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The Monthly Infectious Diseases Surveillance Report is produced by Public Health Ontario (PHO) for the public health community of Ontario. We welcome feedback by email to: SurveillanceServices@oahpp.ca.

Past issues and additional information on the Monthly Infectious Diseases Surveillance Report are available online at: http://www.publichealthontario.ca/en/ServicesAndTools/SurveillanceServices/Pages/Monthly-Infectious-Diseases-Surveillance-Report.aspx.

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Infectious Disease in Focus

VEROTOXIN PRODUCING *E. COLI* (OR SHIGA TOXIN PRODUCING *E. COLI*)

Verotoxin producing *E. coli* (VTEC), also known as Shiga toxin producing *E. coli* (STEC), is a highly pathogenic subtype of *E. coli* and is a reportable disease in Ontario. VTEC are distinguished from other *E. coli* by the ability to produce Shiga toxins (also referred to as verotoxins), or by the presence of genes encoding those toxins.[1-4] Serogroup classification of *E. coli* is characterized by the somatic (O) surface antigen;[4] over 250 serogroups of VTEC have been identified as causing disease in humans.[1] The VTEC serogroup *E. coli* O157 has been the main focus of public health prevention and response, and has been associated with high rates of complications including hemolytic uremic syndrome (HUS), chronic renal impairment, and death.[3-5]

Unlike *E. coli* O157, most non-O157 *E. coli* serogroups of VTEC are not readily detected in the laboratory with routine culture-based methods. As a result, non-O157 VTEC are likely under-diagnosed and underreported.[1,5,6] Where non-O157 VTEC testing has taken place, frequently identified serogroups include *E. coli* O26, O111, O103, O45 and O121.[5] Outbreaks caused by non-O157 VTEC in recent years have occurred in Germany (O104) and the United States (O121).[7,8] In Ontario, most private laboratories do not test for non-O157 *E. coli* serogroups of VTEC. Where non-O157 VTEC cases are suspected, samples can be forwarded to the Public Health Ontario Laboratories (PHOL) for non-O157 VTEC testing.

Various laboratory methods are used for further subtyping of VTEC to support epidemiological linkage between cases; pulsed field gel electrophoresis (PFGE) is the most common method used in Canada and is an important tool for identifying and investigating outbreaks.[4] Recently, the National Microbiology Laboratory (NML) has started conducting multiple-locus variable number tandem repeat analysis (MLVA) alongside PFGE testing for this pathogen. The value provided by MLVA testing in outbreak investigations is currently being evaluated. In the future, whole genome sequencing may provide additional discriminatory power to VTEC subtyping.

