

October 2015

Monthly Infectious Diseases Surveillance Report

Volume 4, Issue 10

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: cdepr@oahpp.ca. Past issues and additional information are available [online](#).

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IN FOCUS

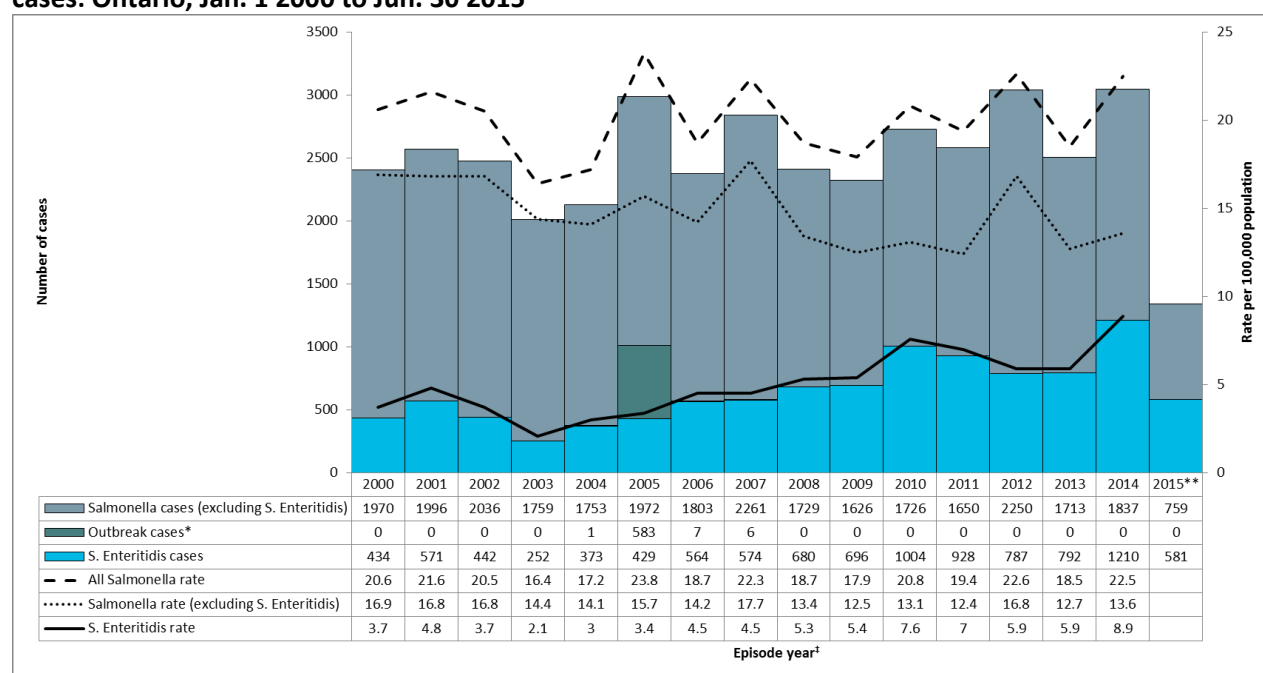
Nuggets of wisdom: Trends in *Salmonella* and outbreaks associated with frozen, processed chicken products

Trends in *Salmonella*

Salmonella is the second most frequently reported enteric pathogen, accounting for a large burden of disease in the Ontario population. In 2014, 3,047 *Salmonella* cases were reported, corresponding to an incidence rate of 22.5 cases per 100,000 population. It is estimated that for each case of *Salmonella* reported to public health, 13 to 37 cases go unreported.¹

Since 2000, the incidence rates of *Salmonella* in Ontario have fluctuated, from a low of 16.4 cases per 100,000 population (2,011 cases) in 2003 to a high of 23.8 cases per 100,000 population (2,984 cases) in 2005 (Figure 1). In contrast, the incidence rate for *S. Enteritidis* has increased consistently over the same period. The incidence rate for *S. Enteritidis* has more than doubled from 2000 to 2014 going from 3.7 cases per 100,000 (434 cases) in 2000 to 8.9 cases per 100,000 population (1,210 cases) in 2014. In the first six months of 2015, 581 *S. Enteritidis* cases were reported suggesting a continued increasing trend. The sustained upward trend of *S. Enteritidis* incidence rates over the last 15 years makes *S. Enteritidis* notably different than most other reportable enteric pathogens where declines over similar timeframes have been observed². Furthermore, the increasing trend in the incidence rate for *S. Enteritidis* appears to be occurring largely among non-travel cases. The incidence rate for non-travel *S. Enteritidis* cases increased from 4.6 cases per 100,000 (479 cases) in 2012 to 5.8 cases per 100,000 (779 cases) in 2014, while a lesser increase was observed among travel-related *S. Enteritidis* cases (Figure 2). Analysis of risk factor information, including travel status, is limited to cases with episode dates on or after January 1, 2011, following the addition of those risk factors in iPHIS.

Figure 1. Reported number and incidence rate (per 100,000 population) of confirmed *Salmonella* cases: Ontario, Jan. 1 2000 to Jun. 30 2015



Data sources:

Ontario cases: Ontario Ministry of Health and Long-Term Care (MOHLTC), integrated Public Health Information System (iPHIS) database, extracted by Public Health Ontario (PHO) [2015/08/27].

