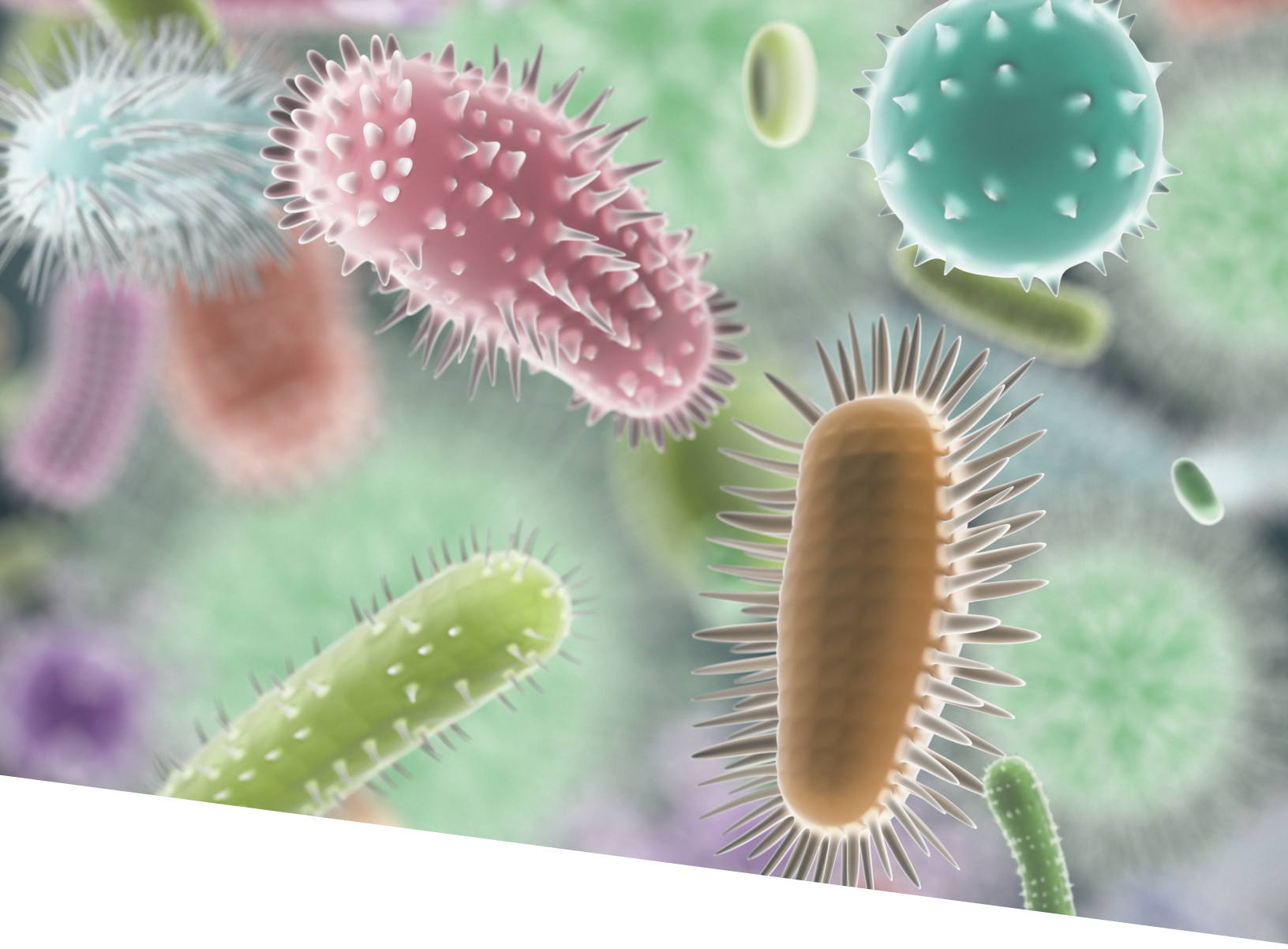

REPORTABLE DISEASES IN YORK REGION

2016 ANNUAL REPORT

York Region

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INTRODUCTION

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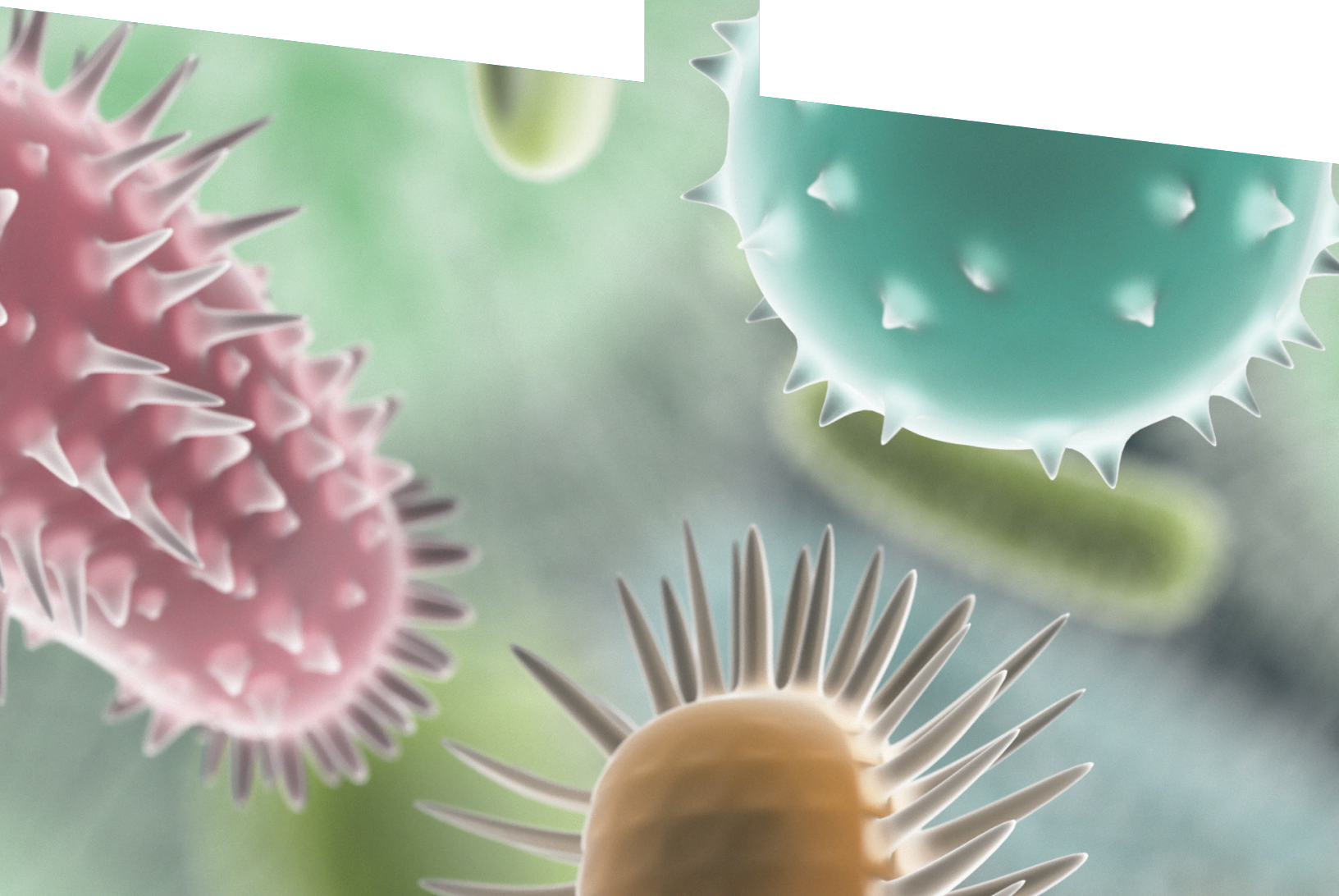

1 INTRODUCTION

The *2016 Annual Reportable Diseases* report provides a summary of reportable disease data in York Region for 2016. This report is a resource for York Region residents, public health practitioners and health professionals involved in the management and control of infectious diseases. This report is an update of the last report, *Reportable Diseases in York Region, 2000 to 2015,* released in 2017. This report contains a summary of descriptive epidemiology for reportable diseases for a 10 year period between 2007 and 2016, including relevant comparisons to provincial data where available. There were no significant global events impacting York Region in 2016. The information in the report is summarized in chapters by disease category. Data within the report are presented for diseases designated as reportable under Regulation 559/51 of the *Health Protection and Promotion Act*, R.S.O 1990 in 2016. As of May 1, 2018, reportable diseases are referred to as diseases of public health significance. As a health unit, York Region Public Health is responsible for controlling the spread of these diseases.

The data presented in this report represent the most current disease counts and rates in York Region and they supersede all previously reported statistics. The data within the report reflect disease case counts in York Region as of December 2017 for select diseases and January 2018 for the remaining diseases. A detailed description of the methodology and data sources used in this report is included in Chapter 8: Technical notes. Of note, where age groups are not mentioned, reference to children, adults and seniors have been described using broad age ranges described in section 8.5 of the Technical notes.

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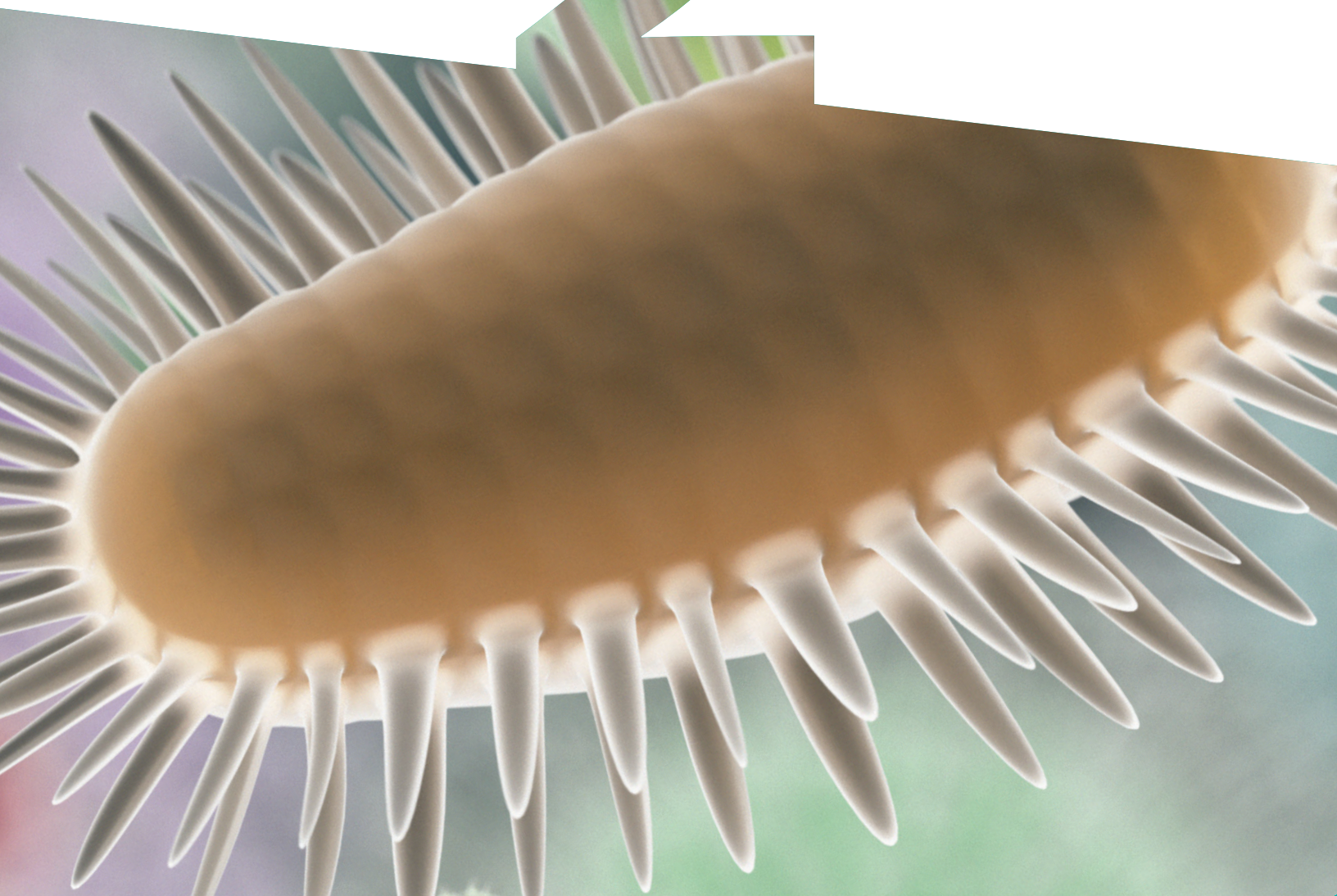
ENTERIC DISEASES

2



2 ENTERIC DISEASES

Enteric diseases refer to gastrointestinal illnesses that result from ingesting bacteria, viruses, parasitic microorganisms or toxins that may be traced back to food, water, animals or an infected person.[i] The true burden of these diseases is hard to estimate, as they are generally under-reported. Many infected persons do not experience symptoms or experience mild symptoms and may not seek medical care. [ii] In addition, individuals who seek medical care may not be asked to submit stool samples for laboratory testing or be willing to submit stool samples, in which case reportable diseases would not be diagnosed and reported.

Table 2.0 highlights York Region cases of reportable enteric diseases. In 2016, two cases of paratyphoid fever and five cases of typhoid fever were reported in York Region. With the exception of one paratyphoid case that was transmitted from a household contact, all paratyphoid and typhoid cases were travel-related. This report focuses on the more commonly reported enteric diseases in York Region.

Highlights

- Increase in both travel-related and non-travel related cyclosporiasis cases in 2016
- National hepatitis A outbreak related to frozen fruit product in 2016, with one related case in York Region
- *Salmonella* Heidelberg outbreak in York Region, which started in 2015 had 59 associated cases

Table 2.0 Enteric diseases:

Annual cases, York Region, 2007-2016

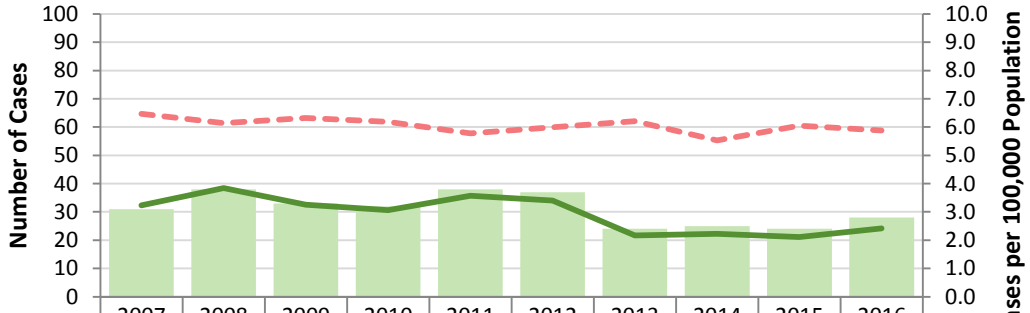
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
Amebiasis	31	38	33	32	38	37	24	25	24	28	
Botulism	0	0	0	0	0	0	0	0	0	0	No cases reported since 1991[†]
Campylobacter enteritis	400	339	304	297	349	360	380	387	320	363	
Cholera	0	0	0	0	0	0	0	0	0	0	Last case reported in 2001
Cryptosporidiosis	27	18	26	46	17	16	9	11	24	18	
Cyclosporiasis	5	13	6	16	7	5	6	13	24	32	
Giardiasis	87	73	75	77	77	87	68	83	83	78	
Hepatitis A	7	5	5	11	6	13	4	4	6	7	
Listeriosis	1	5	5	7	4	2	3	3	4	4	
Paralytic shellfish poisoning	-	-	-	-	-	-	0	0	0	0	Became reportable December 2013
Paratyphoid fever	3	6	3	7	3	0	3	0	4	2	
Salmonellosis	260	220	256	266	223	277	231	304	334	310	
Shigellosis	25	18	19	14	27	56	17	34	24	21	
Trichinosis	0	0	0	0	0	0	0	0	0	0	Last case reported in 1993
Typhoid fever	5	5	5	5	6	2	3	0	4	5	
Verotoxin-producing E. coli	17	12	8	8	12	18	5	16	18	14	
Yersiniosis	54	52	42	43	43	27	32	32	33	41	

[†]Electronic reporting started in 1991.

2.1 Amebiasis

In 2016, there were 28 cases of amebiasis reported in York Region. Between 2007 and 2016, the incidence of amebiasis decreased slightly in York Region and the incidence rate in 2016 is similar to recent years (Figure 2.1.1). The incidence of amebiasis in Ontario also decreased throughout the 10 year period and was consistently higher than York Region.

Figure 2.1.1 Incidence of Amebiasis, York Region and Ontario, 2007-2016:
Cases and rates



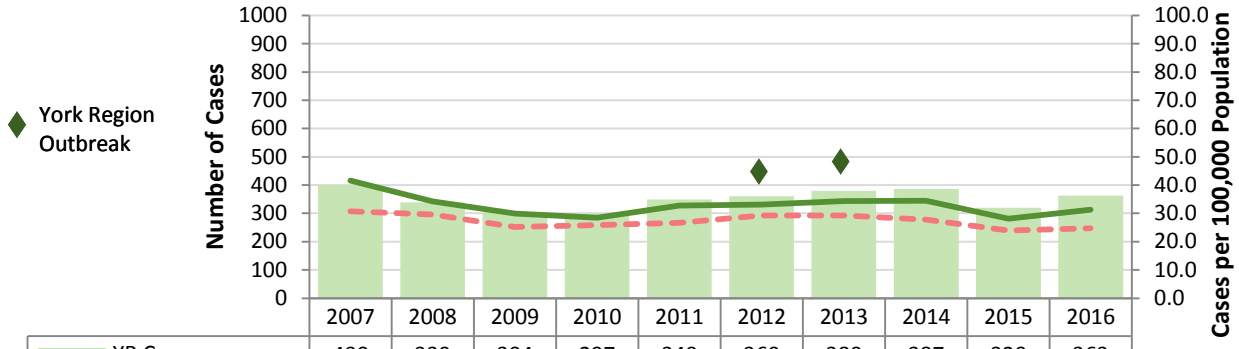
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	31	38	33	32	38	37	24	25	24	28
YR Incidence Rate	3.2	3.8	3.3	3.1	3.6	3.4	2.2	2.2	2.1	2.4
ON Incidence Rates	6.5	6.1	6.3	6.2	5.8	6.0	6.2	5.5	6.0	5.9

In 2016, the incidence rate was highest among males compared to females (3 cases per 100,000 population compared to 1.9 cases per 100,000 population) and the highest incidence rate was observed among adults 30 years or older.

2.2 Campylobacter enteritis

In 2016, there were 363 cases of *Campylobacter* enteritis reported in York Region. There was a decrease in the incidence rate of *Campylobacter* enteritis between 2007 and 2010, followed by a slight increase in 2011 (Figure 2.2.1). Since 2011, the incidence rate in York Region has fluctuated with the lowest incidence observed in 2015. York Region has consistently had higher incidence rates of *Campylobacter* enteritis compared to Ontario. Please refer to the 2000-2015 Reportable Diseases Report for further details on the *Campylobacter* enteritis outbreaks in 2012 and 2013.

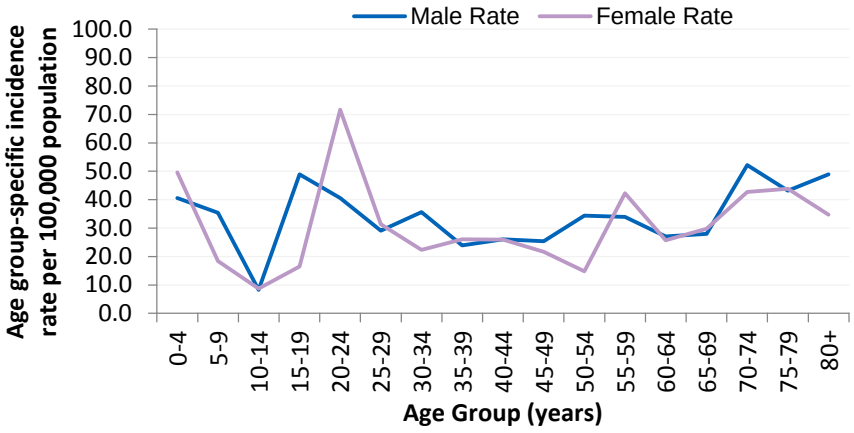
Figure 2.2.1 Incidence of *Campylobacter* enteritis, York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	400	339	304	297	349	360	380	387	320	363
YR Incidence Rate	41.6	34.3	30.0	28.5	32.8	33.1	34.4	34.4	28.1	31.4
ON Incidence Rates	30.7	29.6	25.2	25.9	26.6	29.2	29.3	27.8	24.0	24.7

Among 2016 *Campylobacter* enteritis cases reported in 2016, the incidence rate was slightly higher among males compared to females (32.9 and 29.9 cases per 100,000 population). Although there were slight differences in incidence rates among males and females by age, in general, the incidence rate was lowest in both sexes among children (5 to 14 years) (Figure 2.2.2). An unexpected peak was noted among females in the 20 to 24 year age group.

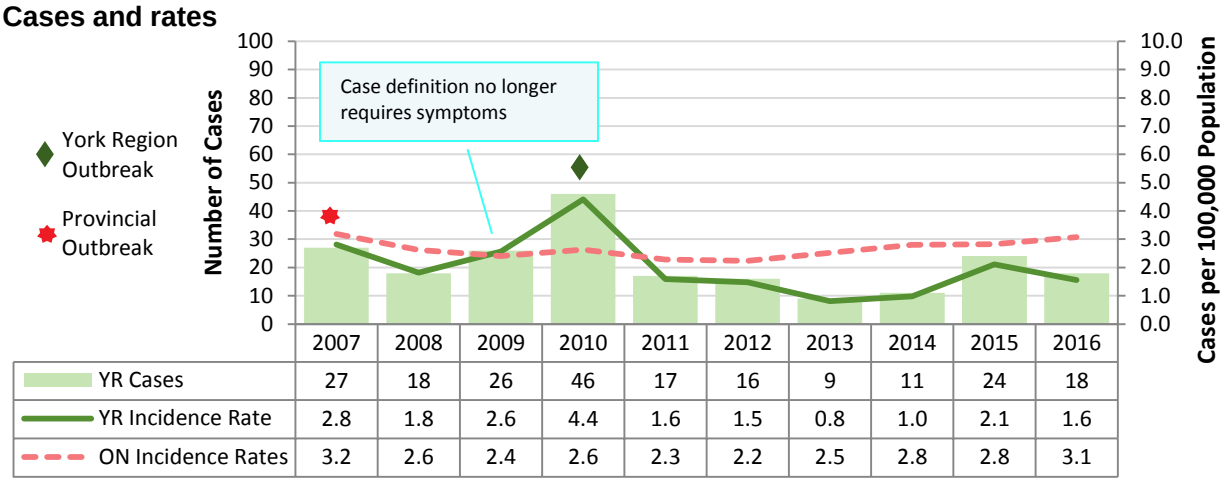
Figure 2.2.2 Incidence rate of *Campylobacter* enteritis by sex and age, York Region, 2016



2.3 Cryptosporidiosis

In 2016, there were 18 cases of cryptosporidiosis reported in York Region. The incidence rate of cryptosporidiosis in York Region has fluctuated throughout the 2007 to 2016 period, and has remained consistently lower than the incidence rate in Ontario, with the exception of 2010 when York Region experienced an outbreak (Figure 2.3.1). Please refer to the 2000-2015 Reportable Diseases Report, Cryptosporidiosis Chapter for further information on outbreaks occurring between 2007 and 2010.