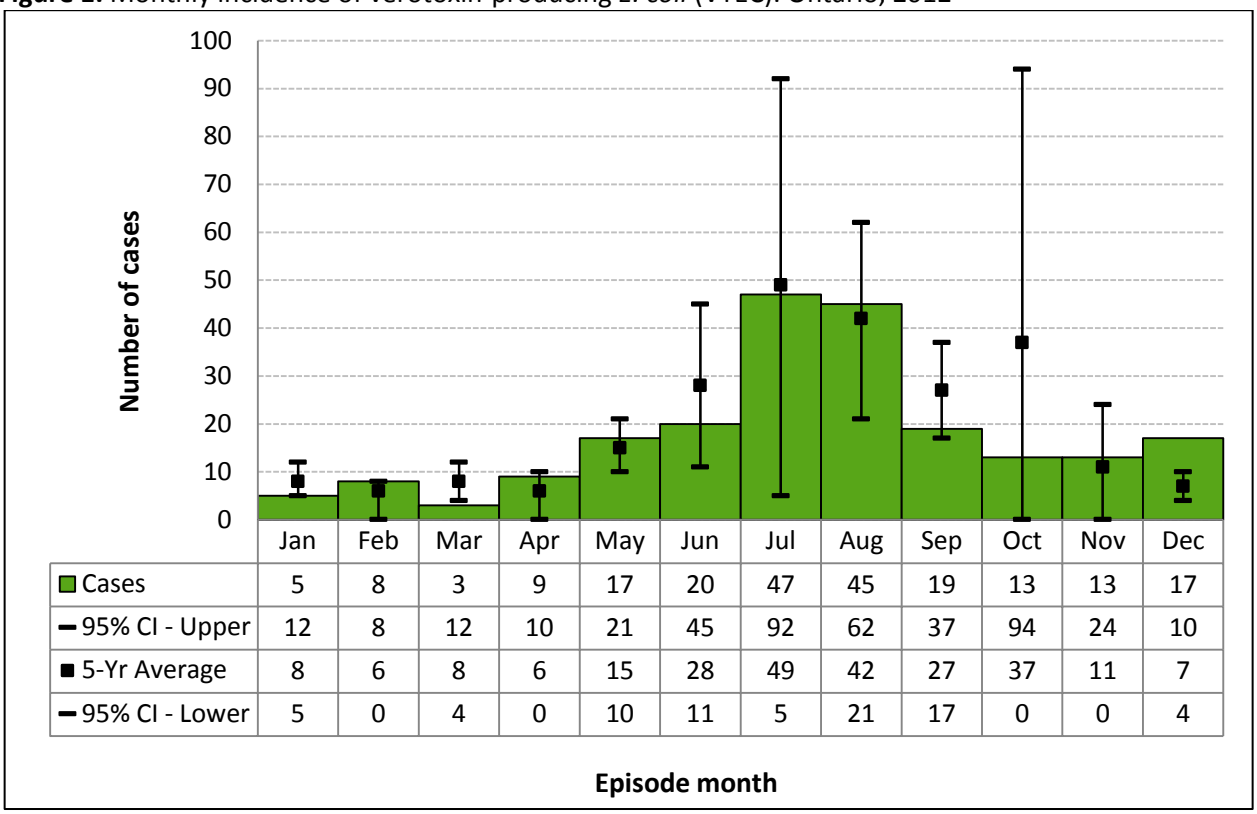
Ruminants such as sheep, goats, and cattle are the primary reservoirs of VTEC, although it does not generally cause illness in these animals. More recently, VTEC have also been isolated from the gastrointestinal tracts of dogs and cats with chronic diarrhea.[2] Transmission of VTEC to humans occurs mainly through consumption of contaminated food or water, animal contact, or person-to-person transmission.[2,3,5,9] Outbreaks of VTEC have been linked to contaminated foods including ground and tenderized beef; produce such as lettuce, spinach, sprouts, unpasteurized juice; dairy products; and raw nuts. Outbreaks involving contact with animals have been primarily linked to petting zoos or contact with farm animals. Documented outbreaks of person-to-person transmission most often involve childcare settings, household contacts, and institutions.[5,9]

The incubation period for VTEC ranges from one to ten days, with a median of three to four days.[3] Clinical presentations range from mild, self-limiting diarrhea to bloody diarrhea, hemorrhagic colitis, and HUS.[2,3,5] Susceptibility to the disease is universal; however, children under the age of five, the elderly, and immunocompromised individuals are at the greatest risk of severe illness.[3] Mild forms of VTEC typically resolve within three to four days, while the more severe forms require hospitalization and may become life threatening.[3]

In 2012, a total of 216 confirmed cases of VTEC were reported in Ontario, an incidence of 1.62 cases per 100,000 population. From 2003 to 2012, the incidence of VTEC declined in Ontario by approximately 57%. National rates[10] available from 2003 to 2008 followed a similar declining pattern as Ontario. Increases in cases of VTEC are typically observed in the warmer months (Figure 1), with close to half (42.6%) of cases in 2012 reported in July and August. In December 2012, higher than expected counts were reported, as a number of cases were related to a national outbreak involving lettuce distributed to a fast food chain.[11]

In 2012, males and females were affected almost equally, with similar overall counts and rates reported. The cases ranged in age from four months to 94 years, with a median age of 20 years. Rates of VTEC were highest among children under the age of five years (5.82 cases per 100,000 population). Among all health units, the highest rates of VTEC in 2012 were reported in Perth District (12.97 cases per 100,000 population), followed by Algoma District (8.49 cases per 100,000 population). All of Algoma's cases (10) occurred among patients at a hospital, and 40% (4/10) of Perth's cases were related to an outbreak of VTEC among children attending a daycare.

