frontenac and Lennox & Addington (0 per cent). Across health units, the proportions of full- and part-time specialist teachers among these schools was varied.

These data indicate an increasing trend of specialist health and physical education teachers in elementary and secondary schools in Ontario. This is encouraging because specialist teachers can contribute to improvements in various health outcomes for students and to the development of physical literacy (see Box 3), an important goal of Ontario's Health and Physical Education Curriculum.¹⁶⁹

The analysis for this indicator is limited, however, because it does not account for the size of the student populations in the schools to which the specialist physical and health education teachers were assigned. As such, the data in and of themselves cannot speak to the equity of specialist teacher resourcing across schools.

These data were analyzed at the public health unit level and great variation was seen in the ratio of students to specialist teachers assigned to teach health and physical education in Ontario (data not shown). Timiskaming, York Region and Grey Bruce public health units had the lowest student-to-specialist teacher ratios, while the highest student-to-teacher ratios were

seen in Brant County, Halton Regional and Peel Regional public health units (data not shown).

Provincially, the number of students per specialist teacher assigned to teach health and physical education in Ontario has declined over the past seven academic years in elementary and secondary schools (data not shown). This ratio has remained consistently higher in secondary schools, compared to elementary schools. In elementary schools, the ratio has more than halved, from 2,794 to 1,128 students per full-time equivalent specialist health and physical education teacher between the 2006/2007 and the 2012/2013 school years (data not shown). A similar trend is observed within secondary schools, where the ratio has declined from 5,878 to 3,226 students per full-time equivalent specialist health and physical education teachers between the 2006/2007 and 2012/2013 school years (data not shown).

Important improvements have been made in the ratio of the number of students for each full-time equivalent specialist teacher assigned to teach health and physical education in Ontario. If this trend continues, Ontario's children will have greater potential to be provided high quality daily physical health education and achieve physical literacy.

Enrolment in health and physical education

Schools play an important part in helping children and youth develop the knowledge, skills and habits for lifelong active living. Despite the well-known benefits of physical activity, only an estimated 7 per cent of Canadian children and youth participate in 60 minutes a day, six days a week of moderate to vigorous physical activity.¹⁷¹ During adolescence,



when youth establish lifelong habits,^{172–174} physical activity actually declines.^{156,175}

Although physical activity can be achieved in a variety of settings and in different ways, school-based physical education classes are especially important. A Cochrane review supports school-based physical activity interventions as effective in increasing physical activity duration, as well as reducing blood cholesterol and the time spent watching television.¹⁷⁶ The U.S. Task Force on Community Preventive Services found strong support for school-based physical education because of its effectiveness in increasing physical activity and improving physical fitness among adolescents and children.¹⁷⁷

The data in Figure 13 come from the Ontario School Information System from the Ministry of Education and present the percentage of secondary school students in Ontario who earned a credit in one or more physical education courses from the 2005/2006 to the 2012/2013 school years, by grade.

The percentage of grade nine students who earned one or more physical education credits ranged from 83.0 per cent during the 2005/2006 school year to 87.4 per cent during the 2012/2013 school year (Figure 13). In contrast, the percentage of grade 12 students who were enrolled in physical education courses ranged from 25.1 per cent during the 2005/2006 school year to 26.2 per cent during the 2012/2013 school year (Figure 13).

These data indicate that the majority of Ontario students are taking their mandated physical education credit in grade 9. A lower proportion

of students in grades 10 to 12 are taking a physical education course, which could be contributing to the low percentage of youth that engage in physical activity for 60 minutes a day, six days a week (data not shown). These data support the importance of secondary students being required to earn a physical education credit in every grade from 9 to 12 to achieve high school graduation, a recommendation that was highlighted in the joint Cancer Care Ontario–Public Health Ontario *Taking Action to Prevent Chronic*

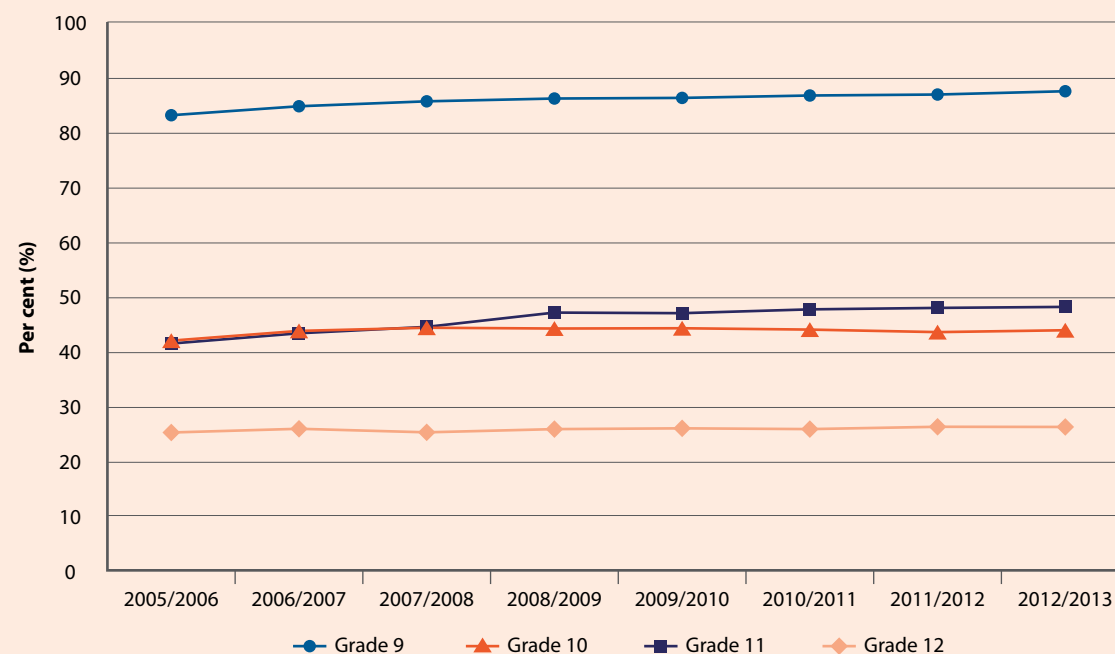
Disease report and has been supported by the Ontario Society of Physical Activity Promoters in Public Health.

Physical activity policies and policy implementers in Ontario

Policies that directly increase physical activity in Ontario are primarily school-based, but other policies, such as those that support recreation, sport and active transportation also address physical activity in the province.

FIGURE 13

Percentage of secondary school students in Ontario who earned a credit in one or more physical education courses, by grade, 2005/2006 school year to 2012/2013 school year



Source: Ontario School Information System, 2005/2006 to 2012/2013 (Ministry of Education)

With respect to school-based policies, the Ontario Ministry of Education Policy/Program Memorandum No. 138 requires elementary students (grades 1 to 8) to have a minimum of 20 minutes of sustained moderate to vigorous physical activity each school day during instructional time.¹⁷⁸ Public Health Ontario is currently undertaking an evaluation of this policy, and the Premier of Ontario has recently announced a pilot program to assess the feasibility of including 60 minutes of physical activity in the school day.¹⁷⁹ At the secondary school level, Ontario students require one physical education credit to graduate from high school.

The Ontario Ministry of Finance also addresses physical activity among children with the Children's Activity Tax Credit. Eligible expenses include registration of children in organized and supervised fitness activities that contribute to cardiorespiratory endurance.¹⁸⁰ The federal government's Children's Fitness Tax Credit similarly allows parents to claim expenses for children's physical activity programs. A study conducted in March 2009 examined the effectiveness of the Children's Fitness Tax Credit in increasing physical activity. Parents in the lowest income brackets were significantly less aware of and less likely to claim the Children's Fitness Tax Credit than other income groups. A tax credit like the Children's Fitness Tax Credit may only benefit Ontarians who can afford to pay the costs of registration for a physical activity program. The study suggests that the tax credit is rather inequitable for a large portion of the population, but if a more equitable process can be implemented allowing low-income families to take advantage of the Children's Fitness Tax Credit, it is possible for the tax credit to be an effective policy tool for encouraging physical activity among children.¹⁶⁰

Ontario's Chief Medical Officer of Health recommended in a 2004 report that schools and school boards ensure that physical education is taught by teachers who have appropriate training in physical education.

The Canadian Sport Policy was renewed in 2012, setting the 2012–2022 national direction for all governments, institutions and organizations in the area of sport for working with individuals, communities and society.¹⁸¹ A 2010 evaluation of the previous Canada Sport Policy noted that the goal of increasing the number of people participating in sport had not been met and that participation had instead decreased.¹⁸²

Policies affecting physical activity across all age groups include Ontario's Planning Act,¹⁸³ which outlines minimum standards on land use planning and development, and requires that all municipal and regional decisions be consistent with the Provincial Policy Statement.¹⁸⁴ Systematic reviews support the implementation of land use policies to support physical activity and active transportation.¹⁸⁵ The Provincial Policy Statement was updated in 2014, and now includes the term "active transportation," as well as the directive to support active transportation through appropriate densities and land use mix in communities and densities for new housing. Official municipal plans are updated every five years and over the next few years will integrate requirements from the 2014 Provincial Policy Statement. Many municipalities have already included active transportation in their policies, plans and activities,

such as Niagara Region's Complete Streets Model Policy Handbook,¹⁸⁶ the City of Hamilton Pedestrian Mobility Plan¹⁸⁷ and the City of Thunder Bay Active Transportation Plan.¹⁸⁸

Physical activity programs and program implementers in Ontario

Broad-scale programs addressing physical activity in Ontario include those supporting school curricula, such as those offered by Ophea and Physical and Health Education (PHE) Canada,¹⁸⁹ and after-school activities through Ontario's After-School Program and Parks and Recreation Ontario.¹⁹⁰ There are also considerable community capacity-building initiatives through Canadian Sport for Life and the Healthy Communities Fund,¹³⁸ which support local and provincial health promotion initiatives that provide Ontarians of all ages and abilities with opportunities to improve their health. Such initiatives include those promoting physical activity and programs that increase places and opportunities for physical activity, such as those supported by the Ontario Sport and Recreation Communities Fund.¹⁹¹ The province has also recognized a number of non-profit organizations with mandates to provide recreation programs in communities and specific foci on sport, recreation and physical activity as Provincial Recreation Organizations.¹⁹²



Discussion and future directions

The policies related to the quality of health and physical education programs in elementary and secondary schools need to be further examined and possibly modified. For example, the proportion of elementary and secondary schools that have a full-time equivalent health and physical education specialist teacher and whether physical education taught by a specialist should be mandatory for all students should be considered.

Recommendations in the *Taking Action to Prevent Chronic Disease* report need to be implemented and monitored, including the recommendation that secondary students be required to earn a physical education credit in every grade from 9 to 12 in order to graduate and the recommendation that the daily physical activity policy in Ontario elementary schools continue to be implemented, as well as examined for its feasibility and quality.

Efforts are needed to facilitate and encourage the involvement of children and youth in various types of physical activity starting at a young age. The provincial government can play a role in helping create policy around physical activity standards in child care facilities and schools by improving access to physical activity, creating a supportive environment and looking at barriers (financial, transportation and parental awareness of opportunities and resources).

Finally, in future years, the Prevention System Quality Index will endeavour to evaluate indicators relevant to physical activity, expanding the current focus beyond school-aged children and youth.





Environment

INDICATOR:

Air Quality Index exceedance

Many preventable cancers and cases of chronic disease occur because of contaminated air, water, soil and food.

These environmental risk factors include ionizing radiation, asbestos dusts and fibres, and a variety of metals and organic compounds.¹⁹³

The World Health Organization (WHO) concluded in a March 2014 report that the largest single environmental health risk is air pollution.¹⁹⁴ Contamination of outdoor air originates from a variety of human activities, including industrial processes and from natural sources, such as forest fires.^{195,196} The WHO identifies fine particulate matter (PM_{2.5}) air pollution, primarily from fuel combustion, as having the greatest impact of all air pollutants as especially relevant to human health.¹⁹⁷ Sources of PM_{2.5} air pollution include motor vehicles, power plants, industry, households and outdoor burning of organic matter for fuel and natural sources.¹⁹⁷ Other outdoor air pollutants with significant adverse health effects include carbon monoxide (CO), ground-level ozone, nitrogen dioxide (NO₂) and sulfur dioxide (SO₂).¹⁹⁸ Emerging evidence specifically links traffic-related air pollution to negative effects on health.¹⁹⁹

In 2013, the International Agency for Research on Cancer concluded that there is sufficient evidence to show that exposure to outdoor air pollution (as a mixture) causes lung cancer (Group 1), with the closest association found with fine particulate matter.^{195,200} Several longitudinal studies suggest that repeated, long-term exposure to outdoor air pollution increases the risk among healthy individuals of developing and dying from cardiovascular and respiratory disease, in addition to lung cancer.²⁰¹

The WHO estimates that approximately 3.7 million deaths in 2012 worldwide (455,000 deaths in high-income countries) are attributable to outdoor air pollution.²⁰² The Ontario Medical Association estimated that in 2008, 9,500 deaths in Ontario were attributable to air pollution,²⁰³ making up 45 per cent of the 21,000 deaths attributed to outdoor air pollution in Canada in 2008.²⁰⁴ In this first Prevention System Quality Index (PSQI) report on environment exposures, the focus is on outdoor air pollution based on the scale of its impact.

