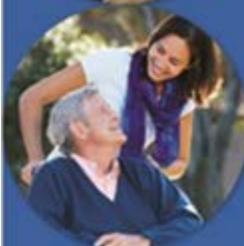


Infectious Diseases

in Waterloo Region



Surveillance Report, 2018



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Introduction

Infectious diseases are illnesses caused by microorganisms such as bacteria, viruses, and parasites. Infectious diseases have the potential to cause serious illness and can have community-wide implications. As such, Region of Waterloo Public Health undertakes a number of activities to prevent or reduce the burden of infectious diseases in the community.

In Ontario, the Health Protection and Promotion Act (HPPA) outlines all infectious diseases of public health importance that must be reported to local public health units by physicians, hospitals, institutions, schools, laboratories, and other healthcare practitioners¹. In addition, the Infectious Diseases Protocol of the Ontario Public Health Standards (OPHS) mandates that all local public health units prevent, control, and manage infectious diseases of public health importance.²

In order to meet its HPPA and OPHS requirements, Region of Waterloo Public Health implements a variety of programs and services related to infectious disease prevention and control for residents and visitors of Waterloo Region. These programs and services include:

- 1) Case and contact management of cases and exposures of diseases of public health significance (see Appendix B for complete list);
- 2) Outbreak management, including community outbreaks and those in institutions;
- 3) Health promotion activities and services for community groups, including, but not limited to, primary care providers, emergency service workers, and childcare providers; and,
- 4) Clinic-based services for sexual health, immunization, tuberculosis screening, and management.

The Infectious Diseases in Waterloo Region Report for 2018 provides an update to the community on the local status of infectious diseases of public health significance. The findings from this report will be used to inform local public health programming in the prevention and transmission of reportable, infectious diseases in Waterloo Region.

¹ Health Protection and Promotion Act, R.S.O. 1990, c. H.7. Available from: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm

² Population and Public Health Division, Ministry of Health and Long Term Care, Infectious Disease Protocol, Ontario Public Health Standards, 2018. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/protocols_guidelines/Infectious_Diseases_Protocol_2018_en.pdf

2018 Infectious Disease Highlights

This section highlights notable infectious disease trends in Waterloo Region in 2018. Highlights are meant to provide an overview of disease trends, to identify if there have been increasing or decreasing trends, to highlight local rates that were different than provincial rates, and to explore emerging trends or issues.

Please see Appendix A for information on all infectious diseases of public health significance and Appendix B for information on respiratory and enteric outbreaks.

Enteric Diseases

Most enteric disease rates in Waterloo Region were lower or similar to those of Ontario in 2018

- Local rates of most enteric diseases (including amebiasis, brucellosis, campylobacteriosis, cyclosporiasis, giardiasis, listeriosis, salmonellosis, shigellosis and yersiniosis) were similar to or lower than rates in Ontario.
- Almost one-third (28 per cent) of enteric diseases in Waterloo Region were attributed to travel outside the region.
- There were a few enteric diseases that had rates higher than the province in 2018:
 - Hepatitis A: see below for a description of a local Hepatitis A outbreak in 2018.
 - Cryptosporidiosis:
 - There was an increased number of cases of cryptosporidiosis in 2018 compared to previous years. An investigation identified no clusters or common exposures.
 - The most common risk factors among local cases included contact with animals (often linked to poor hand hygiene), and consumption of raw/unwashed fruits and vegetables, which is consistent with known risk factors for cryptosporidiosis. The majority of cases occurred in the summer months. Some neighbouring public health units also identified increased rates during the 2018 summer months.
 - Verotoxin-producing *Escherichia coli* (VTEC):
 - Although the number of *E. coli* cases in Waterloo Region remained low (n=15 in 2018), the local rates can fluctuate from year to year. In 2018, the rate was higher than in 2017; however, it was similar to the previous ten year average.
 - Investigation into local *E. coli* cases determined that almost all cases were sporadic and not epidemiologically linked to other cases. However, there were two cases that were part of an outbreak at a