Ontario population [2005-2013]: Population Estimates 1986-2013, MOHLTC, IntelliHEALTH Ontario, extracted [2015/05/22]. Population estimates for 2013 were used to calculate rates for 2014.

Notes:

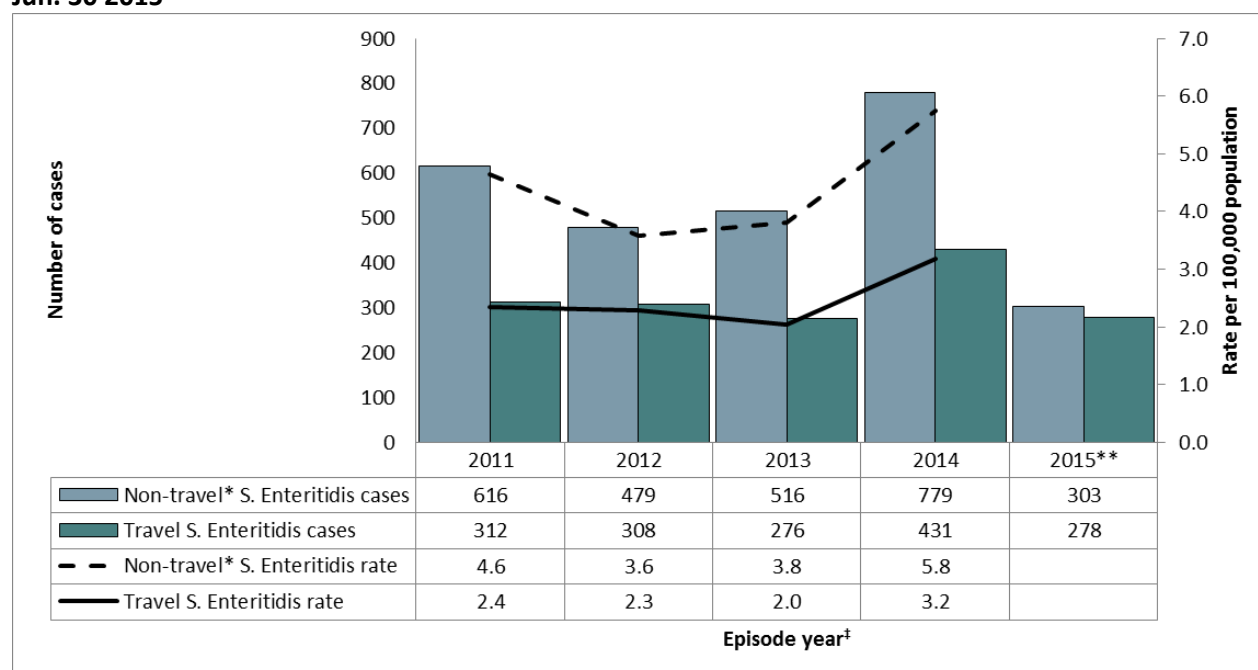
* Only one *Salmonella* outbreak has been shown in Figure 1, as this outbreak was large and substantially impacted the total number of reported *Salmonella* cases for 2005. This is in contrast to other *Salmonella* outbreaks where the outbreak impacted the serotype-specific number of reported cases, but had less of an impact on the total number of *Salmonella* cases reported. It should be noted that the majority of cases linked to the 2005 outbreak

shown in Figure 1 were *S. Enteritidis* (570 cases), however, a small proportion (27 cases) were other/unspecified *Salmonella* serotypes.

** Incomplete year. Includes cases with episode dates on or before June 30, 2015.

† Episode date is an estimate of the onset date of disease for a case. In order to determine this date, the following hierarchy is in place in iPHIS: Onset Date > Specimen Collection Date > Lab Test Date > Reported Date. If an onset date exists, it will be used as the episode date. If not available, then the next available date in the hierarchy will be used.

Figure 2. Reported number of confirmed *S. Enteritidis* cases by travel status: Ontario, Jan. 1 2011[†] to Jun. 30 2015



Data sources:

Ontario cases: Ontario Ministry of Health and Long-Term Care (MOHLTC), integrated Public Health Information System (iPHIS) database, extracted by Public Health Ontario (PHO) [2015/08/27].

Ontario population [2005-2013]: Population Estimates 1986-2013, MOHLTC, IntelliHEALTH Ontario, extracted [2015/05/22]. Population estimates for 2013 were used to calculate rates for 2014.

Notes:

* Non-travel cases were defined as those for which travel outside of Ontario was not reported as a risk factor, and includes cases where risk factor information was reported as unknown or was missing. As a result, the number of non-travel cases may be an overestimate.

† Risk factors were added in iPHIS in January 2011. However, reporting of risk factor information in iPHIS likely varied across public health units (PHUs) in the period immediately following their availability. Furthermore, Enhanced Surveillance Directives (ESDs) issued in 2014 and 2015 for *Salmonella* outbreak investigations may have resulted in increased awareness and reporting of risk factors for *Salmonella* cases. As a result, trends in risk factors over time should be interpreted with caution.