Air Quality Index exceedance

Two numerical indices have been developed in Canada to characterize real-time ambient air pollution levels and communicate the health significance of these levels to the public:

- **The Air Quality Index is calculated by measuring concentrations of ozone, fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and total reduced sulphur compounds. The measured concentration is compared to**

scientifically established air quality standards, and based on the concentration of the pollutant that is highest relative to its standard, an Air Quality Index value is reported.²⁰⁵

- **The Air Quality Health Index, which integrates and interprets the sum of the excess mortality risk associated with real-time ambient levels of PM_{2.5}, NO₂ and ozone for 12 major Canadian cities.**

The Air Quality Index is sensitive to changes in policies because the calculation is based on the province-wide air quality standard. The Air Quality Health Index, which is not included in this report, is also used to measure ambient levels of air pollution in the province of Ontario. In 2013, Public Health Ontario released a report summarizing results of a comprehensive study undertaken in order to compare the Air Quality Index and the Air Quality Health Index, which found that each index has its limitations. Since the Air Quality Index is based on a larger point measurement scale (100 versus 10 for the Air Quality Health Index), the Air Quality Index shows more daily variation than the Air Quality Health Index. Additionally, while the Air Quality Index is calculated using a larger number of air pollutants, the level at any point in time is based on only a single pollutant. Both the Air Quality Index and Air Quality Health Index have been criticized for failing to correct for how local variation in air pollution affects an individual's risk of health effects associated with exposure to ambient air pollution.²⁰⁶ The Air Quality Index is also criticized for being less responsive to nitrogen oxides (a marker for traffic-related pollution).²⁰⁶

This report presents data on the Air Quality Index because these data are widely available for Ontario. The indicator uses data from the Ontario Ministry of Environment, which calculates the Air Quality Index on an hourly basis using readings from monitoring stations across the province.²⁰⁷ During the indicator's period of analysis (2002–2012), the number of monitoring stations increased from 36 to 40 and a few stations were replaced, resulting in 43 differently named stations during this period. The Air Quality Index is a relative scale in that the lower the value, the better the air quality and the higher the value, the greater the level of air pollution and the greater the health concern. If the Air Quality Index is below 49, the air quality is categorized as good or very good. If the Air Quality Index is greater than 49, there may be some adverse effects on sensitive populations. If the Air Quality Index is 100 or more, there may be adverse effects for a large proportion of those exposed, and possible significant damage to vegetation and property. If an Air Quality Index station records an Air Quality Index above 49, the local medical officer of health is informed.

The numbers of Air Quality Index exceedance days at each monitoring station for each year (2002–2012) were obtained from the Ontario Ministry of the Environment air quality reports. The number of days with at least one hour for which the calculated Air Quality Index reading exceeded 49 was used as an indicator of the Air Quality Index exceedance days. The indicator allowed for comparison over time combining data from the 43 Air Quality Index monitoring stations in Ontario.



Between 2002 and 2012, the percentage of days for which the Air Quality Index exceeded 49 fell from 11.2 per cent in 2002 to 8.0 per cent in 2012. The highest percentage in that period was 13.4 per cent in 2005 and the lowest was in 2009 with 4.3 per cent (Figure 14).

Although air quality in Ontario according to the above indicator has improved since 2002, Ontario still ranks high in Canada for environmental release of carcinogens, such as PM_{2.5}, where Ontario is the

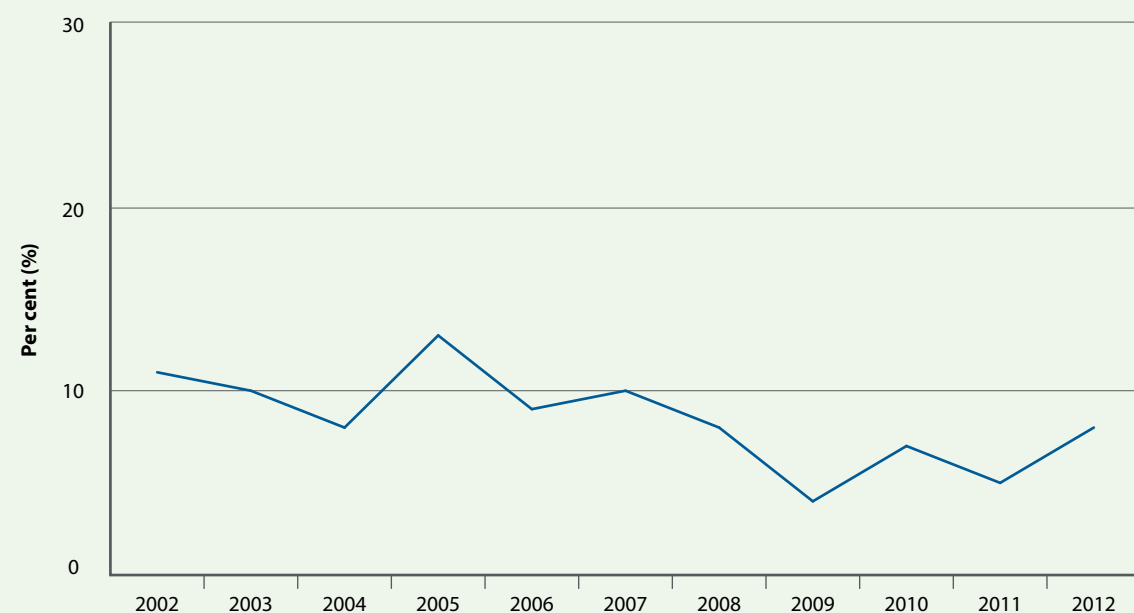
second highest source of emissions after Alberta.^{208,209} Furthermore, some studies predict that mortality and illness associated with air pollution will still increase even at current air pollution levels.²¹⁰ Consequently, Ontario is revising traditional standards, decreasing focus on “impingement standards” (i.e., the point at which a contaminant contacts the ground or a building) and moving towards using more “risk-based approaches” or health effects-based standards that are more protective of human and environmental health.²¹¹

Outdoor air pollution policies and policy implementers in Ontario

Over the last 30 years, the Ontario government has used a range of province-wide policies targeted at reducing mobile and stationary air pollution sources to address air pollution. Previously enacted environmental legislation in Ontario has largely addressed trans-boundary air pollution, an anti-smog action plan, vehicles’ design and fuel content standards, energy sector restructuring and ambient air monitoring and reporting air emissions through regulatory standards, guidelines, emissions cap and trade and bans. The government has also strived to increase public awareness of pollution reduction.

In 2009, Ontario took the lead in Canada and enacted the Toxics Reduction Act, 2009, which addresses the reduction and use of toxic substances in general, including those that are released into the air. The act requires over 800 facilities from the major manufacturing and mineral processing industrial sectors to track, account for and report the use and creation of 360 toxic substances, and to make this information readily accessible to the public. The Toxics Reduction Act, 2009 requires these facilities to prepare and publish toxic substance reduction plans, although the implementation of these plans is voluntary. The Ministry of the Environment’s goal is to reduce the creation, use, release or off-site transfer of toxic substances, and to encourage safer alternatives, including new technologies. This legislation is new and unique in Canada, and is modeled after the successful Massachusetts Toxics Use Reduction Act that reports reduced toxic chemical use, as well as environmental releases.²¹²

FIGURE 14
Trend in percentage of days per year with Air Quality Index exceedance (readings > 49) for 43 locations in Ontario, 2002–2012



Source: Air Quality Ontario, 2002–2012 (Ministry of the Environment and Climate Change)

In April 2014, Ontario eliminated all coal-fired power generation in the province, making it the first jurisdiction in North America to do so.²¹³ In July 2014, the Ontario government reintroduced Bill 138, Ending Coal for Cleaner Air Act, 2013. If passed, the act will permanently prohibit coal-fired electricity generation at stand-alone facilities in Ontario.²¹⁴

Many Ontario municipalities, cities and towns, have either stand-alone idling control bylaws or anti-idling provisions in other bylaws. For example, in Toronto, Chapter 517 of the Municipal Code prohibits idling for more than one minute in a 60-minute period.²¹⁵

Outdoor air pollution programs and program implementers in Ontario

Programs introduced in Ontario that have addressed air pollution from mobile sources emissions include:

- *Drive Clean* — A provincial vehicle emission inspection program that came into effect in 1999 and seeks to reduce nitrogen oxides and volatile organic compounds through emissions testing of motor vehicles, including heavy duty trucks and buses, every two years for vehicles over more than seven years old. This program is also additionally enforced through the Smog Patrol team.
- *20/20 The Way to Clean Air Campaign* — A clean air environmental program that was designed to encourage the residents and schools within Peel Region, York, Toronto and Halton public health units to reduce vehicle use and emissions by 20 per cent and home energy use by 20 per cent.

Discussion and future directions

There have been great strides made in reducing environmental harms in Ontario in recent years, including the introduction of the Toxics Reduction Act, 2009 and the elimination of all coal-fired power generation.

Future reports will aim to include other indicators to monitor the effect of environmental policies and programs that could be introduced in order to improve the health of Ontarians. These may extend beyond air pollution and consider water and soil pollution as relevant for cancer. As well, a consideration of how exposures differ by geography will be made. Additionally, the next Cancer Risk Factors in Ontario report to be released in 2016 will focus on the epidemiology of a wide range of environmental risk factors for cancer in Ontario that will be discussed in future PSQI reports.

In 2009, Ontario took the lead in Canada and enacted the Toxics Reduction Act, 2009, which addresses the reduction and use of toxic substances in general, including those that are released into the air.



Ultraviolet radiation

INDICATOR:

Tanning bed use

Skin cancer is the most common form of cancer in Ontario, making up one-third of all diagnosed cancer cases.²¹⁶

Overexposure to ultraviolet radiation (UVR) from the sun or from other sources, such as tanning equipment, is the cause of most skin cancers.^{217,218} Solar UVR and UVR-emitting tanning devices have been classified as carcinogenic to humans by the International Agency for Research on Cancer, causing all major skin cancer types, including cutaneous melanoma, the most fatal type of skin cancer, and basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), which are the most common.²¹⁷

An estimated 39,400 Ontarians were diagnosed with skin cancer in 2014.²¹⁹ Since the majority of skin cancer cases are preventable,^{217,218} addressing UVR exposure has the potential to substantially impact the future burden of this disease.

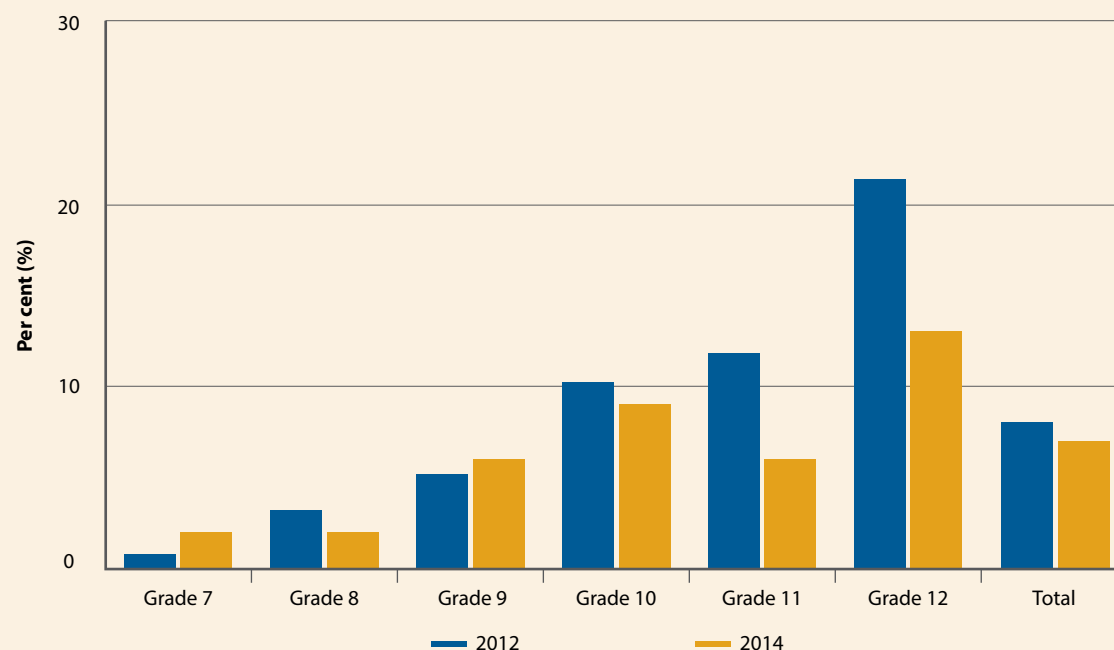
System-level prevention activities to reduce UVR exposure, however, are currently limited.

Tanning bed use

This indicator was selected based on the importance of reducing UVR exposure among children and youth.

FIGURE 15

Percentage of middle and high school students who reported using a tanning bed in the previous years, overall and by grade, 2012 and 2014



Source: Youth Indoor Tanning Survey, 2012 and 2014 (Ipsos Reid, Cancer Care Ontario, Canadian Cancer Society, Ryerson University)

Evidence suggests that adolescents and young adults under age 35 who use tanning equipment are 75 per cent more likely than never-users to be diagnosed with melanoma and are at higher risk of being diagnosed with melanoma at a young age.²²⁰ Figure 15 depicts tanning bed use in Ontario middle and high school students in 2012 and 2014, by grade.

The indicator, based on 2012 and 2014 survey data from Ipsos Reid prepared for the Canadian Cancer Society, Cancer Care Ontario and Ryerson University, shows the pattern of reported use prior to and just after the introduction of the Skin Cancer Prevention Act (Tanning Beds), 2013. As of May 1, 2014, the act bans the sale and marketing of

tanning services to youth under 18 years of age and is enforced on a complaints basis by boards of health. The indicator will be compared to results from a survey to be conducted in 2015 that will measure patterns of use after the legislation has been in place for about a year. The comparison between the current data and the 2015 data will help assess the impact and effectiveness of the legislation.

The figure shows reported tanning bed use in any location, such as tanning salons, fitness clubs and in-home tanning beds. It does not show use limited to commercial locations. The Skin Cancer Prevention Act covers any commercial location but exempts private in-home tanning beds. Data by public health unit are not available.