Figure 1. Monthly incidence of verotoxin-producing *E. coli* (VTEC): Ontario, 2012



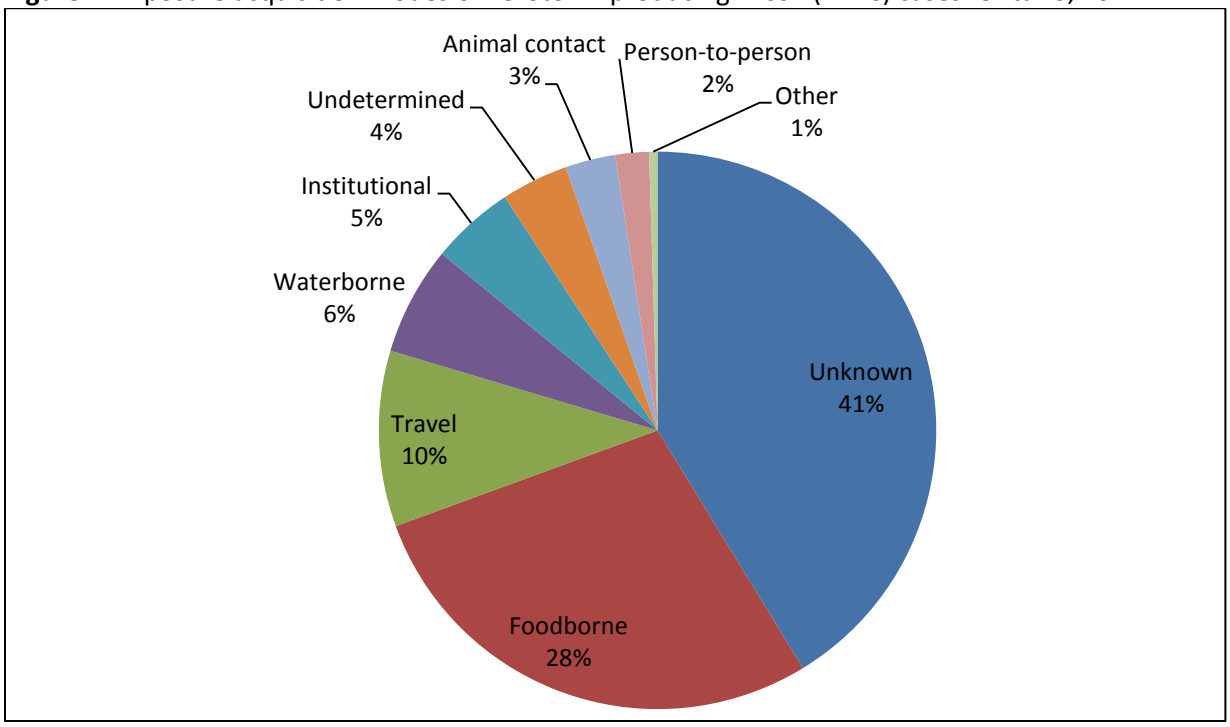
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cases	5	8	3	9	17	20	47	45	19	13	13	17
95% CI - Upper	12	8	12	10	21	45	92	62	37	94	24	10
5-Yr Average	8	6	8	6	15	28	49	42	27	37	11	7
95% CI - Lower	5	0	4	0	10	11	5	21	17	0	0	4

Ontario cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/04/17].

Symptoms were reported by 93% (201/216) of cases, with the most frequently reported symptoms being bloody diarrhea (99%), abdominal pain (80%), vomiting (36%), nausea (33%) and dehydration (23%). HUS was reported by five cases (2%). Twenty-seven percent (59/216) of cases were reported as hospitalized, and two cases (1%) were fatal, both with VTEC as the underlying cause of death.

Exposures were reported for the majority (95%; 206/216) of VTEC cases in 2012, although a large proportion of exposures (41%; 85/206) were reported as unknown. Foodborne, travel, and waterborne exposures were the most commonly reported (Figure 2). Among cases reporting foodborne transmission, the most frequently reported exposure settings were in private homes (38%; 22/58) and food premises (36%; 21/58); ground beef was the most commonly reported exposure source (34%; 20/58). The majority of VTEC cases reporting a travel exposure travelled outside Canada (86%; 17/21); of those, the most common destination was in the Caribbean (61%; 11/18). Among waterborne exposures, the most common exposure settings (77%; 10/13) were natural water bodies (i.e. lakes, rivers, and streams).