** Incomplete year. Includes cases with episode dates on or before June 30, 2015.

† Episode date is an estimate of the onset date of disease for a case. In order to determine this date, the following hierarchy is in place in iPHIS: Onset Date > Specimen Collection Date > Lab Test Date > Reported Date. If an onset date exists, it will be used as the episode date. If not available, then the next available date in the hierarchy will be used.

***Salmonella* and frozen processed chicken**

Raw, frozen, processed chicken products that are often breaded, such as nuggets, strips, and burgers, are an important risk factor for *Salmonella* infection. Since 2012, an increasing number of non-travel *Salmonella* cases have reported consumption of frozen, processed chicken products (Table 1). In 2012, 97 non-travel *Salmonella* cases (4.1% of all non-travel *Salmonella* cases) reported consumption of frozen, processed chicken products and in 2014; this increased to 187 non-travel *Salmonella* cases (8.5% of all non-travel *Salmonella* cases). In the first six months of 2015, 117 non-travel *Salmonella* cases (13.7% of non-travel *Salmonella* cases) reported consuming frozen, processed chicken products, suggesting a continued increasing trend.

The proportion of cases reporting frozen, processed chicken by *Salmonella* serotype is shown in Figure 3. Since 2012, the proportion of non-travel cases reporting frozen, processed chicken increased for *S. Enteritidis*, *S. Heidelberg*, *S. Typhimurium*, and *S. Thompson*. The increase, however, was greatest and most consistent for *S. Enteritidis*. From 2012 to 2014, the number of non-travel *S. Enteritidis* cases reporting consumption of frozen, processed chicken increased from 32 cases (6.7% of all non-travel *S. Enteritidis* cases) to 108 cases (13.9% of non-travel *S. Enteritidis* cases), respectively (Table 2, Figure 3). In the first six months of 2015, 64 non-travel *S. Enteritidis* cases (21.1% of non-travel *S. Enteritidis* cases) reported consumption of frozen, processed chicken products, suggesting a continued increase in reporting of that risk factor. The increase in the proportion of non-travel *S. Heidelberg* cases reporting consumption of frozen, processed chicken products was also notable; however, the number of cases was low compared to *S. Enteritidis*. Eighteen cases of *S. Heidelberg* reported frozen, processed chicken in 2012 (4.1% of non-travel *S. Heidelberg* cases), increasing to 19 cases in 2014 (7.7% of non-travel *S. Heidelberg* cases). In the first six months of 2015, 10 non-travel cases of *S. Heidelberg* reported consumption of frozen, processed chicken (14.5% of non-travel *S. Heidelberg* cases).

Table 1. Number of confirmed non-travel (NT)* *Salmonella* cases reporting frozen processed chicken (FPC) by serotype and year: Ontario, Jan. 1 2011† to Jun. 30 2015

Serotype	2011		2012		2013		2014		2015**		Total	
	NT cases reporting FPC/ Total NT cases	%	NT cases reporting FPC/ Total NT cases	%	NT cases reporting FPC/ Total NT cases	%	NT cases reporting FPC/ Total NT cases	%	NT cases reporting FPC/ Total NT cases	%	NT cases reporting FPC/ Total NT cases	%
S. Enteritidis	31/616	5.0	32/479	6.7	57/516	11.0	108/779	13.9	64/303	21.1	292/2693	10.8
S. Heidelberg	15/262	5.7	18/438	4.1	24/305	7.9	19/246	7.7	10/69	14.5	86/1320	6.5
S. Typhimurium	15/275	5.5	15/436	3.4	13/283	4.6	11/251	4.4	9/98	9.2	63/1343	4.7
S. Thompson	5/77	6.5	2/148	1.4	4/71	5.6	14/200	7.0	6/65	9.2	31/561	5.5
Other serotypes†	34/737	4.6	30/864	3.5	26/704	3.7	35/724	4.8	28/317	8.8	153/3346	4.6
Total	100/1967	5.1	97/2365	4.1	124/1879	6.6	187/2200	8.5	117/852	13.7	625/9263	6.7

Data source:

Ontario Ministry of Health and Long-Term Care (MOHLTC), integrated Public Health Information System (iPHIS) database, extracted by Public Health Ontario (PHO) [2015/08/27].

Notes:

