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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.

In this issue:

Infectious Disease in Focus

MEASLES

Under the guidance of the Pan American Health Organization (PAHO), countries of the Americas are currently documenting the elimination of measles, rubella and congenital rubella syndrome (CRS). Following the global eradication of smallpox in 1979 and the certification of polio eradication in the Americas in 1994, the Region of the Americas adopted the goal of eliminating measles by 2000, and rubella and CRS by 2010. The interruption of endemic measles virus was achieved in the Americas in 2002; in Canada, the last endemic case of measles occurred in 1997. PAHO has developed a Plan of Action[1] to provide guidance on the necessary evidence to document and verify that endemic measles and rubella virus transmission has been interrupted. To support the requirements for enhanced surveillance, in addition to iPHIS data entry, confirmed and probable cases are to be reported via telephone to Public Health Ontario (PHO) within one business day of receipt of initial notification as per the 2013 Infectious Diseases Protocol.[2]

Measles is an acute, highly communicable viral disease and is a leading cause of vaccine-preventable disease deaths in children worldwide. Typical maculopapular rash appears on the third to seventh day of illness, often accompanied by fever. Patients normally improve by the third day after rash onset and those who do not experience complications usually fully recover after seven to ten days. The disease is more severe in infants and adults than in children. In developing countries, case-fatality ratios among young children may reach 5-10%[3]. While deaths from measles are rare in industrialized countries, severe forms of disease may still occur in previously healthy individuals. In the pre-vaccination period, more than 90% of

individuals were infected by ten years of age and epidemic cycles of increasing incidence occurred every two to three years.[4] Measles is easily prevented through vaccination with two doses of measles-containing vaccine.

In Canada, measles vaccine is currently only available in combination with mumps, rubella and varicella vaccine (MMR and MMRV vaccine). In Ontario, a single dose of MMR vaccine was implemented in 1975. A single dose program continued until 1996, when a second dose was introduced as part of a plan to eradicate measles; only one dose is required for rubella protection. The first dose of the MMR vaccine is routinely given at 12 months of age. Prior to 2007, the second dose was recommended for children between four and six years of age; between 2007 and 2011, the second dose was administered at 18 months. As of August 2011, the second dose is administered as a combined MMRV vaccine between four and six years of age. Two MMR vaccines and one MMRV vaccine are currently available for use in Ontario. Over 99% of individuals who receive two doses of measles vaccine develop serologic evidence of immunity[5] in an outbreak setting. Vaccine effectiveness of two doses has been reported to be between 95% and 99.5%.[6,7]

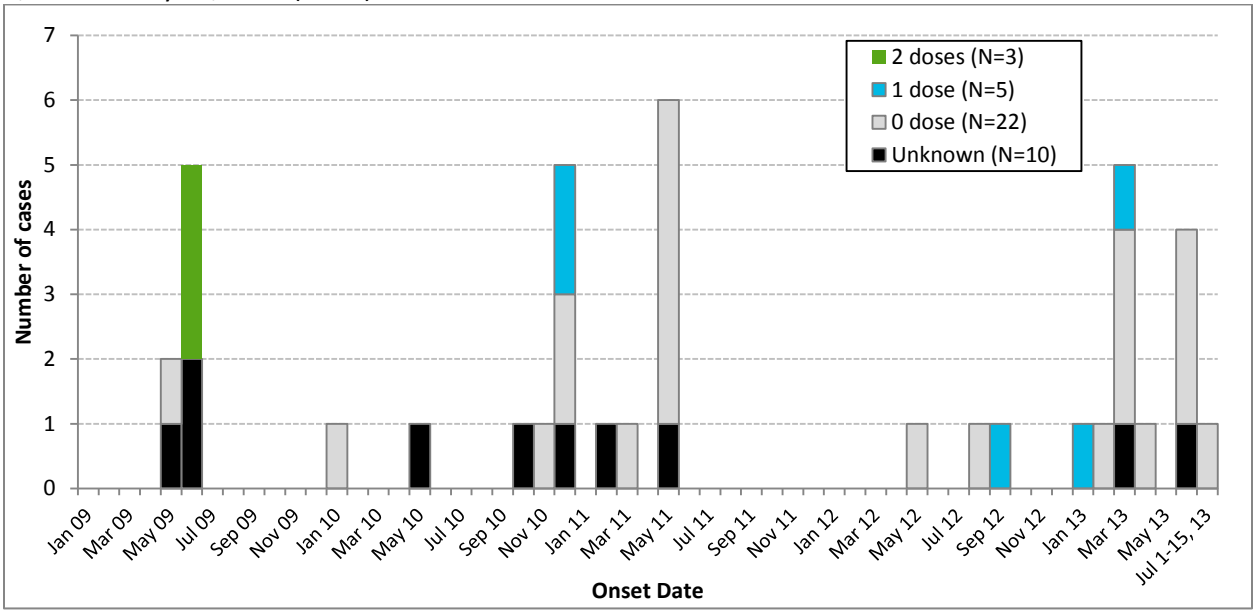
Between January 1, 2009 and July 15, 2013, 40 confirmed and nine probable cases of measles were reported in Ontario. In addition, 474 persons were investigated but did not meet the case definition. Among confirmed cases, the overall annual incidence of measles ranged between 2.2 and 6.8 cases per 10,000,000 between 2009 and 2012; the annualized incidence rate in 2013 was 17.7 cases per 10,000,000. Figure 1 presents the distribution of cases by month of disease onset and immunization status. Despite a thorough review of numerous fields in the integrated Public Health Information System (iPHIS) where immunization information could be captured, including mandatory fields that were structured specifically to capture this information as well as drop-down and free text fields, immunization status could only be assessed for 30 of the 40 cases (75%). Of these, 22 (73.3%) were unimmunized, five (16.7%) had one dose, and three (10%) had received two doses of measles-containing vaccine (up-to-date). The majority of cases were female (21/40, 52.5%). The annualized incidence rate was 3.4 and 6.7 cases per 10,000,000 among males and females, respectively. The median age of cases was 11.0 years, and ranged between 6 months and 59 years. The highest annualized age-specific incidence rate occurred among infants <1 year of age (76.4 cases per 10,000,000) (Figure 2). The annualized incidence of measles in Ontario varied across health regions.