Figure 2. Exposure acquisition modes of verotoxin-producing *E. coli* (VTEC) cases: Ontario, 2012



Ontario cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/04/17].
Note 1: Exposures for cases reporting more than one exposure were re-coded by Public Health Ontario using a most likely exposure algorithm. Exposures were recoded as "undetermined" when a most likely exposure could not be determined based on available information, and as "travel-related" when travel outside of Canada plus any other exposure was reported. Cases that reported single exposures were not recoded.
Note 2: Travel refers to any travel outside Ontario, and assumed not to be locally acquired.
Note 3: Does not include ten cases with missing exposure information.

In 2012, there were a number of small, locally investigated VTEC clusters where common epidemiological and/or PFGE pattern links were identified. Ontario was also involved in four national outbreaks of VTEC in 2012, where under the national Foodborne Illness Outbreak Response Protocol (FIORP) the Public Health Agency of Canada took the coordination lead; three involved ground beef products and one involved fresh produce, all with cases across multiple provinces.[11-13] However, common sources are not always identified during outbreak investigations. Timely case interviews and complete food histories, where possible, provide critical information for investigating common sources of outbreaks.

Various measures can be taken to prevent infection with VTEC. Thorough hand washing is recommended after using the bathroom, changing diapers, before preparing or eating food, and after contact with animals or their environments (at farms, petting zoos, fairs). Also, thorough cooking of meats, including ground beef and meat that has been needle-tenderized, to an internal temperature of at least 71˚C is recommended. Other recommendations include avoidance of raw milk, unpasteurized dairy products, and unpasteurized juices (e.g. fresh apple cider); avoidance of swallowing water when swimming or playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools; drinking water from a safe (treated or boiled) supply; and prevention of cross contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after touching raw meat.[3,14,15]

Significant Reportable Disease Activity

Table 1 provides a list of reportable diseases for which incidence in 2013 was significantly higher than expected compared to the five-year historical average (2008-2012). Both monthly and year-to-month (YTM) comparisons were made for each of the reportable diseases listed in Appendix 1.

CHLAMYDIA

There was a significant increase in the number of chlamydia cases reported YTM (January to May 2013) compared to the five year (2008 to 2012) average for January to May. Potential explanations for this increase have been summarized in both the May 2013 (Volume 2, Issue 5) and June 2013 (Volume 2, Issue 6) editions of the Monthly Infectious Diseases Surveillance Report. The July 2012 (Volume 1, Issue 8) edition further describes the epidemiology of chlamydia in Ontario.

LEGIONELLOSIS

From January 1 to May 31, 2013, case counts for legionellosis were significantly higher than expected compared to the five-year average YTM counts for 2008 to 2012. The majority of cases were reported from health units in and around the "Golden Horseshoe" area, which is similar to where cases have been reported in previous years. However, based on information available at this time there is no evidence to support any unusual cluster activity. Of those individuals tested for *Legionella* at Public Health Ontario Laboratories from January to May 2013, 1.2% had positive results; this was higher compared to the percentage positive from January to May in previous years (average: 0.7% for 2010-2012). This increase may be partially attributed to an increase in testing for *Legionella* since 2009 due to improved patient/clinician awareness. Legionellosis follows a seasonal trend with most cases occurring between July and October each year. Legionellosis in 2013 was previously described in the May 2013 (Volume 2, Issue 5) and June 2013 (Volume 2, Issue 6) editions of the Monthly Infectious Diseases Surveillance Report.

Table 1. Summary of significant increases in reportable disease incidence: Ontario, January 1 to May 31, 2013

Reportable disease	2013			Historical comparisons						5-year avg annual count (2008-2012)
	May	YTM	YTM rate ŧ	Current month 5-year avg (2008-2012)	Current month 5-year avg (2008-2012) rate ŧ	% difference in rates (current month minus 5-year avg)†	YTM 5-year avg (2008-2012)	YTM 5-year avg (2008-2012) rate ŧ	% difference in rates (YTM 2013 minus YTM 5-year avg)†	
Chlamydial Infections*	2,793	14,659	1070.8	2,619	198.0	3	13,269	1,003.1	7	32,293
Legionellosis*	7	35	2.6	3	0.2	125	15	1.2	120	124

Ontario Cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/06/20].
Ontario Population: Ontario Ministry of Health and Long-Term Care, intelliHEALTH Ontario, extracted [2012/10/15].
ŧ Rates listed are cases per 1,000,000 population.
† Percent (%) difference is calculated using unrounded rates; numbers displayed in these columns may vary from calculations using rounded rates.
* Statistically significant difference ($p<0.05$) in incidence reported in year-to-month (January to May 2013) compared to the five-year historical average (January to May 2008-2012).