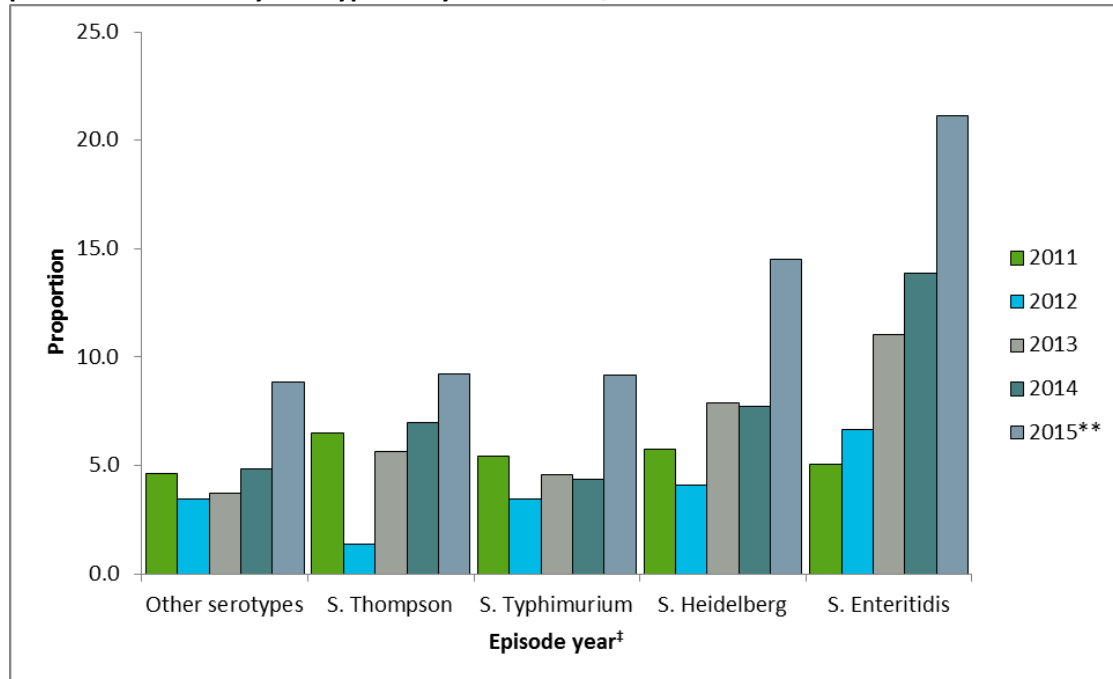
*Non-travel cases were defined as those for which travel outside of Ontario was not reported as a risk factor, and includes cases where risk factor information was reported as unknown or was missing. As a result, the number of non-travel cases may be an overestimate.

†Risk factors were added in iPHIS in January 2011. However, reporting of risk factor information in iPHIS likely varied across PHUs in the period immediately following their availability. Furthermore, ESDs issued in 2014 and 2015 for *Salmonella* outbreak investigations may have resulted in increased awareness and reporting of risk factors for *Salmonella* cases. As a result, trends in risk factors over time should be interpreted with caution.

** Incomplete year. Includes cases with episode dates on or before June 30, 2015.

†All *Salmonella* serotypes in the “other” category were serotypes for which frozen processed chicken consumption was reported as a risk factor, but less than 10 cases per year with that serotype reported FPC.

Figure 3. Proportion of confirmed non-travel* *Salmonella* cases reporting consumption of frozen processed chicken by serotype and year: Ontario, Jan. 1 2011[†] to Jun. 30 2015



Data source:

Ontario Ministry of Health and Long-Term Care (MOHLTC), integrated Public Health Information System (iPHIS) database, extracted by Public Health Ontario (PHO) [2015/08/27].

Notes:

*Non-travel cases were defined as those for which travel outside of Ontario was not reported as a risk factor, and includes cases where risk factor information was reported as unknown or was missing. As a result, the number of non-travel cases may be an overestimate.

**Incomplete year. Includes cases with episode dates on or before June 30, 2015.

[†]Risk factors were added in iPHIS in January 2011. However, reporting of risk factor information in iPHIS likely varied across PHUs in the period immediately following their availability. Furthermore, ESDs issued in 2014 and 2015 for *Salmonella* outbreak investigations may have resulted in increased awareness and reporting of risk factors for *Salmonella* cases. As a result, trends in risk factors over time should be interpreted with caution.

[‡]Episode date is an estimate of the onset date of disease for a case. In order to determine this date, the following hierarchy is in place in iPHIS: Onset Date > Specimen Collection Date > Lab Test Date > Reported Date. If an onset date exists, it will be used as the episode date. If not available, then the next available date in the hierarchy will be used.

***Salmonella* outbreaks linked to frozen processed chicken**

In addition to the observed increasing trend in the number of non-travel *Salmonella* cases reporting consumption of frozen, processed chicken products, a number of *Salmonella* outbreaks have been linked to frozen, processed chicken products. In a 2014 Ontario *S. Enteritidis* investigation, frozen, processed chicken consumption among outbreak-confirmed cases was above expected compared to the general Ontario population (44.9% versus 18.5%, respectively). Three of 11 frozen, processed chicken samples submitted by cases were a match to the case by phage type (PT) and pulsed-field gel electrophoresis (PFGE); a fourth sample was positive for *S. Enteritidis*, but did not match the case by PT

or PFGE. All four positive *S. Enteritidis* samples were produced at the same federally-registered establishment.

In 2015, a national *S. Enteritidis* outbreak investigation linked a total of 51 cases across four provinces (Ontario 35 cases, Quebec 12 cases, Nova Scotia two cases, and Newfoundland two cases) to frozen, processed chicken products. Three food samples submitted by cases were a PFGE match to the outbreak cases and were produced on one specific production date at the same federally-registered establishment implicated in the 2014 outbreak. Five retention or retail samples produced by the establishment on that same date were also a PFGE match to outbreak cases. The investigation led to a [voluntary food recall warning](#) of select frozen, processed chicken products. Furthermore, the food safety investigation revealed that different types of processed chicken products (i.e. nuggets, strips, and burgers) as well as different brand names can all be produced from the same source chicken, using the same processing line in the same facility on the same day.