As measles is no longer endemic in Ontario, seasonal trends are no longer discernible. Twelve of the 40 confirmed cases (30%) did not result in subsequent transmission. The remaining 28 cases were the result of three clusters that occurred following importation in 2009, 2010 and 2011, and two additional clusters in 2013 without links to travel outside Canada. Importation status could be determined for 67.5% of cases (27/40). Multiple distinct episodes of importation were associated with the United Kingdom (2009, 2011, 2013), Pakistan (2010, 2012, 2013) and France (2010, 2011). Although 13 cases were classified as having an unknown importation status, it is important to note that in 12 instances (92.3%), documentation suggests that investigation for a source occurred despite the lack of identification. Laboratory testing by polymerase chain reaction (PCR) is preferred, and should be collected in addition to serology wherever possible; PCR is more sensitive and specific (less false positive tests) than serology for diagnosis during acute illness. In addition, all PCR-positive specimens are submitted to the National Microbiology Laboratory for genotyping, and this information can assist in determining importation status. Genotype information was only reported for 16 cases; of these, genotype B3 was isolated in five cases (31.3%), followed by D8 and D9 (four cases each, 25%), and D4 (three cases, 18.8%).

In order for Ontario to satisfactorily demonstrate elimination of measles, continued vigilance is required. Given that measles has not been eradicated globally, it is critical that people are fully vaccinated to protect themselves. Every potential measles case needs to be followed-up and thoroughly investigated; this should

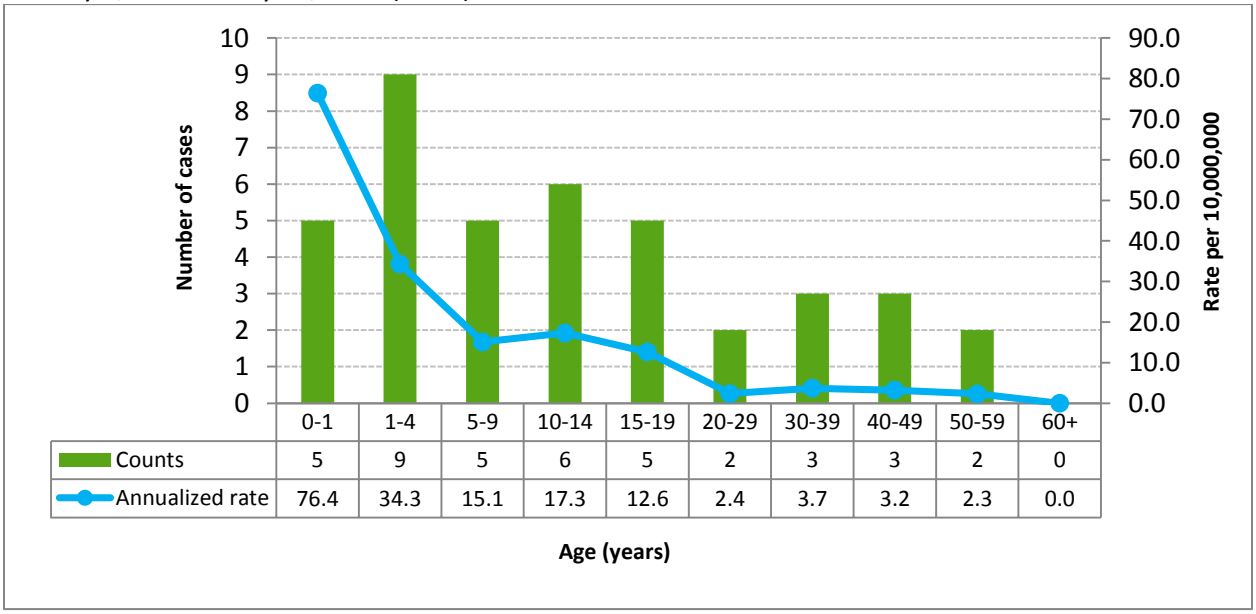
include determination of source of infection, as well as immunization status. It is hoped that with the continued effort of all immunization providers and public health, Ontario will be able to fulfill its requirement to document measles elimination.