Infectious Disease Activity in Other Jurisdictions

This section of the report provides a snapshot of current activity related to infectious diseases across Canada and/or globally. The items included in this section are selected based on ongoing or potential implications for public health in Ontario.

WORLD YOUTH DAY 2013 IN RIO DE JANEIRO, BRAZIL: UPDATE FOR TRAVELLERS

Summary: Brazil is hosting World Youth Day 2013 in Rio de Janeiro from July 23 to 28. Over a million travellers including Canadians are expected to attend the event. With mass gatherings, there is a risk of transmission of infectious diseases that are prevalent in the host country as well as countries from which travellers arrive. The Public Health Agency of Canada (PHAC) is advising Canadian travellers to take precautions to protect against infectious diseases including: vaccine preventable diseases (VPD) such as measles, vectorborne diseases such as yellow fever and dengue fever and gastrointestinal diseases such as cyclosporiasis and hepatitis A. PHAC has also issued specific travel health notices due to recent reports of large numbers of cases of measles and dengue fever in Brazil. Ongoing outbreaks of other VPDs in other parts of the world such as measles in the United Kingdom and rubella in Japan are also a threat during this period of heightened travel and mass gathering.

Implications: Several tropical diseases, VPDs and gastrointestinal diseases are commonly acquired during international travel resulting in illness. Some of these diseases have implications for secondary transmission upon return to Canada. Prompt and complete case management and reporting are therefore required to prevent secondary transmission and to document the origin of cases, particularly for diseases such as measles and rubella that are targeted for elimination. Travellers should ensure that they are up to date on routine immunizations prior to travelling. Recommendations for further protecting against infectious diseases during travel are available on PHAC's website at the link provided below.

http://www.phac-aspc.gc.ca/tmp-pmv/notices-avis/index-eng.php

INFECTIOUS SYPHILIS OUTBREAKS – CANADA

Summary: The British Columbia Centre for Disease Control (BCCDC) issued an alert in June 2013 indicating that infectious syphilis rates in the province have reached a 30 year high. Other provinces in Canada, including Nova Scotia, New Brunswick, Quebec and Alberta have also recently reported outbreaks and higher incidence of syphilis. Infectious syphilis in most of these regions has mainly affected men who have sex with men (MSM), with a lower number of cases in the heterosexual population with the exception of Alberta. BCCDC has recommended that men who have sex with men get tested for syphilis every three to six months.

Implications: Syphilis is a sexually transmitted infection (STI) that is considered to be infectious during the first year after initial infection. In Ontario, there were 790 infectious syphilis cases reported in 2012, with the majority of cases occurring in males (96%). From 2001 to 2012, the incidence of infectious syphilis increased by 1,375%, from 0.4 cases per 100,000 population in 2001 to 5.9 cases per 100,000 population in 2012. Since 2009 the incidence of syphilis in Ontario has been relatively stable. However, the increase in syphilis incidence reported in British Columbia in 2012 is a reminder that even after several years of lower rates, as occurred in British Columbia from 2009 to 2011, rates of syphilis can increase substantially.

http://www.bccdc.ca/resourcematerials/newsandalerts/healthalerts/SyphilisVancouver.htm
http://www.bccdc.ca/NR/rdonlyres/3485757D-A8DC-417C-8422-521D6C911B2D/0/STI_Annual_Report_2011_20130327.pdf
http://www.publichealthontario.ca/en/DataAndAnalytics/Documents/2013_June_PHO_Monthly_Report.pdf

Enhanced Surveillance Directives (ESD) Discontinued in May

No Enhanced Surveillance Directives were discontinued in May 2013.