Overall, 8.0 per cent of students in 2012 and 7.0 per cent of students in 2014 reported using tanning beds (Figure 15). Use was higher among high school as compared to middle school students in both 2012 and 2014, but among students in grades 10, 11 and 12, there was a decrease in use between 2012 and 2014 (Figure 15).

Although this indicator suggests some decrease in use in individual grades, the total rate in 2012 and 2014 remain similar. Following a year of implementation of the Skin Cancer Prevention Act, the desired result of the 2015 survey is a much greater decrease among all grades.



The City of Toronto's Shade Policy is the first policy in North America to specifically address shade.

Ultraviolet radiation policies and policy implementers in Ontario

Aside from the Skin Cancer Prevention Act (Tanning Beds), 2013, public policies in the area of reducing UVR exposure in Ontario are currently limited in scope.

Federal legislation in the form of the Radiation Emitting Devices Act, includes safety regulations and standards for tanning equipment.²²¹ Health Canada regulates sunscreens as a drug and its *Sunscreen Monograph* defines requirements for sunscreens sold in Canada.²²² There has been interest in making sunscreen freely available in public areas, but as a regulated drug, it is limited in where and how it may be dispensed.²²² In addition, the *Sunscreen Monograph* currently has less stringent requirements for manufacturers when labelling their products as protective against the UVA portion of the UVR spectrum compared to European standards.²²²

Other policies include those that are at the municipal level that address the provision of shade, and policies addressing occupational health and safety at the provincial and municipal levels.

The City of Toronto's Shade Policy, approved by the Toronto Board of Health in 2007, is a leading policy because it is the first policy in North America to specifically address shade. Other municipalities in Ontario have included the provision of shade in official plans (e.g., Waterloo, Kitchener, Cambridge)²²³ and in guidelines and standards for city-owned housing (e.g., Region of Peel).²²⁴

Policies specifically addressing UVR exposure in occupational settings include provincial guidelines

for farmers who regularly employ five or more employees, and, at the municipal level, policies that provide guidelines for protecting city employees from prolonged sun exposure, such as in the City of Toronto and the City of Vaughan.²²⁵

In general, policies to reduce ultraviolet radiation exposure that are recommended by a number of organizations^{226–228} include those addressing:

- **Shade in school and municipal outdoor settings, including municipal childcare**
- **Protection for outdoor workers, which may be regulated provincially**
- **Tanning equipment legislation and regulations**

Ontario's new Skin Cancer Prevention Act (Tanning Beds), 2013 is an important step towards reducing the use of tanning equipment.²²⁹ There is a substantial opportunity for further development of other UVR protection policies.

Ultraviolet radiation programs and program implementers in Ontario

Programs to promote sun-protective behaviours are primarily based at the local level and include work covering many of the public health units in Ontario. Programs in public health units include materials and toolkits to promote sun-protective behaviours in schools, in workplaces and for parents.

One intervention that is currently absent in Ontario, but could lead to significant improvements in sun-protective behaviours across the province is a broad-scale, multi-component education and communication program.²³⁰

In the near future, Cancer Care Ontario will provide a melanoma risk assessment for the public to access through the *My CancerIQ* website.²³¹

Cancer Care Ontario's Program in Evidence-Based Care has prepared skin cancer screening clinical practice guidelines for primary care providers, which recommend skin self-examination counselling for individuals assessed as being at high risk for skin cancer and offering annual total body skin examinations by a trained healthcare provider for individuals assessed as being at very high risk.²³² The guidelines do not recommend that the general population (i.e., those not at increased risk) receive routine counselling or total body skin examinations.²³² The Program in Evidence-Based Care has also prepared clinical practice guidelines recommending against the use of indoor tanning devices.²³³

Discussion and future directions

Work to monitor the effectiveness of the Skin Cancer Prevention Act (Tanning Beds), 2013 will continue with the third tanning equipment use survey led by the Canadian Cancer Society, Ontario Division, which has partnered with Cancer Care Ontario. Updated national consensus on a set of sun safety messages for Canada is expected in 2015; a consistent set of messages is an important part of public awareness. More work is needed to broaden the scope of system-level interventions that address shade, outdoor workers and comprehensive education strategies on sun protection, accompanied by an increased scope in monitoring in these areas. Ongoing monitoring of sun exposure and protection behaviours by Ontarians is also important for assessing the effectiveness of initiatives.

More work is needed to broaden the scope of system-level interventions that address shade, outdoor workers and comprehensive education strategies on sun protection, accompanied by an increased scope in monitoring in these areas.



Cancer screening

INDICATORS:

Breast cancer screening participation rate

Cervical cancer screening participation rate

Colorectal cancer screening overdue rate

Cancer screening is a key component of Ontario's prevention and cancer control system.

Cancer screening detects cancer or pre-cancerous changes at an early stage, when they are easier to treat. Ontario operates breast, cervical and colorectal cancer screening programs that have contributed to reduced mortality.^{17,18,234}

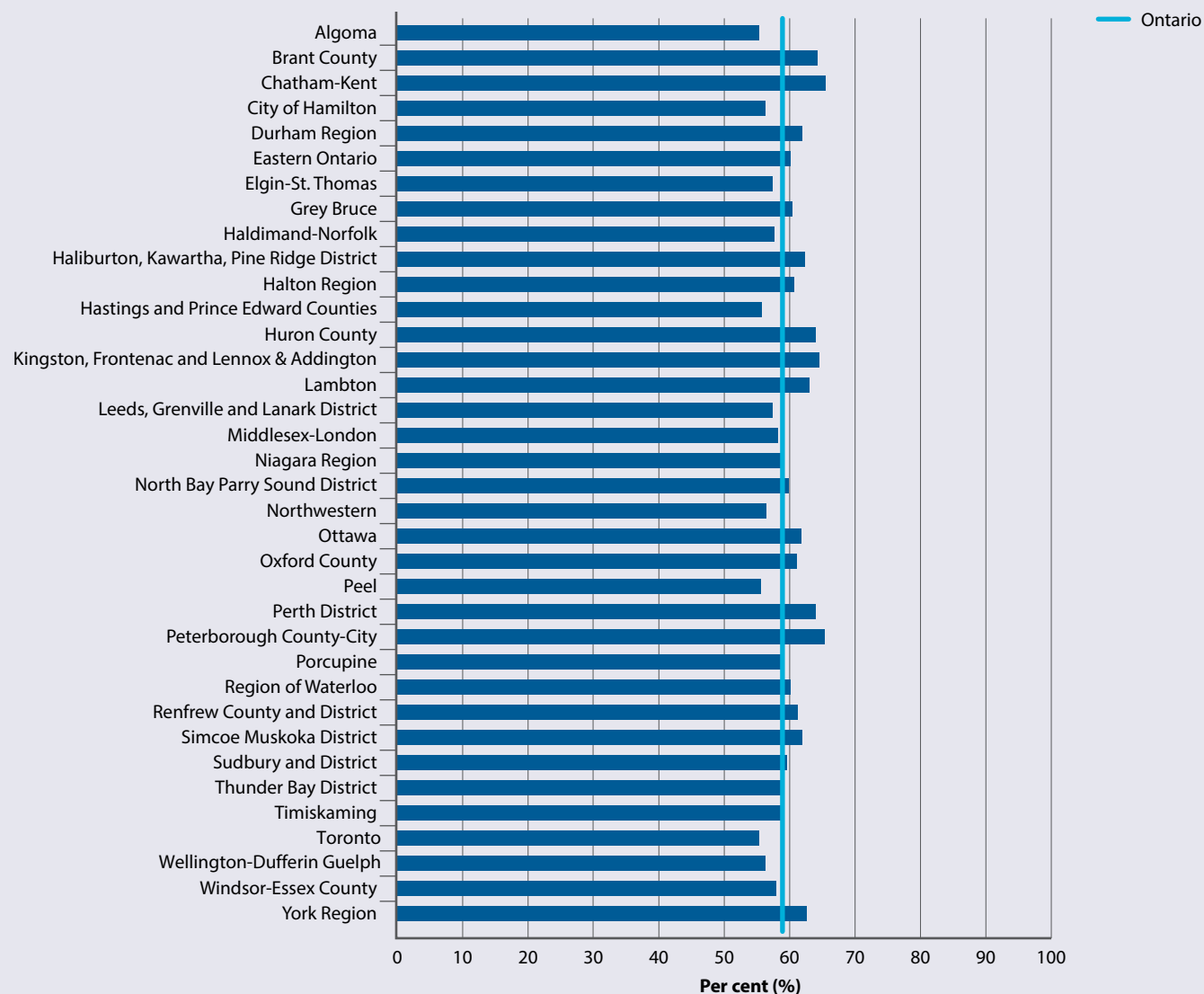
Cancer Care Ontario (CCO) collects data on cancer screening in the province using indicators that have been adapted from national and international screening program evaluation frameworks.¹⁷ The focus of this section is on the proportion of the eligible population in Ontario that participates in breast, cervical and colorectal cancer screening programs. The cancer screening participation rates are also compared for each of Ontario's 36 public health units. "Participation" in cancer screening programs often includes both participation and retention rates; this report focuses on participation rates only.

Breast cancer screening participation rate

Breast cancer screening is done via mammogram, which uses low-dose X-rays to look for changes in the breasts that may indicate early signs of breast cancer.²³⁵ Breast cancer screening is delivered through

FIGURE 16

Percentage of Ontario screen-eligible women, aged 50–74, who completed at least one mammogram within a two-year period, overall and by public health unit, 2012–2013



Sources: Ontario Health Insurance Plan Claims History Database and Registered Persons Database, 2012–2013 (Ministry of Health and Long-Term Care); Integrated Care Management System and Ontario Cancer Registry, 2012–2013 (Cancer Care Ontario); Postal Code Conversion File Plus version 6a, 2012–2013 (Statistics Canada)

Prepared by: Cancer Screening Evaluation and Reporting, Cancer Care Ontario

Note: Estimates are age-standardized to the 2006 Canadian population.



an organized province-wide screening program, the Ontario Breast Screening Program (OBSP), and through non-OBSP centres. Breast cancer screening for women at average risk for breast cancer is recommended for those aged 50–74 every two years.²³⁶ The OBSP High Risk Screening Program provides women aged 30–69 years who are at high risk for breast cancer with annual screening using mammography and magnetic resonance imaging (MRI).^{237,238}

In 2012–2013, 59 per cent of eligible women in Ontario at average risk for breast cancer were screened with a mammogram, which is slightly lower than the participation rate in previous years, which had remained steady at 60–61 per cent (Figure 16). The Ontario participation rate is below the national target of 70 per cent within a 30 month period.²³⁹ The proportion of women screened through the OBSP (versus non-OBSP centres) has increased from 58 per cent in 2006–2007 to 76 per cent in 2012–2013, offering important advantages for women and physicians (data not shown).

Breast cancer screening participation rates varied across the province (Figure 16). In 2012–2013, the public health units with the highest participation rates were Chatham-Kent (65.5 per cent), Peterborough (65.3 per cent) and Kingston, Frontenac, Lennox and Addington (64.5 per cent). The lowest participation rates were found in Algoma (55.2 per cent) and Toronto (55.3 per cent), and in Peel, Hastings and Prince Edward Counties, Wellington-Dufferin-Guelph, Hamilton and Northwestern, each of which had a participation rate of approximately 56 per cent.

Cervical cancer screening participation rate

Cervical screening identifies pre-cancerous changes in the cells of the cervix using a Pap test. Cervical screening is delivered through the Ontario Cervical Screening Program (OCSPP), an organized, population-based screening program. CCO updated its cervical cancer screening guidelines in 2012. Cervical cancer screening is now recommended for average risk women aged 21–69 every three years if they are, or have ever been, sexually active. Screening can stop at age 70 in women who have had three or more normal test results in the prior 10 years.²⁴⁰

In 2011–2013, 61.8 per cent of eligible women in Ontario were screened for cervical cancer and pre-cancer with a Pap test, slightly lower than in recent years (Figure 17). The cervical cancer screening participation rate remained steady at 64–65 per cent since 2005–2007 (data not shown). The 2012 cervical cancer screening guidelines recommend that screening be initiated at age 21 rather than age 20; this change may account for the slightly lower participation rate in 2011–2013.

Cervical cancer screening participation rates varied by public health unit (Figure 17). In 2011–2013, the highest participation rates were found in Kingston, Frontenac, Lennox and Addington (68.2 per cent), and Halton (67.5 per cent), as well as in Perth, Durham, Peterborough, Wellington-Dufferin-Guelph and Ottawa, each of which had a participation rate of approximately 67 per cent. The lowest participation rates were found in Porcupine (54.1 per cent) and Northwestern (54.9 per cent).