Figure 1. Confirmed measles cases by month of symptom onset and immunization status: Ontario, January 1, 2009 to July 15, 2013 (N=40)



Ontario cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/07/29].

Figure 2. Number and annualized rate (per 10,000,000) of confirmed measles cases by age group: Ontario, January 1, 2009 to July 15, 2013 (N=40)



	0-1	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60+
Counts	5	9	5	6	5	2	3	3	2	0
Annualized rate	76.4	34.3	15.1	17.3	12.6	2.4	3.7	3.2	2.3	0.0

Ontario cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/07/29].

Note 1: Rates were calculated using population data from Statistics Canada accessed through intelliHealth.

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.

Table 1. Summary of significant increases in reportable disease incidence: Ontario, January 1 to June 30, 2013

Reportable disease	2013			Historical comparisons						5-year avg annual count (2008-2012)
	June	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*	2,699	17,405	1271.4	2,682	202.8	-3	15,951	1,205.8	5	32,294
Legionellosis*	29	68	5.0	11	0.8	164	26	2.0	153	124

Ontario Cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/07/24].
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 June 2013) compared to the five-year historical average (January to June 2008-2012).

CHLAMYDIA

There was a significant increase in the number of chlamydia cases reported YTM (January to June 2013) compared to the five-year (2008 to 2012) average for January to June. Potential explanations for this increase were summarized in the May 2013 (Volume 2, Issue 5) edition of the Monthly Infectious Diseases Surveillance Report. The increase was also noted in the June 2013 (Volume 2, Issue 6) and July 2013 (Volume 2, Issue 7) editions. The July 2012 (Volume 1, Issue 8) edition further describes the epidemiology of chlamydia in Ontario.

LEGIONELLOSIS

From January 1 to June 30, 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. Of those individuals tested for *Legionella* by Public Health Ontario Laboratories in June 2013, 5.3% had positive results; this was higher compared to the percentage of positive test results in June in previous years (average: 2.8% for 2010 to 2012). Legionellosis follows a seasonal trend, with the majority of cases occurring between July and October each year. Case and laboratory data both indicate that the seasonal increase of legionellosis for 2013 began in June. An Enhanced Surveillance Directive was issued on June 28, 2013; however, based on information available during this period, there was no evidence to support any unusual cluster activity. Legionellosis activity in 2013 was previously described in the May 2013 (Volume 2, Issue 5), June 2013 (Volume 2, Issue 6), and July 2013 (Volume 2, Issue 6) editions of the Monthly Infectious Diseases Surveillance Report. The Legionellosis In Focus in the December 2011 (Volume 1, Issue 1) edition provides additional information about legionellosis in Ontario.

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.

LEGIONELLOSIS INCREASES IN THE UNITED STATES

Summary:

The U.S. Centers for Disease Control and Prevention (CDC) reported an increase of legionellosis cases beyond historical limits for the month of July. The cumulative case count for legionellosis in the U.S. for 2013 (ending on July 27, 2013) was 39% higher than the same timeframe for the year 2012 (ending on July 28, 2012). Specifically, Northeast and Mid-Atlantic states have experienced the increase in cases. Health departments are collaborating with the CDC to investigate the increase; however, the reason for this increase is unknown at this time. While cases of legionellosis in the U.S. tend to occur in the summer and early fall, the country has experienced an overall increase of legionellosis case counts in recent years.