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Infectious Disease in Focus – Verotoxin producing *E. coli*

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Appendix – Reportable Diseases

Appendix 1. Confirmed cases of reportable diseases by month: Ontario, 2008-2013*

Reportable disease	2013														Historical comparisons						5-year avg (2008-2012) annual count
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTM	YTM rate ŧ	Current month 5-year avg (2008-2012)	Current month 5-year avg (2008-2012) rate ŧ	% difference rates (current month minus 5-year avg)†	YTM 5-year avg (2008-2012)	YTM 5-year avg (2008-2012) rate ŧ	% difference rates (YTM 2013 minus YTM 5-year avg)†	
AIDS	10	3	12	1	11								**37**	2.7	9	0.7	18	50	3.8	-28	113
Amebiasis	61	64	62	87	54								**328**	24.0	58	4.4	-10	329	24.9	-4	794
Botulism	0	0	0	0	0								**0**	0.0	1	0.1	-100	2	0.1	-100	3
Brucellosis	0	1	0	1	0								**2**	0.1	0	0.0	-100	2	0.1	21	4
Campylobacter Enteritis	153	197	244	213	276								**1,083**	79.1	244	18.5	9	1,066	80.6	-2	3,561
Chlamydial Infections	3,145	2,753	2,864	3,104	2,793								**14,659**	1070.8	2,619	198.0	3	13,269	1,003.1	7	32,293
Cholera	0	0	0	0	0								**0**	0.0	0	0.0	-	0	0.0	-100	1
Cryptosporidiosis	10	16	18	10	5								**59**	4.3	14	1.1	-66	84	6.4	-32	316
Cyclosporiasis	1	3	5	14	9								**32**	2.3	19	1.5	-55	43	3.3	-28	120
Cytomegalovirus Infection, Congenital	2	0	2	1	0								**5**	0.4	1	0.1	-100	3	0.2	73	6
Encephalitis	1	2	4	0	0								**7**	0.5	1	0.1	-100	7	0.5	-3	18
Encephalitis/Meningitis	4	14	8	8	6								**40**	2.9	9	0.7	-36	48	3.6	-19	156
Food Poisoning, All Causes	6	2	4	4	4								**20**	1.5	6	0.5	-38	63	4.8	-69	122
Giardiasis	121	102	85	69	64								**441**	32.2	112	8.4	-45	556	42.0	-23	1,433
Gonorrhoea (All Types)	449	299	337	343	309								**1,737**	126.9	312	23.6	-4	1,580	119.4	6	3,935
Group A Streptococcal Disease, Invasive	49	59	51	53	53								**265**	19.4	54	4.1	-6	293	22.1	-12	565
Group B Streptococcal Disease, Neonatal	5	3	7	5	3								**23**	1.7	6	0.5	-53	22	1.6	3	55
Haemophilus Influenzae B Disease, Invasive	2	0	0	0	1								**3**	0.2	1	0.1	21	2	0.2	21	4
Hepatitis A	15	5	9	5	11								**45**	3.3	9	0.7	13	48	3.7	-10	120
Hepatitis B	6	10	8	7	6								**37**	2.7	10	0.7	-41	51	3.9	-30	122
Hepatitis C	325	284	347	352	382								**1,690**	123.4	351	26.5	5	1,863	140.8	-12	4,439
Hepatitis D	0	0	0	0	0								**0**	0.0	0	0.0	-100	1	0.1	-100	3
Herpes, Neonatal	0	0	0	0	0								**0**	0.0	1	0.0	-100	4	0.3	-100	7
HIV	50	39	54	62	64								**269**	19.6	67	5.1	-8	370	28.0	-30	860
Influenza	3,326	795	510	359	116								**5,106**	373.0	453	34.2	-75	3,511	265.4	41	6,842
Legionellosis	9	7	7	5	7								**35**	2.6	3	0.2	125	15	1.2	120	124
Leprosy	0	0	0	0	0								**0**	0.0	0	0.0	-100	1	0.1	-100	3
Listeriosis	0	1	1	0	1								**3**	0.2	4	0.3	-76	18	1.4	-84	62
Lyme Disease	1	0	3	2	5								**11**	0.8	11	0.8	-57	21	1.6	-49	122
Malaria	14	10	11	13	15								**63**	4.6	21	1.6	-32	73	5.5	-16	214
Measles	1	1	5	1	0								**8**	0.6	6	0.4	-100	14	1.0	-44	17
Meningitis	8	3	8	9	3								**31**	2.3	9	0.7	-68	40	3.0	-25	117