Figure 2.3.1 Incidence of Cryptosporidiosis, York Region and Ontario, 2007-2016:



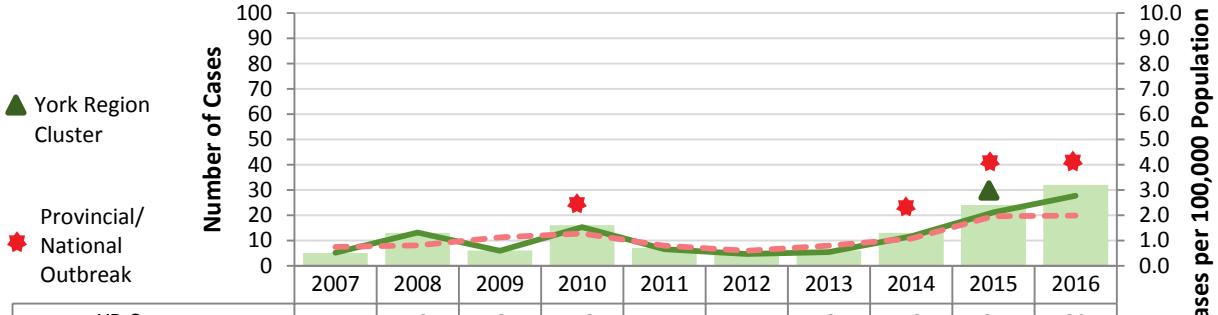
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	27	18	26	46	17	16	9	11	24	18
YR Incidence Rate	2.8	1.8	2.6	4.4	1.6	1.5	0.8	1.0	2.1	1.6
ON Incidence Rates	3.2	2.6	2.4	2.6	2.3	2.2	2.5	2.8	2.8	3.1

Among 2016 cases, the incidence rate was higher among females compared to males (1.9 and 1.2 cases per 100,000 population, respectively) and almost all cases were among children or young adults. This is consistent with what has been observed between the 2000 to 2015 period.

2.4 Cyclosporiasis

In 2016, there were 32 cases of cyclosporiasis reported in York Region. Between 2007 and 2016, the incidence of cyclosporiasis cases has remained low, except in years in which there have been provincial or national outbreaks (Figure 2.4.1). These outbreaks have included non-travel cases related to suspected or known contaminated imported food products (e.g., fresh berries, herbs). The highest incidence was in 2016, with an incidence rate of 2.8 cases per 100,000 population. Similar trends and incidence rates have also been observed for Ontario. Please refer to the 2000-2015 Reportable Diseases Report, Cyclosporiasis Chapter for further information on clusters and outbreaks occurring between 2010 and 2015.

Figure 2.4.1 Incidence of Cyclosporiasis, York Region and Ontario, 2007-2016:
Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	5	13	6	16	7	5	6	13	24	32
YR Incidence Rate	0.5	1.3	0.6	1.5	0.7	0.5	0.5	1.2	2.1	2.8
ON Incidence Rates	0.7	0.8	1.1	1.3	0.8	0.6	0.8	1.1	2.0	2.0

2016: There was a national outbreak of cyclosporiasis cases, with 87 cases reported by four provinces, including Ontario.[iii] The source of the outbreak was not identified. York Region had 12 cases associated with this outbreak.

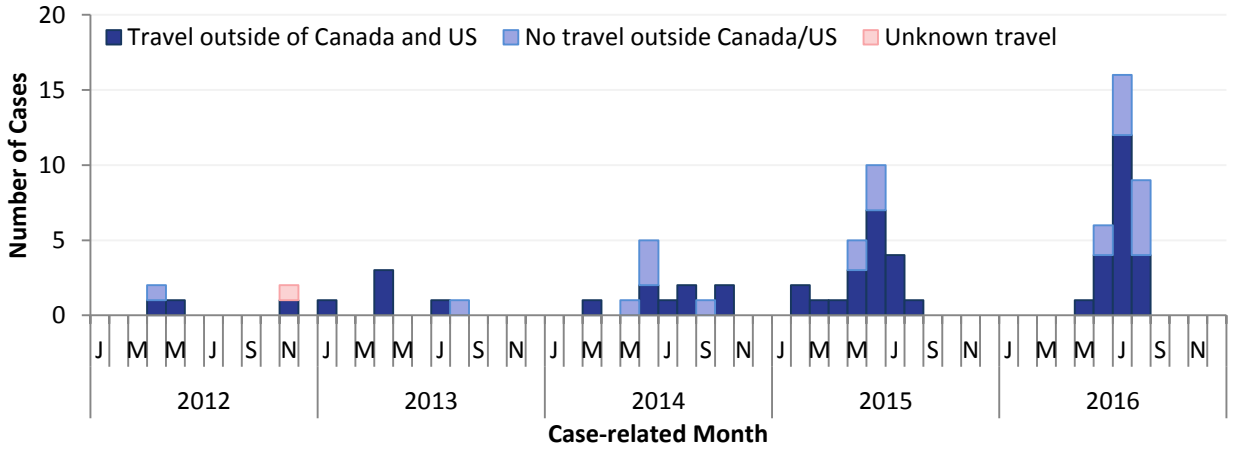
Among 2016 cases, the incidence of cyclosporiasis was higher among females compared to males (3.1 and 2.5 cases per 100,000 population, respectively) and cases were primarily among adults 25 years of age or older.

Cyclosporiasis cases in 2016

There was an increase in cyclosporiasis cases in 2016, and this was observed in cases who reported travelling and cases who did not travel during their exposure period (Figure 2.4.2). The increase in non-travel cases was reflective of the national outbreak, for which York Region had 12 cases associated. Although a food source was not identified, previous cyclosporiasis outbreaks in Canada have been associated with contaminated imported produce. [iv]

In addition to non-travel-related cases, there continues to be an increase in travel-related cases in 2016, as was also observed in 2015. Eighteen of the 20 cases who reported travel outside of Canada/US reported travel to Mexico and 14 of these cases specifically reported travelling to the Mexican Riviera. Similarly, 15 out of 19 cases from 2015 reported travelling to the Mexican Riviera.

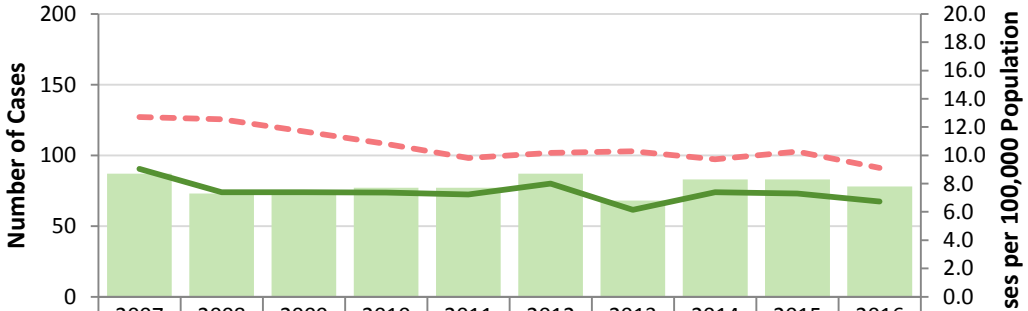
Figure 2.4.2 Monthly cases of Cyclosporiasis by exposure, York Region, 2012 to 2016



2.5 Giardiasis

In 2016, there were 78 cases of giardiasis reported in York Region in 2016. Since 2008, the incidence rate of giardiasis in York Region has been fairly consistent and York Region's incidence rate has been consistently lower than Ontario's during the 2007 to 2016 period (Figure 2.5.1).

Figure 2.5.1 Incidence of Giardiasis, York Region and Ontario, 2007-2016:
Cases and rates



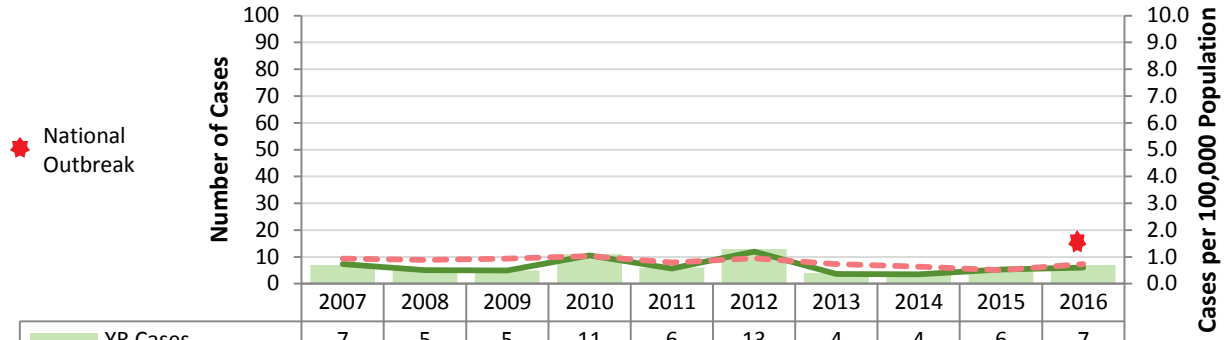
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	87	73	75	77	77	87	68	83	83	78
YR Incidence Rate	9.1	7.4	7.4	7.4	7.2	8.0	6.2	7.4	7.3	6.7
ON Incidence Rates	12.7	12.6	11.7	10.8	9.8	10.2	10.3	9.7	10.3	9.1

In 2016, the incidence rate among males was over two times higher than females (9.7 compared to 3.9 cases per 100,000 population) and the incidence rate was higher among 20 to 69 year olds, peaking among the 40 to 49 year olds.

2.6 Hepatitis A

In 2016, there were seven cases of hepatitis A reported in York Region. The incidence rate of hepatitis A in York Region has remained consistently low throughout 2007 to 2016, with small increases observed in 2010 and 2012 (Figure 2.6.1). York Region's incidence rate has been similar to or just below Ontario's incidence rate throughout this time period. Among 2016 cases, four of the cases were male and cases primarily occurred among adults (aged 20 to 44 years old), with two cases among children.

Figure 2.6.1 Incidence of Hepatitis A, York Region and Ontario, 2007-2016: Cases and rates



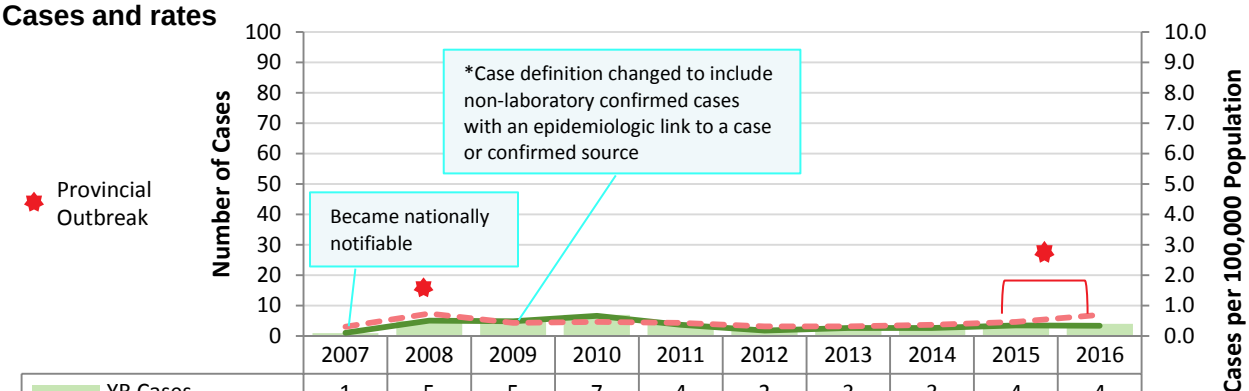
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	7	5	5	11	6	13	4	4	6	7
YR Incidence Rate	0.7	0.5	0.5	1.1	0.6	1.2	0.4	0.4	0.5	0.6
ON Incidence Rates	0.9	0.9	0.9	1.0	0.8	0.9	0.7	0.6	0.5	0.7

2016: National outbreak linked to Nature's Touch brand Organic Berry Cherry Blend. There were 25 cases associated with this outbreak, with 19 cases in Ontario and one case in York Region. [v]

2.7 Listeriosis

In 2016, there were four cases of listeriosis reported in York Region. The incidence rate for listeriosis has remained consistent throughout the 2007 and 2016 period for York Region and Ontario (Figure 2.7.1). Please refer to the 2000 to 2015 Reportable Diseases Report, Listeriosis Chapter for further details on the 2008 provincial outbreak and associated York Region cases. Among the four York Region cases in 2016, three of the cases were male. Three cases were 70 years of age and older, and one case was an infant.

Figure 2.7.1 Incidence of Listeriosis, York Region and Ontario, 2007-2016:
Cases and rates



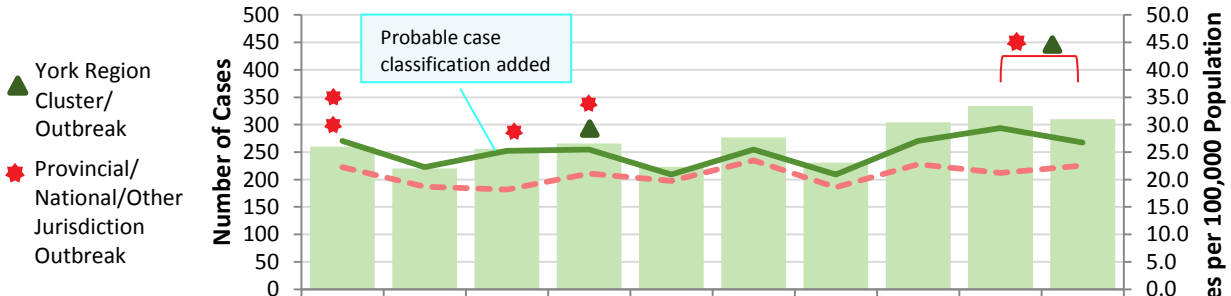
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	1	5	5	7	4	2	3	3	4	4
YR Incidence Rate	0.1	0.5	0.5	0.7	0.4	0.2	0.3	0.3	0.4	0.3
ON Incidence Rates	0.3	0.7	0.4	0.5	0.4	0.3	0.3	0.4	0.5	0.7

2015-2016: Provincial outbreak which began in November 2015 and continued into mid-2016, which was linked to Neilson brand partly-skimmed chocolate milk.[vi] There were 34 cases linked to the outbreak . The majority of cases were older adults. York Region had two cases associated with this outbreak.

2.8 Salmonellosis

In 2016, there were 310 cases of salmonellosis reported in York Region. The incidence of salmonellosis has fluctuated throughout the 2007 and 2016 period in York Region (Figure 2.8.1). The incidence rate in York Region has consistently been higher than Ontario. Please refer to the 2000 to 2015 Reportable Diseases Report, Salmonellosis Chapter for further details on York Region and provincial/national clusters and outbreaks occurring prior to 2015.

Figure 2.8.1 Incidence of Salmonellosis, York Region and Ontario, 2007-2016: Cases and rates

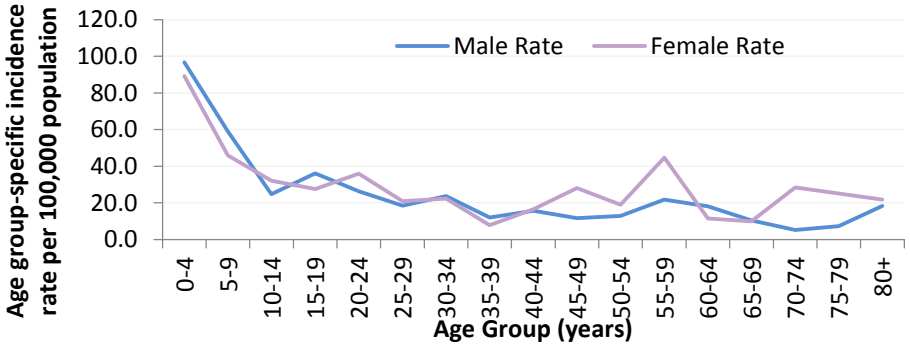


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	260	220	256	266	223	277	231	304	334	310
YR Incidence Rate	27.1	22.3	25.2	25.5	20.9	25.5	20.9	27.0	29.4	26.8
ON Incidence Rates	22.3	18.7	18.2	21.1	19.7	23.5	18.6	22.8	21.2	22.6

- ***2015-2016:*** National outbreak of *Salmonella* Infantis, which started early 2015 and continued to early 2016. The source of the outbreak is believed to have been raw chicken. There were 110 cases from nine provinces, including 63 cases in Ontario. York Region had six cases associated with this outbreak.[vii]
- ▲ *2015-2016:* Outbreak of *Salmonella* Heidelberg starting in late 2015 and ended in mid-2016. There were 59 cases associated with this outbreak and a common food item was suspected, but not confirmed.
- ***2016:*** York Region cases were associated with two out-of-jurisdiction outbreaks in Ontario. One jurisdiction had an outbreak of *Salmonella* Thompson, with five York Region cases associated, and the other jurisdiction had an outbreak of *Salmonella* Infantis, with six York Region cases associated.

Among 2016 cases, the incidence rate was slightly higher among females compared to males (28.2 and 25.3 cases per 100,000 population, respectively). For both sexes, the incidence rate was highest among young children.

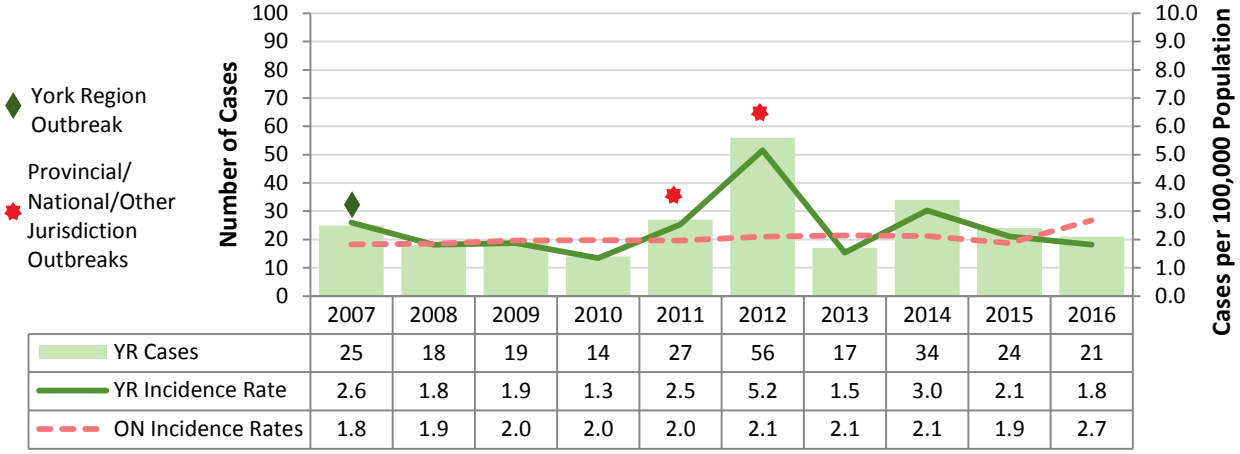
Figure 2.8.2 Incidence rate of Salmonellosis by sex, York Region, 2016



2.9 Shigellosis

In 2016, there were 21 cases of shigellosis reported in York Region. The incidence of shigellosis has fluctuated throughout the 2007 to 2016 period for York Region, but has remained consistent for Ontario, except for the increase in 2016 in the Ontario rate (Figure 2.9.1). In 2016, the incidence rate of shigellosis in York Region was lower than Ontario. Please refer to the 2000 to 2015 Reportable Diseases Report, Shigellosis Chapter for further details on the York Region, provincial and national outbreaks.

Figure 2.9.1 Incidence of Shigellosis, York Region and Ontario, 2007-2016: Cases and rates



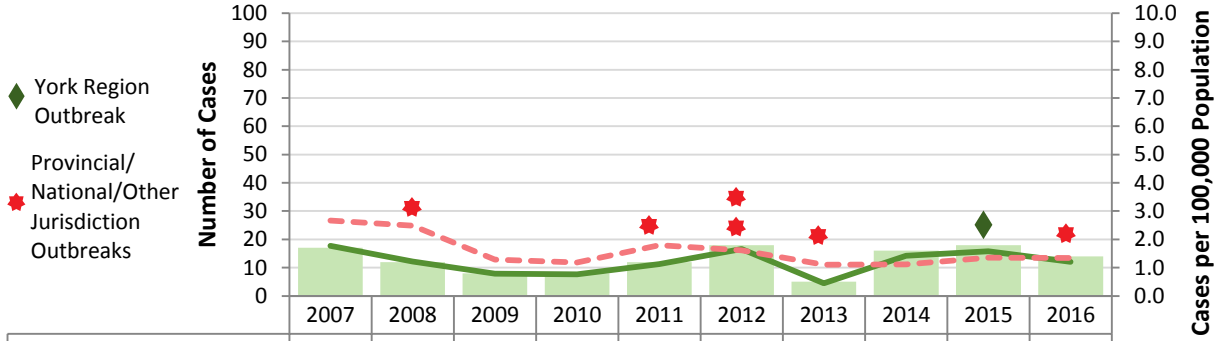
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	25	18	19	14	27	56	17	34	24	21
YR Incidence Rate	2.6	1.8	1.9	1.3	2.5	5.2	1.5	3.0	2.1	1.8
ON Incidence Rates	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.1	1.9	2.7

Among 2016 cases, the incidence rates for males and females were similar (1.9 compared to 1.7 cases per 100,000 population) and the highest incidence rate was among the infant, followed by adult age groups. This is consistent with what was observed for the 2000 to 2015 period.

2.10 Verotoxin-producing *E.coli* infection (VTEC)

In 2016, there were 14 cases of VTEC reported in York Region. The incidence of VTEC has fluctuated slightly throughout the 2007 to 2016 period in York Region; however the incidence rate in 2016 is similar to what has been observed in recent years (Figure 2.10.1). Although Ontario had higher rates than York Region between 2007 to 2011, the rates have been similar since 2012, with the exception of 2013 where the incidence in York Region was lower. There has been a slight decline in the incidence rate of VTEC in Ontario during the 10 year period. Please refer to the 2000 to 2015 Reportable Diseases Report, VTEC Chapter for further information on York Region, provincial and national outbreaks that occurred prior to 2016.