Implications:

An increase in legionellosis cases has also been detected in Ontario. A significant increase in cases reported in June and July compared to the corresponding historical five-year monthly averages, along with Public Health Ontario Laboratories data, suggests that the seasonal peak for legionellosis seems to have occurred during these two months. The case count in August 2013 to date is lower than the historical average. The epidemiologic profile of cases is consistent with reports from previous years, with the majority of cases occurring among males over 50 years of age. Public Health Ontario released an Enhanced Surveillance Directive on June 28 to all public health units in Ontario for prompt reporting and investigation of cases and their possible exposures. No common exposures have been identified among cases. The most up to date guidance on laboratory testing for *Legionella* is available online.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6230md.htm
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6032a3.htm
http://www.teanecknj.gov/index.cfm?fuseaction=content.pageDetails&id=21181&typeID=271
http://www.portal.state.pa.us/portal/server.pt/community/health_alert_network/14217
http://dhss.delaware.gov/dhss/dph/php/alerts/dhan308.html

Enhanced Surveillance Directives (ESD) Discontinued in June

E. Coli

The Public Health Agency of Canada (PHAC) led an investigation along with provincial and federal partners to share epidemiological, microbiological and food safety information related to cases of *E. coli* O157:H7. Public Health Ontario (PHO) issued an Enhanced Surveillance Directive (ESD) on May 31, 2013 to assist with the timely collection of case information for the Ontario cases. Identified cases from across Canada were ultimately aggregated into three sub-clusters based on pulsed field gel electrophoresis (PFGE) and multiple-locus variable number tandem repeat analysis (MLVA) patterns. The first cluster included two cases from a single province, and the second cluster involved four cases from two provinces, including one case from Ontario. Investigations related to these two sub-clusters were not coordinated nationally, as cases were primarily from a single province and were closed on June 17. The sources of the clusters were not identified; however, a number of cases reported eating leafy greens from salad bars, boxed salad, other pre-packaged greens and fresh fruit. The third sub-cluster consisted of nine cases in three provinces, including four cases from Ontario. The source of the outbreak was not identified; however, exposures of interest included romaine lettuce, strawberries and ground beef. The outbreak was declared over on July 8, 2013 and PHO discontinued the ESD on July 12, 2013.