Colorectal cancer screening overdue rate

There are different types of colorectal cancer screening tests ranging from at-home tests, such as the fecal occult blood test (FOBT), to visual inspection of the colon, using flexible sigmoidoscopy or colonoscopy. An FOBT can detect the presence of trace amounts of blood in someone's stool that may indicate cancer in the colon or rectum, even when there are no symptoms.²⁴¹ Ontario's colorectal cancer screening program, ColonCancerCheck, recommends that average-risk individuals aged 50–74 be screened every two years with an FOBT and that individuals at increased risk, defined as having one or more first-degree relatives with colorectal cancer, be screened with colonoscopy.²⁴²

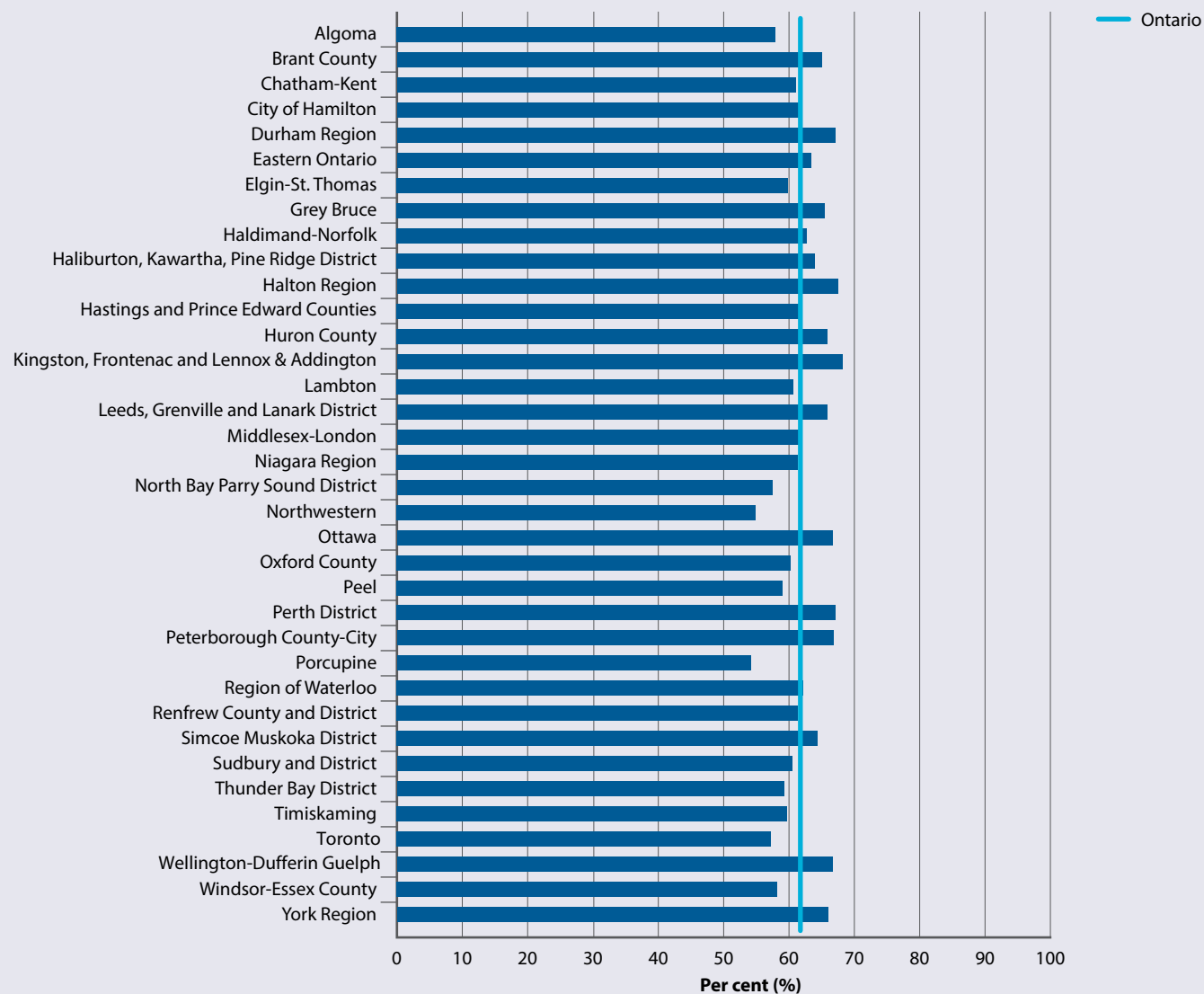
The colorectal cancer screening overdue rate reported here looks at the screen-eligible individuals who were overdue for an FOBT, but also takes into account other colorectal tests, because people who have had a recent flexible sigmoidoscopy or colonoscopy do not need to be screened for colorectal cancer using an FOBT.

In 2013, 41.5 per cent of Ontarians aged 50–74 at average risk for colorectal cancer were considered overdue for colorectal cancer screening since they had not had a recent FOBT, flexible sigmoidoscopy or colonoscopy to detect cancer or pre-cancer (Figure 18). In 2012, 42 per cent were reported to be overdue (data not shown).

The percentage of Ontarians aged 50–74 overdue for colorectal cancer screening varied across the province (Figure 18). In 2013, the public health units

FIGURE 17

Percentage of Ontario screen-eligible women, aged 21–69, who completed at least one Pap test in a three-year period, overall and by public health unit, 2011–2013



Sources: Ontario Health Insurance Plan Claims History Database and Registered Persons Database, 2011–2013 (Ministry of Health and Long-Term Care); CytoBase and Ontario Cancer Registry, 2011–2013 (Cancer Care Ontario); Postal Code Conversion File Plus version 6a, 2011–2013 (Statistics Canada)

Prepared by: Cancer Screening Evaluation and Reporting, Cancer Care Ontario

Note: Estimates are age-standardized to the 2006 Canadian population.



with the lowest overdue rates were York Region (34.6 per cent), Durham (35.6 per cent) and Halton (36.5 per cent). The highest overdue rates were in Northwestern (49.8 per cent) and Elgin-St Thomas (49.5 per cent).

Regional variation in cancer screening participation rates

As noted in the indicator results, there is variation in cancer screening participation rates across Ontario's public health units. Regional variation may be related in part to socio-demographic factors, such as income.

In Ontario, participation rates were lower in lower-income urban neighbourhoods compared to higher-income urban neighbourhoods for breast, cervical and colorectal cancer screening programs. Participation rates for all three programs were higher in rural and remote areas compared to urban areas, and were lowest in very remote areas. Cervical cancer screening participation rates for women living in areas with a high percentage of immigrants were lower than the rates for women living in areas with a low percentage of immigrants.²⁴³

Cancer screening programs and program implementers in Ontario

Breast, cervical and colorectal screening has been shown to reduce mortality from the respective cancers.^{236,240,242} However, the impact of screening on reducing mortality is contingent on people receiving adequate and appropriate follow-up and returning for screening tests regularly for as long as they are eligible. Therefore, robust cancer screening participation, follow-up rates and retention rates are essential for the programs to have their intended effect. In Ontario, CCO and the Regional Cancer Programs have the responsibility for putting in place initiatives targeted to increasing cancer screening participation in the province; public health units play a supportive role.

As part of the Chronic Disease Prevention section of the Ontario Public Health Standards, Ontario's 36 public health units are required to increase public awareness of the benefits of cancer screening and collaborate with community partners to promote and link the public to provincially-approved cancer screening programs.¹²⁴

CCO and the Regional Cancer Programs are accountable for the operation of the provincial cancer screening programs, including developing local innovations to improve breast, cervical and colorectal screening rates, and increasing regional capacity for screening.

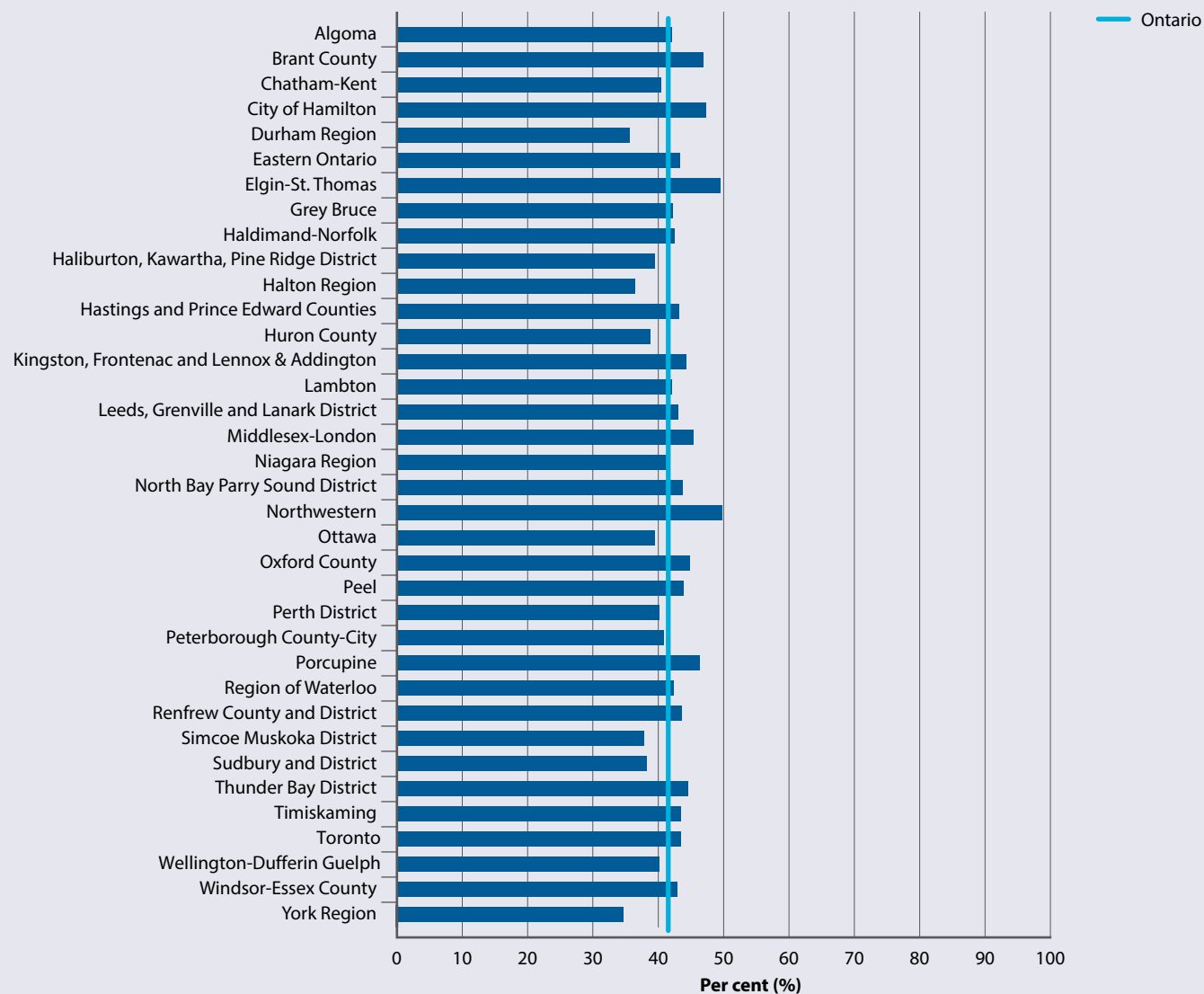
Notably, the Regional Cancer Programs' agreements with CCO do not require them to work with public health units to promote cancer screening programs; however, most Regional Cancer Programs have a long history of working closely with their region's public health units, including through formal prevention and screening networks, and other special projects. Annual cancer screening public awareness campaigns occur in each region, often through these partnerships.

CCO, Regional Cancer Programs and public health units have undertaken initiatives in the past few years to increase participation in the screening programs, as follows.

The impact of screening on reducing mortality is contingent on people receiving adequate and appropriate follow-up and returning for screening tests regularly for as long as they are eligible.

FIGURE 18

Percentage of Ontario screen-eligible individuals, aged 50–74, who are overdue for colorectal screening, overall and by public health unit, 2013



Sources: Ontario Health Insurance Plan Claims History Database and Registered Persons Database, 2009–2013 (Ministry of Health and Long-Term Care); Lab Reporting Tool, Colonoscopy Interim Reporting Tool and Ontario Cancer Registry, 2009–2013 (Cancer Care Ontario); Postal Code Conversion File Plus version 6a, 2009–2013 (Statistics Canada)

Prepared by: Cancer Screening Evaluation and Reporting, Cancer Care Ontario

Notes: Estimates are age-standardized to the 2006 Canadian population. Individuals are considered “overdue” if they have not had a fecal occult blood test in 2 years, colonoscopy in 10 years, or flexible sigmoidoscopy in 5 years.



CCO and the Regional Cancer Programs, with support from public health units, have implemented several initiatives to increase participation in cancer screening programs, such as screening invitation letters, screening status reports, and projects to target under- and never-screening individuals.

Screening correspondence

CCO is working to improve screening participation in the breast, cervical and colorectal cancer screening programs by sending eligible Ontarians letters to invite them to get screened, letters reminding them when it is time to get screened again and letters informing them of their screening test results.

Screening correspondence has expanded considerably in the last year. It is anticipated that the effect of this strategy on participation, follow-up and retention rates will be seen in future years. In 2013, invitation letters for colorectal cancer screening were expanded to all screen-eligible Ontarians aged 50–74. Also in 2013, cervical cancer screening correspondence was launched. The OBSP has sent women reminder and result letters since the program's inception and in 2014, CCO began sending breast cancer screening invitation letters to all eligible Ontario women turning 50.

CCO is planning to implement colorectal cancer screening invitation and recall letters that include an endorsement by an individual's primary care provider, as well as letters to eligible women who have not been screened for breast cancer in at least three years.

Physician reports

CCO recently implemented a Screening Activity Report tool for primary care physicians who are part of a patient enrolment model. The online tool supports primary care physicians in increasing the cancer screening rates in their practice by providing them with information about the breast, cervical and

colorectal cancer screening status and history of their patients. The Screening Activity Report also provides information about the screening programs and a comparison of physicians' screening rates relative to other physicians in their Local Health Integration Network and in the province. The patient screening information is updated monthly.

Under-/never-screened populations

Ontarians with low income, immigrants, ethnic minorities and other minority groups tend to have lower cancer screening participation rates. They may be under-screened (not up-to-date with screening) or never-screened (no history of screening). Regional Cancer Programs, public health units and other community partners are working to increase screening participation in these populations.

CCO funds mobile screening coaches in the North West and Hamilton Niagara Haldimand Brant Regional Cancer Programs, where eligible women who may otherwise be hard to reach can be screened for all three cancers. In addition, CCO-funded projects focused on increasing screening participation among under-/never-screened populations were recently completed. The Regional Cancer Programs are working to make aspects of these initiatives sustainable in their regions. The evaluation findings from these projects are also being used to inform the implementation of CCO's cancer screening public engagement strategy. Planning for the province-wide implementation of interventions to engage under-/never-screened populations is underway, in cooperation with CCO's Aboriginal Cancer Control Unit.