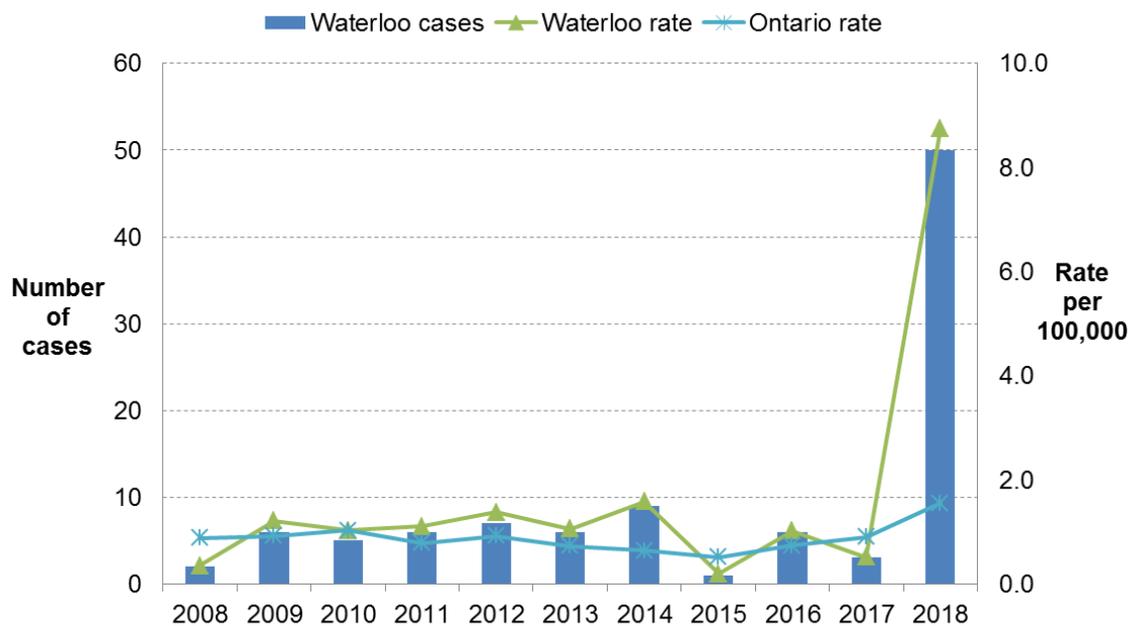
recreational camp in a neighbouring public health unit which could have contributed to our increased rates in 2018.

- Region of Waterloo Public Health manages and controls enteric diseases by following up with reported cases and their contacts, investigating increases in disease rates or disease clusters to identify whether there are common sources or exposures, and providing education regarding risk factors and prevention.

Local hepatitis A outbreak in 2018 among under-housed and illicit/injection drug users

- In 2018, Waterloo Region experienced a very significant increase in the number of hepatitis A cases in 2018 compared to previous years; there were 50 hepatitis A cases in 2018 compared to an average of only five cases per year for the previous 10 years.

Figure 1. Hepatitis A cases and age-standardized incidence rates per 100,000, Waterloo Region and Ontario, 2008-2018



Source: iPHIS, 2008-2018

- The increase was related to a local outbreak that occurred in the months of March through September, with 41 cases sharing the same hepatitis A genotyping sequence or having an epidemiologic link to a confirmed case; there were also cases linked to this outbreak occurring in other neighbouring public health units.
- A common risk factor among a large majority of the cases was illicit or injection drug use and being homeless or under-housed.

- To control the outbreak and prevent transmission to a larger population, Region of Waterloo Public Health undertook a variety of strategies including the following:
 - **Targeted immunization** – Region of Waterloo Public Health offered harm reduction clinics multiple days per week and increased its staffing on a mobile outreach van operated by a community partner, Sanguen Health Centre. Public Health worked closely with community partners to host immunization clinics at shelters, meal programs/outreach centres and by shadowing an outreach worker. Public Health also distributed vaccine to partners in primary care, community health centres and Ontario Addiction Treatment Centres. Approximately 600 doses of hepatitis A vaccine were given during the outbreak period.
 - **Messaging for key partners** – Region of Waterloo Public Health sent public health advisories to local health care partners to provide updates and promote vaccine for the target population. Public Health collaborated with community partners working with the target population to design an immunization strategy that reached those most in need of vaccination. Teleconferences and email communication assisted with keeping key partners informed of strategies and outbreak updates.
 - **Education for cases and contacts** – Region of Waterloo Public Health developed an educational postcard to distribute to local health care and community partners. The postcard contained key messages regarding symptoms, modes of transmission as well as ways to protect against infection. Partners and health care partners were encouraged to distribute postcards to clients in the target population to promote immunization clinics and to create awareness about symptoms and key prevention strategies:

HEPATITIS A is a liver infection caused by the Hepatitis A virus

What are the symptoms of Hepatitis A?

- fatigue, fever
- loss of appetite
- nausea or vomiting
- yellow skin or eyes (jaundice)
- stomach cramps, abdominal pain
- pale poop or dark urine

How is Hepatitis A spread?

Hepatitis A can easily spread from person to person through contact with feces (poop) by:

- Not washing hands
- Having sex with infected partners
- Eating/drinking foods contaminated with Hepatitis A
- Sharing drug use equipment (needles, cookers/spoons, pipes, bongs)
- Sharing toothbrushes or eating utensils

Region of Waterloo
PUBLIC HEALTH AND
EMERGENCY SERVICES

What should I do to protect myself?

TO REDUCE YOUR RISK:

- wash your hands
- don't share
- get vaccinated!