Figure 2.10.1 Incidence of Verotoxin-producing *E.coli* Infections, York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	17	12	8	8	12	18	5	16	18	14
YR Incidence Rate	1.8	1.2	0.8	0.8	1.1	1.7	0.5	1.4	1.6	1.2
ON Incidence Rates	2.7	2.5	1.3	1.2	1.8	1.6	1.1	1.1	1.3	1.3

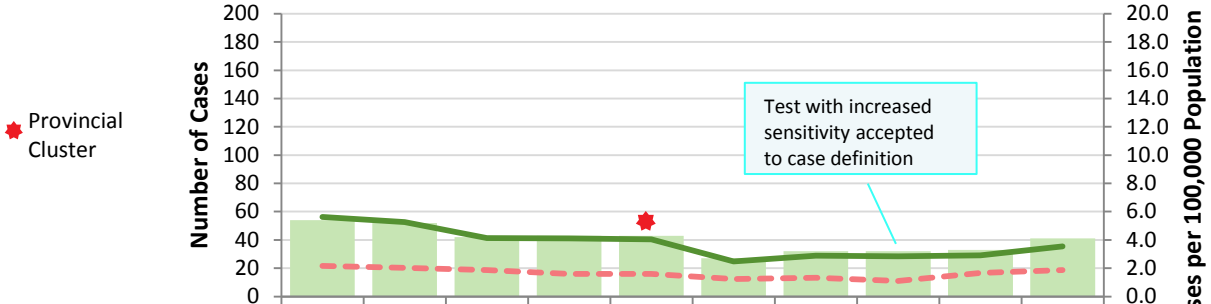
2016: One provincial and two national outbreaks were identified. York Region did not have any cases associated with any of these outbreaks.

Among 2016 cases, the VTEC incidence rate was the same for males and females (1.2 cases per 100,000 population) and the incidence rate was highest among infants and had lower incidence among children, adult and elderly age groups. This is consistent with the 2000 to 2015 period.

2.11 Yersiniosis

In 2016, there were 41 cases of yersiniosis reported in York Region. The incidence of yersiniosis in York Region in 2016 was higher than what has been observed in recent years (Figure 2.11.1). The incidence of yersiniosis decreased between 2007 and 2012 in York Region and Ontario and has been increasing slightly in recent years. The incidence rate in York Region has consistently been higher than Ontario. Please refer to the 2000 to 2015 Reportable Diseases Report, Yersiniosis Chapter

Figure 2.11.1 Incidence of Yersiniosis, York Region and Ontario, 2007-2016: Cases and rates

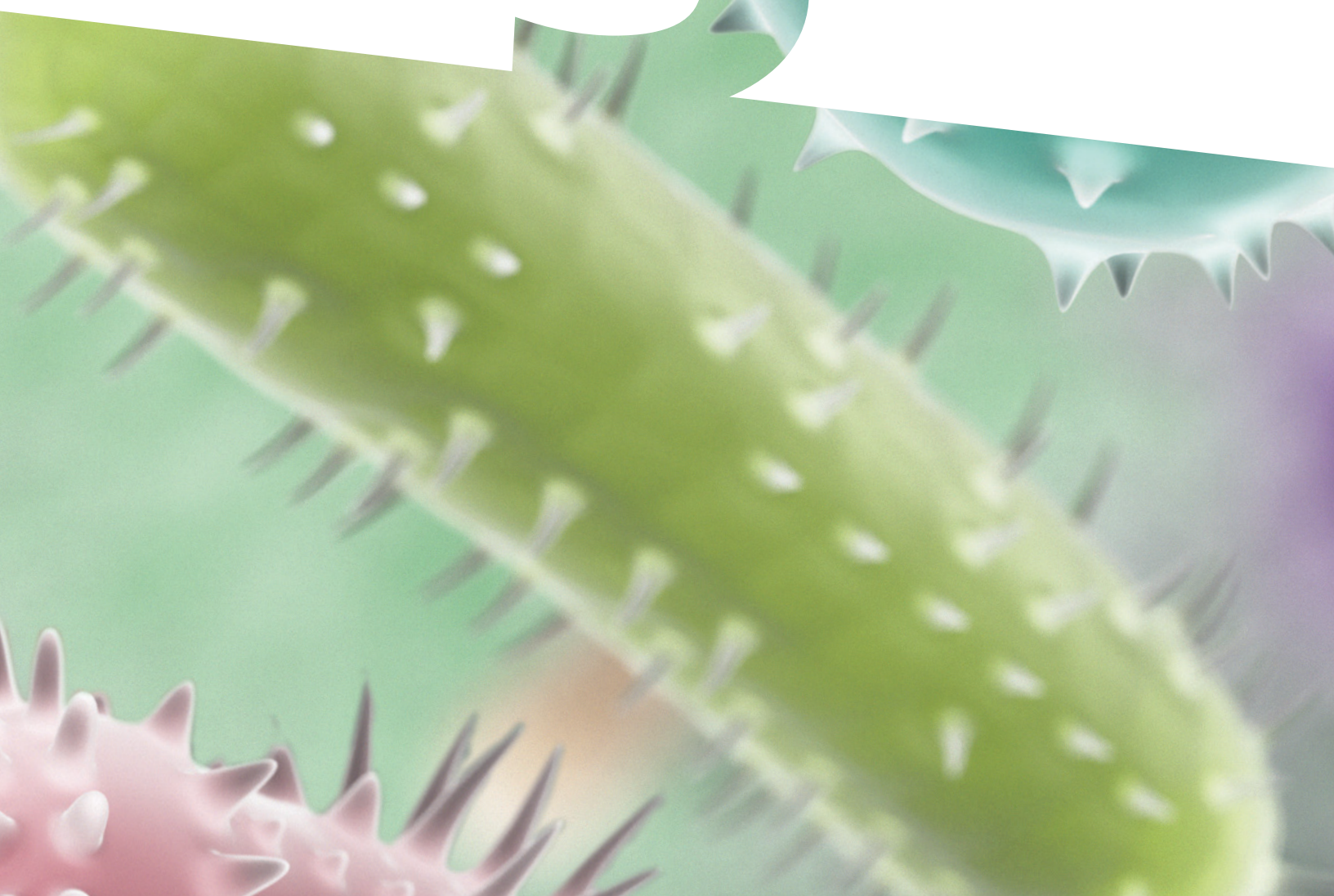


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	54	52	42	43	43	27	32	32	33	41
YR Incidence Rate	5.6	5.3	4.1	4.1	4.0	2.5	2.9	2.8	2.9	3.5
ON Incidence Rates	2.2	2.0	1.9	1.6	1.6	1.2	1.3	1.1	1.7	1.9

Among 2016 cases, the incidence rate was slightly higher in females than males (3.7 versus 3.3 cases per 100,000 population) and the incidence rate was highest among infants.

DISEASES TRANSMITTED BY DIRECT CONTACT AND RESPIRATORY ROUTES

3



3 DISEASES TRANSMITTED BY DIRECT CONTACT AND RESPIRATORY ROUTES

Respiratory infections may be caused by a variety of viruses or bacteria, typically causing symptoms such as coughing, sneezing, runny nose, sore throat and fever.[viii] These infections are spread from person-to-person through droplet transmission (i.e., coughing or sneezing) or through contact with contaminated items. Persons most susceptible to acquiring respiratory infections include the very young and the elderly. Other infections are transmitted when there is direct physical contact from an infected person to a susceptible person. For example, infection may be transmitted through contact with infectious respiratory secretions and skin lesions.[ix] Infection may also occur from a mother to a child through an infected birth canal or from infection in the uterus.[x]

Table 3.0 highlights York Region cases of provincially reportable diseases that are transmitted through respiratory or direct contact routes.

A number of infections transmitted by these routes are included in routine vaccination programs in Ontario and are described in Chapter 5: Vaccine Preventable Diseases. This chapter focuses on invasive group A streptococcal disease, legionellosis and active tuberculosis (TB).

Highlights

- More than half of the 2016 active TB cases are pulmonary, which has been consistent between 2007 and 2016

Table 3.0 Diseases transmitted by direct contact and respiratory routes:

Annual cases, York Region, 2007-2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
Cytomegalovirus (congenital)	2	0	0	1	1	0	-	-	-	-	No longer reportable since 2013
Encephalitis/ Meningitis	26	29	27	30	30	35	31	40	33	39	
Legionellosis	2	4	3	5	4	5	14	7	2	6	
Leprosy	0	2	0	0	1	0	1	0	1	0	
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0	0	0	0	0	0	0	No cases reported since 2003
Group A Streptococcal disease, invasive	15	16	25	24	38	24	34	27	34	31	
Group B Streptococcal disease, neonatal	3	5	2	2	5	5	3	3	5	2	
Tuberculosis (active)	70	53	61	62	53	53	49	41	49	50	

Encephalitis and Meningitis Syndromes: 2016 Cases in Focus

Although encephalitis and meningitis do not constitute diseases in themselves, these health outcomes do present as serious conditions and in some cases can be life-threatening.[xi] It is important to monitor these syndromes in order to identify emerging infectious agents of public health significance. Organisms that cause a reportable disease and result in encephalitis or meningitis are not included in the meningitis/encephalitis category. Table 3.0.2 provides a breakdown of non-reportable causative agents of encephalitis and meningitis among individuals experiencing these conditions in 2016. Twenty eight per cent of cases did not have a causative agent identified, and the most commonly identified causative agent was enterovirus followed by herpes simplex.

Table 3.0.2 Identified agents among encephalitis and meningitis cases, York Region, 2016

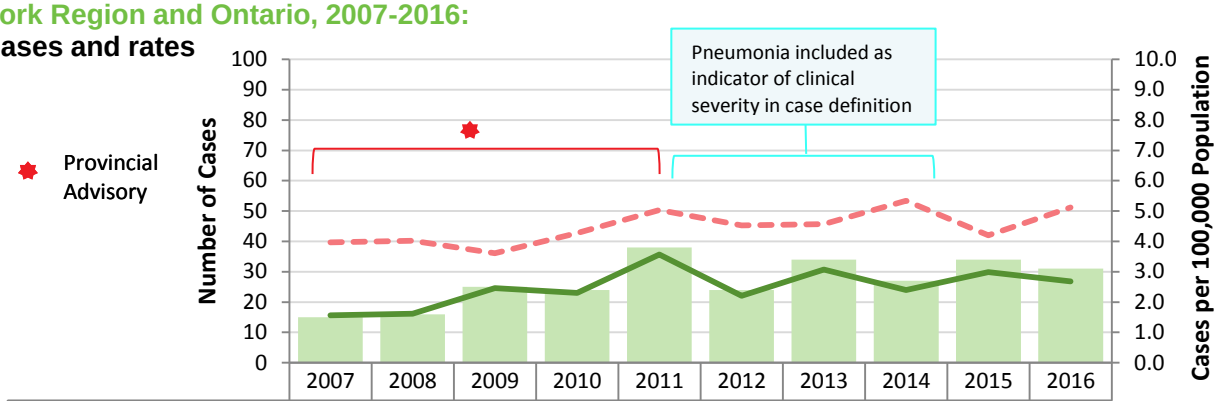
Agent	Proportion
Unspecified	28%
Enterovirus*	23%
Herpes Simplex	15%
Parechovirus**	13%
Shingles	8%
Cryptococcus	3%
Extended spectrum beta-lactamases producing E.coli	3%
Enterococcus	3%
Haemophilus Influenza (Non-typeable)	3%
Staphylococcus aureus	3%

*Enterovirus includes echovirus, other than echoviruses 22 and 23, which are captured as parechovirus
** Routine testing for parechovirus in young children has been added at select hospitals in Ontario in recent years. Thus, parechovirus is more likely to be identified in recent years in comparison to previously being classified as unspecified.

3.1 Group A streptococcal disease, invasive (iGAS)

In 2016, there were 31 cases of iGAS reported in York Region. The incidence of iGAS in 2016 in York Region has been consistent with what has been observed in recent years (Figure 3.1.1). Since the increase in incidence rate in 2009 in York Region, the incidence rate has fluctuated, with the highest incidence observed in 2011. York Region's incidence rate has been consistently lower than Ontario. Although the incidence rate in Ontario has also fluctuated, the overall incidence rate in Ontario increased during this time period. Please refer to the 2000 to 2015 Reportable Diseases Report, iGAS chapter for more information on the provincial increase noted for 2007 to 2011, which in addition to an outbreak, was in part believed to be a result of an advisory to improve awareness of iGAS.

Figure 3.1.1 Incidence of Group A Streptococcal Disease (Invasive), York Region and Ontario, 2007-2016:
Cases and rates



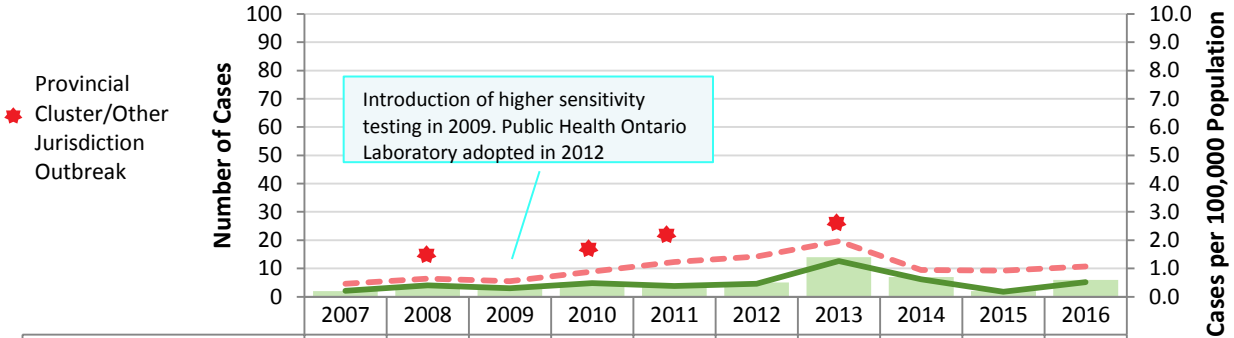
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	15	16	25	24	38	24	34	27	34	31
YR Incidence Rate	1.6	1.6	2.5	2.3	3.6	2.2	3.1	2.4	3.0	2.7
ON Incidence Rates	4.0	4.0	3.6	4.3	5.0	4.5	4.6	5.3	4.2	5.1

Among 2016 cases, the incidence rate was similar for females and males (2.7 and 2.6 cases per 100,000 population respectively) and the incidence rate was highest among the elderly.

3.2 Legionellosis

In 2016, there were six cases of legionellosis reported in York Region and the incidence rate of legionellosis in York Region was 0.5 cases per 100,000 population (Figure 3.2.1). This is consistent with the incidence rate of legionellosis between 2007 and 2015, with the exception of 2013 when York Region had a high number of cases within the same time period as the provincial cluster. The Ontario incidence rate has been higher than York Region and follows a similar trend during the 10 year period. Please refer to the 2000-2015 Reportable Diseases Report, Legionellosis Chapter for further information on previous provincial cluster and outbreaks. Among 2016 York Region cases, cases occurred among older adults and the elderly.

Figure 3.2.1 Incidence of Legionellosis, York Region and Ontario, 2007-2016: Cases and rates

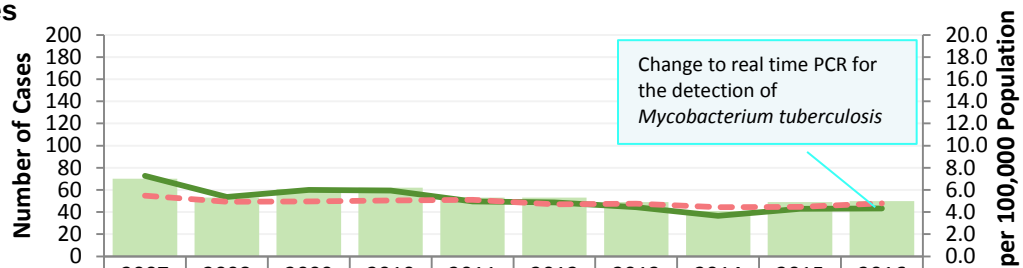


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	2	4	3	5	4	5	14	7	2	6
YR Incidence Rate	0.2	0.4	0.3	0.5	0.4	0.5	1.3	0.6	0.2	0.5
ON Incidence Rates	0.5	0.6	0.5	0.9	1.2	1.4	2.0	0.9	0.9	1.1

3.3 Tuberculosis, active (TB)

In 2016, there were 50 active TB cases reported in York Region. Between 2007 and 2016, there was a decline in incidence observed for TB cases with an incidence of 7.3 per 100,000 population in 2007 to 4.3 per 100,000 population in 2016 (Figure 3.3.1). During this time period, the incidence in York Region was similar to Ontario.

Figure 3.3.1 Incidence of active Tuberculosis, York Region and Ontario, 2007-2016:
Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	70	53	61	62	53	53	49	41	49	50
YR Incidence Rate	7.3	5.4	6.0	5.9	5.0	4.9	4.4	3.6	4.3	4.3
ON Incidence Rates	5.5	4.9	5.0	5.0	5.1	4.7	4.8	4.5	4.5	4.8

Among 2016 cases, the incidence of active TB among male and female cases was similar (4.2 and 4.4 per 100,000 population, respectively) and the age-specific incidence was highest among individuals over 75 years of age. There were no cases among children under 17 years old.

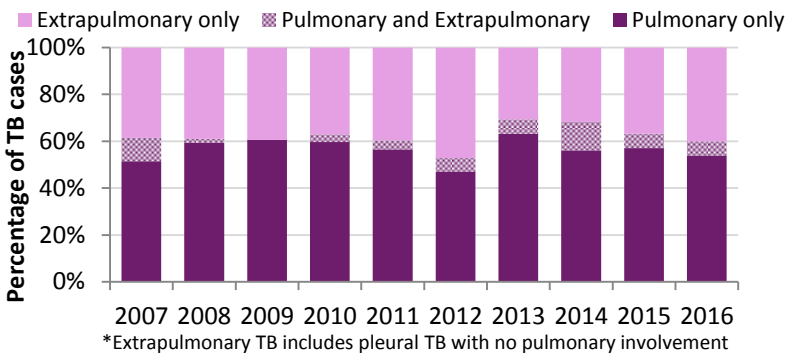
In 2016, 92 per cent of TB cases were foreign-born. Incidence of TB among York Region residents who are foreign-born was highest among residents who identified India as their country of origin. Of the four Canadian-born TB cases, three of the cases visited a TB endemic country and one case was a reactivated case with initial exposure at a workplace some years prior.

In addition, there was one TB case among the 2016 cases who was infected with HIV concurrent with their TB diagnosis.

TB Body Site and Drug Resistance

Figure 3.3.2 Active TB cases by body site, York Region, 2007 to 2016

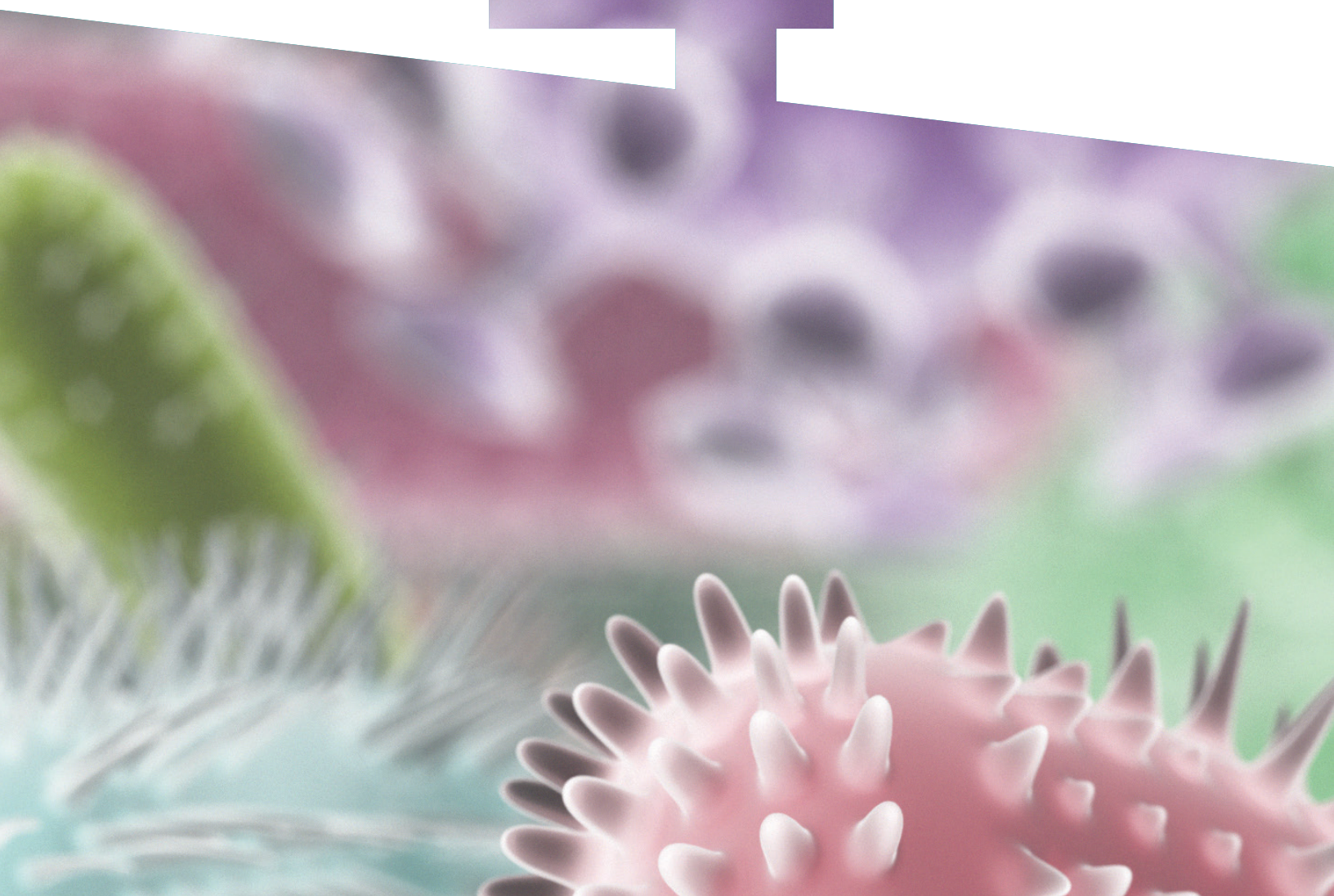
The proportion of active TB cases with pulmonary TB has been consistent between 2007 and 2016, with more than half of reported cases having only pulmonary or pulmonary and extrapulmonary TB (Figure 3.3.2).



Among the 50 active TB cases in 2016, 33 cases had drug resistance information available. Of the 33 cases, four cases (12%) had drug resistance, of which two cases were resistant to isoniazid, one case was resistant to pyrazinamide, and one case was resistant to isoniazid and rifampin (multi-drug resistant).