Discussion and future directions

There is room for improvement in the participation rates in Ontario's breast, cervical and colorectal cancer screening programs and variation across public health units. Regional variation may be related in part to socio-demographic factors, such as income. Initiatives to increase participation, follow-up and retention rates in cancer screening programs are essential to realize benefits that lead to reduced mortality.

CCO and the Regional Cancer Programs, with support from public health units, have implemented several initiatives to increase participation in cancer screening programs, such as screening invitation letters, screening status reports to physicians, and projects to target under- and never-screened individuals. It is important to sustain these initiatives and build on them, to ensure that gains are maintained and grow.

Future Prevention System Quality Index reports will report on retention rates in cancer screening programs, which together with participation rates, form an indicator of overall participation in these programs. Indicators of cancer screening participation may also change over time, as policies and guidelines for cancer screening are revised.

Conclusion

In the *2011–2015 Ontario Cancer Plan*, Cancer Care Ontario identified as a key strategic priority the development and implementation of a focused approach to cancer risk reduction, calling specifically for the development of a prevention performance measurement framework to drive improvement in Ontario's cancer prevention system.

Prevention system performance is typically measured via short- and long-term outcome indicators, namely measures of individual-level behaviour, or impact indicators, defined as long-term disease outcome trends. These factors have been well-measured and reported on in Ontario through published reports authored by several organizations.^{28, 35, 78, 193, 244}

Trends of behaviour and disease trends may or may not directly indicate whether needed policies and programs have been introduced or are successful. The Prevention System Quality Index (PSQI) is meant to directly measure policy and program activity happening in the Ontario context to address individual behaviour or exposures related to tobacco, alcohol, healthy eating, physical activity, environment, ultraviolet radiation and cancer screening. Table 5 shows prevention system quality according to the inaugural set of PSQI indicators.

This report suggests that strides are being made in some areas. For example, Ontarians are being exposed to less second-hand smoke in vehicles

and at home now than in 2003. Additionally, it is encouraging to learn that the proportion of publicly funded elementary and secondary schools with specialist teachers assigned to teach health and physical education is increasing. Similarly, the Air Quality Index analysis shows that there has been a decline in the percentage of days with poor air quality since 2002. It remains important, however, not to be complacent in this area because this rate has now been stable since 2009.

This report also suggests that there is clearly work to be done in several risk factor domains. While the percentage of Ontario screen-eligible women, aged 50–74, who completed at least one mammogram within a two-year period has been increasing, Ontario is still below the national target of 70 per cent. Cervical cancer screening rates have declined recently therefore continued knowledge translation and communication efforts regarding Ontario's screening programs should be a priority. Effort is needed to increase the percentage of the total tobacco retail price accounted for by tobacco taxes to 75 per cent as recommended by the World Health Organization's six implementation measures for tobacco control (MPOWER). There is also an opportunity in conjunction with other provincial cessation efforts, to drive an increase in smoking cessation counselling by healthcare providers; only 10 per cent of Ontario's smokers are being reached through primary care physician-led smoking

cessation consults according to an analysis of Ontario Health Insurance Plan billing codes. Moreover, decreasing food insecurity among Ontario households through various measures should be emphasized in prevention efforts. In the area of alcohol policy, there is a current direction towards greater private alcohol retailing in the province, which is associated with increased alcohol consumption.

This is an inaugural report. In future years, the report's indicators will be measured again, allowing readers to see whether policy and program recommendations are being implemented. This set of indicators is also likely to be expanded as different data sources become available.

The PSQI presents an evaluation of the efforts of Ontario's cancer prevention system. To facilitate moving forward as a system, actors at various levels should strive to work together in addressing the areas where significantly more work is needed. Working as a system, Ontario's cancer prevention actors have the potential to effect broad-based positive change in risk factor exposures and behaviours, thereby impacting long-term cancer incidence.

TABLE 5

Ontario prevention system quality according to 2015 Prevention System Quality Index indicators

Indicator	Desired direction	As of this report
Tax as a percentage of total tobacco retail price	Increase (to at least 75%)	In June 2014, Ontario is below 75% and not where it should be, lagging behind other provinces
Physician-led smoking cessation counselling	Increase	From 2008 to 2013, remained stable at 10%
Exposure to second-hand smoke	Decrease	From 2003 to 2013, among both adults and teens, decreased at home and in vehicles; slight increase in exposure in public places over the same time period
Minimum retail price of alcohol	Increase or remain stable relative to the rate of inflation	Insufficient number of years of data to derive trend
Publicly owned and run off-premise alcohol retail outlets	Increase or remain stable	From 2013 to 2014, there was a decrease from 26.0% to 24.9%
Alcohol outlet density (on- and off-premise)	Decrease or remain stable	Insufficient number of years of data to derive trend
Household food insecurity	Decrease	From 2005 to 2013, remained stable
Cost of a Nutritious Food Basket	Not applicable	Increased by ~\$30 between 2009 and 2014; consistent with increases in the cost of food in the province as a whole during the same time period, according to the Consumer Price Index for food purchased in stores

Indicator	Desired direction	As of this report
Physical education specialists in schools	Increase	Increased from 2006/2007, but decreased since 2010/2011
Enrolment in health and physical education	Increase to 100% at all grades	From 2005/2006 school year to 2012/2013 school year, remained stable at all grades (grade 9 stable at ~85%; grade 12 stable at 25%)
Air Quality Index	Decline in percentage of days with poor air quality	Declined from 2002; stable since 2009
Tanning bed use	Decrease	Insufficient number of years of data to derive trend
Breast cancer screening participation rate	Increase to at least national target of 70%	Time trend not presented in figure but commentary notes suggest increase from 58 per cent in 2006-2007 to 76 per cent in 2012-2013
Cervical cancer screening participation rate	Increase	Time trend not presented in figure but commentary notes a decrease from 2010-2012 to the current 61.8 per cent in 2011-2013, while it had been stable at approximately 64 to 65 per cent since 2004-2006
Colorectal cancer screening overdue rate	Decrease	Time trend not presented in figure but commentary rate appears stable at 41.6 per cent from immediate year prior (2012)

References

1. Colditz GA, Sellers TA, Trapido E. Epidemiology — identifying the causes and preventability of cancer? *Nat Rev Cancer*. 2006 Jan;6(1):75–83.
2. Brownson RC, Baker EA, Novick LF. Community-based prevention: programs that work. Gaithersburg (MD): Aspen Publishers; 1999.
3. Green L, Kreuter MW. Health program planning: an educational and ecological approach. 4th ed. Boston: McGraw-Hill; 2005.
4. Hann NE, Kean TJ, Matulionis RM, Russell CM, Sterling TD. Policy and environmental change: new directions for public health. *Health Promot Pract*. 2004 Oct;5(4):377–81.
5. Parra DC, Hoehner CM, Hallal PC, Reis RS, Simoes EJ, Malta DC, et al. Scaling up of physical activity interventions in Brazil: how partnerships and research evidence contributed to policy action. *Glob Health Promot*. 2013 Dec;20(4):5–12.
6. Scottish Parliament. Alcohol (Minimum Pricing) (Scotland) Act 2012. 2012 asp 4 Jun 29, 2012.
7. Legowski B, Legetic B. How three countries in the Americas are fortifying dietary salt reduction: a north and south perspective. *Health Policy*. 2011 Sep;102(1):26–33.
8. Australian Government Department of Health [Internet]. Canberra: Commonwealth of Australia; 2014 [cited 2014 Nov 2]. Introduction of tobacco plain packaging in Australia. Available from: <http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-plain>
9. Texas Department of State Health Services [Internet]. Austin (TX): Texas Department of State Health Services; 2012 [cited 2014 Oct 31]. The plan for Healthy Texas. Available from: <http://planhealthytexas.org/English/Default.aspx>
10. Public Health Agency of Canada, World Health Organization. Mobilizing intersectoral action to promote health: the case of ActNow BC in British Columbia, Canada. Ottawa: Public Health Agency of Canada; 2009.
11. National Collaborating Centre for Healthy Public Policy. Health impact assessment in Quebec: when the law becomes a lever for action. Montreal: Institut national de santé publique du Québec; 2008.
12. National Collaborating Centre for Healthy Public Policy. The Quebec Public Health Act's section 54: briefing note. Montreal: Institut national de santé publique du Québec; 2008.
13. Ontario Tobacco Research Unit. Monitoring the Ontario Tobacco Strategy. Progress toward our goals 1998/1999. Fifth annual monitoring report. Toronto: Ontario Tobacco Research Unit; 1999.
14. Ialomiteanu AR, Hamilton HA, Adlaf EM, Mann RE. CAMH Monitor eReport: substance use, mental health and well-being among Ontario adults 1977–2013. Toronto: Centre for Addiction and Mental Health; 2014.
15. Statistics Canada [Internet]. Ottawa: Statistics Canada; 2014 Jun [cited 2015 Jan 19]. Table 105-0501 — Health indicator profile, annual estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) and peer groups, occasional. Available from: <http://www5.statcan.gc.ca/cansim/a47>
16. Ontario Tobacco Research Unit. Indicators of Smoke-Free Ontario progress. Monitoring and evaluation series, vol. 14/15, no. 2. Toronto: Ontario Tobacco Research Unit; 2010.
17. Cancer Care Ontario. Ontario Breast Screening Program 2011 report. Toronto: Queen's Printer for Ontario; 2013.
18. Cancer Care Ontario. Ontario Cervical Screening Program 2012 report. Toronto: Queen's Printer for Ontario; 2014.
19. Cancer Quality Council of Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2014 Oct 31]. Modifiable risk factors in Ontario. Cancer System Quality Index 2014. Available from: <http://www.csqi.on.ca/cms/one.aspx?portalId=289784&pageId=296064>
20. National Skin Cancer Prevention Committee. Exposure to and protection from the sun in Canada: a report based on the 2006 Second National Sun Survey. Toronto: Canadian Partnership Against Cancer; 2010.
21. Environment Canada [Internet]. Gatineau (QC): Her Majesty the Queen in Right of Canada, as represented by the Minister of the Environment; 2014 [cited 2015 Feb 21]. National Pollution Release Inventory. Available from: <http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=4A577BB9-1>
22. Environment Canada [Internet]. Gatineau (QC): Her Majesty the Queen in Right of Canada, as represented by the Minister of the Environment; 2015 [cited 2015 Feb 21]. Air pollutant emission inventory. Available from: <http://www.ec.gc.ca/pollution/default.asp?lang=En&n=E96450C4-1>
23. Melkas T. Health in all policies as a priority in Finnish health policy: a case study on national health policy development. *Scand J Public Health*. 2013 Mar;41(11 Suppl):3–28.
24. Puska P. Successful prevention of non-communicable diseases: 25 year experiences with North Karelia Project in Finland. *Public Health Med*. 2002;4(1):5–7.
25. Puska P. The North Karelia Project: 30 years successfully preventing chronic diseases. *Diabetes Voice*. 2008 May;53:26–9.
26. World Health Organization, International Agency for Research on Cancer [Internet]. Lyon, FR: International Agency for Research on Cancer; 2014 [cited 2014 Dec 4]. Mortality from all cancers. Finland. Age-standardised rate (World). Males, age 35–64. Available from: http://www-dep.iarc.fr/WHOdb/Graph4l.asp?cancer%5B%5D=150&male=1&country%5B%5D=4070&sYear=1969&Year=2006&stat=3&age_from=8&age_to=13&orientation=2&window=1&grid=1&line=2&moving=1&scale=0&submit=%A0%A0%A0Execute%A0%A0%A0
27. Wallerstein N, Mendes R, Minkler M, Akerman M. Reclaiming the social in community movements: perspectives from the USA and Brazil/South America: 25 years after Ottawa. *Health Promot Int*. 2011 Dec;26 Suppl 2:ii226–36.
28. Cancer Quality Council of Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2015 [cited 2015 Jan 20]. Cancer System Quality Index 2014. Available from: <http://www.csqi.on.ca/>
29. World Health Organization. A framework to monitor and evaluate implementation: WHO global strategy on diet, physical activity and health. Geneva: World Health Organization; 2008.