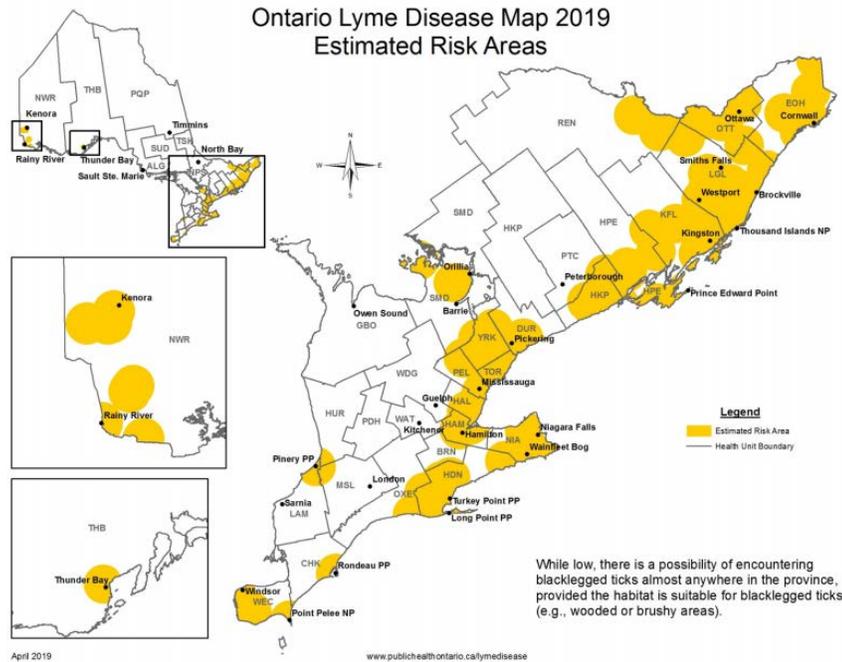
VACCINE CLINIC

- **Hygiene kits** – Recognizing that access to washrooms, water and other personal hygiene supplies is often an issue for under-housed and homeless populations, hygiene kits were distributed through key community partners to the target population to further reduce the risk of hepatitis A transmission. These kits contained items related to hygiene (e.g. soap, bottled water, cleansing hand towelettes, Band-Aids, nail cleansing brushes, toothpaste, tooth brushes, Chap Stick and a garbage bag).
- Region of Waterloo Public Health plans to further monitor local hepatitis A activity and follow-up on cases in the community. Public Health also plans to offer a second dose of hepatitis A vaccine in spring and summer of 2019. A second dose, when given within one year of the first dose, provides long-term immunity to hepatitis A and will help to prevent future outbreaks in the target population.

Vectorborne Diseases

Lyme disease rates in Waterloo Region lower than the province but higher than previous years

- Lyme disease rates in Waterloo Region remain lower than the province; the local rate in 2018 was 2.1 per 100,000 compared to 4.2 per 100,000 in Ontario.
- However, rates of Lyme disease among residents in Waterloo Region have been gradually increasing over the last few years (2.1 per 100,000 in 2018 compared to previous five-year average of 1.0 per 100,000). Ontario also experienced an increase in Lyme disease activity over the past few years (4.2 per 100,000 in 2018 compared to previous five-year average of 3.5 per 100,000).
- All local cases were acquired during travel outside of Waterloo Region.
- The black-legged tick is not currently established in Waterloo Region, however several areas in Ontario have been identified as endemic and these risk areas have expanded in 2019.
- Estimated Lyme disease risk areas include parts of Peel, York, Durham, Toronto, Halton, Hamilton, Oxford, Wainfleet Bog in Niagara Region, Turkey Point, Long Point, and Rondeau Provincial Parks, Point Pelee National Park, and other areas along the shores of Lake Erie, Lake Ontario, and Lake Huron:



Source: Public Health Ontario (2019), Ontario Lyme Disease Map 2019 Estimated Risk Areas, Available at: <https://www.publichealthontario.ca/-/media/documents/lyme-disease-risk-area-map-2019>

- Region of Waterloo Public Health continues to help prevent exposure to Lyme disease through public education, investigation of suspect human cases, and identification and testing of ticks that are found on humans for tick population surveillance purposes.