SEXUALLY TRANSMITTED AND BLOOD-BORNE INFECTIONS

4



4 SEXUALLY TRANSMITTED INFECTIONS AND BLOOD-BORNE INFECTIONS

Sexually transmitted infections (STIs) and blood-borne infections (BBIs) are transmitted through unprotected sexual contact and/or direct contact with infected blood or bodily fluids. [xii] This generally occurs through contact with mucosal surfaces or through non-intact skin. Some infections, such as HIV, syphilis, hepatitis B and C, can also be transmitted during pregnancy or birth from mother to child.[xi] Reportable STIs can have long-term health outcomes, especially if untreated.

Many people infected with STIs and/or BBIs are asymptomatic and their infections may go unreported due to lack of screening or testing.[xii] Therefore, it is difficult to quantify the full burden of illness attributed to these infections.

Table 4.0 highlights the York Region cases of reportable sexually transmitted and blood-borne infections in Ontario.

Highlights

- Select STIs continue to rise in York Region in 2016, including chlamydia, HIV and infectious syphilis
- In 2016, 23 per cent of syphilis cases were concurrently infected with HIV at the time of syphilis diagnosis

Table 4.0 Sexually transmitted and blood-borne infections:
Annual Cases, York Region, 2007-2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
Chancroid	0	0	0	0	0	0	0	0	0	0	No cases reported since 1991†
Chlamydial infections	1131	1303	1482	1734	1821	1885	1870	1861	2062	2294	
Gonorrhea	102	119	106	132	159	202	209	297	261	260	
Hepatitis B (acute)	5	2	7	9	5	9	4	5	3	0	
Hepatitis B (chronic)	430	390	378	409	408	415	437	412	369	361	
Hepatitis C	227	235	227	197	168	182	181	162	159	157	
Hepatitis D	1	1	1	0	1	1	-	-	-	-	No longer reportable since 2013
Herpes (neonatal)	0	1	0	1	1	0	-	-	-	-	No longer reportable since 2013
HIV/AIDS	16	15	13	26	34	18	17	21	23	27	
Ophthalmia neonatorum	0	0	0	0	0	0	0	0	0	0	Last case was reported in 2005.
Syphilis (infectious)	13	12	15	25	29	25	26	20	36	40	
*Syphilis (non-infectious)**	83	62	58	47	35	41	43	44	32	53	

*Includes syphilis infections that could not be staged. †Electronic reporting started in 1991.

Repeat sexually transmitted infections

Figure 4.0.1 Repeat infections of a sexually transmitted infection* within previous five years, 2007 to 2016

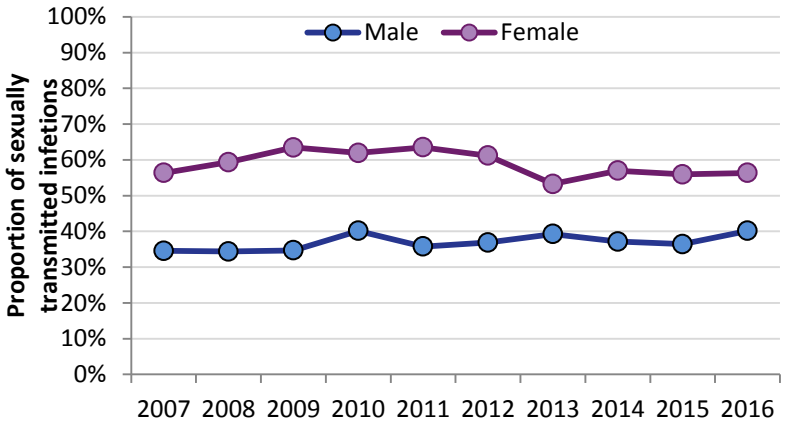
*STI includes gonorrhea, chlamydia, infectious syphilis and HIV

Figure 4.0.1 describes the proportion of sexually transmitted infections* that were considered to be a repeat of an infection in the previous five years. The proportion of infections that were repeat infections increased slightly between 2007 and 2016.

**HIV was not considered a repeat infection if it occurred within a year of an STI and a 30 day window was used for other diseases.

Asymptomatic sexually transmitted infections among females compared to males

Figure 4.0.2 Asymptomatic sexually transmitted infections* by sex, York Region, 2007 to 2016



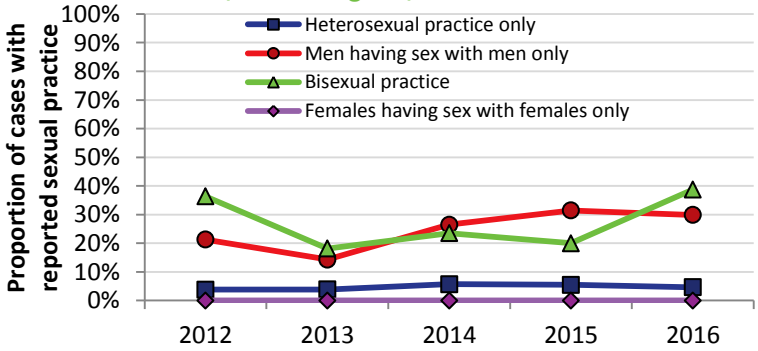
*STI includes gonorrhea, chlamydia, infectious syphilis

The proportion of asymptomatic cases among males and females was consistent over the ten year period. In addition, females consistently had a higher proportion of asymptomatic cases than males.

**Diseases that were considered co-infections and reported together had the same symptom information attributed. Thus, an individual may have had symptoms for one disease and not the other; however, the overall symptom information that was recorded as part of the coinfection report was attributed to both diseases.

Anonymous partnering practices among STI cases with reported sexual practice

Figure 4.0.3 Anonymous partnering practices among STI occurrences, York Region, 2012 to 2016



*STI includes gonorrhea, chlamydia, infectious syphilis and HIV

**Co-infections occurring on the same date were considered as one STI occurrence

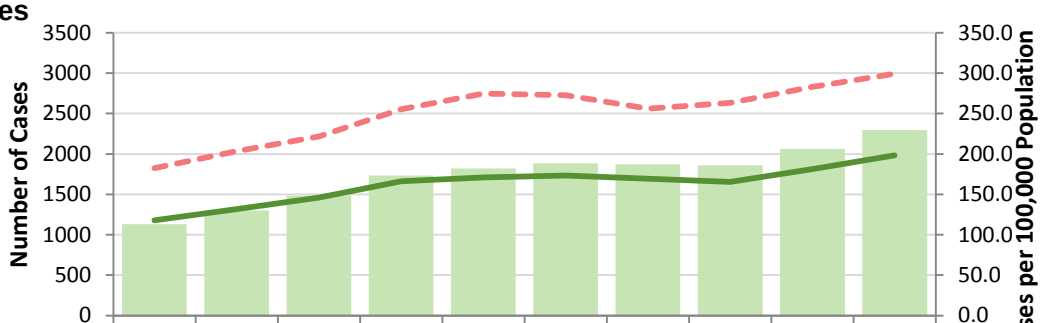
***Anonymous partnering practice includes reports of anonymous sex, meeting partners at parties, other social venues or social media

Figure 4.0.3 describes the proportion of unique STI occurrences** with identified sexual practice reporting anonymous partnering practices.*** Between 2012 and 2016, anonymous partnering practice increased among men who reported having sex with men only, fluctuated among cases reporting bisexual practice and remained consistent among cases who reported only heterosexual practice. Anonymous partnering practice was not reported among females reporting having sex with females throughout this time period.

4.1 Chlamydia trachomatis infection (chlamydia)

In 2016, there were 2,294 cases of chlamydia reported in York Region. Between 2007 and 2016, the incidence of chlamydia has been increasing in York Region and Ontario (Figure 4.1.1). In 2016, the incidence of chlamydia in York Region and Ontario were nearly double that of 2007. Overall, the incidence of chlamydia in York Region has been lower than Ontario.

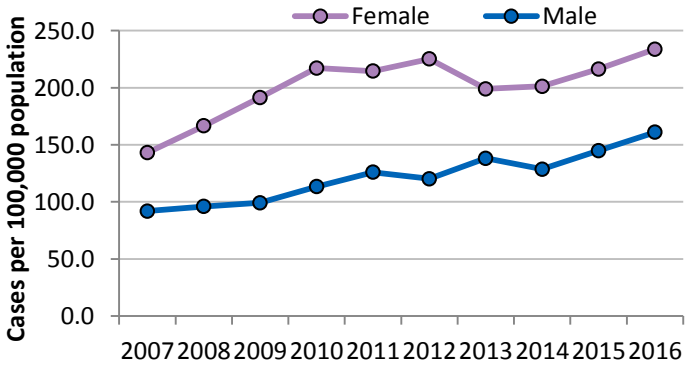
Figure 4.1.1 Incidence of Chlamydia in York Region and Ontario, 2007-2016: Cases and Rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	1131	1303	1482	1734	1821	1885	1870	1861	2062	2294
YR Incidence Rate	117.7	131.8	146.0	166.2	170.9	173.5	169.2	165.5	181.2	198.2
ON Incidence Rates	182.6	203.6	221.8	255.2	274.7	272.7	256.0	263.2	283.2	299.4

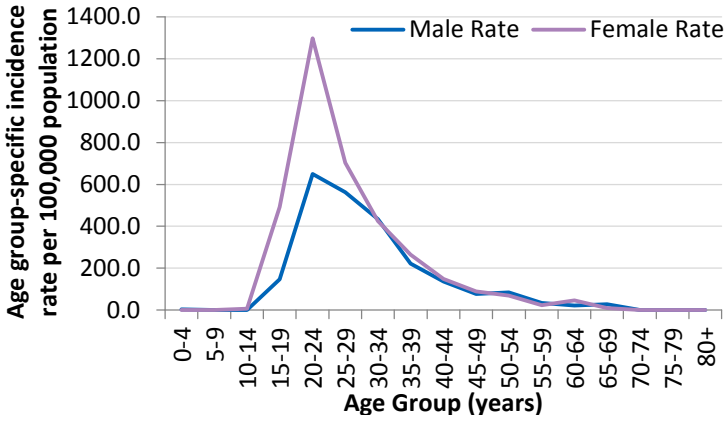
Similar to previous years, in 2016, the incidence of chlamydia among females was higher than in males (Figure 4.1.2), and the incidence of chlamydia was lowest among children and seniors and highest among young adults (Figure 4.1.3).

Figure 4.1.2 Incidence of chlamydia by sex, York Region, 2007-2016



*Excludes five cases with other/unknown sex

Figure 4.1.3 Sex and age-group incidence of chlamydia cases, York Region, 2016



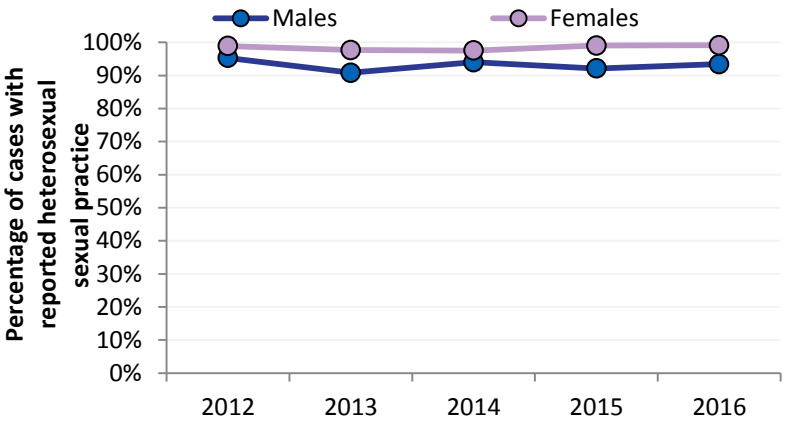
*Excludes five cases with other/unknown sex

Heterosexual practice reported among chlamydia cases with reported sexual practice

Among chlamydia cases with a known sexual practice*, exclusive heterosexual practice was reported by nearly all cases among males and females (Figure 4.1.4). This was consistent throughout the 2012 to 2016 time period.

*on average, about half of chlamydia cases had a reported sexual practice each year

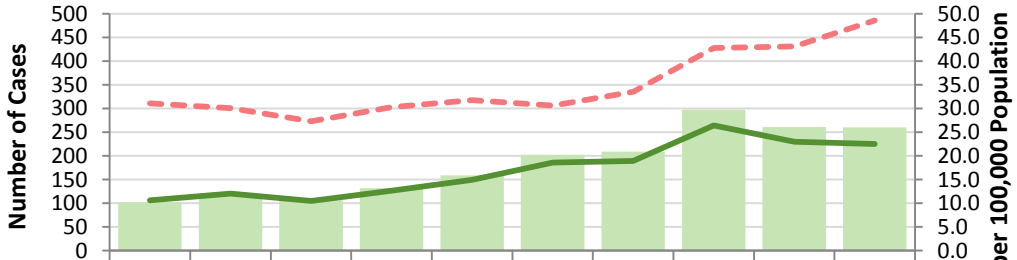
Figure 4.1.4 Reported heterosexual practice only among chlamydia cases and by sex, York Region, 2012 to 2016



4.2 Gonorrhea

In 2016, there were 260 cases of gonorrhea reported in York Region, and the incidence rate was double the incidence rate in 2007 (Figure 4.2.1). Similar to York Region, there has been an increase in gonorrhea cases in Ontario. Overall, the incidence of gonorrhea in York Region is lower than that of Ontario.

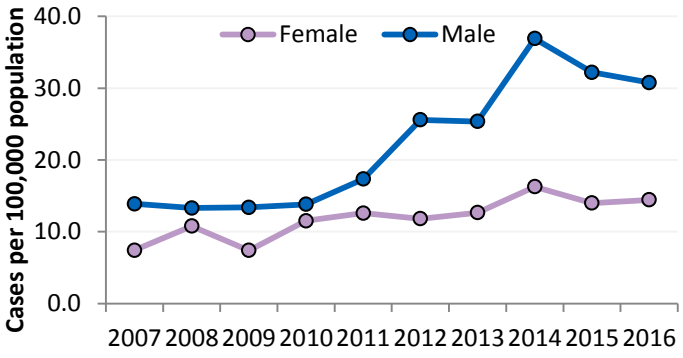
Figure 4.2.1 Incidence of Gonorrhea, York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	102	119	106	132	159	202	209	297	261	260
YR Incidence Rate	10.6	12.0	10.4	12.6	14.9	18.6	18.9	26.4	22.9	22.5
ON Incidence Rates	31.1	30.0	27.3	30.2	31.7	30.6	33.5	42.8	43.1	48.5

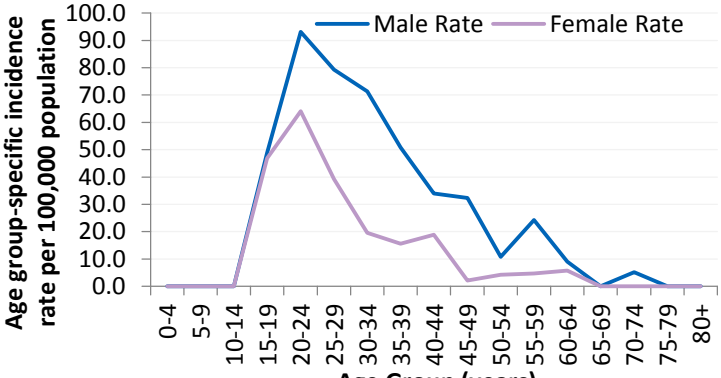
The incidence of gonorrhea remained higher among males compared to females in 2016 (Figure 4.2.2). The difference in incidence between males and females increased between 2011 and 2014, with an overall higher incidence among males. In 2016, the age-group specific incidence was highest among the 20 to 24 year olds for males and females.

Figure 4.2.2 Incidence of gonorrhea by sex, York Region, 2007-2016



*Excludes one case with other/unknown sex

Figure 4.2.3 Sex and age-group incidence of gonorrhea cases, York Region, 2016



*Excludes one case with other/unknown sex

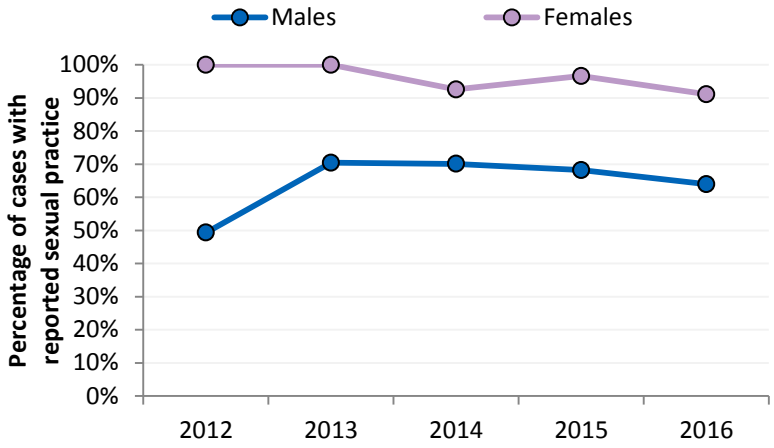
Among gonorrhea cases reported in 2016, 17 per cent of the cases were co-infected with chlamydia. This is slightly lower than what was observed in 2015 (20 per cent) and is consistent with the decrease that has been observed in gonorrhea cases co-infected with chlamydia in recent years in York Region, which was described in the *2000-2015 Reportable Diseases Summary Report* (refer to Figure 4.2.4).

Heterosexual practice reported among gonorrhea cases with reported sexual practice

Among gonorrhea cases with a known sexual practice between 2012 and 2016, nearly all females reported exclusive heterosexual practice; however, that slightly declined during the time period (Figure 4.2.4). Among male gonorrhea cases, there was an increase in reports of exclusive heterosexual practice between 2012 and 2013, where more than half of male gonorrhea cases have reported exclusive heterosexual practice since 2013.

*about 70% of gonorrhea cases had a sexual practice reported on an annual basis (with the exception of 2012, where half of the cases had a reported sexual practice).

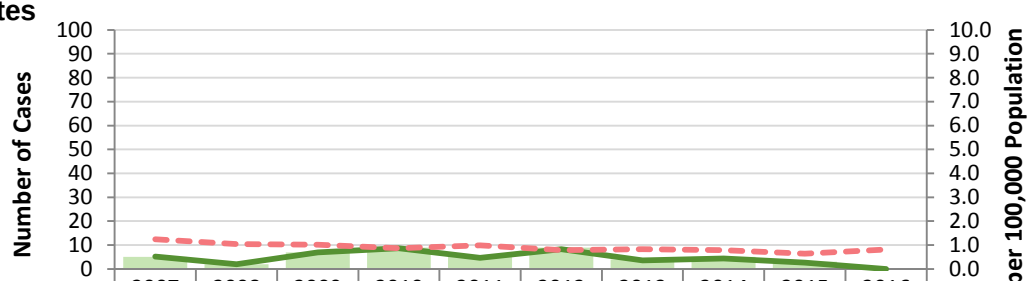
Figure 4.2.4 Reported heterosexual practice only among gonorrhea cases and by sex, York Region, 2012 to 2016



4.3 Hepatitis B, acute and chronic infections

In 2016, there were no cases of acute hepatitis B reported in York Region. The incidence has been relatively stable throughout the 2007 to 2016 period; however, the incidence of acute hepatitis B in York Region has been lower in recent years (2013 to 2016) in comparison to 2009 to 2012 (Figure 4.3.1). Throughout the 10 year period, the incidence of acute hepatitis B slightly decreased in Ontario and was higher than York Region in most years.

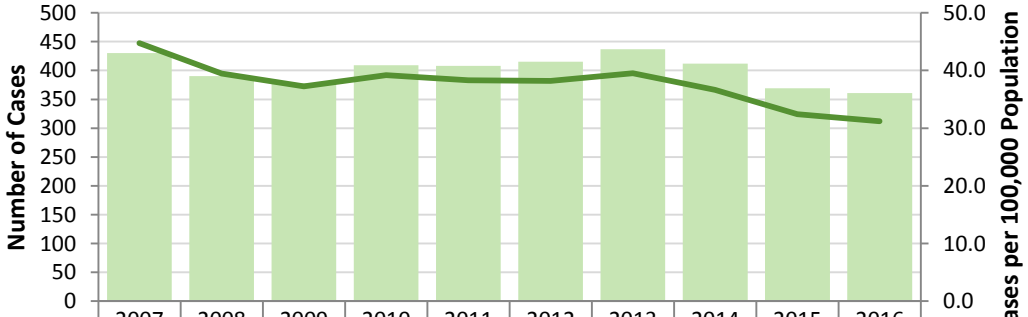
Figure 4.3.1 Incidence of Hepatitis B (acute infections), York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	5	2	7	9	5	9	4	5	3	0
YR Incidence Rate	0.5	0.2	0.7	0.9	0.5	0.8	0.4	0.4	0.3	0.0
ON Incidence Rates	1.2	1.0	1.0	0.9	1.0	0.8	0.8	0.8	0.6	0.8

In 2016, there were 361 cases of chronic hepatitis B reported in York Region (Figure 4.3.2). Overall, there has been a decrease in reported chronic hepatitis B in York Region between 2007 and 2016, with the lowest incidence of 31.2 cases per 100,000 population in 2016.

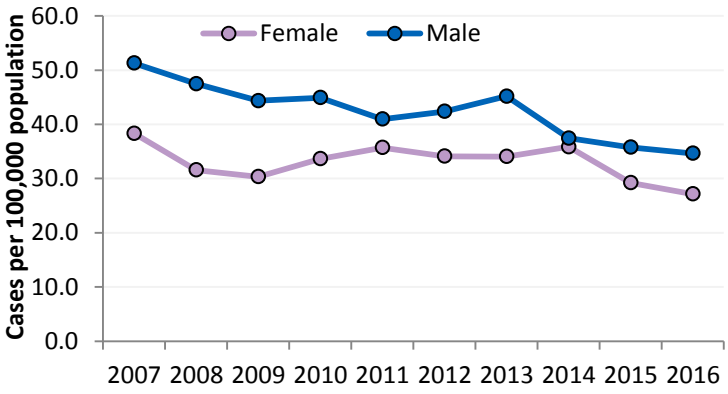
Figure 4.3.2 Incidence of Hepatitis B (chronic infections), York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	430	390	378	409	408	415	437	412	369	361
YR Incidence Rate	44.8	39.4	37.3	39.2	38.3	38.2	39.5	36.6	32.4	31.2

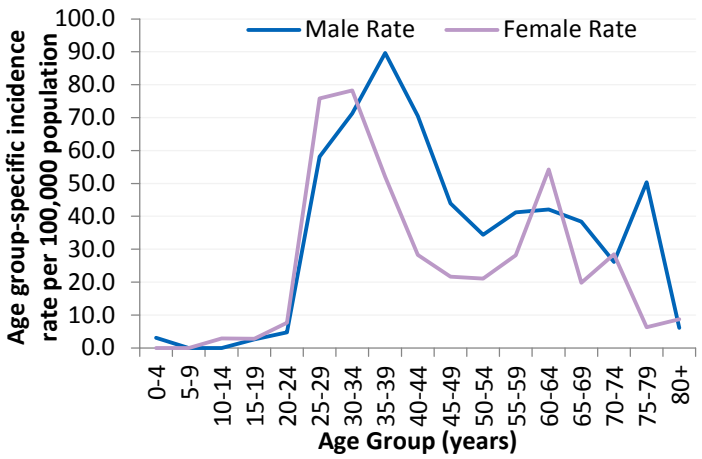
In 2016, the incidence of chronic hepatitis B was higher among males compared to females, which has been consistent for the time period examined (Figure 4.3.3). In 2016, there were age-group specific sex differences observed. Males had a higher incidence than females in the 35 to 39 age group, and females had a higher incidence in the 25 to 34 age groups (Figure 4.3.4). This is consistent with what was observed in the 2000 to 2015 period. Cases primarily occurred among the 25 to 64 year age group.