30. United States Department of Health and Human Services, The Secretary's Advisory Committee on National Health Promotion and Disease Prevention Objectives For 2020. Phase 1 report: recommendations for the framework and format of Healthy People 2020. Washington: United States Department of Health and Human Services; 2008.
31. Institute of Medicine (US), Committee on Public Health Strategies to Improve Health. For the public's health the role of measurement in action and accountability. Washington: National Academies Press; 2011.
32. Cancer Care Ontario, Ontario Agency for Health Protection and Promotion (Public Health Ontario). Taking action to prevent chronic disease: recommendations for a healthier Ontario. Toronto: Queen's Printer for Ontario; 2012.
33. World Health Organization. WHO report on the global tobacco epidemic, 2008: the MPOWER package. Geneva: World Health Organization; 2008.
34. World Health Organization. WHO report on the global tobacco epidemic, 2013: Enforcing bans on tobacco advertising, promotion and sponsorship. Geneva: World Health Organization; 2013.
35. Cancer Care Ontario. Tobacco. Cancer risk factors in Ontario. Toronto: Queen's Printer for Ontario; 2014.
36. World Health Organization, International Agency for Research on Cancer. Tobacco smoke and involuntary smoking. IARC monographs on the evaluation of carcinogenic risks to humans, vol. 83. Lyon, FR: International Agency for Research on Cancer; 2004.
37. Office of the Surgeon General (US), Office on Smoking and Health (US). The health consequences of smoking: a report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2004.
38. Secretan B, Straif K, Baan R, Grosse Y, El Ghissassi F, Bouvard V, et al. A review of human carcinogens--Part E: tobacco, areca nut, alcohol, coal smoke, and salted fish. *Lancet Oncol*. 2009 Nov;10(11):1033-4.
39. Oberg M, Jaakkola MS, Woodward A, Peruga A, Prüss-Ustün A. Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. *Lancet*. 2011 Jan 8;377(9760):139-46.
40. Ontario Tobacco Research Unit. The burden of tobacco use in Ontario. Toronto: Ontario Tobacco Research Unit; 2006.
41. Ontario Tobacco Research Unit. Smoke-Free Ontario Strategy monitoring report. Toronto: Ontario Tobacco Research Unit; 2015.
42. World Health Organization. WHO Framework Convention on Tobacco Control. Geneva: World Health Organization; 2005.
43. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 17]. MPOWER. Available from: <http://www.who.int/tobacco/mpower/en/>
44. Chaloupka FJ, Cummings KM, Morley CP, Horan JK. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tob Control*. 2002 Mar;11 Suppl 1:162-72.
45. Chaloupka FJ, Wechsler H. Price, tobacco control policies and smoking among young adults. *J Health Econ*. 1997 Jun;16(3):359-73.
46. Gruber J, Sen A, Stabile M. Estimating price elasticities when there is smuggling: the sensitivity of smoking to price in Canada. *J Health Econ*. 2003 Sep;22(5):821-42.
47. International Agency for Research on Cancer, IARC Working Group on the Effectiveness of Tax and Price Policies for Tobacco Control. Effectiveness of tax and price policies for tobacco control. Lyon, FR: International Agency for Research on Cancer; 2011.
48. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 17]. Raise taxes on tobacco: best practices in tobacco taxation. Available from: http://www.who.int/tobacco/mpower/raise_taxes/en/index3.html
49. World Health Organization, Regional Office for Europe. Fact sheet: tobacco taxation [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 17]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0007/250738/140379_Fact-sheet-Tobacco-Taxation-Eng-ver2.pdf
50. Tauras JA, Huang J, Chaloupka FJ. Differential impact of tobacco control policies on youth sub-populations. *Int J Environ Res Public Health*. 2013 Sep;10(9):4306-22.
51. United States Department of Health and Human Services. Reducing tobacco use: a report of the Surgeon General. Atlanta (GA): United States Department of Health and Human Services, Centres for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2000.
52. Tauras JA. Public policy and smoking cessation among young adults in the United States. *Health Policy*. 2004 Jun;68(3):321-32.
53. Zhang B, Schwartz R. What effect does tobacco taxation have on contraband? Debunking the taxation - contraband tobacco myth. Toronto: Ontario Tobacco Research Unit; 2015.
54. Non-Smokers' Rights Association. Cigarette prices in Canada [Internet]. Toronto: Non-Smokers' Rights Association; 2014 [cited 2015 Jan 5]. Available from: http://www.nsra-adnf.ca/cms/file/files/140605_map_and_table.pdf
55. Ontario Tobacco Research Unit. Smoke-Free Ontario Strategy monitoring report. Toronto: Ontario Tobacco Research Unit; 2013.
56. World Health Organization. WHO Framework Convention on Tobacco Control. Geneva: World Health Organization; 2003.
57. Smoke-Free Ontario, Scientific Advisory Committee. Evidence to guide action: comprehensive tobacco control in Ontario. Toronto: Ontario Agency for Health Protection and Promotion; 2010.
58. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 17]. Offer help to quit tobacco use. Available from: <http://www.who.int/tobacco/mpower/offer/en/index2.html>
59. Fiore MC, Jaén CR, Baker TB, Bailey WC, Benowitz N, Curry SJ. Treating tobacco use and dependence: 2008 update US Public Health Service clinical practice guideline executive summary. *Respir Care*. 2008 Sep 1;53(9):1217-22.
60. Registered Nurses' Association of Ontario. Integrating smoking cessation into daily nursing practice [Internet]. Toronto: Registered Nurses' Association of Ontario; 2007 Mar [cited 2015 Jan 8]. Available from: http://rnao.ca/sites/rnao-ca/files/Integrating_Smoking_Cessation_into_Daily_Nursing_Practice.pdf

61. CAN-ADAPTT. Canadian smoking cessation clinical practice guideline. Toronto: Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-informed Tobacco Treatment, Centre for Addiction and Mental Health; 2011.
62. Ontario Medical Association. Specific neurocognitive assessment (K032) and smoking cessation services (E079 and K039). Toronto: Ontario Medical Association; 2011.
63. Office of the Surgeon General (US), Office on Smoking and Health (US). The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2006.
64. Farrelly MC. Monitoring the tobacco use epidemic V: The environment: factors that influence tobacco use. *Prev Med*. 2009 Jan;48(1 Suppl):S35–43.
65. Wakefield MA, Chaloupka FJ, Kaufman NJ, Orleans CT, Barker DC, Ruel EE. Effect of restrictions on smoking at home, at school, and in public places on teenage smoking: cross sectional study. *BMJ*. 2000 Aug 5;321(7257):333–7.
66. Ontario. Smoke-Free Ontario Act - Reg. 48/06. Jan 1, 2015.
67. Ontario Associate Minister of Health and Long-Term Care. Bill 45, Making Healthier Choices Act, 2015. Nov 24, 2014.
68. Government of Canada. Tobacco Products Labelling Regulations (Cigarettes and Little Cigars) (SOR/2011-177). May 7, 2012.
69. Centers for Disease Control and Prevention (US), Office on Smoking and Health. Best practices for comprehensive tobacco control programs--2014. Atlanta (GA): United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
70. Ontario Tobacco Research Unit. Tobacco smoke entering homes in multi-unit dwellings in Ontario. Toronto: Ontario Tobacco Research Unit; 2014.
71. Reynolds K, Lewis B, Nolen JDL, Kinney GL, Sathya B, He J, et al. Alcohol consumption and risk of stroke: a meta-analysis. *JAMA*. 2003 Feb 5;289(5):579–88.
72. Roerecke M, Rehm J. Irregular heavy drinking occasions and risk of ischemic heart disease: a systematic review and meta-analysis. *Am J Epidemiol*. 2010 Mar 15;171(6):633–44.
73. Ronksley PE, Brien SE, Turner BJ, Mukamal KJ, Ghali WA. Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. *BMJ*. 2011;342:d671.
74. Tramacere I, Negri E, Bagnardi V, Garavello W, Rota M, Scotti L, et al. A meta-analysis of alcohol drinking and oral and pharyngeal cancers. Part 1: overall results and dose-risk relation. *Oral Oncol*. 2010 Jul;46(7):497–503.
75. Klatsky AL. Alcohol and cardiovascular diseases. *Expert Rev Cardiovasc Ther*. 2009 May;7(5):499–506.
76. O'Keefe JH, Bybee KA, Lavie CJ. Alcohol and cardiovascular health: the razor-sharp double-edged sword. *J Am Coll Cardiol*. 2007 Sep 11;50(11):1009–14.
77. World Health Organization. Global status report on alcohol 2004. Geneva: World Health Organization; 2004.
78. Cancer Care Ontario. Alcohol. Cancer risk factors in Ontario. Toronto: Queen's Printer for Ontario; 2014.
79. Giesbrecht N, Wettlaufer A, April N, Asbridge M, Cukier S, Mann R, et al. Strategies to reduce alcohol-related harms and costs in Canada: a comparison of provincial policies. Toronto: Centre for Addiction and Mental Health; 2013.
80. Babor T, Caetano R, Caswell S, Edwards G, Giesbrecht N, Graham K, et al. Alcohol: no ordinary commodity: research and public policy. 2nd ed. New York: Oxford University Press; 2010.
81. Anderson P, Chisholm D, Fuhr DC. Alcohol and global health 2: effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet*. 2009 Jun 27;373(9682):2234–46.
82. Meier PS, Purshouse R, Brennan A. Policy options for alcohol price regulation: the importance of modelling population heterogeneity. *Addiction*. 2010 Mar;105(3):383–93.
83. Gruenewald PJ, Ponicki WR, Holder HD, Romelsjö A. Alcohol prices, beverage quality, and the demand for alcohol: quality substitutions and price elasticities. *Alcohol Clin Exp Res*. 2006 Jan;30(1):96–105.
84. Black H, Gill J, Chick J. The price of a drink: levels of consumption and price paid per unit of alcohol by Edinburgh's ill drinkers with a comparison to wider alcohol sales in Scotland. *Addiction*. 2011 Apr;106(4):729–36.
85. Holmes J, Meng Y, Meier PS, Brennan A, Angus C, Campbell-Burton A, et al. Effects of minimum unit pricing for alcohol on different income and socioeconomic groups: a modelling study. *Lancet*. 2014 May 10;383(9929):1655–64.
86. Stockwell T, Auld MC, Zhao J, Martin G. Does minimum pricing reduce alcohol consumption? The experience of a Canadian province. *Addiction*. 2012 May;107(5):912–20.
87. Alcohol and Gaming Commission of Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2014 Feb 10]. Ferment on premise facilities FAQs. Available from: http://www.agco.on.ca/en/faqs/faqs_licence_brewon.aspx
88. LCBO [Internet]. Toronto: LCBO; 2013 [cited 2014 Dec 15]. Today's LCBO: balancing profitability and social responsibility. About the LCBO. Available from: <http://www.foodanddrink.ca/aboutlcbo/todayslcbo.shtml>
89. Ontario. Liquor Control Act, R.S.O. 1990, c. L.18. Jun 20, 2012.
90. Ontario. Alcohol and Gaming Regulation and Public Protection Act, 1996, S.O. 1996, c. 26, Sched. Jul 1, 2011.
91. LCBO Economic Policy and Planning. LCBO pricing examples. Toronto: LCBO; 2013.
92. LCBO Economic Policy and Planning. LCBO pricing examples. Toronto: LCBO; 2014.
93. Hill-McManus D, Brennan A, Stockwell T, Giesbrecht N, Thomas G, Zhao J, et al. Model-based appraisal of alcohol minimum pricing in Ontario and British Columbia: a Canadian adaptation of the Sheffield Alcohol Policy Model Version 2. Sheffield: University of Sheffield; 2012.

94. Hahn RA, Middleton JC, Elder R, Brewer R, Fielding J, Naimi TS, et al. Effects of alcohol retail privatization on excessive alcohol consumption and related harms: a community guide systematic review. *Am J Prev Med*. 2012 Apr;42(4):418–27.
95. Her M, Giesbrecht N, Room R, Rehm J. Privatizing alcohol sales and alcohol consumption: evidence and implications. *Addiction*. 1999 Aug;94(8):1125–39.
96. Wagenaar AC, Holder HD. Changes in alcohol consumption resulting from the elimination of retail wine monopolies: results from five US states. *J Stud Alcohol*. 1995 Sep;56(5):566–72.
97. Nelson DE, Naimi TS, Brewer RD, Roebor J. US state alcohol sales compared to survey data, 1993–2006. *Addiction*. 2010 Sep;105(9):1589–96.
98. Popova S, Giesbrecht N, Bekmuradov D, Patra J. Hours and days of sale and density of alcohol outlets: impacts on alcohol consumption and damage: a systematic review. *Alcohol Alcohol*. 2009 Oct;44(5):500–16.
99. Campbell CA, Hahn RA, Elder R, Brewer R, Chattopadhyay S, Fielding J, et al. The effectiveness of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and alcohol-related harms. *Am J Prev Med*. 2009 Dec;37(6):556–69.
100. Stockwell T, Zhao J, Macdonald S, Vallance K, Gruenewald P, Ponicki W, et al. Impact on alcohol-related mortality of a rapid rise in the density of private liquor outlets in British Columbia: a local area multi-level analysis. *Addiction*. 2011 Apr;106(4):768–76.
101. Stockwell T, Zhao J, Macdonald S, Pakula B, Gruenewald P, Holder H. Changes in per capita alcohol sales during the partial privatization of British Columbia's retail alcohol monopoly 2003–2008: a multi-level local area analysis. *Addiction*. 2009 Nov;104(11):1827–36.
102. Task Force on Community Preventive Services (US). Recommendations for reducing excessive alcohol consumption and alcohol-related harms by limiting alcohol outlet density. *Am J Prev Med*. 2009 Dec;37(6):570–1.
103. Alcohol and Gaming Commission of Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2015 [cited 2015 Jan 20]. VQA wine sales at farmers' markets [Internet]. Available from: http://www.agco.on.ca/en/whatwedo/farmers_market.aspx
104. Premier's Advisory Council on Government Assets. Retain and gain: making Ontario's assets work better for taxpayers and consumers. Initial report [Internet]. 2014 [cited 2015 Jan 19]. Available from: <https://dr6j45jk9xcmk.cloudfront.net/documents/3804/2014-11-11-draft-report-premiers-advisory.pdf>
105. Brennan RJ, Ferguson R, Benzie R. Kathleen Wynne not afraid to liberalize beer, wine sales, minister says. *The Toronto Star* [Internet]. 2015 Mar 13 [cited 2015 Mar 13]; Available from: <http://www.thestar.com/news/queenspark/2015/03/13/kathleen-wynne-not-afraid-to-liberalize-beer-wine-sales-minister-says.html>
106. Smith LA, Foxcroft DR. The effect of alcohol advertising, marketing and portrayal on drinking behaviour in young people: systematic review of prospective cohort studies. *BMC Public Health*. 2009;9:51.
107. Siegfried N, Pienaar DC, Ataguba JE, Volmink J, Kredt T, Jere M, et al. Restricting or banning alcohol advertising to reduce alcohol consumption in adults and adolescents. *Cochrane Database Syst Rev*. 2014;11:CD010704.
108. Butt P, Beirness D, Gliksman L, Paradis C, Stockwell T. Alcohol and health in Canada: a summary of evidence and guidelines for low-risk drinking. Ottawa: Canadian Centre on Substance Abuse; 2011.
109. Canadian Centre on Substance Abuse. Canada's Low-Risk Alcohol Drinking Guidelines [Internet]. 2013 [cited 2014 Dec 15]. Available from: <http://www.ccsa.ca/eng/topics/alcohol/drinking-guidelines/pages/default.aspx>
110. Health Canada. Eating well with Canada's Food Guide : a resource for educators and communicators. Ottawa: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2011.
111. World Cancer Research Fund, American Institute for Cancer Research. Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Second expert report. Washington: World Cancer Research Fund, American Institute for Cancer Research; 2007.
112. World Health Organization, Food and Agriculture Organization. Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. WHO technical report series 916. Geneva: World Health Organization; 2003.
113. World Health Organization. Global status report on noncommunicable diseases 2010 [Internet]. Geneva: World Health Organization; 2011 [cited 2011 Sep 26]. Available from: http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf
114. Health Canada. Canadian guidelines for body weight classification in adults. Ottawa: Health Canada; 2003.
115. Cancer Care Ontario. Healthy weights, healthy eating and active living. Cancer risk factors in Ontario. Toronto: Queen's Printer for Ontario; 2015.
116. Garriguet D. Diet quality in Canada. *Health Rep*. 2009 Sep;20(3):41–52.
117. Food and Agriculture Organization. Report of the World Food Summit. Rome: Food and Agriculture Organization; 1996.
118. Tarasuk V, Mitchell A, Dachner N. Report on household food insecurity in Canada, 2012. Toronto: Research to identify policy options to reduce food insecurity (PROOF); 2014.
119. Vogt J, Tarasuk V. Analysis of Ontario sample in Cycle 2.2 of the Canadian Community Health Survey (2004). Toronto: Public Health Research, Education and Development (PHRED) Program; 2007.
120. Kirkpatrick SI, Tarasuk V. Food insecurity is associated with nutrient inadequacies among Canadian adults and adolescents. *J Nutr*. 2008 Mar;138(3):604–12.