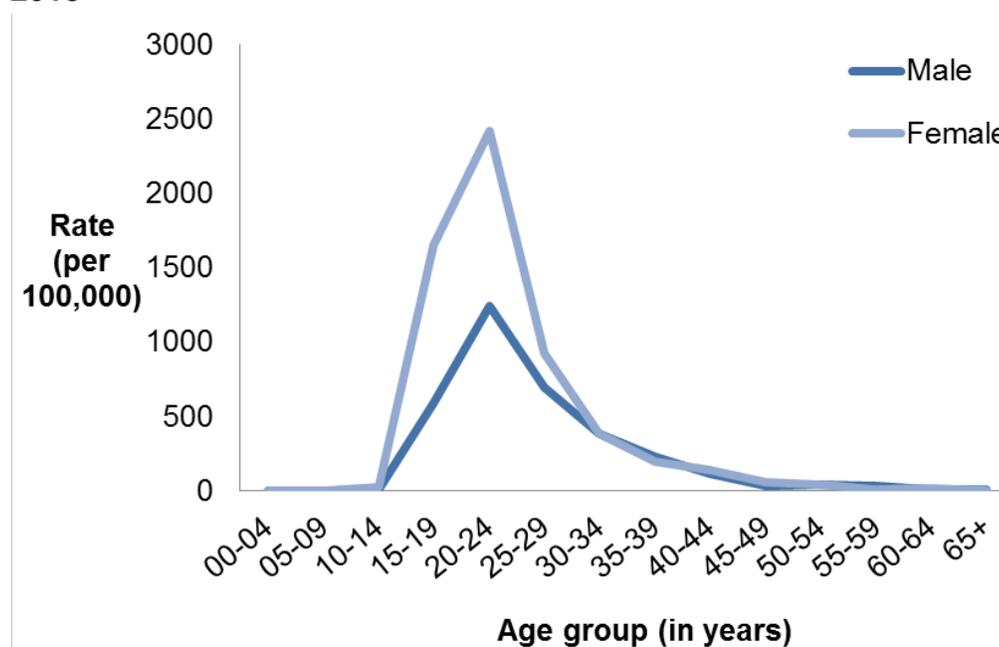
Sexually Transmitted and Blood-borne Infections

Rates of chlamydia, gonorrhea and infectious syphilis continue to increase in Waterloo Region and Ontario

- **Chlamydia rates highest among youth and young adult females**
 - Chlamydia is the most common infectious disease in Waterloo Region with 1802 cases occurring in 2018.
 - Rates of chlamydia in Waterloo Region and Ontario have been increasing for the last decade; the rate in 2018 was 311.9 per 100,000 compared to a five-year average of 254.3 per 100,000.
 - Rates of chlamydia in 2018 were highest among the 20-24 year age group (1809.1 per 100,000), followed by the 15-19 year age (1108.5 per 100,000) and 25-29 year age groups (810.4 per 100,000). In the 15-19 year age group, the majority of cases (75 per cent) were among 18-19 year olds.

- Rates of chlamydia are also higher among females (391.1 per 100,000) than males (245.4 per 100,000), especially among 20-24 year old (2417.4 per 100,000) and 15-19 year old females (1651.5 per 100,000).

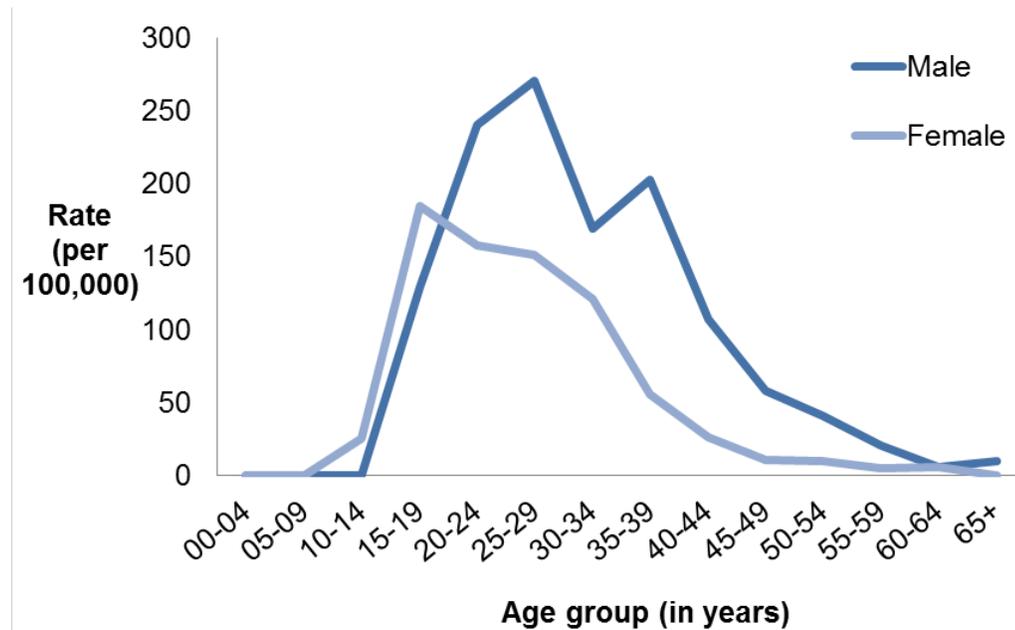
Figure 2. Age-specific rates of chlamydia, per 100,000, Waterloo Region, 2018