Figure 4.3.3 Incidence of chronic hepatitis B by sex, York Region, 2007-2016



*Excludes four cases with other/unknown sex

Figure 4.3.4 Sex and age-group incidence of chronic hepatitis B cases, York Region, 2016

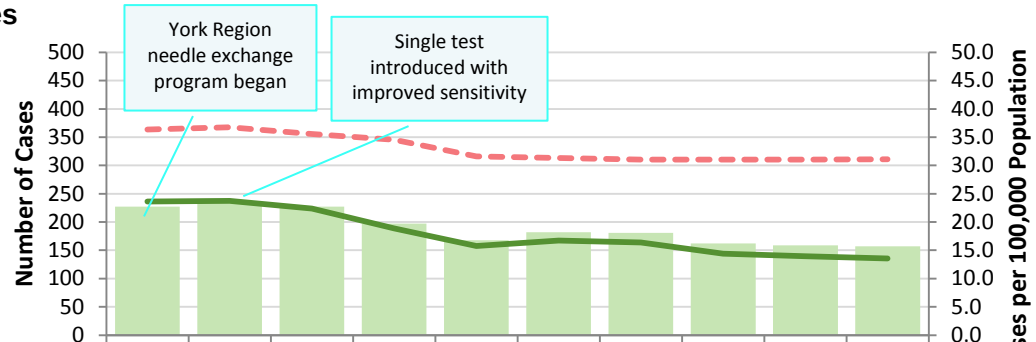


*Excludes four cases with other/unknown

4.4 Hepatitis C

In 2016, there were 157 cases of hepatitis C reported in York Region. The incidence of hepatitis C has been decreasing between 2007 and 2016 in Ontario and York Region, with the lowest incidence of 13.6 cases per 100,000 population observed for York Region in 2016 (Figure 4.4.1). The overall incidence in Ontario was higher than York Region during this time period.

Figure 4.4.1 Incidence of Hepatitis C, York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	227	235	227	197	168	182	181	162	159	157
YR Incidence Rate	23.6	23.8	22.4	18.9	15.8	16.8	16.4	14.4	14.0	13.6
ON Incidence Rates	36.4	36.8	35.6	34.6	31.6	31.3	31.0	31.1	31.0	31.1

The incidence of hepatitis C among males was higher than females from 2007 to 2016 (Figure 4.4.2). Among 2016 hepatitis C cases, the incidence was highest among males in the age group 35 to 39 years and there were no cases under 20 years of age (Figure 4.4.3).

Figure 4.4.2 Incidence of chronic hepatitis C by sex, York Region, 2007-2016

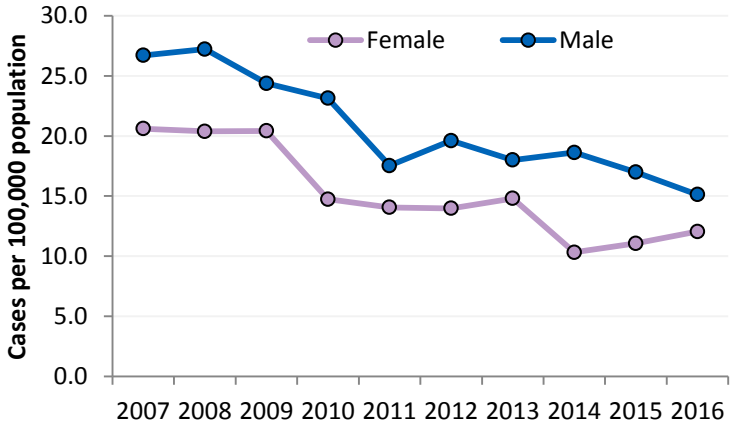
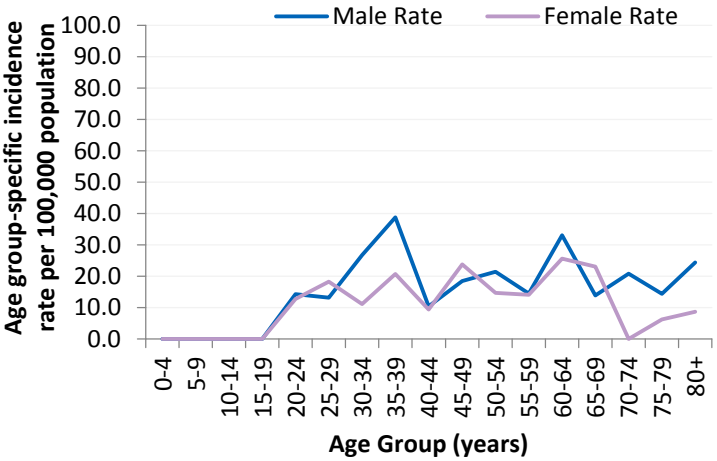
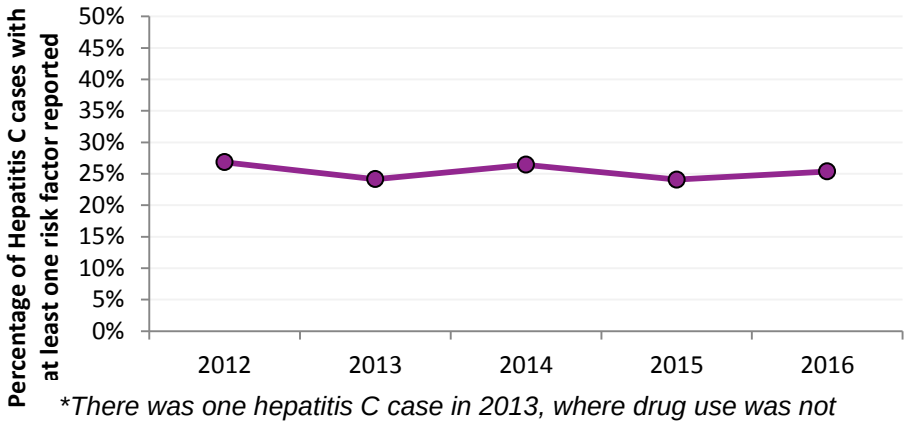


Figure 4.4.3 Sex and age-group incidence of hepatitis C cases, York Region, 2016



Injection drug use

Figure 4.4.4 Injection Drug Use Among Hepatitis C Cases, York Region, 2012 to 2016



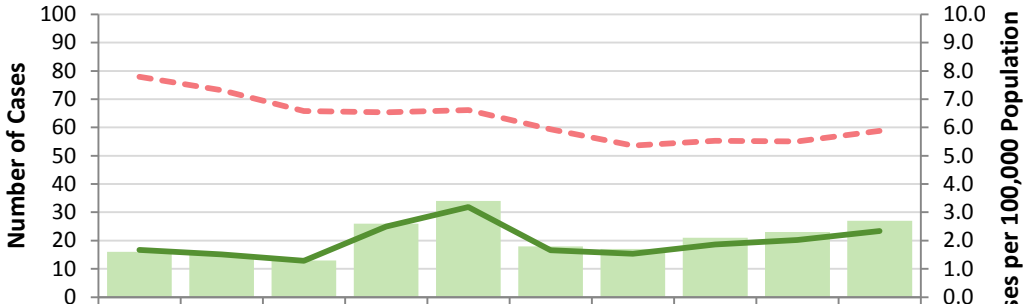
**There was one hepatitis C case in 2013, where drug use was not distinguished between injection drug use and/or inhalation drug use. This case has been included as having injected drugs.*

One of the common routes of exposure for hepatitis C is injection drug use (IDU)[xi]. Between 2012 and 2016, reported IDU among hepatitis C cases has been consistent, with a quarter of cases reporting IDU in 2016.

4.5 Human immunodeficiency virus including AIDS (HIV infection)

In 2016, there were 27 cases of HIV reported in York Region. The incidence rate of HIV has been increasing in York Region since 2013, with an incidence of 2.3 cases per 100,000 population in 2016 (Figure 4.5.1). The incidence rate in York Region has consistently been lower than Ontario. The incidence rate in Ontario decreased between 2007 to 2013, and started slightly increasing since 2013.

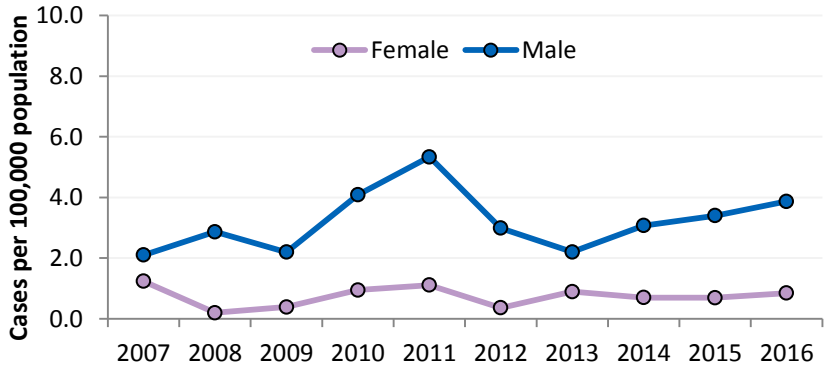
Figure 4.5.1 Incidence of HIV Infections York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	16	15	13	26	34	18	17	21	23	27
YR Incidence Rate	1.7	1.5	1.3	2.5	3.2	1.7	1.5	1.9	2.0	2.3
ON Incidence Rates	7.8	7.3	6.6	6.5	6.6	5.9	5.4	5.5	5.5	5.9

Overall, the incidence of HIV was over four times higher among males compared to females in 2016 (Figure 4.5.2). Among 2016 cases, the incidence rate was highest among the 25 to 44 year age group, and the 55 to 59 year age group. In 2016, there were three cases of HIV with AIDS at the time of diagnosis. Just over half of the male HIV cases reported the sexual practice of men having sex with men (either exclusively or in addition to the opposite sex).

Figure 4.5.2 Incidence of HIV Infections by sex, York Region, 2007-2016



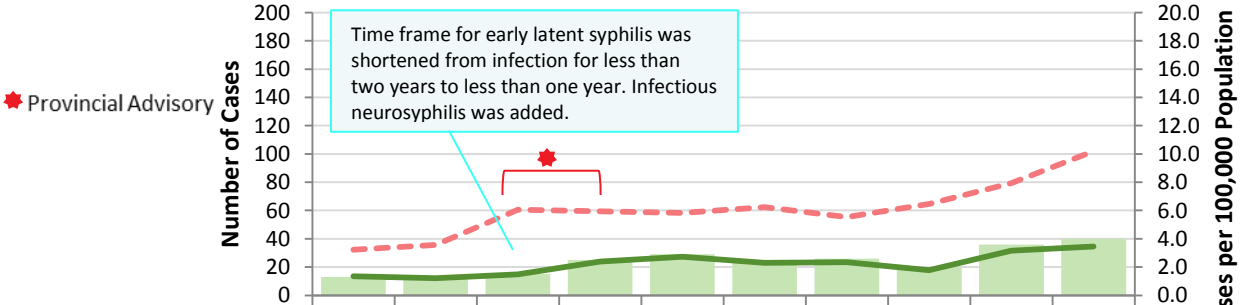
4.6 Syphilis, infectious and non-infectious

Infectious Syphilis

In 2016, there were 40 cases of infectious syphilis reported in York Region. The incidence rate of infectious syphilis was 3.5 cases per 100,000 population in 2016. There has been an increase in cases starting in 2015 and continuing in 2016 (Figure 4.6.1). This substantial increase has also been observed provincially. Prior to this, a substantial increase was observed in 2010 for York Region. The incidence of infectious syphilis is consistently higher in Ontario than York Region. Please refer to the 2000 to 2015 Reportable Diseases Report, Syphilis Chapter for further information on provincial advisories that occurred prior to 2016.

Figure 4.6.1 Incidence of Infectious Syphilis, York Region and Ontario, 2007-2016

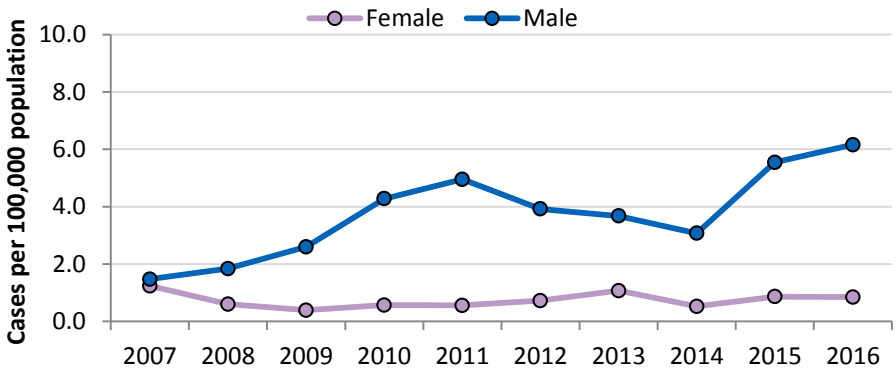
Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	13	12	15	25	29	25	26	20	36	40
YR Incidence Rate	1.4	1.2	1.5	2.4	2.7	2.3	2.4	1.8	3.2	3.5
ON Incidence Rates	3.2	3.6	6.0	5.9	5.8	6.2	5.5	6.5	7.9	10.2

In 2016, the incidence rate of infectious syphilis cases was seven times higher in males compared to females in York Region (Figure 4.6.2), and the age-specific incidence rate was highest among the 20 to 44 year age group overall. While the incidence among females has been fairly consistent between the 2007 to 2016 period, the incidence has been increasing among males.

Figure 4.6.2 Incidence of infectious syphilis by sex, York Region, 2007-2016

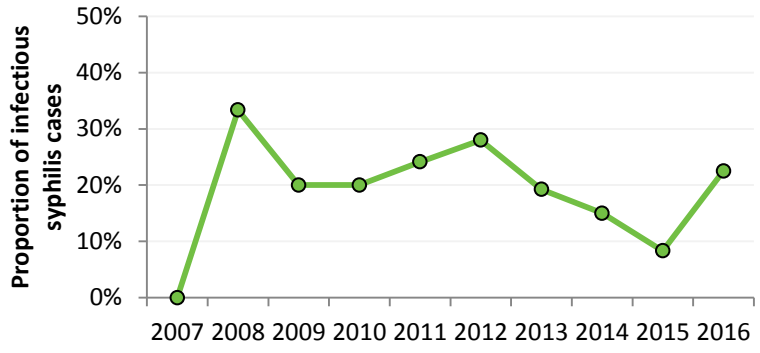


Syphilis among pregnant women

Pregnant women who have untreated infectious syphilis have a high risk of transmitting the infection to their fetus, resulting in congenital syphilis.[xi] Congenital syphilis can result in stillbirth, prematurity or death. Infants who are born with syphilis can have a number of clinical manifestations that can appear as early as two months of age or as late as two years of age. During the period of 2007 and 2016, there were five cases of infectious syphilis among women who reported being pregnant, with one case in 2009, three in 2013 and one in 2015. There were three cases of congenital syphilis between 2007 and 2016.

HIV concurrent infection among infectious syphilis cases [xiii]

Figure 4.6.3 HIV concurrent infection among infectious syphilis cases, York Region, 2007 to 2016

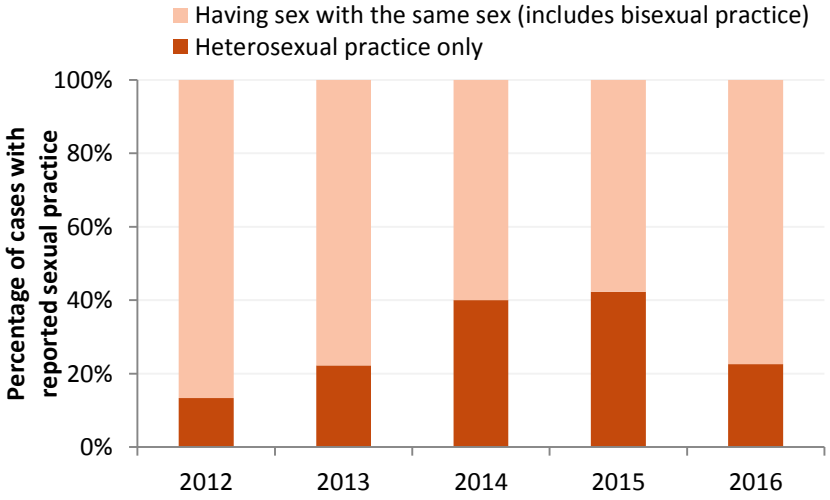


** These estimates may be underestimated as an individual's HIV diagnosis from another jurisdiction (i.e., outside of Ontario) may not be disclosed to public health and not recorded within our reporting*

Concurrent infections of HIV and syphilis are of concern due to the impacts the infections have on each other. Concurrent infections of syphilis and HIV can result in syphilis increasing HIV infectiousness and transmissibility as a result of increasing the HIV viral load.[xiii] Similarly, HIV infection among syphilis cases can increase the risk of central nervous system disease among syphilis cases and result in neurosyphilis.[xi] In 2016, 23 per cent of syphilis cases were concurrently infected with HIV.

Sexual practice among male infectious syphilis cases who reported their sexual practice

Figure 4.6.4. Reported sexual practice among male infectious syphilis cases, York Region, 2012 to 2016

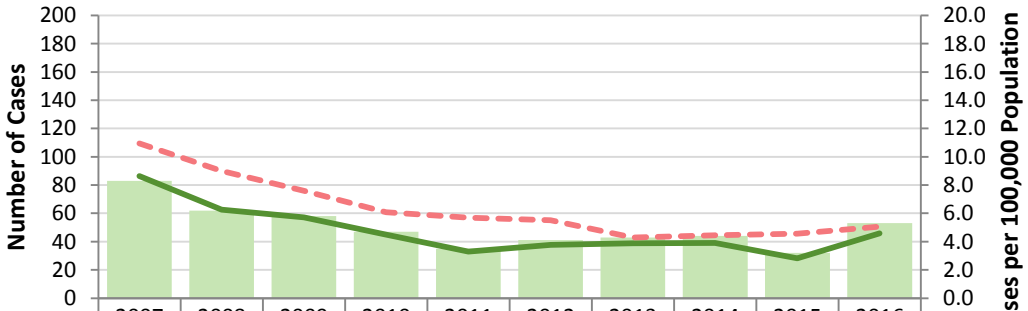


Nearly a quarter of males with infectious syphilis reported exclusive heterosexual practice in 2016 (Figure 4.6.4), consistent with 2012 to 2013. Nearly twice as many males with infectious syphilis reported exclusive heterosexual practice in 2014 and 2015, compared to 2016.

Non-infectious Syphilis

In 2016, there were 53 cases of non-infectious syphilis reported in York Region. The incidence rate of non-infectious syphilis cases was 4.6 cases per 100,000 population in York Region in 2016, and this was a slight increase in incidence relative to recent years (Figure 4.6.5). During the time period of 2007 to 2016, there was an overall decrease in non-infectious syphilis in Ontario and York Region, with the incidence in Ontario being higher than York Region for most years.

Figure 4.6.5 Incidence of Non-Infectious Syphilis, York Region and Ontario, 2007-2016: Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	83	62	58	47	35	41	43	44	32	53
YR Incidence Rate	8.6	6.3	5.7	4.5	3.3	3.8	3.9	3.9	2.8	4.6
ON Incidence Rates	10.9	9.0	7.6	6.1	5.7	5.5	4.3	4.5	4.6	5.0

**Non-infectious syphilis includes unstaged syphilis. There were no unstaged syphilis cases from 2010 to 2016 and only one to two cases in 2007, 2008 and 2009.*

The incidence rate among males and females decreased between 2007 and 2011 and fluctuated between 2011 and 2016 (Figure 4.6.6). Among cases in 2016, the incidence rate is highest among adults 35 years of age and older and is similar among males and females (Figure 4.6.7).