121. Health Canada [Internet]. Ottawa: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2010 [cited 2015 Jan 20]. Household Food Security Survey Module (HFSSM). Available from: <http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/insecurit/hfssm-mesam-eng.php>
122. Ontario Ministry of Health Promotion. Nutritious Food Basket: guidance document. Toronto: Queen's Printer for Ontario; 2010.
123. Ontario Ministry of Health and Long-Term Care. Nutritious Food Basket protocol 2014. Toronto: Queen's Printer for Ontario; 2014.
124. Ontario Ministry of Health and Long-Term Care. Ontario Public Health Standards 2008. Toronto: Queen's Printer for Ontario; 2008.
125. Ontario Ministry of Education [Internet]. Toronto: Queen's Printer for Ontario; 2015 [cited 2015 Jan 20]. Healthy Food for Healthy Schools Act. Available from: <http://www.edu.gov.on.ca/eng/healthyschools/lifestyle.html>
126. Ontario Minister of Agriculture and Food. Bill 36, Local Food Act, 2013. Nov 6, 2013.
127. Health Canada [Internet]. Ottawa: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2014 [cited 2015 Jan 20]. Nutrition labelling. Available from: <http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/index-eng.php>
128. Health Canada [Internet]. Ottawa: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2007 [cited 2015 Jan 20]. Office of Nutrition Policy and Promotion. Available from: <http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/hpfb-dgpsa/onpp-bppn/index-eng.php>
129. Government of Canada [Internet]. Ottawa: Her Majesty the Queen in Right of Canada 2014 [cited 2015 Jan 21]. Canadian Food Inspection Agency. Available from: <http://www.inspection.gc.ca/eng/1297964599443/1297965645317>
130. Ontario Ministry of Children and Youth Services [Internet]. Toronto: Queen's Printer for Ontario; 2010 [cited 2015 Jan 20]. Student Nutrition Program. Available from: <http://www.children.gov.on.ca/htdocs/English/topics/schoolsnacks/index.aspx>
131. Ontario Fruit and Vegetable Growers' Association [Internet]. Guelph: Ontario Fruit and Vegetable Growers' Association; 2015 [cited 2015 Jan 20]. Available from: <http://www.ofvga.org/>
132. Ontario Ministry of Aboriginal Affairs [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 20]. Helping Aboriginal families make healthy choices. Available from: <http://news.ontario.ca/maa/en/2014/03/helping-aboriginal-families-make-healthy-choices.html>
133. Dietitians of Canada [Internet]. Toronto: Dietitians of Canada; 2015 [cited 2015 Jan 20]. EatRight Ontario. Available from: <http://www.eatrightontario.ca/en/aboutERO.aspx>
134. Ontario Public Health Association [Internet]. Toronto: Ontario Public Health Association; 2010 [cited 2015 Jan 20]. Community Food Advisor Program in Ontario. Available from: <http://www.communityfoodadvisor.ca/>
135. Ontario Public Health Association. Changes to the coordination of the Community Food Advisor program [Internet]. Toronto: Ontario Public Health Association; 2013 [cited 2015 Jan 20]. Available from: <http://opha.on.ca/getmedia/279b5539-d088-4cd0-8876-423de026f807/Transition-Letter-FINAL.pdf.aspx>
136. Ontario Federation of Indigenous Friendship Centres. Urban Aboriginal Healthy Living program [Internet]. Toronto: Ontario Federation of Indigenous Friendship Centres; 2013 [cited 2015 Mar 3]. Available from: <http://www.ofifc.org/about-friendship-centres/programs-services/health/urban-aboriginal-healthy-living-program>
137. Ontario Ministry of Health and Long-Term Care [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 20]. Healthy Kids Community Challenge. Available from: <http://news.ontario.ca/mohltc/en/2014/01/healthy-kids-community-challenge.html>
138. Ontario Ministry of Health and Long-Term Care [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 20]. Healthy Communities Fund. Available from: <http://www.mhp.gov.on.ca/en/healthy-communities/hcf/>
139. Ontario Ministry of Agriculture and Food and Rural Affairs [Internet]. Toronto: Queen's Printer for Ontario; 2015 [cited 2015 Jan 20]. Local Food Fund. Available from: http://www.omafra.gov.on.ca/english/about/local_food_fund.htm
140. Dietitians of Canada [Internet]. Toronto: Dietitians of Canada; 2015 [cited 2015 Jan 20]. Fresh from the Farm — a fresh take on school fundraising. Available from: <http://www.freshfromfarm.ca/home.aspx>
141. Roustit C, Hamelin A-M, Grillo F, Martin J, Chauvin P. Food insecurity: could school food supplementation help break cycles of intergenerational transmission of social inequalities? *Pediatrics*. 2010 Dec;126(6):1174–81.
142. Ontario Food and Nutrition Strategy Design Team. Ontario Food and Nutrition Strategy: a plan for healthy food and food systems [Internet]. Toronto: Sustain Ontario; 2014 [cited 2015 Jan 20]. Available from: <http://sustainontario.com/work/ofns/>
143. Friedenreich CM, Neilson HK, Lynch BM. State of the epidemiological evidence on physical activity and cancer prevention. *Eur J Cancer*. 2010 Sep;46(14):2593–604.
144. Warburton DE, Charlesworth S, Ivey A, Nettlefold L, Bredin SS. A systematic review of the evidence for Canada's Physical Activity Guidelines for Adults. *Int J Behav Nutr Phys Act*. 2010;7:39.
145. United States Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta (GA): United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
146. Toronto Public Health. Road to health: Improving walking and cycling in Toronto. Toronto: Toronto Public Health; 2012.

147. Canadian Society for Exercise Physiology. Canadian Physical Activity Guidelines; Canadian Sedentary Behaviour Guidelines [Internet]. Ottawa: Canadian Society for Exercise Physiology; 2012. Available from: http://www.csep.ca/CMFiles/Guidelines/CSEP_Guidelines_Handbook.pdf
148. Rissel C, Curac N, Greenaway M, Bauman A. Physical activity associated with public transport use — a review and modelling of potential benefits. *Int J Environ Res Public Health*. 2012 Jul;9(7):2454–78.
149. Schoeppe S, Duncan MJ, Badland H, Oliver M, Curtis C. Associations of children's independent mobility and active travel with physical activity, sedentary behaviour and weight status: a systematic review. *J Sci Med Sport*. 2013 Jul;16(4):312–9.
150. Sahlqvist S, Song Y, Ogilvie D. Is active travel associated with greater physical activity? The contribution of commuting and non-commuting active travel to total physical activity in adults. *Prev Med*. 2012 Sep;55(3):206–11.
151. Audrey S, Procter S, Cooper AR. The contribution of walking to work to adult physical activity levels: a cross sectional study. *Int J Behav Nutr Phys Act*. 2014;11(1):37.
152. Statistics Canada. 2011 National Household Survey: data tables. Catalogue no. 99-012-X2011031. Ottawa: Statistics Canada; 2014.
153. Janssen I, Leblanc AG. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int J Behav Nutr Phys Act*. 2010;7:40.
154. Centers for Disease Control and Prevention (US). The association between school-based physical activity, including physical education, and academic performance. Atlanta (GA): United States Department of Health and Human Services; 2010.
155. Allison KR, Adlaf EM. Structured opportunities for student physical activity in Ontario elementary and secondary schools. *Can J Public Health*. 2000 Oct;91(5):371–5.
156. Allison KR, Adlaf EM, Dwyer JJM, Lysy DC, Irving HM. The decline in physical activity among adolescent students: a cross-national comparison. *Can J Public Health*. 2007 Apr;98(2):97–100.
157. Kelder SH, Perry CL, Klepp KI, Lytle LL. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *Am J Public Health*. 1994 Jul;84(7):1121–6.
158. Freedson PS, Rowland TW. Youth activity versus youth fitness: let's redirect our efforts. *Res Q Exerc Sport*. 1992 Jun;63(2):133–6.
159. Malina RM. Physical activity and fitness: pathways from childhood to adulthood. *Am J Hum Biol*. 2001 Apr;13(2):162–72.
160. Spence J, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10:356.
161. Active Healthy Kids Canada. Dropping the ball: Canada's report card on physical activity for children and youth. Toronto: Active Healthy Kids Canada; 2005.
162. Chief Medical Officer of Health of Ontario. 2004 Chief Medical Officer of Health report. Healthy weights, healthy lives. Toronto: Queen's Printer for Ontario; 2004.
163. DeCorby K, Halas J, Dixon S, Wintrup L, Janzen H. Classroom teachers and the challenges of delivery quality physical education. *J Educ Res*. 2005;(98):208–20.
164. Faucette N, McKenzie T, Patterson. Descriptive analysis of nonspecialist elementary physical education teachers' curricular choices and class organization. *J Teach Phys Educ*. 1990;9:284–93.
165. Davis KS, Burgeson CR, Brener ND, McManus T, Wechsler H. The relationship between qualified personnel and self-reported implementation of recommended physical education practices and programs in US schools. *Res Q Exerc Sport*. 2005 Jun;76(2):202–11.
166. Faulkner GEJ, Dwyer JJM, Irving H, Allison KR, Adlaf EM, Goodman J. Specialist or nonspecialist physical education teachers in Ontario elementary schools: examining differences in opportunities for physical activity. *Alberta J Educ Res* [Internet]. 2008 [cited 2015 Feb 20];54(4). Available from: <http://ajer.journalhosting.ucalgary.ca/index.php/ajer/article/view/654>
167. Sallis JF, McKenzie TL, Alcaraz JE, Kolody B, Faucette N, Hovell MF. The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *Sports, Play and Active Recreation for Kids*. *Am J Public Health*. 1997 Aug;87(8):1328–34.
168. Fox K, Harris J. Perspectives on health and exercise. Basingstoke: University of Bristol; 2003.
169. Ontario Ministry of Education. The Ontario Curriculum Grades 1-8. Toronto: Queen's Printer for Ontario; 2010.
170. Whitehead M. The concept of physical literacy. *Eur J Phys Educ*. 2001 Jan 1;6(2):127–38.
171. Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian children and youth: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. *Health Rep*. 2011 Mar;22(1):15–23.
172. Huotari P, Nupponen H, Mikkelsen L, Laakso L, Kujala U. Adolescent physical fitness and activity as predictors of adulthood activity. *J Sports Sci*. 2011 Aug;29(11):1135–41.
173. Kjønniksen L, Anderssen N, Wold B. Organized youth sport as a predictor of physical activity in adulthood. *Scand J Med Sci Sports*. 2009 Oct;19(5):646–54.
174. Tammelin T, Näyhä S, Hills AP, Järvelin MR. Adolescent participation in sports and adult physical activity. *Am J Prev Med*. 2003 Jan;24(1):22–8.
175. Canadian Fitness and Lifestyle Research Institute [Internet]. Ottawa: Canadian Fitness and Lifestyle Research Institute; 2011 [cited 2014 Nov 17]. Kids CAN PLAY! Activity levels of children and youth in Ontario. Available from: <http://www.cfri.ca/sites/default/files/node/972/files/CANPLAY%20Bulletin%202.6%20ON%20-%20EN.pdf>
176. Dobbins M, Husson H, DeCorby K, LaRocca RL. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database Syst Rev*. 2013;2:CD007651.