Source: iPHIS, 2018

- The most commonly reported risk factors for local chlamydia cases include having unprotected sex, and having multiple sexual partners in the last six months.
- **Gonorrhea rates highest among young adult males**
 - Rates of gonorrhea have also been increasing both locally and provincially in recent years, particularly among males. The local gonorrhea rate in 2018 was 68.9 per 100,000 compared to a previous five-year average of 43.6 per 100,000; Ontario had a similar rate in 2018 (73.1 per 100,000).
 - In Waterloo Region, rates are higher among males (91.0 per 100,000) than females (50.6 per 100,000).
 - Among males, the highest rates were seen among 25-29 year olds (270.5 per 100,000), followed by the 20-24 year (240.7 per 100,000) and 35-39 year age groups (203.3 per 100,000).
 - Among females, the highest rates were seen in 15-19 year (184.9 per 100,000), followed by 20-24 year (158.1 per 100,000) and 25-29 year (151.4 per 100,000) age groups.

Figure 3. Age-specific rates of gonorrhoea, per 100,000, Waterloo Region, 2018



Source: iPHIS, 2018

- The most common risk factors among local gonorrhoea cases included not using a condom, having multiple sexual partners in the last 6 months, and having sex with someone of the same sex (in particular, men who have sex with men).

- **Infectious syphilis rates also increasing for last three years**
 - Local rates of infectious syphilis have been increasing since 2016; the Waterloo Region rate in 2016 was 3.3 per 100,000 compared to 7.0 per 100,000 in 2018.
 - However, local rates remain lower than those of the province (13.3 per 100,000).
 - Rates among males (12.1 per 100,000) are considerably higher than among females (1.4 per 100,000), and highest in the 45-49 year age group (21.3 per 100,000), followed by the 20-24 year age group (17.2 per 100,000).
 - The most common risk factors among local infectious syphilis cases in 2018 include not using a condom, men who have sex with men, and having more than one sexual partner in the last six months.
- To address high sexually transmitted infection (STI) rates among young adults, Region of Waterloo Public Health has initiated a situational assessment with community partners and local universities and colleges. From this assessment and evidence, this committee will develop a strategy along with measurable objectives.
- Public Health provides access to services specific to youth, including a youth clinic as well as public health nurse availability at Waterloo Region District School Board secondary schools on a weekly basis.
- Public Health also continues to offer sexual health clinics at both the public health offices and at community sites for priority populations.

Provincial funding for hepatitis C treatment available in 2018

- Early in 2018, the Ontario government announced that it would cover the cost of medication for all hepatitis C virus cases regardless of the severity of the disease. This change was largely due to the availability of more affordable, minimally invasive drugs with high cure rates. Prior to these changes, the Ontario Drug Benefit program only approved treatment for individuals in the late stages of liver disease.
- Additionally, Canadian hepatitis C guidelines have been updated to encourage healthcare providers to offer hepatitis C testing to baby boomers and people at risk for infection.
- Both of these events have likely contributed to the increase in hepatitis C cases being diagnosed both locally and across the province; in 2018, the local incidence rate of hepatitis C (27.3 per 100,000) was slightly higher than the previous five-year average (22.0 per 100,000).

- However, local rates are lower than that of the province (27.2 per 100,000 in Waterloo Region compared to 35.9 per 100,000 in Ontario); this difference is statistically significant (SRR = 0.8, 95% CI 0.7-0.9).
- Rates among men (32.5 per 100,000) were higher than among females (22.5 per 100,000) and the highest rates were in the 60-64 year age group (66.5 per 100,000), followed by the 30-34 year age group (53.9 per 100,000)
- The most common risk factors among local hepatitis C cases in 2018 include injection drug use (and shared drug use equipment), undergoing invasive medical/surgical procedures, and being homeless/under-housed.

Other Infectious Diseases

Rates of legionellosis demonstrate a continuing increasing trend both locally and provincially

- Rates of legionellosis were higher in 2018 (5.5 per 100,000) compared to the previous 5-year average (2.0 per 100,000); similar increasing trends have also been observed in the province in the last few years.
- Rates were highest among older age groups; the highest rate was observed among 60-64 year olds (16.5 per 100,000) followed closely by 55-59 year-olds (15.1 per 100,000).
- This is expected, as those 50 years or older and with certain risk factors such as a history of smoking, chronic lung disease or a weakened immune system have an increased risk of acquiring the illness.
- Rates were highest in the months of August and October.
- Among Waterloo Region cases, there were no common sources of risk identified.

Future Considerations

Changes to Diseases of Public Health Significance

As of May 1, 2018, the list of Diseases of Public Health Significance (previously known as Reportable Diseases) came into effect under Ontario Regulations 135/18 which outline the diseases that must be reported to the local Medical Officer of Health.