Meningococcal Disease, Invasive	3	2	0	1	1								**7**	0.5	3	0.2	-70	23	1.7	-70	45
Mumps	2	1	1	2	3								**9**	0.7	6	0.5	-53	31	2.3	-72	130
Ophthalmia Neonatorum	0	2	0	0	0								**2**	0.1	0	0.0	-	1	0.1	61	3
Paratyphoid Fever	2	7	10	5	2								**26**	1.9	4	0.3	-46	28	2.1	-12	52
Pertussis (Whooping Cough)	19	17	14	13	18								**81**	5.9	48	3.7	-64	208	15.7	-62	535
Q Fever	1	0	0	3	1								**5**	0.4	0	0.0	142	3	0.2	61	11
Rabies	0	0	0	0	0								**0**	0.0	0	0.0	-	0	0.0	-100	0
Rubella	0	0	0	1	0								**1**	0.1	0	0.0	-	1	0.1	-3	1
Rubella, Congenital Syndrome	0	0	0	0	0								**0**	0.0	0	0.0	-	0	0.0	-	0
Salmonellosis	149	184	212	179	177								**901**	65.8	219	16.5	-22	1,030	77.9	-15	2,609
Shigellosis	21	22	26	24	22								**115**	8.4	26	2.0	-18	104	7.9	6	254
Streptococcus Pneumoniae, Invasive	142	100	92	115	77								**526**	38.4	110	8.3	-32	594	44.9	-14	1,212
Syphilis, Early Congenital	0	0	0	0	0								**0**	0.0	0	0.0	-100	1	0.0	-100	1
Syphilis, Infectious	61	50	46	42	29								**228**	16.7	58	4.4	-52	297	22.5	-26	717
Syphilis, Other	54	37	36	35	37								**199**	14.5	71	5.4	-50	372	28.1	-48	881
Tetanus	1	1	0	0	0								**2**	0.1	0	0.0	-	0	0.0	383	1
Tuberculosis	39	45	47	60	44								**235**	17.2	55	4.2	-23	265	20.0	-14	634
Tularemia	0	0	0	0	0								**0**	0.0	0	0.0	-	0	0.0	-	1
Typhoid Fever	7	8	7	5	4								**31**	2.3	7	0.5	-43	46	3.5	-35	90
Verotoxin Producing E. Coli Including HUS	15	2	8	19	8								**52**	3.8	15	1.1	-47	40	3.1	24	208
West Nile Virus Illness	0	0	0	0	0								**0**	0.0	0	0.0	-100	1	0.1	-100	74
Yellow Fever	0	0	0	0	0								**0**	0.0	0	0.0	-100	0	0.0	-100	0
Yersiniosis	15	17	12	21	14								**79**	5.8	15	1.1	-9	98	7.4	-22	216

Ontario Cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/06/20].

Ontario Population: Ontario Ministry of Health and Long-Term Care, intelliHEALTH Ontario, extracted [2012/10/15].

* Appendix 1 is not an exhaustive list of all reportable diseases in Ontario.

ŧ Rates listed are cases per 1,000,000 population.

† Percent (%) difference is calculated using unrounded rates; numbers displayed in these columns may vary from hand calculations using rounded rates.

Note 1: Does not include cases in which the Ministry of Health and Long-Term Care was selected as the Diagnosing Health Unit or cases with a Disposition Description set to 'does not meet' or 'entered in error'.

Note 2: Case counts for tuberculosis and AIDS are based on diagnosis date and not episode date. HIV case counts are based on encounter date.

Note 3: Differentials in year over year comparisons are reflective of changes in disease incidence and changes in the size of the population.
Note 4: The one measles case and one rubella case in April 2013 were related to travel and were not acquired in Ontario. The measles cases reported in January and February 2013 did not have travel history noted.
Note 5: Statistical tests comparing rates were not performed when the YTM rate in previous years was zero.
Note 6: Case counts for amebiasis, Lyme disease, mumps, pertussis and West Nile Virus illness are based on the sum of confirmed and probable cases as reported in iPHIS.