Evidence from the 2014 and 2015 investigations implicating frozen, processed chicken products as a risk factor for *Salmonella* infection are consistent with findings elsewhere. A 2011 study in Ontario found that among individuals who consumed any poultry meat, the odds of *S. Enteritidis* was 3.3 (95%CI 1.3-8.8) times higher among individuals who consumed processed chicken compared to those who did not.³ Similarly, a study in British Columbia and another study in Canada found that consumption of frozen, processed chicken nuggets and/or strips was significantly associated with *S. Heidelberg* (mOR 11.0, 95%CI 1.4-85.2; mOR 4.0, 95%CI 1.4-13.8, respectively).^{4,5} Outbreaks in the US have also been linked to frozen, processed chicken products, which have also resulted in voluntary recalls.

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SIGNIFICANT REPORTABLE DISEASE ACTIVITY

Table 1 provides a list of reportable diseases for which incidence in 2015 was found to be significantly higher ($p < 0.05$) than expected compared to the five-year historical average (2010-2014). Both monthly and year-to-month (YTM) comparisons were made for each of the reportable diseases listed in [Appendix 1](#), with the exception of influenza, measles, rubella, and congenital rubella syndrome. Influenza surveillance data are regularly reported through the [Ontario Respiratory Virus Bulletin](#) and the [Laboratory-based Respiratory Pathogen Surveillance Report](#). Measles, rubella, and congenital rubella syndrome have been eliminated in Canada, although cases continue to occur related to travel importations. Statistical comparisons are no longer included for these diseases.

Table 1. Summary of statistically significant increases in reportable disease incidence: Ontario, January 1 to August 31, 2015

Reportable disease	2015				Historical comparisons						5-year avg annual count (2010-2014)
	Aug	Aug rate ‡	YTM	YTM rate ‡	Current month 5-year avg (2010-2014)	Current month 5-year avg (2010-2014) rate ‡	% difference in rates (current month minus 5-year avg)†	YTM 5-year avg (2010-2014)	YTM 5-year avg (2010-2014) rate ‡	% difference in rates (YTM 2015 minus YTM 5-year avg)†	
Chlamydial Infections ¹	3174	226.7	24991	1784.7	2982	221.9	2.1	23482	1747.3	2.1	35430
Cyclosporiasis ^{1,2}	23	1.6	221	15.8	5	0.4	308.8	100	7.4	112.5	117
Encephalitis/Meningitis ¹	24	1.7	126	9.0	21	1.6	9.7	91	6.8	32.3	148
Gonorrhoea (All Types) ^{1,2}	503	35.9	3846	274.7	394	29.3	22.6	2932	218.2	25.9	4531
Lyme Disease ¹	20	1.4	235	16.8	29	2.1	-33.4	152	11.3	48.0	186
Pertussis (Whooping Cough) ¹	26	1.9	474	33.8	58	4.3	-57.3	261	19.4	74.6	402

Ontario Cases: MOHLTC, iPHIS database, extracted by PHO [2015/09/16].

Ontario Population: Population Estimates [2010-2013]: Statistics Canada, distributed by MOHLTC, received [2014/07/03]. Population Projections [2014-2015]: MOHLTC, IntelliHEALTH Ontario, extracted by PHO [2014/04/11].

‡ 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.

¹ Statistically significant difference ($p < 0.05$) in incidence reported in year-to-month (January 1 to August 31, 2015) compared to the five-year historical average (January 1 to August 31, 2010-2014), using a likelihood ratio test.

² Statistically significant difference ($p < 0.05$) in incidence reported in current month (August 2015) compared to the five-year historical average (August 2010-2014), using a likelihood ratio test.

Chlamydia

There was a statistically significant increase of 2.1% in the monthly incidence of laboratory-confirmed chlamydial infections reported in August 2015 (226.7 cases per 1,000,000 population) compared to the five-year (2010-2014) monthly historical average (221.9 cases per 1,000,000). This is the second consecutive significant monthly increase in chlamydial infections reported. Over the past ten years, the incidence of laboratory-confirmed chlamydial infections has increased with the exception of 2013, where a decrease in the incidence and testing was observed. For further details about this decrease please refer to the [Reportable Disease Trends in Ontario, 2013](#). The increase noted this month may be a

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continuation of the increase in incidence observed over the past ten years. PHO will continue to monitor the number of chlamydia infections in subsequent months.

Cyclosporiasis

Statistically significant increases in both the monthly and YTM incidence rates of cyclosporiasis were observed in August 2015, with 23 cases reported in August compared to an expected five-year average of five cases. On average, a total of three non-travel related cases of cyclosporiasis are expected in Ontario for the month of August. Because cyclosporiasis is not endemic in Canada, its occurrence is most frequently associated with travel to endemic countries in tropical and subtropical regions of the world, or with consumption of contaminated food imported from these countries. The increase in Ontario in August was due largely to travel, specifically to resort stays in Mexico. Of 14 cases reported in August with data on exposures, 71.4% (10/14) reported travel to Mexico. Of the four cases not associated with travel, two were included in a national investigation into an increase in the incidence of non-travel related cyclosporiasis. The source of this increase has not been identified; however, past outbreaks in the United States and Canada have been associated with imported fresh produce including berries, cilantro, basil, snow peas and mesclun lettuce.