The following changes occurred:

- Malaria and Yellow Fever are no longer considered diseases of public health significance.
- The case definition for *Haemophilus influenzae* changed. As of May 1, 2018, all serotypes of *H. influenzae* are now reportable (previously just serotype b was reportable). This resulted in a small increase of cases in 2018 (n=6).
- Three diseases were added:
 - **Blastomycosis:**

Blastomycosis is caused by *Blastomyces dermatitidis* and *Blastomyces gilchristii*, fungi that are found in warm, moist soil especially along waterways such as lakes or rivers. Exposure is caused by inhalation of airborne spores during activities such as camping, forestry work, farming and hunting in endemic areas. Since May 1, 2018, only one case of blastomycosis has been reported in Waterloo Region.
 - **Carbapenemase-producing Enterobacteriaceae (CPE)**

Enterobacteriaceae that are resistant to carbapenem antimicrobials through the production of carbapenemase are known as carbapenemase-producing *Enterobacteriaceae* (CPE). A primary risk factor for acquiring CPE is exposure in health care facilities with prevalent CPE. Recent travel and hospitalization abroad are also important risk factors. Since being added as a reportable disease in May of 2018, 10 cases have been reported locally in Waterloo Region. Most cases occurred in the summer months. The local rate is similar to that of the province.
 - ***Echinococcus multilocularis* infection**

Echinococcus multilocularis is a small tapeworm that is found in canids (coyotes, foxes, dogs) and rodents, and is transmitted by the ingestion of feces of infected animals. Individuals in high risk occupations such as veterinary staff, wildlife workers, hunters and trappers are considered at higher risk of infection. There were no cases local cases of *E. multilocularis* reported in Waterloo Region in 2018 and only one case was reported provincially since the disease became reportable in May.

Appendix A – Infectious Disease Summary Table

Counts and age-standardized incidence rates for diseases of public health significance, Waterloo Region and Ontario, 2018, 2008-2017¹

Disease	Waterloo				Waterloo compared to Ontario (2018)*	Ontario			
	Number of cases (2018)	Rate per 100,000 (2018)	5 year average (2013-2017)	Trend in rate per 100,000 (2008-2018)		Rate per 100,000 (2018)	5 year average (2013-2017)	Trend in rate per 100,000 (2008-2018)	
Chlamydia	1,802	311.9	254.3			337.4	284.4		
Gonorrhea	399	68.9	43.6			73.1	45.0		
Hepatitis C	156	27.3	22.0		↓	35.9	32.0		
Campylobacteriosis	130	22.9	27.4		↓	23.5	25.8		
Salmonellosis	125	21.7	21.5			18.4	20.7		
Giardiasis	64	11.3	9.2			10.4	9.7		
Invasive pneumococcal disease	58	10.4	10.5			8.4	7.5		
Cryptosporidiosis	50	8.8	2.6		↑	5.3	2.8		
Hepatitis A	50	8.8	0.9		↑	1.6	0.7		
Syphilis, infectious ²	38	7.0	4.4		↑	13.3	8.5		
Group A streptococcal disease, invasive (iGAS)	34	6.0	5.0			7.7	5.1		
Legionellosis	31	5.5	2.0		↑	2.2	1.2		
Encephalitis/meningitis	23	4.1	3.3		↑	1.1	1.3		
Syphilis, other ³	21	3.7	4.1		↑	6.2	4.7		
Verotoxin-producing Escherichia coli (VTEC)	15	2.7 ⁶	1.4		↑	1.2	1.1		
Pertussis (whooping cough) ⁴	15	2.6 ⁶	3.1			2.8	3.4		
Yersiniosis	14	2.4 ⁶	1.6			2.1	1.6		
Tuberculosis (active)	13	2.2 ⁶	2.6		↓	4.4	4.4		
Lyme disease ⁴	12	2.1 ⁶	1.0			4.2	3.5		
Amebiasis ⁴	12	2.1 ⁶	4.8			3.4	5.8		
Cyclosporiasis	10	1.8 ⁶	1.4			1.9	1.5		
Shigellosis	9	1.6 ⁶	1.5			2.2	2.1		
Typhoid/paratyphoid fever	8	1.5 ⁶	0.7			0.9	0.8		
HIV/AIDS	8	1.4 ⁶	2.3			6.8	6.3		
Haemophilus influenzae ⁵	6	1.1 ⁶	0.0			1.3	0.0		
Group B streptococcal disease, neonatal	6	1.1 ⁶	0.4			0.4	0.4		
West Nile virus (WNV) ⁴	5	0.9 ⁶	0.2			0.9	0.5		
Hepatitis B	4	0.8 ⁶	0.4			0.6	0.7		
Invasive meningococcal disease	4	0.7 ⁶	0.1			0.2	0.2		
Listeriosis	2	0.4 ⁶	0.4			0.5	0.4		
Botulism	0	0.0	0.0			0.0 ⁶	0.0		
Brucellosis	0	0.0	0.0			0.1 ⁶	0.0		
Cholera	0	0.0	0.0			0.0	0.0		
Creutzfeldt-Jakob disease	0	0.0	0.1			0.1 ⁶	0.1		
Hemorrhagic fevers	0	0.0	0.0			0.0	0.0		
Leprosy	0	0.0	0.0			0.0 ⁶	0.0		
Measles	0	0.0	0.0			0.1 ⁶	0.1		
Mumps ⁴	0	0.0	0.4			0.7	0.5		
Ophthalmia neonatorum	0	0.0	0.0			0.0 ⁶	0.0		