Figure 4.6.6 Incidence of non-infectious syphilis by sex, York Region, 2007-2016

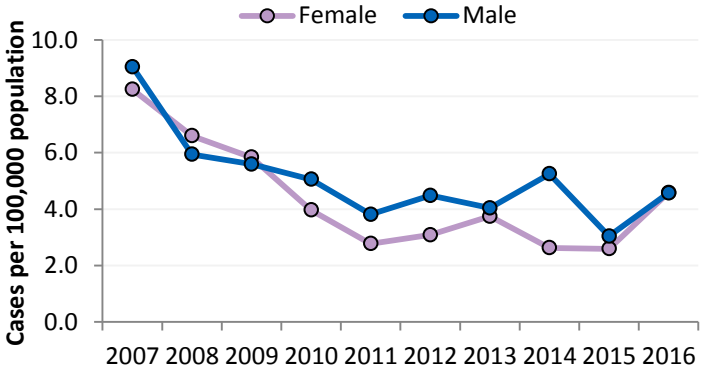
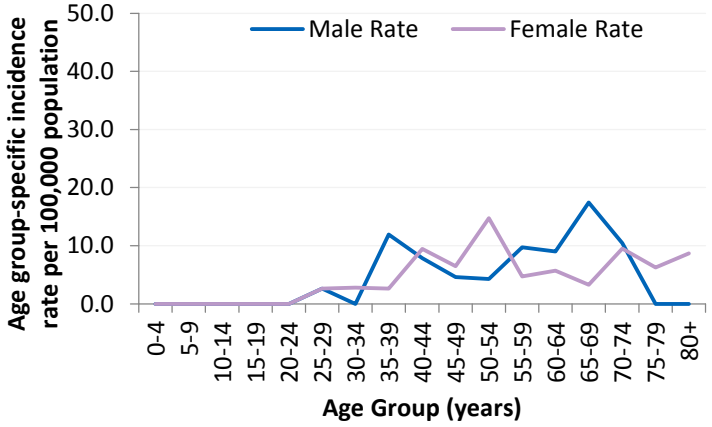
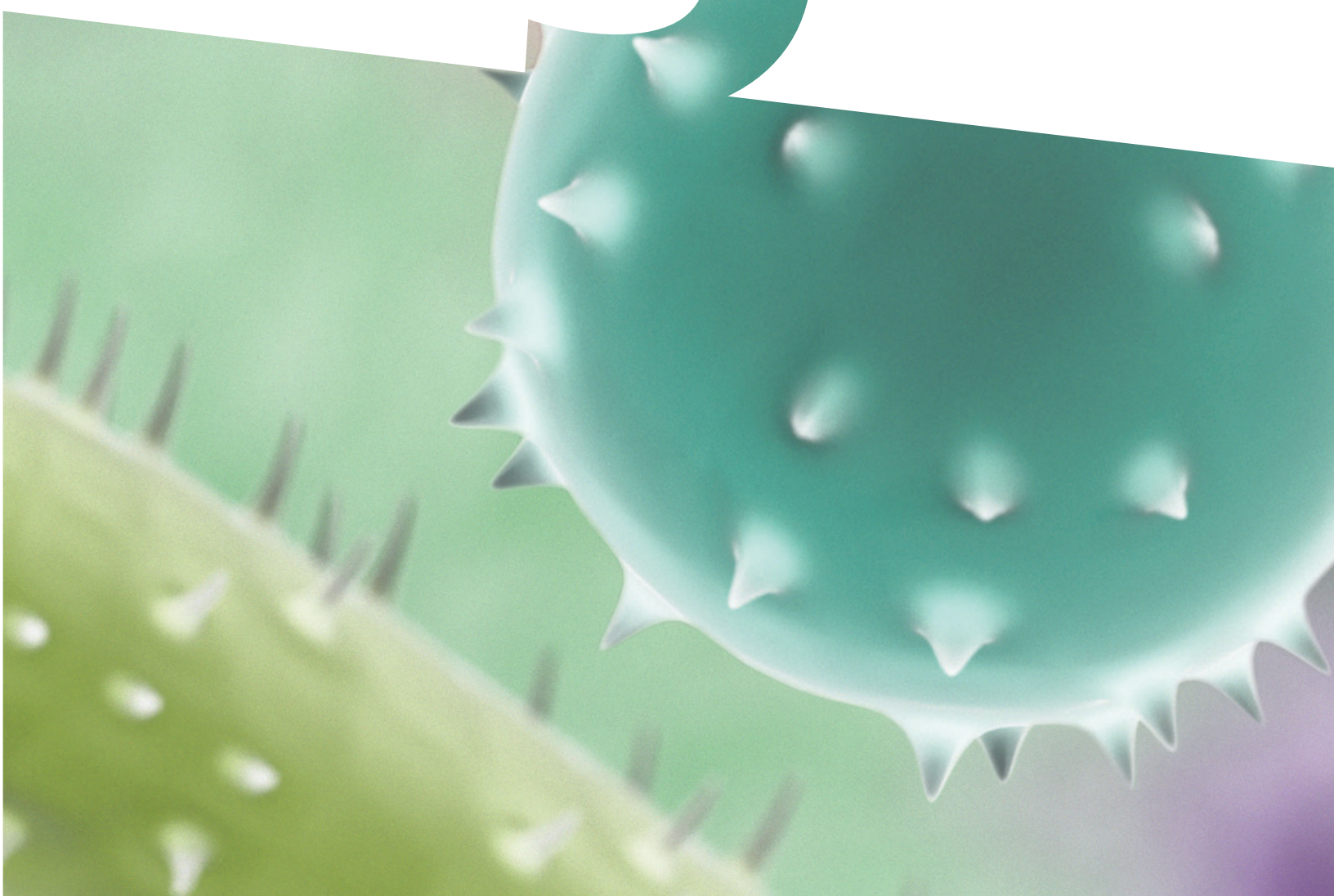


Figure 4.6.7 Sex and age-group incidence of non-infectious syphilis cases, York Region, 2016



VACCINE PREVENTABLE DISEASES

5



5 VACCINE PREVENTABLE DISEASES

Selected infectious diseases that are preventable by vaccination are presented in this chapter. Immunization has played an important role in reducing the burden of infectious diseases, saving more lives than any other health initiative in the last 50 years.[xiv] Ongoing surveillance of vaccine preventable disease incidence provides information regarding vaccination program effectiveness and the impact on the prevention and control of disease transmission. Some infections in this category, including polio, are considered surveillance priorities due to global and national disease eradication and control efforts. Information on vaccine preventable diseases in Canada since 1924 can be obtained from the Public Health Agency of Canada's website.[xv]

Table 5.0 highlights the York Region cases of reportable diseases under routine vaccination programs in Ontario.

Highlights

- There was one case of tetanus reported in 2016, and the most recent case reported prior to that was in 2010.
- One case each of measles, mumps and invasive meningococcal disease were reported in 2016
- Overall, the majority of vaccine preventable diseases continue to be low in York Region in 2016 (with the exception of influenza)

Table 5.0 Vaccine preventable diseases:

Annual cases, York Region, 2007-2016

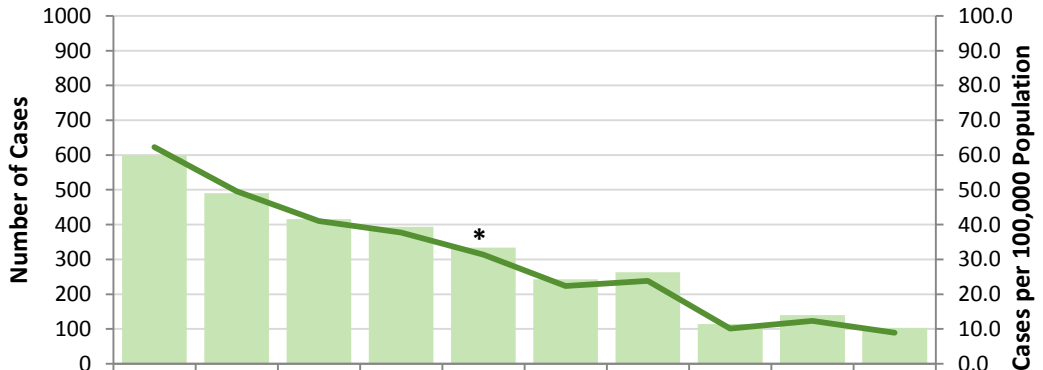
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
Acute Flaccid Paralysis								2	0	0	Syndrome became reportable December 2013
Diphtheria	0	0	0	0	0	0	0	0	0	0	Vaccine first introduced in 1926; no cases have been reported in Ontario since 1995
Haemophilus influenzae b disease, invasive	0	0	0	0	0	1	0	0	1	0	Vaccine first introduced in 1986
Influenza	131	200	1098	151	155	287	303	797	476	871	Vaccine first publicly-funded in 2000
Measles	0	1	0	0	0	0	0	5	1	1	Vaccine first introduced in 1963
Meningococcal disease, invasive	7	1	3	1	2	4	1	0	2	1	Vaccine first introduced in 1981. Routine in 2005.
Mumps	5	2	11	1	3	1	0	0	0	1	Vaccine first introduced in 1969
Pertussis	183	147	21	2	18	38	21	19	39	24	Vaccine first introduced in 1943
Pneumococcal disease, invasive	35	54	53	56	45	47	47	59	27	50	Vaccine first introduced in 1983
Poliomyelitis, Acute	0	0	0	0	0	0	0	0	0	0	Vaccine first introduced in 1955; last indigenous case of wild poliovirus detected in Canada in 1977
Rubella	0	0	1	0	0	0	0	0	0	0	Vaccine first introduced in 1969; last indigenous cases of rubella in Canada reported in 2005
Rubella congenital syndrome	0	0	0	0	0	0	0	0	0	0	Last York Region case reported in 1995
Smallpox	0	0	0	0	0	0	0	0	0	0	Vaccine first introduced in 1885; last case of smallpox in Ontario in 1962; declared globally eradicated in 1980
Tetanus	0	0	0	1	0	0	0	0	0	1	Vaccine first introduced in 1940
Varicella (Chickenpox)	598	490	416	394	334	243	263	114	140	103	Vaccine publicly-funded in 2005

Varicella (Chickenpox)

Varicella case counts provided by schools and childcare centres are reported to the province on a monthly basis as aggregate counts by age group. The aggregate counts presented in this report are approximate because individual cases were not investigated to remove duplicate records prior to 2015, and in general, varicella is under-reported. Case reports obtained through laboratory test results or physician reporting of cases with complications or hospitalizations, were investigated individually but are also included in aggregate counts. The incidence of chickenpox continued to decline in York Region in 2016 (Figure 5.0.1). Ontario data for chickenpox is unavailable.

Figure 5.0.1 Incidence of Varicella (Chickenpox), York Region, 2007-2016:

Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	598	490	416	394	334	243	263	114	140	103
YR Incidence Rate	62.2	49.6	41.0	37.8	31.3	22.4	23.8	10.1	12.3	8.9

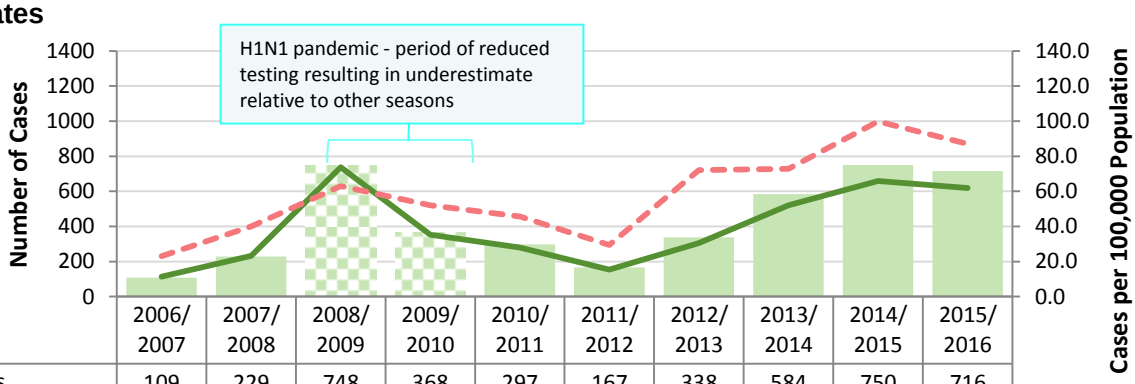
*Data unavailable for February 2011

5.1 Influenza

Influenza data are presented in this chapter by influenza season, as is typically done since calendar year comparisons of influenza incidence are difficult to interpret. The influenza reporting period is defined as September 1 to August 31 of the following year. Reported cases are a small proportion of those infected with influenza as only laboratory-confirmed cases are reportable and the majority of influenza cases are not confirmed through laboratory testing.[xvi]

In the 2015/2016 season, there were 716 laboratory-confirmed cases of influenza reported in York Region. The incidence rate of influenza for the 2015/16 season in York Region is consistent with the overall increase in influenza cases that have occurred since the 2011/12 season, and was slightly lower than the incidence rate of influenza in the 2014/2015 season (Figure 5.1.1). This was also observed for Ontario. The highest incidence of influenza occurred during the H1N1 pandemic, which started in the 2008/2009 season and continued into the 2009/10 season. Please refer to the 2000-2015 Reportable Diseases Report, Influenza Chapter for further details on the H1N1 pandemic and impact on York Region.

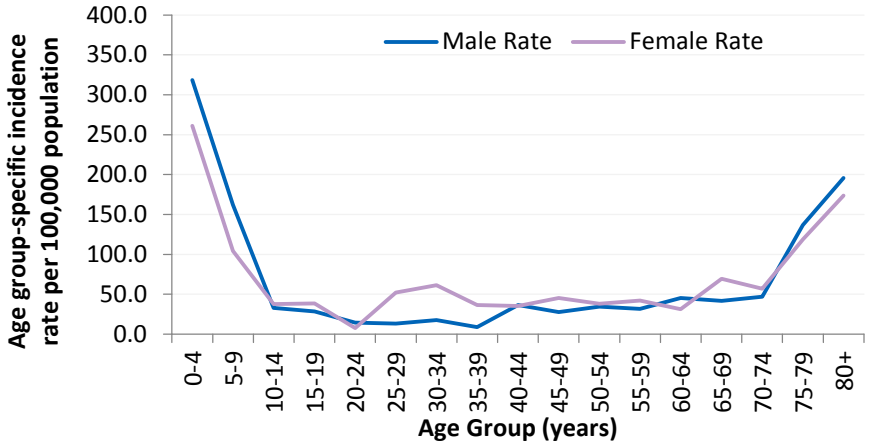
Figure 5.1.1 Incidence of influenza, York Region and Ontario, 2006/07 - 2015/16:
Cases and rates



	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
YR Cases	109	229	748	368	297	167	338	584	750	716
YR Incidence Rate	11.3	23.2	73.7	35.3	27.9	15.4	30.6	51.9	65.9	61.8
ON Incidence Rates	23.0	40.0	63.1	52.0	45.6	29.4	72.2	72.8	99.8	86.9

Among cases in the 2015/16 influenza season, the incidence rate was slightly higher among females compared to males (63.3 compared to 60.3 cases per 100,000 population, respectively). In both sexes, the age groups with the highest incidence rate were children less than five years of age, followed by the elderly (Figure 5.1.2). This is consistent with the age group most impacted by the H1N1 pandemic 2009 subtype, which was the most commonly circulating strain during the 2015/2016 season. [xvii]

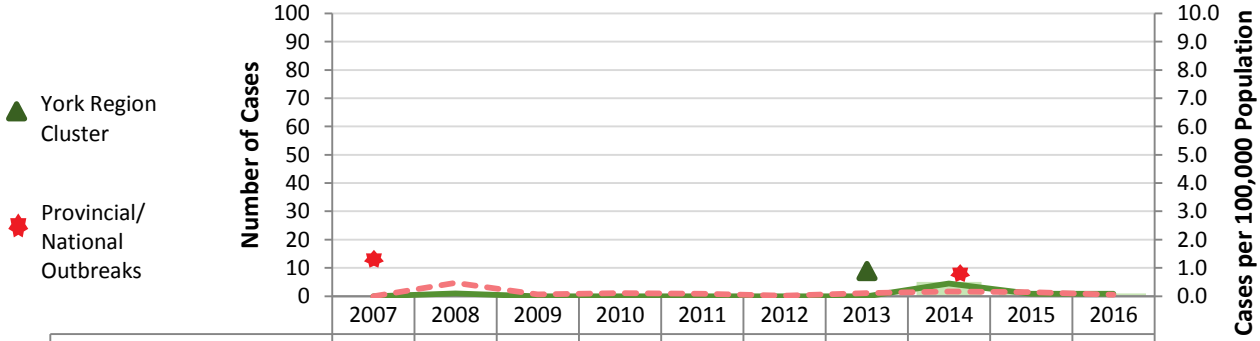
Figure 5.1.2 Incidence rate of Influenza by sex, York Region, 2015/2016 season



5.2 Measles

In 2016, there was one case of measles reported in York Region. Between 2007 and 2016, measles was rare with zero to one case occurring per year, with the exception of 2014 when a cluster of five measles cases was identified (Figure 5.2.1). During this 10 year period, eight measles cases were reported. Three of the cases were male. One case was an infant, two cases were between 10 to 19 years of age and five cases were between 20 to 35 years of age. Similar to York Region, the incidence of measles in Ontario was low in 2016 and has been low during the time period of 2007 to 2016. A few provincial and national outbreaks have occurred during this ten year time period. Please refer to the 2000 to 2015 Reportable Diseases Report, Measles Chapter for further information on the York Region cluster and the provincial and national outbreaks.

Figure 5.2.1 Incidence of Measles, York Region and Ontario, 2007-2016:
Cases and rates

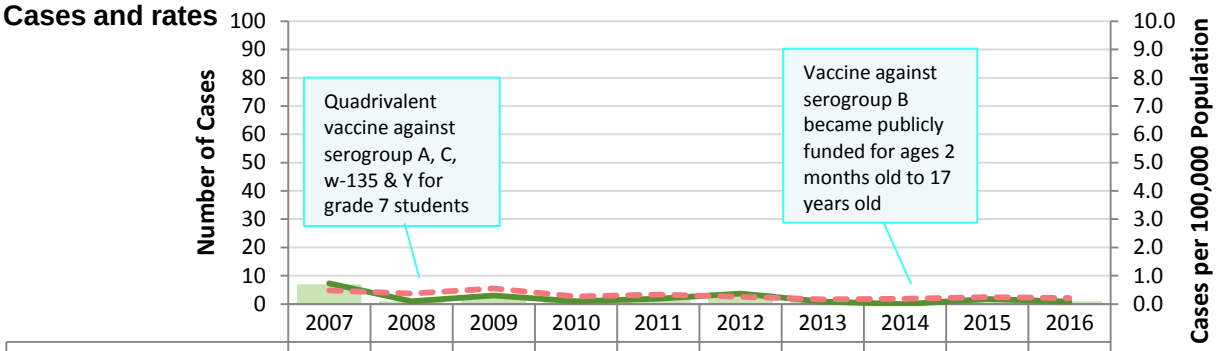


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	0	1	0	0	0	0	0	5	1	1
YR Incidence Rate	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.1
ON Incidence Rates	0.0	0.5	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.1

5.3 Meningococcal disease, invasive

In 2016, there was one case of invasive meningococcal disease reported in York Region, and the low incidence in 2016 has been consistent with recent years (Figure 5.3.1). The overall trend since 2008 has been stable. In York Region, there were 22 cases that occurred during the 2007 and 2016 period. About half of the cases were male. Four of the cases were among infants, three cases were among 15 to 19 year olds and the remaining cases were distributed among adults aged 20 to 79 years of age. The low incidence of invasive meningococcal disease has also been observed in Ontario.

Figure 5.3.1 Incidence of Meningococcal disease (invasive), York Region and Ontario, 2007-2016:



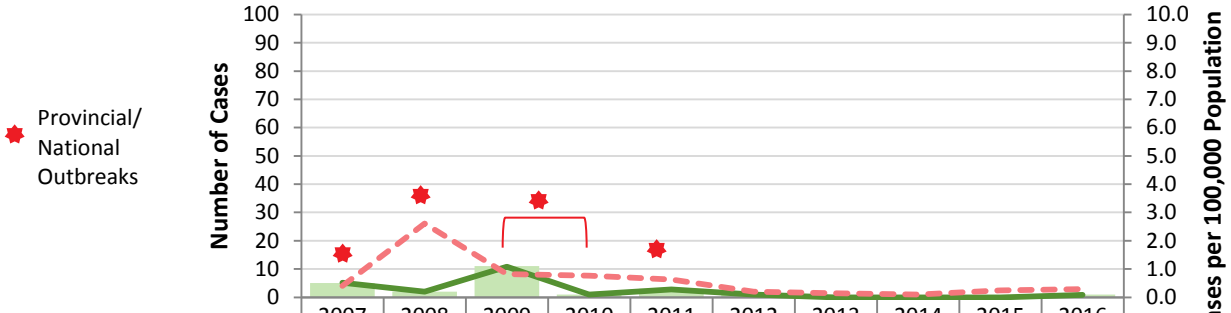
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	7	1	3	1	2	4	1	0	2	1
YR Incidence Rate	0.7	0.1	0.3	0.1	0.2	0.4	0.1	0.0	0.2	0.1
ON Incidence Rates	0.5	0.4	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.2

5.4 Mumps

In 2016, there was one case of mumps reported in York Region. The incidence of mumps throughout the 2007 to 2016 period has been very low, with the exception of years in which York Region has had cases associated with provincial or national outbreaks (2007, 2009 and 2011) (Figure 5.4.1). The incidence of mumps in York Region has been similar to the incidence in Ontario, with the exception of 2008, where there was a large mumps outbreak in Oxford County. Further information on provincial outbreaks and associated York Region cases can be found in the 2000-2015 Reportable Diseases Report, Mumps Chapter.

Between the 2007 and 2016 period, there were 24 cases of mumps in York Region. Among the 22 cases with known age, half of the cases were between 15 and 24 years of age. The remaining cases were primarily 25 years of age and older, and a small proportion of cases was less than 15 years of age. Seventy percent of the 23 cases with known sex were male. The higher proportion of cases among the 15 to 24 age group is consistent with a susceptible cohort of individuals born approximately between 1980 and 1992 who may have only received one dose of mumps containing vaccine since two doses of mumps containing vaccine were not included in the immunization schedule until 1996. [xviii] In addition, the higher proportion of male cases is believed to be a result of males attending high contact settings, such as athletic events, where there is greater risk of being exposed to mumps.

Figure 5.4.1 Incidence of Mumps, York Region and Ontario, 2007-2016:
Cases and rates

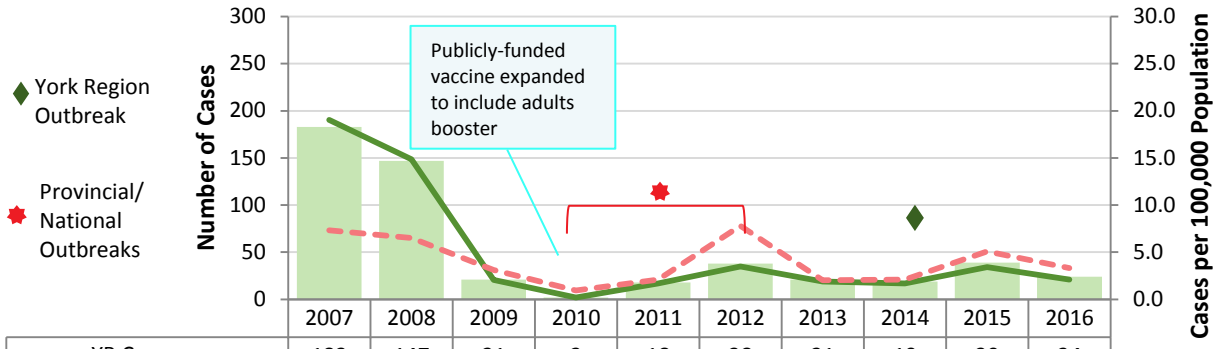


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	5	2	11	1	3	1	0	0	0	1
YR Incidence Rate	0.5	0.2	1.1	0.1	0.3	0.1	0.0	0.0	0.0	0.1
ON Incidence Rates	0.4	2.6	0.8	0.8	0.6	0.2	0.1	0.1	0.2	0.3

5.5 Pertussis

In 2016, there were 24 cases of pertussis reported in York Region, with an incidence rate of 2.1 cases per 100,000 population. Following the high incidence rate of pertussis in 2007 and 2008 in York Region, the incidence rate has declined substantially (Figure 5.5.1). The incidence rate has remained fairly consistent between 2009 and 2016 for York Region and Ontario, with a notable provincial outbreak and local cluster. Please refer to the 2000 to 2015 Reportable Diseases Report, Pertussis Chapter for further details on the cluster and outbreak.