Encephalitis/Meningitis

There was a statistically significant increase in the incidence of encephalitis/meningitis from January 1 to August 31, 2015, compared to the historical five-year average for the same period. An increase from a five-year average of 6.8 cases per 100,000 population to 9.0 cases per 100,000 population in 2015 was observed, representing an increase of 32.2%. The increase was mainly observed in children under the age of five in July and August. Some of the increase is related to enterovirus, specifically in Hamilton. Public Health Ontario will continue to monitor the data available.

Gonorrhea

Compared to the five-year historical averages, there were statistically significant increases in both the monthly and YTM incidence rates of gonorrhea reported in August 2015 and cumulatively from January 1 to August 31, 2015 (22.6% and 25.9%, respectively).

With the exception of January 2015, Ontario has experienced a statistically significant increase in the monthly and YTM incidence of gonorrhea, compared to five-year historical averages, since September 2013. The cause of this ongoing provincial increase in reported gonorrhea cases is not yet well understood and is likely multifactorial. For a summary of the analyses conducted to date, please refer to the Infectious Disease In Focus section of the [February 2015](#) issue of this report. Also, to download the slides and/or audio recording of a recent PHO Rounds presentation on gonorrhea (May 2015), please click [here](#).

Lyme disease

The YTM incidence rate of Lyme disease was significantly higher in 2015 for the period January to August. A total of 235 Lyme disease cases were reported in 2015 through to the end of August compared to the five-year expected average for this period of 152 cases (representing 16.8 and 11.3 cases per million, respectively). The number of Lyme disease cases reported in 2015 to date (235) is higher than the number of cases reported in all of 2014 (220), but lower than the number of cases reported in 2013 (334). The number of cases reported in August 2015 (20 cases) is consistent with the expected decrease in case counts toward the end of the season. Annually, the incidence of Lyme disease peaks in June and July, and this is consistent with trends in other Lyme disease-endemic regions in the United States and Canada. The occurrence of Lyme disease in the summer coincides with both greater participation in outdoor activities and increased presence of infectious nymphal ticks in the environment, both of which increase the opportunity for exposure to Lyme disease.

Pertussis

A statistically significant increase in the YTM incidence of pertussis in Ontario, in comparison to the corresponding historical YTM five-year average, has been noted since May 2015, as identified in the [July 2015](#) issue of this report. The [July 2015](#) and [August 2015](#) issues provide an explanation for this observed increase in pertussis incidence 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.

Current high profile infectious disease activity in other jurisdictions has been described in recent issues of this report. Please refer to the [August 2014](#) issue for a review of the ebola outbreak in West Africa, and the [October 2014](#) issue for a review of enterovirus D68.

RECENTLY DISCONTINUED ENHANCED SURVEILLANCE DIRECTIVES

Pan Am/Parapan Am Games

The TORONTO2015 Pan Am Games took place from July 10 to 26, 2015 (with events starting on July 7), followed by the Parapan Am Games from August 7 to 15, 2015. In collaboration with the Ministry of Health and Long-Term Care and local, provincial, and federal public health partners, PHO issued an ESD that ran from June 5 to August 27, 2015. This ESD communicated the requirements for enhanced surveillance of infectious diseases for all PHUs before, during, and after the Games. PHO is producing a final summary of the enhanced infectious disease surveillance observations during the Pan Am and Parapan Am Games that will be shared with our public health partners once complete.

***Salmonella* Reading**

An Ontario-led Outbreak Investigation Coordinating Committee (OICC) was activated on February 4, 2015, followed by a national OICC on February 13 led by the Public Health Agency of Canada (PHAC). Both OICCs were established to investigate an increase in the incidence of *S. Reading* cases with matching or closely related pulsed-field gel electrophoresis (PFGE) pattern combinations. PHO issued an ESD on February 6, 2015. Over the course of the outbreak, three provinces reported a total of 31 confirmed cases and three probable cases, including 23 confirmed cases and one probable case from Ontario. Onset dates for all cases ranged from November 2014 to July 2015. The source of the outbreak was not identified but was hypothesized to be a shelf-stable food item frequently consumed as a part of Eastern Mediterranean cuisine. The national OICC was deactivated on June 4, 2015 and the ESD was discontinued on September 4, 2015. The outbreak was declared over on September 11, 2015 following a return to the expected baseline of zero cases for the outbreak PFGE pattern combinations.

Cyclosporiasis

On June 30, 2015 PHAC issued a [public health alert](#) regarding an increase in non-travel cyclosporiasis cases and on July 16, 2015 an OICC was established by provincial and federal partners to further

investigate the increase. PHO issued an ESD on July 17, 2015 to assist with the timely collection of information for Ontario cases. A total of 97 outbreak-confirmed cases were reported from four different provinces: Ontario (84 cases), Quebec (seven cases), British Columbia (five cases), and Alberta (one case). Onset dates ranged from May 3 to August 8, 2015. The source of the outbreak was not identified. The ESD was discontinued on September 4, 2015. The outbreak was declared over on September 30, 2015, and the OICC was deactivated on the same date.