Disease	Waterloo			Trend in rate per 100,000 (2008-2018)	Waterloo compared to Ontario (2018)*	Ontario		
	Number of cases (2018)	Rate per 100,000 (2018)	5 year average (2013-2017)			Rate per 100,000 (2018)	5 year average (2013-2017)	Trend in rate per 100,000 (2008-2018)
Psittacosis/Ornithosis	0	0.0	0.0			0.0	0.0	
Q Fever	0	0.0	0.2			0.0 ⁶	0.1	
Rabies	0	0.0	0.0			0.0	0.0	
Rubella	0	0.0	0.0			0.0	0.0	
Rubella, Congenital Syndrome	0	0.0	0.0			0.0	0.0	
Tetanus	0	0.0	0.0			0.0	0.0	
Trichinosis	0	0.0	0.0			0.1 ⁶	0.0	
Tularemia	0	0.0	0.0			0.0	0.0	

Source: iPHIS 2008-2018, Ministry of Health and Long-Term Care), extracted April 23, 2019; Public Health Ontario Infectious Diseases Query 2007-2018, extracted April 23, 2018; Population estimates [2007-2016], Population projections [2017,2018], Ontario Ministry of Health and Long-Term Care, IntelliHEALTH Ontario, extracted May 15, 2018.

* An up arrow indicates that Waterloo Region rates is higher than that of Ontario and that this difference is statistically significant; a down arrow indicates that the Waterloo Region rate is lower than that of Ontario and that this difference is statistically significant; a blank space (no arrow) indicates that there was no statistical difference between Waterloo and Ontario rates. Statistical comparisons were determined by Standardized Rate Ratios (the ratio of age-standardized rates of cases observed in Waterloo Region compared to the age-standardized rate of cases that occurred in Ontario).

¹ Disease ranking does not include latent TB, varicella infections or influenza. Information on influenza can be found at the Waterloo Region Influenza Bulletin which is updated weekly during the months of November and April: <https://www.regionofwaterloo.ca/en/regional-government/waterloo-region-influenza-bulletin.aspx>

² Primary, secondary and early latent syphilis are all considered infectious (includes early latent; primary genital; primary other sites; secondary of skin and mucous membranes; secondary, other; infectious neurosyphilis and primary anal).

³ Other syphilis includes all other types of syphilis such as late latent or unspecified (the other category excludes early congenital syphilis).

⁴ Includes both confirmed and probable cases of amebiasis, mumps, Lyme disease, pertussis and WNV due to case definition changes in 2009 (see Appendix C for more information).

⁵ The case definition of *Haemophilus influenzae* changed on May 1, 2018 to include all serotypes (previously only serotype b was reported).

⁶ Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

NOTE: More information on local and provincial infectious disease counts and rates by age and sex can be found at the Public Health Ontario Reportable Disease Trends in Ontario Tool:

<https://www.publichealthontario.ca/en/DataAndAnalytics/Pages/RDTO.aspx>

Appendix B – Reportable Disease List

Diseases of Public Health Significance (Reportable) 2018/19



Diseases marked with an asterisk*, and respiratory and gastroenteritis outbreaks in institutions and public hospitals should be immediately reported to Region of Waterloo Public Health.

Other diseases are to be reported by the next business day.

For the following diseases please contact the Infectious Disease and Tuberculosis Control Program at 519-883-2248 (fax) or 519-575-4400 ext. 5275:

- Acute Flaccid Paralysis
- Chancroid
- Chickenpox (Varicella)
- Diphtheria*
- Encephalitis*, including:
 1. primary, viral*
 2. post-infectious
 3. vaccine-related
 4. subacute sclerosing panencephalitis
 5. unspecified
- Group A Streptococcal Disease, invasive*
- Group B Streptococcal Disease, neonatal
- Haemophilus Influenzae, all types, invasive*
- Hemorrhagic Fever*, including:
 1. Ebola virus disease*
 2. Marburg virus disease*
 3. Other viral causes*
- Hepatitis A*
- Hepatitis B
- Hepatitis C
- Influenza
- Leprosy
- Lyme Disease
- Measles*
- Meningitis, acute*
 1. bacterial*
 2. viral
 3. other
- Meningococcal disease*
- Mumps*
- Ophthalmia neonatorum*
- Pertussis (Whooping Cough)*
- Pneumococcal disease, invasive
- Poliomyelitis, acute*
- Respiratory Infection Outbreaks in institutions and public hospitals*
- Rubella*
- Rubella, congenital syndrome*
- Severe Acute Respiratory Syndrome (SARS)*
- Smallpox*
- Tetanus
- Creutzfeldt-Jakob Disease, all types *
- Tuberculosis
 1. active infection*
 2. latent infection (positive TB skin test)
- West Nile Virus Illness (WNV)*