References

Infectious Disease in Focus – Measles

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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	4	11	1	13	7							**46**	3.4	11	0.8	-36	61	4.6	-27	114
Amebiasis	62	65	62	89	61	61							**400**	29.2	72	5.5	-18	401	30.3	-4	795
Botulism	0	0	0	0	0	0							**0**	0.0	0	0.0	-	2	0.1	-100	3
Brucellosis	0	1	0	1	0	1							**3**	0.2	1	0.0	61	2	0.2	32	4
Campylobacter Enteritis	153	200	244	215	302	390							**1,504**	109.9	371	28.1	2	1,437	108.6	1	3,561
Chlamydial Infections	3,144	2,754	2,869	3,115	2,824	2,699							**17,405**	1271.4	2,682	202.8	-3	15,951	1,205.8	5	32,294
Cholera	0	0	0	0	0	0							**0**	0.0	0	0.0	-	0	0.0	-100	1
Cryptosporidiosis	10	16	18	12	6	14							**76**	5.6	19	1.4	-28	103	7.8	-29	316
Cyclosporiasis	1	3	5	15	12	12							**48**	3.5	35	2.6	-67	78	5.9	-40	120
Cytomegalovirus Infection, Congenital	2	0	1	1	0	0							**4**	0.3	1	0.1	-100	4	0.3	7	6
Encephalitis	1	2	4	0	0	1							**8**	0.6	2	0.1	-40	9	0.7	-10	18
Encephalitis/Meningitis	4	14	8	7	7	17							**57**	4.2	13	1.0	23	61	4.6	-10	156
Food Poisoning, All Causes	6	2	4	4	4	0							**20**	1.5	5	0.3	-100	68	5.1	-71	123
Giardiasis	122	105	86	76	84	68							**541**	39.5	116	8.7	-43	672	50.8	-22	1,434
Gonorrhoea (All Types)	448	296	337	344	314	332							**2,071**	151.3	320	24.2	0	1,900	143.6	5	3,935
Group A Streptococcal Disease, Invasive	50	59	51	55	53	49							**317**	23.2	43	3.3	9	336	25.4	-9	565
Group B Streptococcal Disease, Neonatal	5	3	7	5	4	5							**29**	2.1	3	0.2	73	24	1.8	15	55
Haemophilus Influenzae B Disease, Invasive	2	0	0	0	1	1							**4**	0.3	0	0.0	383	3	0.2	49	4
Hepatitis A	16	6	8	5	15	9							**59**	4.3	9	0.7	-7	58	4.4	-1	120
Hepatitis B	7	10	8	7	7	7							**46**	3.4	9	0.7	-26	61	4.6	-27	122
Hepatitis C	326	284	351	361	380	299							**2,001**	146.2	408	30.9	-29	2,272	171.8	-15	4,442
Hepatitis D	0	0	0	0	0	1							**1**	0.1	0	0.0	383	2	0.1	-40	3
Herpes, Neonatal	0	0	0	0	0	0							**0**	0.0	0	0.0	-100	4	0.3	-100	7
HIV	50	40	54	62	64	64							**334**	24.4	72	5.4	-14	442	33.4	-27	860
Influenza	3,326	796	511	361	116	14							**5,124**	374.3	520	39.3	-97	4,031	304.7	23	6,843
Legionellosis	9	7	8	5	10	29							**68**	5.0	11	0.8	164	26	2.0	153	124
Leprosy	0	0	0	0	0	0							**0**	0.0	1	0.0	-100	2	0.1	-100	3
Listeriosis	0	1	1	1	1	1							**5**	0.4	7	0.5	-87	26	1.9	-81	62
Lyme Disease	1	0	3	3	14	25							**46**	3.4	26	2.0	-7	48	3.6	-7	124
Malaria	14	10	11	14	16	30							**95**	6.9	25	1.9	18	97	7.3	-6	214
Measles	1	1	5	1	0	4							**12**	0.9	1	0.1	287	15	1.1	-22	17
Meningitis	8	3	8	10	4	14							**47**	3.4	9	0.7	47	49	3.7	-8	117
Meningococcal Disease, Invasive	3	2	0	1	1	3							**10**	0.7	4	0.3	-19	26	2.0	-63	45
Mumps	2	1	1	2	2	0							**8**	0.6	14	1.0	-100	44	3.4	-83	130
Ophthalmia Neonatorum	0	2	0	0	0	0							**2**	0.1	0	0.0	-100	1	0.1	38	3
Paratyphoid Fever	2	8	9	6	1	1							**27**	2.0	4	0.3	-78	33	2.5	-20	52
Pertussis (Whooping Cough)	19	17	14	13	24	20							**107**	7.8	50	3.8	-61	258	19.5	-60	535
Q Fever	1	0	0	4	2	0							**7**	0.5	1	0.1	-100	4	0.3	54	11
Rabies	0	0	0	0	0	0							**0**	0.0	0	0.0	-	0	0.0	-100	0
Rubella	0	0	0	1	0	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	-	0
Salmonellosis	149	185	212	184	192	177							**1,099**	80.3	215	16.3	-20	1,245	94.1	-15	2,609
Shigellosis	21	22	28	23	26	14							**134**	9.8	22	1.6	-37	126	9.5	3	254
Streptococcus Pneumoniae, Invasive	141	100	94	117	79	61							**592**	43.2	69	5.2	-14	662	50.1	-14	1,212
Syphilis, Early Congenital	0	0	0	0	0	0							**0**	0.0	0	0.0	-	1	0.0	-100	1
Syphilis, Infectious	63	51	47	46	50	39							**296**	21.6	69	5.2	-46	367	27.7	-22	718
Syphilis, Other	56	43	42	44	37	29							**251**	18.3	81	6.1	-65	453	34.2	-46	881
Tetanus	1	1	0	0	0	0							**2**	0.1	0	0.0	-100	1	0.1	142	1
Tuberculosis	39	45	47	63	46	30							**270**	19.7	55	4.2	-48	321	24.2	-19	636
Tularemia	0	0	0	0	0	0							**0**	0.0	0	0.0	-100	0	0.0	-100	1
Typhoid Fever	7	8	7	5	4	1							**32**	2.3	4	0.3	-77	50	3.8	-38	90
Verotoxin Producing E. Coli Including HUS	15	2	8	19	9	10							**63**	4.6	21	1.6	-54	61	4.6	-1	208
West Nile Virus Illness	0	0	0	0	0	0							**0**	0.0	1	0.1	-100	2	0.1	-100	74
Yellow Fever	0	0	0	0	0	0							**0**	0.0	0	0.0	-	0	0.0	-100	0
Yersiniosis	15	17	12	22	15	10							**91**	6.6	18	1.4	-47	116	8.8	-24	216

Ontario Cases: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted [2013/07/24].

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 rubella case in April 2013 was related to travel and was not acquired in Ontario. Although importation status was unknown for 10 of 12 measles cases between January and June 2013, it is important to note that for all cases, documentation indicates that investigation for a source occurred despite the lack of identification.
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.