Appendix – Reportable Diseases

Appendix 1. Confirmed cases of reportable diseases, and probable cases of select reportable diseases, by month: Ontario, 2010-2015*

Reportable disease	2015														Historical comparisons							5-year avg (2010-2014) annual count
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTM	YTM rate †	Current month 5-year avg (2010-2014)	Current month 5-year avg (2010-2014) rate †	% difference rates (current month minus 5-year avg)†	YTM 5-year avg (2010-2014)	YTM 5-year avg (2010-2014) rate †	% difference rates (YTM 2015 minus YTM 5-year avg)†		
Acute Flaccid Paralysis	0	0	0	0	1	0	0	0	-	-	-	-	1	0.1	n/a	n/a	n/a	n/a	n/a	n/a		
AIDS	3	6	4	3	5	2	9	2	-	-	-	-	34	2.4	7.6	0.6	-74.7	70	5.2	-53.4		
Amebiasis	56	62	64	81	64	57	73	74	-	-	-	-	531	37.9	67.2	5.0	5.7	556	41.4	-8.3		
Botulism	0	0	1	0	0	0	2	0	-	-	-	-	3	0.2	0.4	0.0	-100.0	1.2	0.1	139.9		
Brucellosis	0	0	0	1	0	1	1	0	-	-	-	-	3	0.2	0.6	0.0	-100.0	4.2	0.3	-31.5		
Campylobacter enteritis	184	173	221	194	228	296	428	407	-	-	-	-	2131	152.2	493.8	36.7	-20.9	2487.6	185.1	-17.8		
Chlamydial Infections	3227	2921	3187	3124	2946	3195	3217	3174	-	-	-	-	24991	1784.7	2982.2	221.9	2.1	23481.6	1747.3	2.1		
Cholera	0	0	0	0	0	0	0	0	1	-	-	-	1	0.1	0	0.0	-	0	0.0	-		
Cryptosporidiosis	18	15	25	14	17	20	56	59	-	-	-	-	224	16.0	76.6	5.7	-26.1	229.2	17.1	-6.2		
Cyclosporiasis	1	5	7	7	31	91	56	23	-	-	-	-	221	15.8	5.4	0.4	308.8	99.8	7.4	112.5		
Encephalitis	2	3	0	1	3	2	1	1	-	-	-	-	13	0.9	1.8	0.1	-46.7	12.2	0.9	2.3		
Encephalitis/Meningitis	12	13	12	13	5	18	29	24	-	-	-	-	126	9.0	21	1.6	9.7	91.4	6.8	32.3		
Food Poisoning, All Causes	8	0	6	2	3	2	2	0	-	-	-	-	23	1.6	32.2	2.4	-100.0	67.6	5.0	-67.3		
Giardiasis	105	104	127	107	68	83	134	123	-	-	-	-	851	60.8	158.2	11.8	-25.4	904.6	67.3	-9.7		
Gonorrhoea (All Types)	476	435	477	413	472	510	560	503	-	-	-	-	3846	274.7	393.8	29.3	22.6	2932.4	218.2	25.9		
Group A Streptococcal Disease, Invasive	77	42	62	53	60	48	40	38	-	-	-	-	420	30.0	36.6	2.7	-0.4	452.6	33.7	-10.9		
Group B Streptococcal Disease, Neonatal	1	2	3	3	6	2	4	1	-	-	-	-	22	1.6	5.2	0.4	-81.5	35.6	2.6	-40.7		
Haemophilus Influenzae B Disease, Invasive	0	1	0	0	3	1	2	0	-	-	-	-	7	0.5	0	0.0	-	3	0.2	123.9		
Hepatitis A	11	3	10	12	1	5	5	3	-	-	-	-	50	3.6	10.8	0.8	-73.3	68.4	5.1	-29.8		
Hepatitis B (Acute)	6	5	5	6	8	4	7	6	-	-	-	-	47	3.4	6.6	0.5	-12.8	73.6	5.5	-38.7		
Hepatitis B (Chronic)	141	107	131	119	106	118	92	52	-	-	-	-	866	61.8	n/a	n/a	n/a	n/a	n/a	n/a		
Hepatitis C	351	330	385	340	369	346	403	311	-	-	-	-	2835	202.5	357.8	26.6	-16.6	2871	213.6	-5.2		
HIV	56	55	70	67	53	59	54	53	-	-	-	-	467	33.3	64	4.8	-20.5	527.4	39.2	-15.0		
Influenza	4884	2181	1310	810	221	44	21	8	-	-	-	-	9479	676.9	4	0.3	91.9	4225.8	314.4	115.3		
Legionellosis	7	2	4	6	10	13	16	16	-	-	-	-	74	5.3	38.2	2.8	-59.8	102.6	7.6	-30.8		
Leprosy	1	0	1	0	0	0	0	0	-	-	-	-	2	0.1	0.2	0.0	-100.0	2.4	0.2	-20.0		
Listeriosis	3	2	2	2	6	4	11	7	-	-	-	-	37	2.6	8.4	0.6	-20.0	35	2.6	1.5		
Lyme Disease	3	3	0	7	24	95	83	20	-	-	-	-	235	16.8	28.8	2.1	-33.4	152.4	11.3	48.0		
Malaria	12	2	8	9	17	22	21	19	-	-	-	-	110	7.9	27.6	2.1	-33.9	158.2	11.8	-33.3		
Measles	8	10	1	0	1	0	0	0	-	-	-	-	20	1.4	#	#	#	#	#	#		
Meningitis	4	3	7	6	10	25	12	10	-	-	-	-	77	5.5	14.4	1.1	-33.4	76.2	5.7	-3.0		
Meningococcal Disease, Invasive	5	3	1	4	3	3	3	1	-	-	-	-	23	1.6	1.6	0.1	-40.0	20.8	1.5	6.1		
Mumps	3	1	3	2	11	8	0	1	-	-	-	-	29	2.1	6.8	0.5	-85.9	37.8	2.8	-26.4		
Ophthalmia neonatorum	1	0	1	0	0	0	0	0	-	-	-	-	2	0.1	0.2	0.0	-100.0	1.8	0.1	6.6		
Paralytic Shellfish Poisoning	0	0	0	0	0	0	0	0	-	-	-	-	0	0.0	n/a	n/a	n/a	n/a	n/a	n/a		
Paratyphoid Fever	6	2	10	3	4	0	2	8	-	-	-	-	35	2.5	5	0.4	53.5	34	2.5	-1.2		
Pertussis (Whooping Cough)	16	19	29	27	89	176	92	26	-	-	-	-	474	33.8	58.4	4.3	-57.3	260.6	19.4	74.6		
Q Fever	1	0	3	2	0	1	1	0	-	-	-	-	8	0.6	2.2	0.2	-100.0	9.8	0.7	-21.7		
Rabies	0	0	0	0	0	0	0	0	-	-	-	-	0	0.0	0	0.0	-	0.2	0.0	-100.0		
Rubella	0	0	0	0	0	0	0	0	-	-	-	-	0	0.0	#	#	#	#	#	#		
Rubella, Congenital Syndrome	0	0	0	0	0	0	0	0	-	-	-	-	0	0.0	#	#	#	#	#	#		
Salmonellosis	185	186	249	245	267	214	248	289	-	-	-	-	1883	134.5	332	24.7	-16.5	1970.2	146.6	-8.3		
Shigellosis	18	19	16	19	14	11	15	29	-	-	-	-	141	10.1	24.6	1.8	13.1	188.6	14.0	-28.3		
Streptococcus Pneumoniae, Invasive	103	82	113	117	71	72	49	36	-	-	-	-	643	45.9	43.8	3.3	-21.1	740.8	55.1	-16.7		
Syphilis, Early Congenital	0	0	0	0	1	1	0	1	-	-	-	-	3	0.2	0	0.0	-	0.8	0.1	259.9		
Syphilis, Infectious	67	72	73	106	75	84	66	27	-	-	-	-	570	40.7	66.6	5.0	-61.1	532.6	39.6	2.7		
Syphilis, Other	47	43	54	44	43	50	40	32	-	-	-	-	353	25.2	48.2	3.6	-36.3	468.8	34.9	-27.7		
Tetanus	0	0	0	0	1	0	0	0	-	-	-	-	1	0.1	0.2	0.0	-100.0	1.6	0.1	-40.0		
Tuberculosis	41	30	54	53	51	54	54	33	-	-	-	-	370	26.4	59	4.4	-46.3	431.2	32.1	-17.7		
Tularemia	0	0	0	0	0	0	0	0	-	-	-	-	0	0.0	0	0.0	-	0.4	0.0	-100.0		
Typhoid Fever	5	3	3	9	4	4	5	3	-	-	-	-	36	2.6	8	0.6	-64.0	58.2	4.3	-40.6		
Verotoxin Producing E. coli including HUS	6	6	6	10	11	19	22	35	-	-	-	-	115	8.2	31.4	2.3	7.0	126	9.4	-12.4		
West Nile Virus Illness	0	0	0	0	0	2	1	13	-	-	-	-	16	1.1	46.4	3.5	-73.1	59.4	4.4	-74.1		
Yellow Fever	0	0	0	0	1	0	0	0	-	-	-	-	1	0.1	0.2	0.0	-100.0	1	0.1	-4.0		
Yersiniosis	14	11	15	15	15	14	17	22	-	-	-	-	123	8.8	21.6	1.6	-2.3	133.4	9.9	-11.5		