177. Task Force on Community Preventive Services (US). Recommendations to increase physical activity in communities. *Am J Prev Med*. 2002 May;22 (4, Supplement 1):67–72.
178. Ontario Ministry of Education. Policy/Program Memorandum No. 138: daily physical activity in elementary schools, grades 1–8 [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2014 Nov 17]. Available from: <http://www.edu.gov.on.ca/extra/eng/ppm/138.html>
179. Ontario, Office of the Premier. News release: promoting well-being at school [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 20]. Available from: <http://news.ontario.ca/opo/en/2014/11/promoting-well-being-at-school.html>
180. Ontario Ministry of Finance [Internet]. Toronto: Queen's Printer for Ontario; 2010 [cited 2015 Jan 20]. Children's Activity Tax Credit. Available from: <http://www.fin.gov.on.ca/en/Credit/calc/index.html>
181. Canadian Heritage. The Canadian Sport Policy 2012 [Internet]. Ottawa: Her Majesty the Queen in Right of Canada; 2013 [cited 2015 Jan 20]. Available from: <http://www.pch.gc.ca/eng/1358351890624/1358352054107>
182. The Sutcliffe Group Incorporated. Interprovincial sport and recreation council: evaluation of the Canadian Sport Policy. Ottawa: Canadian Heritage, Sport Canada Branch; 2010.
183. Ontario Ministry of Municipal Affairs and Housing [Internet]. Toronto: Queen's Printer for Ontario; 2010 [cited 2015 Jan 21]. The Planning Act. Available from: <http://www.mah.gov.on.ca/Page1760.aspx>
184. Ontario Ministry of Municipal Affairs and Housing [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 21]. Provincial Policy Statement. Available from: <http://www.mah.gov.on.ca/Page215.aspx>
185. Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT, et al. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *J Phys Act Health*. 2006;3(Suppl 1):S55–76.
186. Niagara Region. Complete streets for Niagara. Thorold (ON): Niagara Region; 2012.
187. City of Hamilton [Internet]. Hamilton: City of Hamilton; 2013 [cited 2015 Jan 21]. Pedestrian mobility plan. Available from: http://www.hamilton.ca/CityDepartments/PublicWorks/Environment_Sustainable_Infrastructure/StrategicPlanning/StrategicEnvironmentalPlanningProjects/Pedestrian+Master+Plan.htmto
188. City of Thunder Bay [Internet]. Thunder Bay (ON): Corporation of the City of Thunder Bay; 2015 [cited 2015 Jan 21]. Active transportation plan. Available from: http://www.thunderbay.ca/Living/Getting_Around/Active_Transportation/Active_Transportation_Plan.htm
189. Ophea [Internet]. Toronto: Ophea; 2015 [cited 2015 Jan 21]. Available from: <https://www.ophea.net/>
190. Ontario Ministry of Tourism, Culture and Sport [Internet]. Toronto: Queen's Printer for Ontario; 2015 [cited 2015 Jan 20]. Ontario's After School Program. Available from: http://www.mtc.gov.on.ca/en/sport/afterschool/after_school.shtml
191. Ontario [Internet]. Toronto: Queen's Printer for Ontario; c.2009-2010 [cited 2015 Jan 21]. Ontario Sports and Recreation Communities Fund. Available from: <http://www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/GrantOpportunities/PRDR006918>
192. Parks and Recreation Ontario [Internet]. Toronto: Parks and Recreation Ontario; 2015 [cited 2015 Jan 20]. Available from: <http://www.prontario.org/>
193. Cancer Care Ontario. Evidence summary. Cancer risk factors in Ontario. Toronto: Queen's Printer for Ontario; 2013.
194. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 8]. 7 million premature deaths annually linked to air pollution. Available from: <http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/>
195. International Agency for Research on Cancer. Air pollution and cancer. Straif K, Cohen A, Samet J, editors. Lyon, FR: International Agency for Research on Cancer; 2013.
196. Loomis D, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, et al. The carcinogenicity of outdoor air pollution. *Lancet Oncol*. 2013 Dec;14(13):1262–3.
197. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 8]. Ambient air pollution. Available from: http://www.who.int/gho/phe/outdoor_air_pollution/en/
198. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 8]. Air pollution and health. Available from: http://www.who.int/phe/health_topics/outdoorair/en/
199. Brauer M, Reynolds C, Hystad P. Traffic-related air pollution and health in Canada. *CMAJ*. 2013 Dec 10;185(18):1557–8.
200. International Agency for Research on Cancer [Internet]. Lyon, FR: World Health Organization, International Agency for Research on Cancer; 2013 [cited 2014 Nov 4]. Outdoor air pollution a leading environmental cause of cancer deaths. Available from: <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2013/10/outdoor-air-pollution-a-leading-environmental-cause-of-cancer-deaths>
201. Chen H, Goldberg MS. The effects of outdoor air pollution on chronic illnesses. *McGill J Med*. 2009 Jan;12(1):58–64.
202. World Health Organization [Internet]. Geneva: World Health Organization; 2014 [cited 2014 Dec 8]. Burden of disease from ambient air pollution for 2012. Available from: http://www.who.int/phe/health_topics/outdoorair/databases/AAP_BoD_results_March2014.pdf?ua=1
203. Ontario Medical Association. Local premature smog deaths in Ontario [Internet]. Toronto: Ontario Medical Association; 2008 [cited 2014 Dec 8]. Available from: <https://www.oma.org/Resources/Documents/2008LocalPrematureSmogDeaths.pdf>
204. Canadian Medical Association. No breathing room: national illness costs of air pollution. Ottawa: Canadian Medical Association; 2008.
205. Ontario Ministry of the Environment [Internet]. Toronto: Queen's Printer for Ontario; 2010 [cited 2015 Mar 3]. Monitoring air quality. Available from: <http://www.airqualityontario.com/science/background.php>

206. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Copes R, Chen H. Review of Air Quality Index and Air Quality Health Index. Toronto: Queen's Printer for Ontario; 2013.
207. Ontario Ministry of the Environment [Internet]. Toronto: Queen's Printer for Ontario; 2010 [cited 2015 Mar 13]. Air quality data sets. Available from: http://www.airqualityontario.com/science/data_sets.php
208. Environment Canada [Internet]. Gatineau (QC): Her Majesty the Queen in Right of Canada, as represented by the Minister of the Environment; 2015 [cited 2015 Mar 31]. Air pollutant emission data (search results). 2013 air pollutant emissions for Ontario. Available from: http://www.ec.gc.ca/inrp-npri/donnees-data/ap/index.cfm?do=ap_result&process=true§or=&lang=en&year=2013&substance=all&location=ON&submit=Submit&div=0
209. Environment Canada [Internet]. Gatineau (QC): Her Majesty the Queen in Right of Canada, as represented by the Minister of the Environment; 2015 [cited 2015 March 31]. Air pollutant emission data (search results). 2013 air pollutant emissions for Alberta. Available from: http://www.ec.gc.ca/inrp-npri/donnees-data/ap/index.cfm?do=ap_result&process=true§or=&lang=en&year=2013&substance=all&location=AB&submit=Submit&div=0
210. Wood J. Canadian environmental indicators: air quality. Vancouver: Fraser Institute; 2012.
211. Stewart K. Analysis of Ontario's five-point clean air plan. Thorold (ON): Niagara Region; 2004 [cited 2014 Nov 17]. Available from: http://www.niagararegion.ca/living/health_wellness/inspection/pdf/5point-plan.pdf
212. Massey RI. Program assessment at the 20 year mark: experiences of Massachusetts companies and communities with the Toxics Use Reduction Act (TURA) program. J Cleaner Production. 2011 Mar;19(5):505–16.
213. Ontario Ministry of Energy [Internet]. Toronto: Queen's Printer for Ontario; 2013 [cited 2015 Jan 20]. Creating cleaner air in Ontario. Available from: <http://news.ontario.ca/mei/en/2013/10/creating-cleaner-air-in-ontario.html>
214. Ontario Minister of the Environment. Bill 138, Ending coal for a cleaner air act, 2013. Nov 25, 2013.
215. City of Toronto. Toronto Municipal Code Chapter 517, Idling of Vehicles and Boats. Jul 8, 2010
216. Krueger H, Williams D, Chomiak M, Trenaman L. The economic burden of skin cancer in Canada: current and projected. Toronto: Canadian Partnership Against Cancer; 2010.
217. International Agency for Research on Cancer. A review of human carcinogens. Part D: radiation. IARC monographs on the evaluation of carcinogenic risks to humans, vol. 100D. Lyon, FR: International Agency for Research on Cancer; 2012.
218. Armstrong BK, Kricger A. The epidemiology of UV induced skin cancer. J Photochem Photobiol B Biol. 2001 Oct;63(1-3):8–18.
219. Canadian Cancer Society's Advisory Committee on Cancer Statistics. Canadian Cancer Statistics 2014. Toronto: Canadian Cancer Society; 2014.
220. Boniol M, Autier P, Boyle P, Gandini S. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. BMJ. 2012;345:e4757.
221. Canada. Radiation Emitting Devices Act (R.S.C., 1985, c. R-1). Oct 13, 2004.
222. Health Canada. Sunscreen monograph - version 2.0. Ottawa: Her Majesty the Queen in Right of Canada, as represented by the Minister of Health; 2013.
223. Region of Waterloo [Internet]. Kitchener (ON): Region of Waterloo, 2012 [cited 2014 Dec 19]. See our progress - Region of Waterloo strategic focus 2011-2014 - environmental sustainability | 1.5.4. Available from: <http://seeourprogress.regionofwaterloo.ca/environmental-sustainability/1-5-4.html>
224. Region of Peel. Affordable housing design guidelines and standards. Family and senior apartment buildings [Internet]. Brampton: Region of Peel Real Property Asset Management Employee & Business Services; 2011 [cited 2014 Dec 19]. Available from: <http://www.peelregion.ca/housing/social/pdf/design-guidelines-apr-2011.pdf>
225. Canadian Partnership Against Cancer. Environmental scan of policy and legislation as it relates to skin cancer prevention. Toronto: Canadian Partnership Against Cancer; 2009.
226. United States Department of Health and Human Services. The Surgeon General's call to action to prevent skin cancer. Washington: United States Department of Health and Human Services, Office of the Surgeon General; 2014.
227. Community Preventive Services Task Force (US) [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (US); 2014 [cited 2014 Dec 19]. The Community Guide — preventing skin cancer, education and policy approaches. Available from: <http://www.thecommunityguide.org/cancer/skin/education-policy/index.html>
228. Ontario Sun Safety Working Group. Recommendations. In: Cancer Care Ontario, Canadian Cancer Society, editors. Insight on cancer: sun exposure and protective behaviours in Ontario: An Ontario report based on the 2006 Second National Sun Survey [Internet]. Toronto: Cancer Care Ontario, Canadian Cancer Society; 2010 [cited 2014 Dec 19]. Available from: <https://www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=87528>
229. Ontario. Skin Cancer Prevention Act (Tanning Beds), 2013. May 1, 2014.
230. Saraiya M, Glanz K, Briss PA, Nichols P, White C, Das D, et al. Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: a systematic review. Am J Prev Med. 2004 Dec;27(5):422–66.
231. Cancer Care Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Feb 9]. My CancerIQ. Available from: <https://www.mycanceriq.ca>
232. From L, Marrett L, Rosen C, Zwaal C, Johnston M, Bak K et al. Screening for skin cancer: a clinical practice guideline. Toronto: Queen's Printer for Ontario; 2005. Program in Evidence-based Care Evidence-based Series: 15-1 IN REVIEW.
233. McWhirter E, Souter LH, Rumble RB, Rosen CF, Tenkate T, McLaughlin J, et al. The use of indoor tanning devices and the risk of developing cutaneous malignant melanoma: a systematic review and clinical practice guideline. Toronto: Queen's Printer for Ontario; 2014. Program in Evidence-based Care Evidence-based Series No.: 8-8.

234. Cancer Care Ontario. ColonCancerCheck 2010 program report. Toronto: Queen's Printer for Ontario; 2012.
235. Cancer Care Ontario [Internet]. Toronto: Queen's Printer for Ontario; 2015 [updated 2015 Jan 16; cited 2015 Jan 20]. Available from: <https://www.cancercare.on.ca/pcs/screening/breastscreening/mammograms/>
236. The Canadian Task Force on Preventive Health. Recommendations on screening for breast cancer in average-risk women aged 40–74 years. CMAJ. 2011 Nov 22;183(17):1991–2001.
237. Chiarelli AM, Prummel MV, Muradali D, Majpruz V, Horgan M, Carroll JC, et al. Effectiveness of screening with annual magnetic resonance imaging and mammography: results of the initial screen from the Ontario High Risk Breast Screening Program. J Clin Oncol. 2014 Jul 20;32(21):2224–30.
238. Warner E, Messersmith H, Causer P, Eisen A, Shumak R, Plewes D. Magnetic resonance imaging screening of women at high risk for breast cancer. Toronto: Queen's Printer for Ontario; 2012. Program in Evidence-based Care Evidence-based Guideline No.: 15-11 Version 2.
239. Canadian Partnership Against Cancer. Report from the Evaluation Indicators Working Group: guidelines for monitoring breast cancer screening program performance. 3rd ed. Toronto: Canadian Partnership Against Cancer; 2013.
240. Murphy J, Kennedy E, Dunn S, Fung Kee Fung M, Gzik D, McLachlin CM, et al. Cervical screening. Toronto: Queen's Printer for Ontario; 2011. Program in Evidence-based Care Evidence-based Series No.: 15-9.
241. Rabeneck L, Zwaal C, Goodman JH, Mai V, Zamkane M. Cancer Care Ontario guaiac fecal occult blood test (FOBT) laboratory standards: evidentiary base and recommendations. Clin Biochem. 2008 Nov;41(16-17):1289–305.
242. Hewitson P, Glasziou P, Watson E, Towler B, Irwig L. Cochrane systematic review of colorectal cancer screening using the fecal occult blood test (hemoccult): an update. Am J Gastroenterol. 2008 Jun;103(6):1541–9.
243. 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 Jul;48(7):611–8.
244. Ontario Agency for Health Protection and Promotion (Public Health Ontario) [Internet]. Toronto: Queen's Printer for Ontario; 2014 [cited 2015 Jan 20]. Snapshots. Available from: <http://www.publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/default.aspx#.VL7fQnser0w>

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