Figure 5.5.1 Incidence of Pertussis, York Region and Ontario, 2007-2016:
Cases and rates



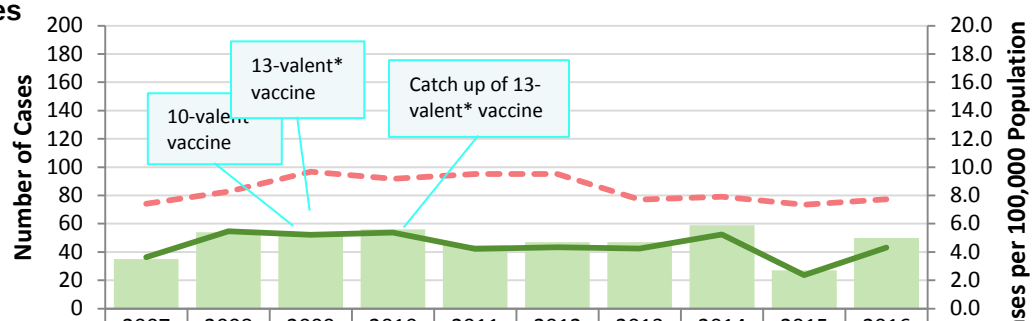
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	183	147	21	2	18	38	21	19	39	24
YR Incidence Rate	19.0	14.9	2.1	0.2	1.7	3.5	1.9	1.7	3.4	2.1
ON Incidence Rates	7.3	6.5	3.1	0.9	2.1	7.8	2.0	2.1	5.1	3.3

Among 2016 cases, the incidence rate of pertussis was slightly higher among females compared to males (2.2 versus 1.9 cases per 100,000 population). The incidence rate was highest among infants, followed by children. There were five cases in the 40 to 49 age group, and no cases in other adult age groups.

5.6 Pneumococcal disease, invasive

In 2016, there were 50 cases of invasive pneumococcal disease in York Region. Between 2007 and 2016, the incidence rate of invasive pneumococcal disease remained fairly consistent, with a decline in 2015 (Figure 5.6.1). A similar overall trend was observed in Ontario. York Region consistently had a lower incidence rate of invasive pneumococcal disease compared to Ontario between 2007 and 2016.

Figure 5.6.1 Incidence of Pneumococcal disease (invasive), York Region and Ontario, 2007-2016:
Cases and rates



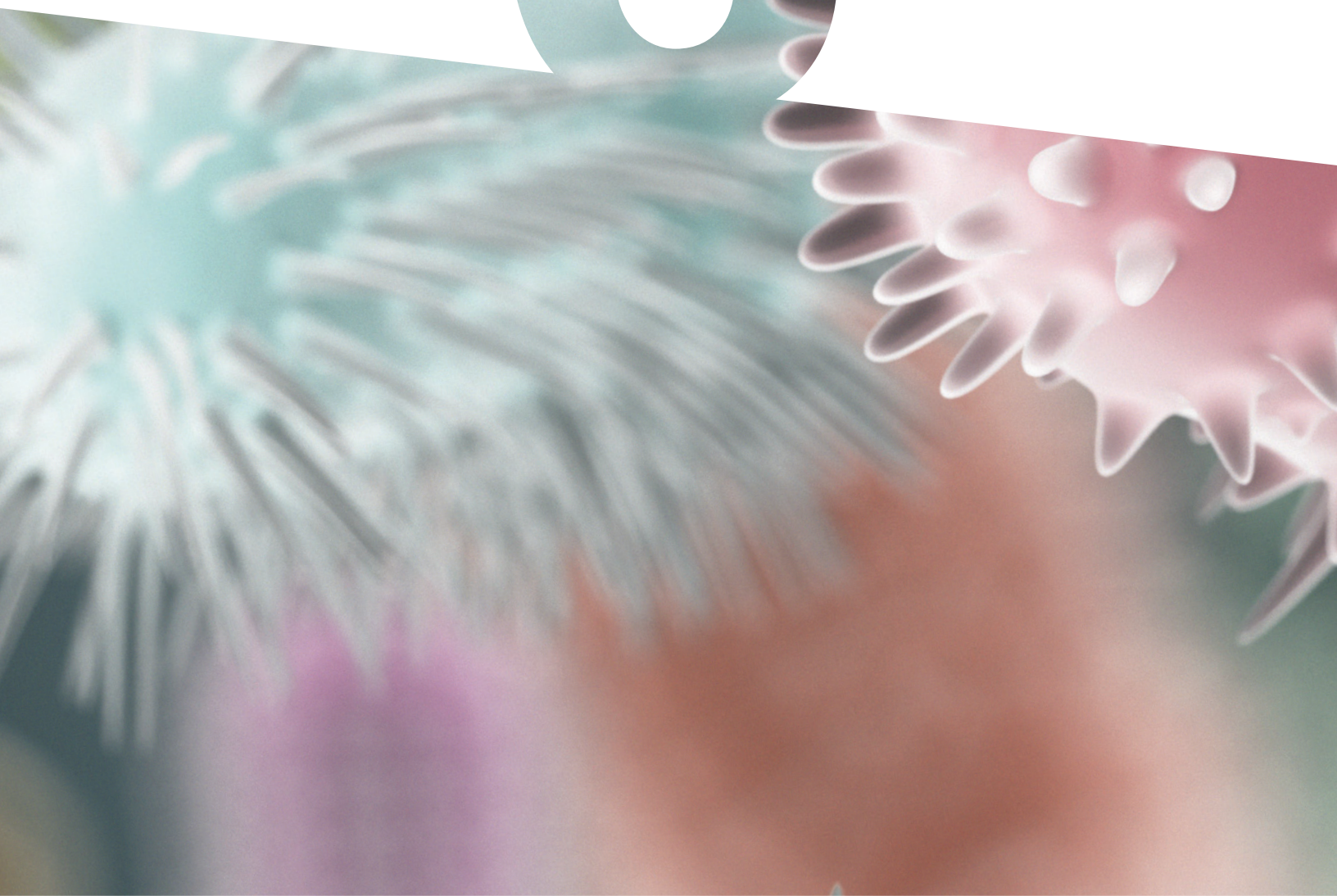
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	35	54	53	56	45	47	47	59	27	50
YR Incidence Rate	3.6	5.5	5.2	5.4	4.2	4.3	4.3	5.2	2.4	4.3
ON Incidence Rates	7.4	8.3	9.7	9.2	9.5	9.5	7.7	7.9	7.3	7.7

* Valence number is the number of serotypes that are included in the vaccine (i.e., a 10-valent vaccine protects against ten serotypes of the bacteria).

Among 2016 cases, the incidence was slightly higher among females than males (4.4 and 4.2 cases per 100,000 population, respectively) and the incidence rate was highest among the elderly.

VECTOR-BORNE AND ZOONOTIC DISEASES

6



6 VECTOR-BORNE AND ZOONOTIC DISEASES

Vector-borne diseases are bacterial, viral or parasitic infections that are transmitted to humans by mosquitoes, ticks, fleas and flies (i.e., vectors) or from an infected host (e.g., birds, mice, other mammals). Zoonotic diseases are bacterial, viral or parasitic infections that are transmitted freely between species under natural conditions. These diseases are typically transmitted from animals to humans. Creutzfeldt-Jakob disease has been included in this chapter, as it is part of a group of rare progressive neurodegenerative (prion) disorders that affect both humans and animals.

Table 6.0 highlights the York Region cases of reportable vector-borne and zoonotic diseases in Ontario.

- In 2016, there was one case of brucellosis. Brucellosis occurs mainly among travelers to endemic areas and those handling infected animals.[xix]
- Viral hemorrhagic fevers such as Ebola virus disease, Marburg virus disease and Lassa fever have never been reported in York Region.[xvii]
- In 2016, there were 12 cases of malaria. Malaria, a protozoan-caused illness transmitted by mosquitoes, occurs among individuals who travel from malaria endemic countries.[xi]
- In 2016, there was one case of Q fever. Q fever is a bacterial illness usually transmitted to humans from infected sheep, goats and cattle, often through contact with placental tissue or birth fluids.[xi]
- In Ontario, the last domestic case of human rabies occurred in 1967.[xvii] Rabies is endemic in some Ontario wildlife. There were 288 cases of animal rabies reported in Ontario in 2016, which was a substantial increase from 2015, where there were 24 cases.[xx] The rabies strains isolated included bat rabies, raccoon rabies and fox rabies. No animal rabies was identified in York Region in 2016.

This report focuses on Lyme disease and West Nile virus.

Highlights

- Incidence rate of Lyme disease in 2016 was consistent with what has been reported in recent years
- Among Lyme disease cases reported in 2016, the majority of cases had travelled to an established Lyme disease risk area
- Incidence rate of West Nile virus remained low in 2016
- In the 2012 to 2016 period, there were seven cases of West Nile virus with neurological syndromes

Table 6.0 Vector-borne and zoonotic diseases:

Annual cases, York Region, 2007-2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	NOTES
Anthrax	0	0	0	0	0	0	0	0	0	0	No cases in Ontario since 1991†
Brucellosis	0	1	0	0	0	0	1	0	0	1	
Creutzfeldt-Jakob Disease	0	1	2	0	1	0	2	3	0	1	
Hantavirus pulmonary syndrome	0	0	0	0	0	0	0	0	0	0	Since becoming reportable in 2001 no cases have been reported in Ontario
Hemorrhagic fevers	0	0	0	0	0	0	0	0	0	0	No cases reported in Canada since 2002
Lyme Disease (confirmed)	2	2	2	1	3	2	13	6	8	5	
Lyme Disease (probable)	2*		0	1	2	2	3	3	2	5	Became reportable in 2009
Malaria	8	10	12	15	10	10	8	12	6	12	
Plague	0	0	0	0	0	0	0	0	0	0	No York Region cases since 1991†
Psittacosis/ Ornithosis	0	0	0	0	0	0	0	0	0	0	No York Region cases since 1991†
Q fever	0	0	0	1	1	1	0	1	0	1	
Rabies (human)	0	0	0	0	0	0	0	0	0	0	Ontario's last domestic case reported in 1967
Tularemia	0	0	0	0	0	0	0	0	0	0	No York Region cases since 1991†
West Nile virus illness	2	4	0	0	1	17	1	1	1	3	Cases reported in York Region since 2002
Yellow fever	0	0	0	0	0	0	0	0	0	0	No York Region cases since 1991†

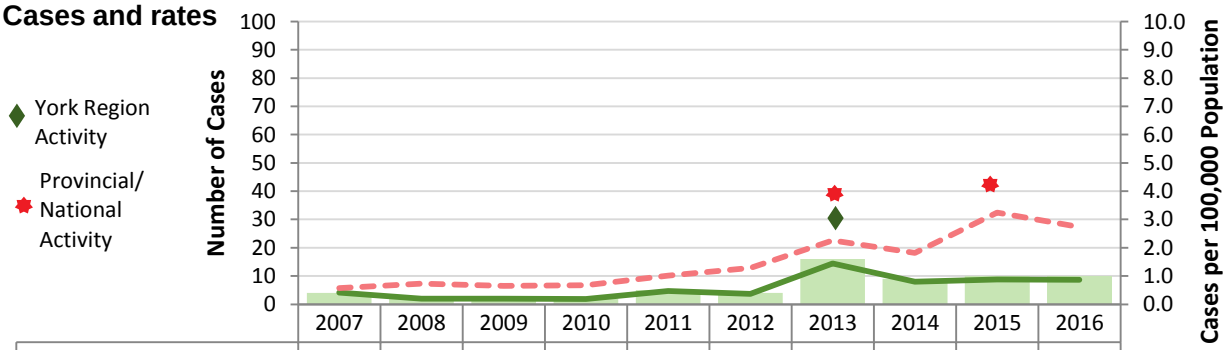
*Symptom onset in 2007 for cases reported after probable case definition inclusion in 2009. †Electronic reporting started in 1991.

6.1 Lyme disease

In 2016, there were 10 cases of Lyme disease reported in York Region (Figure 6.1.1). In York Region, the incidence rate of Lyme disease remained quite low between 2007 and 2012, followed by an increase in 2013. The increase in 2013 was associated with travel to blacklegged tick endemic areas. [xxi] The annual incidence rates of Lyme disease for 2014 to 2016 are lower than 2013; however, they have consistently been higher than the 2007 to 2012 period. Ontario rates have been higher than York Region, and have increased throughout the 10 year period. Please refer to the 2000 to 2015 Reportable Diseases Report, Lyme Disease Chapter for further information on increases in Ontario and York Region.

Figure 6.1.1 Incidence of Lyme Disease, York Region and Ontario, 2007-2016:

Cases and rates



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	4	2	2	2	5	4	16	9	10	10
YR Incidence Rate	0.4	0.2	0.2	0.2	0.5	0.4	1.4	0.8	0.9	0.9
ON Incidence Rates	0.6	0.7	0.7	0.7	1.0	1.3	2.3	1.8	3.2	2.7

Among all 2016 cases, the incidence was slightly higher among females compared to males (1.0 and 0.7 cases per 100,000 population, respectively). There were two cases among children less than 10 years of age, three cases above 60 years of age, and the remaining five cases were among 20 to 54 year age groups.

Lyme Disease Exposures for Cases in 2016

There are well-established risk areas for blacklegged ticks in Canada.[xxii] In addition, tick dragging in Ontario is undertaken twice during the May and October period (one in spring and one in fall) to identify new and emerging risk areas.[xxiii] Identification of at least one tick during this annual process helps to identify possible risk areas (based on a 20 km radius from that point). Note that possible risk areas are not categorized with federally defined endemic and risk areas. Based on this activity in 2016, the southeastern part of York Region is considered to be a possible risk area. Table 6.1.1 provides a breakdown of exposures for Lyme disease cases reported in 2016, where half of the cases had an exposure likely outside of York Region.

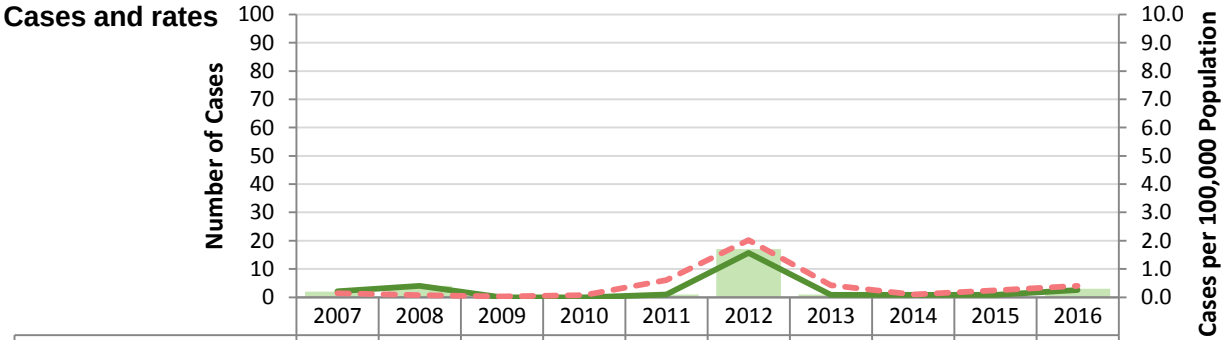
Table 6.1.1 Exposure areas of Lyme disease cases (N=10), York Region, 2016

Exposure Area	Number of cases (%)
Possibly York Region (YR) acquired	5 (50%)
Likely acquired outside of York Region	5 (50%)
Unknown	0

6.2 West Nile virus illness

In 2016, there were three cases of West Nile virus reported in York Region. The incidence of West Nile virus has been low and consistent in York Region and Ontario throughout the 2007 to 2016 period, with the exception of 2012 (Figure 6.2.1). Please refer to the profile below for further information on the relatively high incidence of West Nile virus in York Region in 2012. All three cases in 2016 were male, 50 years of age and older.

Figure 6.2.1 Incidence of West Nile Virus, York Region and Ontario, 2007-2016:

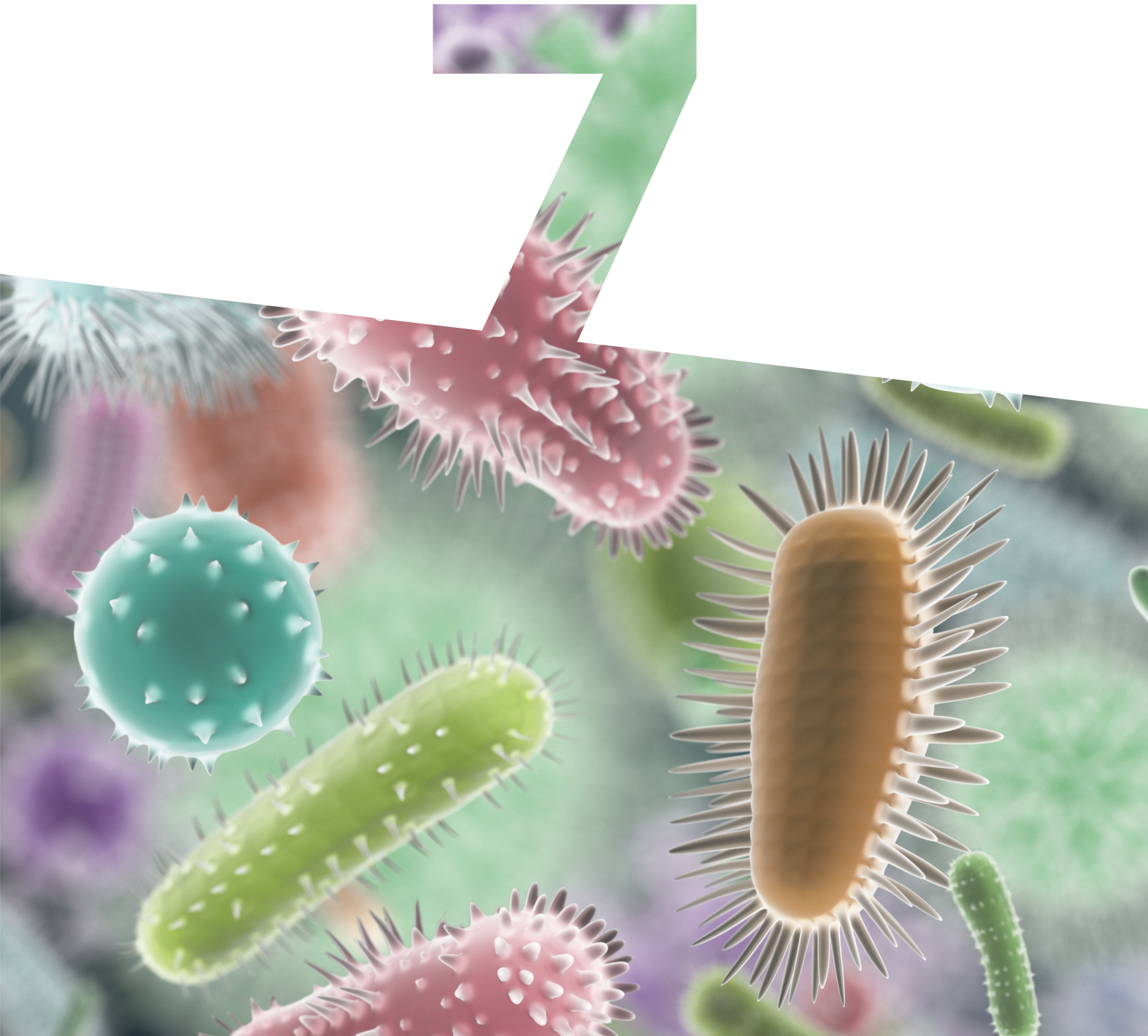


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
YR Cases	2	4	0	0	1	17	1	1	1	3
YR Incidence Rate	0.2	0.4	0.0	0.0	0.1	1.6	0.1	0.1	0.1	0.3
ON Incidence Rates	0.1	0.1	0.0	0.1	0.6	2.0	0.4	0.1	0.2	0.4

Syndromes among West Nile virus cases

In general, 70 to 80 per cent of West Nile virus cases are asymptomatic[xi]; however, they are not likely to be reported unless they have undergone blood testing. Cases that do experience symptoms can experience mild symptoms, such as occurrence of headache, muscle pain, joint pain, gastrointestinal symptoms and presentation of rash. In one per cent of cases, individuals can experience more severe symptoms, such as neurological complications. These may include meningitis, encephalitis, acute flaccid paralysis, movement disorder, parkinsonism or other neurological conditions. Among the 23 York Region cases reported between 2012 and 2016, seven cases had neurological syndromes, and the remaining cases had non-neurological syndromes. There were no asymptomatic cases reported. Among the seven cases with neurological syndromes, the following syndromes were experienced by two cases each: meningitis, encephalitis, acute flaccid paralysis and movement disorder.

OUTBREAKS



7 OUTBREAKS

An outbreak can be defined as an increase in the number of cases of illness within a community that exceeds what can normally be expected.[xi] Therefore, when determining if an outbreak exists, it is done relative to the usual frequency of the disease in the same area, among the same population, at the same season of the year.[xi]

Outbreaks are generally under-reported because:

- individuals may not know to report clusters of disease incidence to public health
- outbreaks comprised of individuals with less severe symptoms may go unreported
- outbreaks without individuals seeking medical care and subsequent testing may go unreported
- outbreaks due to non-reportable organisms are not reported by laboratories

Outbreaks in the community are less likely to be reported because cases may not know about each other's illness whereas outbreaks in institutions are more easily detected when cases are located in the same place. Therefore, the number of reported outbreaks likely underestimates the true burden of outbreak-related illness in York Region.

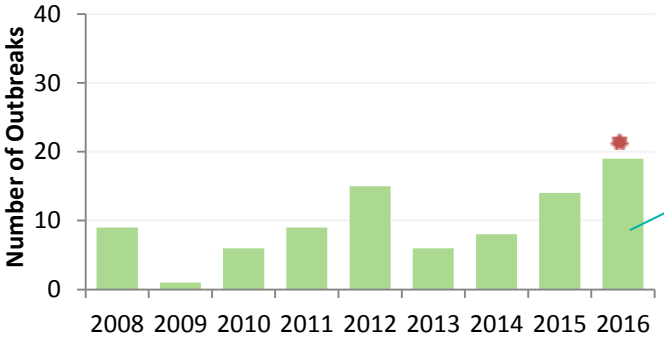
This chapter focuses on enteric and respiratory outbreaks. For additional information on enteric and respiratory outbreaks, refer to the 2000-2015 Reportable Diseases Report, Outbreak Chapter in the 2000-2015 Annual Reportable Diseases Summary Report.

In 2016, York Region Public Health had 157 confirmed enteric and respiratory outbreaks.

7.1 Enteric outbreaks

In 2016, there were 19 confirmed enteric outbreaks in community settings and 74 in institutional settings (Figures 7.1.1 and 7.1.2). A specific agent was not identified for the majority of these outbreaks. In community and institutional settings, norovirus was either the only or most commonly identified agent. This is similar to previous years, as detailed in the 2000 to 2015 Reportable Diseases Summary Report. Campylobacter, enterovirus, and shigella were each associated with one institutional outbreak. Among institutional enteric outbreaks, the majority of outbreaks were in childcare settings.

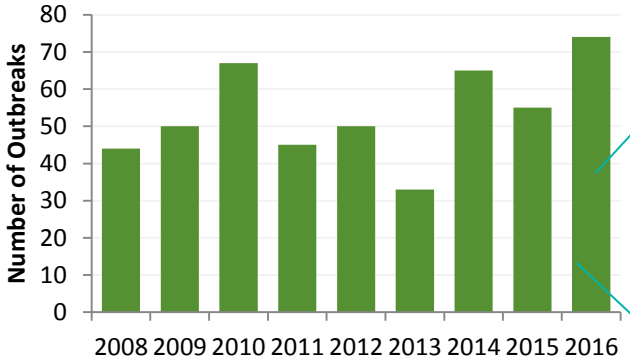
Figure 7.1.1 Enteric Community Outbreaks, York Region, 2008 to 2016



Agent	% of 2016 outbreaks
Norovirus	47%
Unknown agent	53%

2016: A higher number of schools reported elevated illness compared to previous years. This resulted in a higher proportion of confirmed outbreaks in schools in 2016 compared to previous years (68% compared to a median of 14% for 2011 to 2015). Norovirus was detected in all school outbreaks with a specimen submitted.