For the following diseases please contact Health Protection and Investigation at 519-883-2248 (fax) or 519-575-4400 :

- Amebiasis
- Anthrax*
- Blastomycosis
- Botulism*
- Brucellosis*
- Campylobacter Enteritis
- Carbapenemase-producing Enterobacteriaceae (CPE) colonizations and infections (cases)
- Cholera
- Clostridium difficile infection (CDI) outbreaks in public hospitals
- Cryptosporidiosis
- Cyclosporiasis
- Echinococcus multilocularis infection
- Food poisoning, all causes
- Gastroenteritis, institutional outbreaks*
- Giardiasis, except asymptomatic cases
- Hantavirus Pulmonary Syndrome*
- Lassa Fever*
- Legionellosis
- Listeriosis
- Paralytic Shellfish Poisoning
- Paratyphoid Fever
- Plague*
- Psittacosis/Ornithosis
- Q Fever*
- Rabies*
- Salmonellosis
- Shigellosis
- Trichinosis
- Tularemia
- Typhoid Fever
- Verotoxin – producing E. coli infection including Hemolytic Uremic Syndrome (HUS)
- Yersiniosis

For the following diseases please contact Sexual Health and Harm Reduction at 519-883-2248 (fax) or 519-883-2267:

- Acquired Immunodeficiency Syndrome (AIDS)
- Chlamydia Trachomatis Infection
- Gonorrhoea
- Human Immunodeficiency Virus (HIV)
- Syphilis

Appendix C – Data Sources, Methodology and Limitations

Data Sources

iPHIS

All diseases and risk factors were extracted from integrated Public Health Information System (iPHIS) by Accurate Episode Date (except for HIV which was by encounter date, and tuberculosis which was by diagnosis date). Accurate Episode Date corresponds to the earliest date on record for the case according to iPHIS hierarchy: Symptom Date > Clinical Diagnosis Date > Specimen Collection Date > Lab Test Date > Reported Date.

Provincial data was downloaded from the Public Health Ontario Infectious Diseases Query tool.

IntelliHEALTH

Incidence rates were calculated using population estimates obtained from the Ontario Ministry of Health and Long-term Care. Queries on population data were completed via an online portal called IntelliHEALTH. Population estimates for 2008 to 2016 are post-censal estimates based on the 2006 and 2011 census counts, adjusted for net under-coverage and changes in the population between census day and July 1. The 2017 and 2018 populations are projections which are founded on assumptions about births, deaths and migration over the projection period. The population estimates and projections in this report may differ from those presented elsewhere due to differences in methodology.

Methodology

Incidence rates were calculated as the number of new cases per 100,000 persons in the population.

Age-standardization is a technique that minimizes the effect of differences in age between populations so that findings can be attributed to factors other than age. When comparisons between Waterloo Region and Ontario were made, rates were directly age-standardized using the July 1, 2011 Canadian Standard population from Statistics Canada.

Standardized Rate Ratios (SRR) with 95 per cent confidence intervals were calculated for all reportable diseases. The SRR reported is the ratio of the age-standardized rate of cases observed in Waterloo Region compared to the age-standardized rate of cases that occurred in Ontario. The 95 per cent confidence interval indicates the statistical

significance of the SRR. If the 95 per cent confidence interval contains the value 'one' in its range, the two rates are not statistically different from one another.

A relative standard error (RSE) was also calculated for each rate. The RSE is simply the standard error divided by the mean number of cases and expressed as a percentage. Rates with an RSE >23 per cent are considered unstable and should be interpreted with caution.

Annual average rates for 2013 to 2017 were also calculated which were defined as the average of the age-standardized rates for each year from 2013 to 2017.

Limitations

Information on past episodes of disease can be added or updated to the provincial reporting system at any time. The information summarized in this report represents what was known to Region of Waterloo Public Health and the Ministry of Health and Long-Term Care at the date of data extraction recorded with the stipulation that these data are provisional and subject to change.

When reporting exposure or risk factor proportions, those that were lost to follow-up and did not have risk factor information available were excluded from the denominator. Risk factors in iPHIS are self-reported and may not necessarily reflect the true exposure history of the individual.

For some diseases, case definitions have changed over time. As of April 28, 2009, new provincial case definitions for reportable diseases came into effect to reflect the changing epidemiology of infectious diseases and the use of newer laboratory technologies. These updates impacted the classification of cases for several diseases, and may influence the incidence of some diseases during the year 2009. Both confirmed and probable cases of amebiasis, Lyme disease, mumps, pertussis, and WNV were included to adjust for these changes. However, for other diseases, an observed increase or decrease in disease incidence during this period may not reflect a true change in incidence.