Ontario Cases: MOHLTC, iPHIS database, extracted by PHO[2015/09/16].

Ontario Population: Population Estimates [2010-2013]: Statistics Canada, distributed by Ministry of Health and Long-Term Care, received [2014/07/03]. Population Projections [2014-2015]: Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario, extracted by PHO [2014/04/11].

Column or row-specific notes:

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

Historical comparison data are not provided for measles, rubella, and congenital rubella syndrome because these diseases have been eliminated in Canada. However, as these diseases remain endemic in other countries, imported and import-related cases continue to occur in Ontario.

n/a Acute Flaccid Paralysis and Paralytic Shellfish Poisoning became reportable in Ontario in December 2013. No historical data are available for comparisons. Also, a provincial case definition for chronic hepatitis B was released in January 2012. Please note that chronic and acute hepatitis B case counts are not mutually exclusive and should not be added to obtain a total for hepatitis B cases in Ontario. Historical comparisons are not available as cases of chronic hepatitis B may have been entered using varying criteria prior to this time.

- Does not include cases for 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."
- Differentials in year over year comparisons are reflective of changes in disease incidence and changes in the size of the population.
- Statistical tests comparing rates were not performed when the YTM rate in previous years was zero.
- Case counts for tuberculosis and AIDS are based on diagnosis date and not episode date. HIV case counts are based on encounter date. Case counts for all other diseases are based on episode date.