Figure 7.1.2 Enteric Institutional Outbreaks, York Region, 2008 to 2016



Agent	% of 2016 outbreaks
Norovirus	26%
Campylobacter	1%
Enterovirus	1%
Shigella	1%
Unknown Agent	70%

Setting Type	% of outbreaks
Childcare Setting	70%
Long Term Care Home	18%
Retirement Home	11%
Other (group home)	1%

7.2 Respiratory outbreaks

In 2016, there were no respiratory outbreaks in community settings and 64 in institutional settings (Figures 7.2.1 and 7.2.2). Among institutional outbreaks with identified agents, influenza A and rhinovirus were most commonly identified. This is consistent with previous years, as detailed in the 2000 to 2015 Reportable Diseases Summary Report. Among respiratory outbreaks in institutions, the majority were in long-term care home settings. In long- term care homes and retirement homes, more than half of the agents identified were non-influenza.

Figure 7.2.1 Respiratory Community Outbreaks, York Region, 2008 to 2016

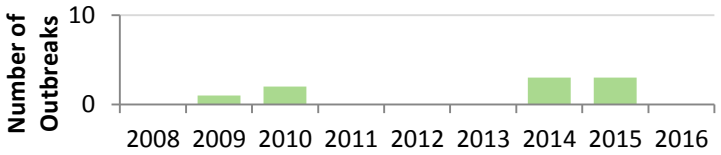
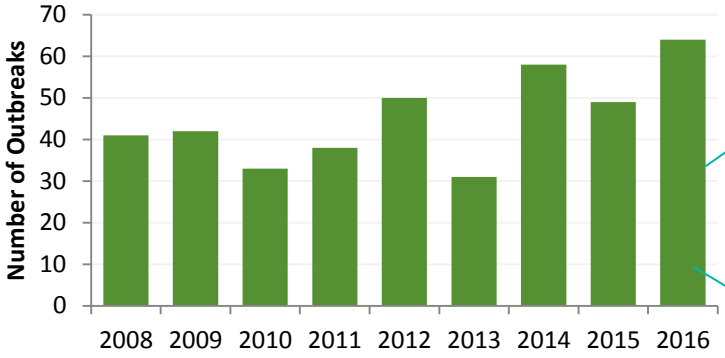
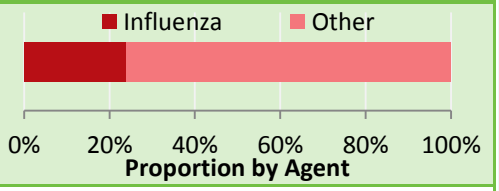
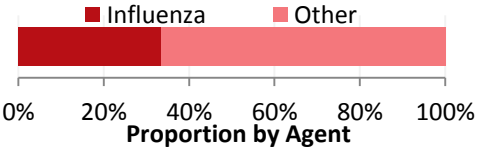


Figure 7.2.2 Respiratory Institutional Outbreaks, York Region, 2008 to 2016



Agent	% of 2016 outbreaks
Influenza A	20%
Rhinovirus	20%
Coronavirus	16%
Parainfluenza	9%
Respiratory Syncytial Virus	9%
Influenza B	6%
Metapneumovirus	6%
Unknown agent	13%

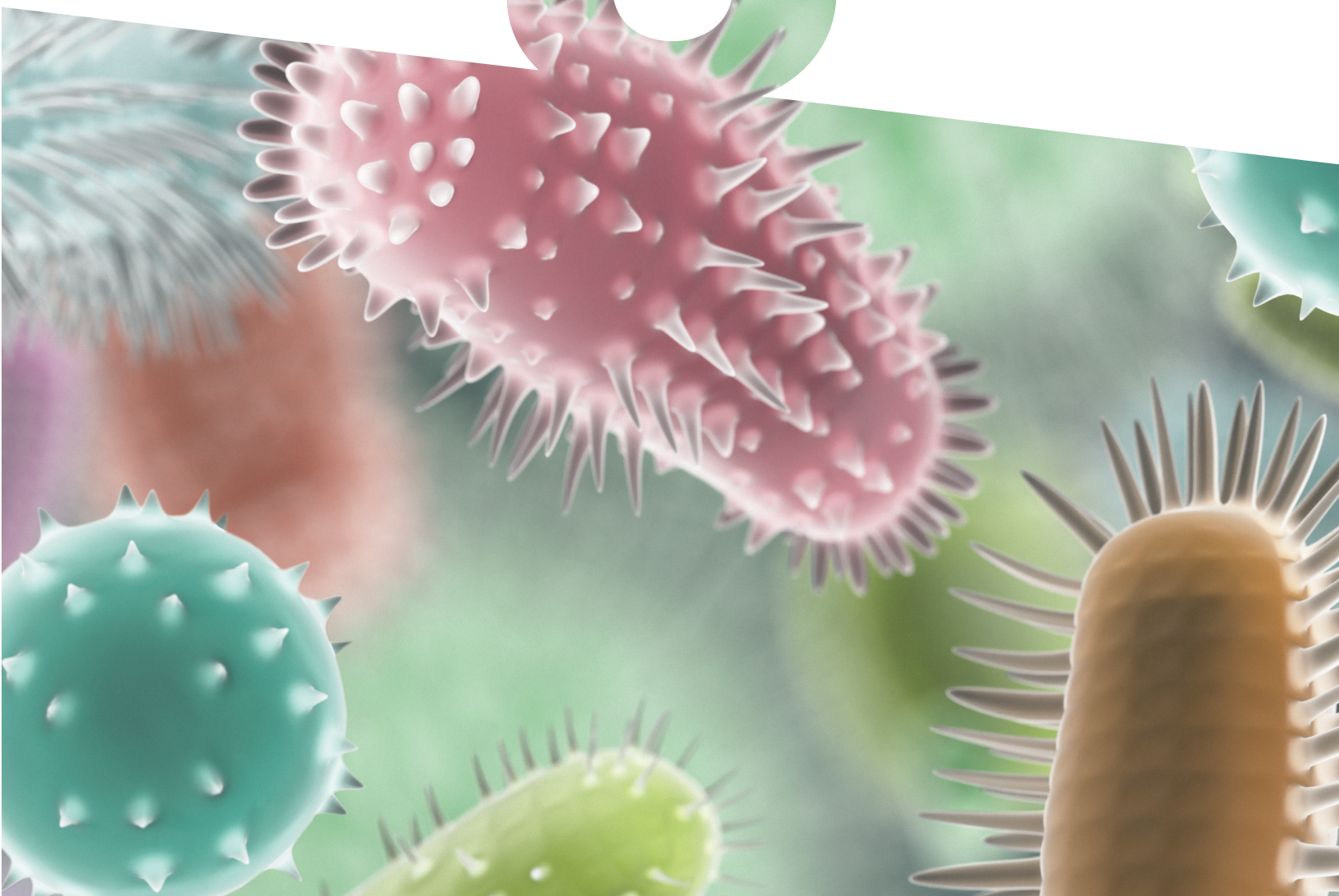
*Proportions may not add up to 100% due to rounding

Setting Type	% of 2016 outbreaks	Distribution of Respiratory Agents
Long Term Care Home	72%	
Retirement Home	19%	
Hospital	5%	Influenza and other respiratory agents detected among three outbreaks
Other (group home, child care setting)	5%	Other agent detected and unknown agent among three outbreaks

*Proportions may not add up to 100% due to rounding

TECHNICAL NOTES

8



8 TECHNICAL NOTES

This section details the data processes conducted to create the *2016 Annual Reportable Diseases Report*.

The data presented in this report represent the most current disease counts and rates in York Region and they supersede all previously reported statistics. Please note that the data presented in this report will not account for cases reported after the time of report production with episode dates that occurred during the report period, or cases for which the diagnosing health unit has changed.

8.1 Data sources

Integrated Public Health Information System (iPHIS): iPHIS is an Ontario Ministry of Health and Long-Term Care-supported centralized database used for the collection of information related to reportable disease cases and contacts as well as outbreak events occurring in public health units across Ontario, and came into effect in 2005. Prior to 2005, the Reportable Diseases Information System (RDIS), a Ministry of Health and Long-Term Care (MOHLTC) supported database, was a stand-alone database used by Ontario public health units to capture reportable disease information for case management and surveillance from which information was exported to the MOHLTC. Very limited case episode data for all Ontario health units for all reported diseases that occurred from 1990 to 2005 were transferred from the RDIS system into iPHIS in 2005. Therefore, limited data is available for cases reported before 2006.

- York Region case and outbreak data were obtained from the Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database, extracted by York Region Public Health on September 15, 2017 (TB data), December 7, 2017 (STI case counts), December 14, 2017 (STD risk factors), December 22, 2017 (outbreak data), January 11, 2018 and January 12, 2018 (OM Module, hepatitis B and C exposures data for West Nile Virus, Lyme Disease and cyclosporiasis).

Statistics Canada CANSIM Tables (Canadian socioeconomic information management system): Population estimates for York Region and Ontario were provided through (CANSIM) tables, Statistics Canada's key socioeconomic database. This database is populated by various data sources including census data from Statistics Canada. The population estimates from the CANSIM tables were used in the denominators for rate calculations.

- Population data were obtained from Statistics Canada. Table 051-0062 - Estimates of population by census division, sex and age group or July 1, based on the Standard Geographical Classification (SGC) 2011, annual (persons) (table), CANSIM (database), accessed: March 08, 2017.
- Immigration data were obtained from Statistics Canada. 2017. *York, RM [Census division], Ontario and Ontario [Province]* (table). *Census Profile*. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017.

PHO Query: Provincial aggregated reportable disease case counts were accessed from the PHO Query Tool (Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS) database).

- Ontario case data for 2007 to 2016 were obtained from Public Health Ontario Query Tool, extracted by York Region Public Health on December 11, 2017.

8.2 Case definitions

Specifications of reportable diseases are listed in Ontario Regulation 559/91 under the *Health Protection and Promotion Act*. The Regulation was amended in late 2013 to add Acute Flaccid Paralysis and Paralytic Shellfish Poisoning to the list of reportable diseases, and was last amended on May 1, 2018. The changes that came into effect as of May 1, 2018 for the *Health Protection and Promotion Act* and corresponding regulation and protocols as do not relate to this data. Local public health units in Ontario are required to conduct surveillance on both confirmed and probable cases of many reportable diseases, including Lyme disease. Details of case definitions used in this report were found in Appendix B–Provincial Case Definitions of the Ontario Public Health Standards, Infectious Diseases Protocol, 2016 and are summarized in Table 8.1. The most common source of case identification is through laboratory notification of confirmed test results (e.g., serology, microbiology cultures, etc.). Physicians are required to report cases that fulfill laboratory or clinical case definitions.

Over the time period covered by this report, there may have been changes to case definitions, laboratory testing methods, or physician/public health practice that may inform the interpretation of the trends displayed. In particular, the Ontario Public Health Standards (OPHS) were released in 2008 along with program-specific protocols, to replace the Mandatory Health Programs and Services Guidelines. As part of the Infectious Diseases Protocol (2008), updated case definitions for reportable disease cases were made available to public health units on April 28, 2009. In York Region, the revised case definitions were implemented in January 2010.

The year of incidence for a case is assigned based on case-related dates that are available for that particular case. The following hierarchy of dates is used: symptom onset, specimen collection, lab test result and the report of illness to the public health unit. Tuberculosis cases are attributed to the year of diagnosis.

The data includes cases for which a York Region residential address was recorded for a case at the time of illness. Therefore, it is not reflective of the location of exposure.

Select diseases are categorized by illness progression. In this report:

- Syphilis data are reported as infectious (primary, secondary, early latent, infectious neurosyphilis and early congenital) and non-infectious (late latent, tertiary, non-infectious neurosyphilis and unstaged syphilis).
- HIV infection incidence includes cases of AIDS. HIV and AIDS co-diagnosis is defined as diagnosis of AIDS-related illness within three months of HIV isolation.
- Hepatitis B is reported as acute (new infection) or chronic (persistent infection for more than six months at time of diagnosis).

Only cases of active tuberculosis are included in this report.

Infants testing positive for hepatitis C or HIV will not be reflected in the data until their confirmatory testing is completed 18 months after birth.

Table 8.1 Classifications included in this report

Disease Category	Disease	Classifications
Enteric Diseases	Amebiasis	Confirmed and probable
	Botulism	Confirmed, probable and suspect
	Campylobacter enteritis	Confirmed and probable
	Cholera	Confirmed and probable
	Cryptosporidiosis	Confirmed and probable
	Cyclosporiasis	Confirmed and probable
	Giardiasis	Confirmed and probable
	Hepatitis A	Confirmed and probable
	Listeriosis	Confirmed and probable
	Paralytic shellfish poisoning	Confirmed and probable
	Paratyphoid fever	Confirmed and probable
	Salmonellosis	Confirmed and probable
	Shigellosis	Confirmed and probable
	Trichinosis	Confirmed and probable
	Typhoid fever	Confirmed and probable
	Verotoxin-producing *E. coli* infection (VTEC)	Confirmed and probable
	Yersiniosis	Confirmed and probable
Diseases Transmitted by Direct Contact and Respiratory Routes	Encephalitis/meningitis syndrome	Confirmed and probable
	Group A streptococcal disease, invasive (iGAS)	Confirmed
	Group B streptococcal disease, neonatal	Confirmed and probable
	Legionellosis	Confirmed and probable
	Leprosy	Confirmed and probable
	Severe Acute Respiratory Syndrome (SARS)	Confirmed and probable
	Tuberculosis, active	Confirmed and suspect
Sexually Transmitted and Blood-borne Infections	Chancroid	Confirmed and probable
	Chlamydia trachomatis infection	Confirmed and probable
	Gonorrhea	Confirmed and probable
	Hepatitis B, acute	Confirmed and Probable
	Hepatitis B, chronic	Confirmed (Carrier)
	Hepatitis C	Confirmed
	Human immunodeficiency virus (HIV infection), including AIDS	Confirmed
	Ophthalmia neonatorum	Confirmed and probable
	Syphilis, infectious	Confirmed
	Syphilis, non-infectious	Confirmed

Table 8.1 continued…

Vaccine Preventable Diseases	Acute flaccid paralysis syndrome	Confirmed
	Chickenpox (Varicella)	Confirmed
	Diphtheria	Confirmed and probable
	Haemophilus influenzae b disease, invasive	Confirmed and probable
	Influenza	Confirmed
	Measles	Confirmed and probable
	Meningococcal disease, invasive	Confirmed and probable
	Mumps	Confirmed and probable
	Pertussis	Confirmed and probable
	Poliomyelitis	Confirmed and probable
	Pneumococcal disease, invasive	Confirmed
	Rubella and congenital rubella syndrome	Confirmed and probable
	Smallpox	Confirmed and probable and suspect
	Tetanus	Confirmed
Vector-borne and Zoonotic Diseases	Anthrax	Confirmed, probable and suspect
	Brucellosis	Confirmed and probable
	Creutzfeldt-Jakob disease	Confirmed, probable and suspect
	Hantavirus pulmonary syndrome	Confirmed
	Hemorrhagic fevers	Confirmed and probable
	Lyme disease	Confirmed and probable
	Malaria	Confirmed and probable
	Plague	Confirmed and probable
	Psittacosis/ornithosis	Confirmed and probable
	Q fever	Confirmed and probable
	Rabies, human	Confirmed and probable
	Tularemia	Confirmed and probable
	West Nile virus illness	Confirmed and probable
	Yellow Fever	Confirmed and probable

8.3 Outbreak definitions

Outbreaks are attributed to the year and month in which they were reported to public health.

Outbreaks were grouped by:

- Outbreaks with predominately gastrointestinal symptoms (enteric).
- Outbreaks with predominately respiratory symptoms.

Enteric and respiratory outbreaks were further classified by the exposure setting as follows:

- Institutional outbreaks include outbreaks where the primary setting is a long-term care facility, retirement home or childcare facility. Outbreaks in hospitals were excluded from this report.
- Community outbreaks include outbreaks where the primary setting is a food premise or other community setting such as a private home, private gathering location, recreational camp, medical office, funeral home, school, etc.

8.4 Data verification

To ensure accuracy and facilitate comparison of reportable disease trends over time in this report, an audit of the case classifications for all reportable disease cases investigated in York Region between 2007 and 2012 was conducted in 2013 and 2014. The audit focused on the verification of all reportable disease case classifications according to the case definition provided by the MOHLTC at the time of the case episode. Case classifications were compared against the Ontario Public Health Standards Appendix B case definitions (2010 to 2012) and the iPHIS Manual case definitions (2005 to 2009). The audit encompassed a combination of iPHIS record reviews, RDIS record reviews and manual chart reviews where required. In 2016, audits to review the case classifications were completed for a sample of reportable disease cases investigated by York Region between 2013 and 2015. In 2017, the case classification was reviewed for all diseases investigated by York Region in 2016, and a sample of select sexually transmitted and bloodborne infections.

Additional data quality audits were completed, which included:

- The identification and resolution of duplicate clients and cases
- Verification of geographic classification
- Verification of episode/diagnosis year
- Validation/revision of out of range values for client age and sex.

Where required, some additional case details (e.g., co-infections) were also verified in client records. Exposure and risk information were not reviewed in detail. Risk factor estimates may be slightly under-reported as risk factors included in the 'other' category (free text field) may be recorded elsewhere in the case record.

8.5 Calculations and comparisons

Calculations were computed and graphed using MS Excel 2010.

Annual case counts represent the number of cases whose earliest known case related date (or date of diagnosis for active tuberculosis) occurred in the year.

Rates are based on the number of reportable disease cases that occur in the York Region population in a designated period of time. Annual rates are the annual count divided by the number of person-years at risk (estimated by annual population) displayed per 100,000 population. The use of a standardized incidence ratio (SIR) adjusts for population age structure differences so comparisons can be made in disease occurrence between York Region and Ontario while controlling for these differences. However, in comparing the 2016 population distribution by age and sex for York Region and Ontario, the distributions were very similar. The population distribution for the 2000 to 2015 years was assessed, and SIRs were calculated and tested when preparing the 2000 to 2015 Reportable Diseases Report. Testing demonstrated that the SIRs did not differ from the crude ratios for a number of diseases. This report compares the crude rates for York Region to the rate for Ontario as a whole. York Region cases were not

removed from the Ontario cases when calculating Ontario rates, and differences between York Region and Ontario were not statistically tested.

For the purposes of trend interpretation in this report, where age groups are not strictly defined, lay terms are used to approximate the general age demographic where the trend is observed. For example, the term ‘young adult’ refers to the approximate age range of 19 to 29 years, but the characteristic attributed to this age group could apply to older adolescents and individuals in their 30’s, whereas ‘older adult’ applies to individuals approximately 50 to 65 years of age. Similarly, if not otherwise defined, children generally refer to individuals under 19 years, but the trend may not apply to older adolescents. The use of the term seniors and elderly implies that the trend described is attributed to individuals over 65 and over 75 years of age, respectively; however it may also apply to individuals a few years younger.

Sex-specific annual rates were presented for sexually transmitted infections. Cases with unknown sex or transgender sex were excluded. Age-group specific and sex-specific rates were calculated to describe the relative burden of illness by age and sex. Cases with an unknown age were excluded from age-specific analyses and cases that were not classified as male or female were excluded from sex-specific analyses.

Cases that reported a travel exposure or travel risk factor were categorized as having reported travel. Cases who did not have travel information specified and who had other risk factors mentioned, were categorized as 'no travel'. All other cases were categorized as 'unknown travel'.

A repeat STI is defined as the occurrence of an infection with one or more of chlamydia, gonorrhea, infectious syphilis, HIV within a five-year period of a prior STI in the same client. HIV was not considered a repeat infection if it occurred within one year of an STI, and a 30-day window was used for other diseases. These were classified as “co-infections” and were counted as single unique STIs. The denominator was defined as the number unique infections within each year.

Symptomatic versus asymptomatic cases was reported as a percentage of STI cases with symptom information. STI infections were categorized as symptomatic if symptoms were reported and asymptomatic if “asymptomatic” was entered in iPHIS.

For STI risk factor reporting that is grouped by sexual practice, cases that did not report a sexual practice were excluded from the charts. For other risk factor reporting, cases with reported known risk factors (or pregnancy for STI reporting) were included in the analysis and expressed as a percentage of all cases with at least one reported known risk factor.

Cases of HIV among TB and infectious syphilis cases were included if HIV was listed as a risk factor, or there was an HIV infection in the database that predated or was concurrent with the tuberculosis/infectious syphilis diagnosis. Concurrent infection of HIV was defined as the infection occurring within one year of the TB/infectious syphilis diagnosis. These estimates may be underestimated as an individual’s HIV diagnosis from another jurisdiction (i.e. outside of Ontario) may not be disclosed to public health and not recorded within iPHIS.

For the incidence of TB among York Region residents who are foreign-born by the country of origin, countries of origin with only one York Region case each were combined into one category. Only countries of origin with more than one York Region case were analyzed individually and compared with the incidence in other countries of origin.

Lyme disease exposures were categorized based on the information that was available in the exposure and risk factor fields. The following definitions and hierarchy were used:

Possibly York Region acquired:

1. Local risk area is the only known exposure:
   a) Case is untraceable or lost to follow-up and lives in a risk area in York Region (YR); OR

   b) Tick exposure known to have occurred in YR risk area; OR

   c) Exposure to YR defined risk area without exposure to risk or endemic areas outside of YR

2. YR risk area and non-YR risk area are reported exposures:
   a) Exposure to YR defined risk area with exposure to risk or endemic areas outside of YR

3. YR risk area is reported exposure with no known non-YR risk area exposure reported:
   a) Tick exposure known to have occurred in YR that is not a risk area; OR

   b) Case reports only exposures in YR but no exposure to risk area; OR

   c) Case reports non-risk area exposures in YR as well as exposures to non-risk areas outside of YR

Likely acquired outside of YR:

a) Tick exposure known to have occurred outside of YR (includes any *Borrelia spp.* other than *Borrelia burgdorferi*); OR
b) Exposure to a risk or endemic area outside of YR but no exposure to YR defined risk area

Unknown acquisition: Case was untraceable or lost to follow-up and did not live in a risk area

West Nile Virus cases were defined as having neurological complications versus non-neurological complications based on Appendix B case definition for West Nile Virus relevant to the year in which the case was reported. Fever is one of the clinical criteria for neurological complications, along with experiencing one of the following severe complications: acute flaccid paralysis, encephalitis, viral meningitis, movement disorders or parkinsonism. Cases who experienced one of the more severe complications and who did not experience fever were classified as experiencing neurological complications at the discretion of the health unit.

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