Acknowledgements

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One of the mandates of local public health units in Ontario is to prevent or reduce the burden of infectious diseases of public health importance. Region of Waterloo Public Health and Emergency Services fulfills this mandate by working to prevent the transmission of infectious and other reportable diseases in the region. These diseases are important since they have the ability to cause serious illness and/or be transmitted to large numbers of individuals. Public Health’s disease-related programs are guided by the Ontario Public Health Standards (OPHS) and local needs.

In fulfilling its mandate related to infectious disease, Public Health monitors the occurrence of these diseases, their associated risk factors and emerging trends. Through the provision of reports such as Local Influenza Surveillance Bulletins and previous Waterloo Region Infectious Disease Status Reports, Region of Waterloo Public Health and Emergency Services is committed to providing the public with timely and accurate information on the local status of infectious diseases.

To add to this body of knowledge, I am pleased to release the Infectious Diseases in Waterloo Region Surveillance Report for 2014. This annual report builds on previous reports and not only presents local disease trends, but also provides a provincial comparison of rates.

I hope you find the information contained in this report both interesting and useful. As always, Region of Waterloo Public Health continually works to improve its programs, services and reporting related to infectious diseases in an effort to build healthy and supportive communities.

Dr. Liana Nolan
Commissioner/Medical Officer of Health
Region of Waterloo Public Health
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Infectious Diseases in Waterloo Region – Surveillance Report 2014
Executive Summary

Background

Infectious diseases (IDs) are illnesses caused by microorganisms such as bacteria, viruses and parasites which may cause serious illness or be transmitted to large numbers of individuals. In accordance with the Ontario Public Health Standards (OPHS), one of the mandates of local public health units in Ontario is to work on the prevention and control of infectious diseases of public health importance. As such, the purpose of this report is to assess Waterloo Region’s rates of infectious diseases of public health importance and to monitor trends over time. This information will be used to aid in planning and evaluating evidence-based public health policies, programs, interventions, and related services so as to mitigate the frequency and impact of infectious diseases in the local community. This report presents Waterloo Region’s rates of reportable diseases for 2014, comparisons to the historical five-year average, and comparison of local rates to those of the province of Ontario. Basic epidemiology, exposure and risk factor information are also provided where appropriate.

Key Findings

Overall

In 2014 there were 2,937 cases of reportable infectious diseases in Waterloo Region. The top five infectious diseases reported in 2014 were chlamydia, influenza, gonorrhrea, campylobacteriosis and salmonellosis, which accounted for 73.9 per cent of all cases. Overall, the rates of most reportable diseases in Waterloo Region were consistent with or lower than provincial rates.

Enteric Diseases

Among enteric (i.e., intestinal) diseases, campylobacteriosis and salmonellosis were the most frequently reported infectious diseases. Waterloo Region rates of enteric diseases were similar or lower compared to those for all of Ontario. While local rates of Hepatitis A were increased in 2014 compared to previous years due to travel-related cases, the rate in 2014 was not significantly higher than the provincial rate. In addition to hepatitis A, travel outside of the province was a common risk factor for amebiasis, cryptosporidiosis, giardiasis, salmonellosis, shigellosis and typhoid/paratyphoid fever. Travellers are reminded to follow good hand hygiene practices, avoid consumption of potentially contaminated food such as raw fruits and vegetables unless they have been washed, peeled or cooked, consume water that is potable, and avoid risky behaviours such as swimming in contaminated water. Region of Waterloo Public Health works to manage and control enteric diseases by following up on reported cases and their contacts,
providing education regarding risk factors and prevention, and supporting long-term care homes, hospitals and daycares in the prevention and control of enteric outbreaks. Region of Waterloo Public Health also performs routine inspections of food premises, long-term care homes and retirement facilities, residential facilities, day nurseries, personal service settings, and recreational water facilities (e.g., public pools, hot tubs and splash pads). In addition, Region of Waterloo Public Health collaborates with federal and provincial partners to identify and remove sources of contaminated food products from the consumer marketplace.

Vector-borne and Zoonotic Diseases

Vector-borne diseases (e.g., malaria, West Nile Virus, Lyme disease) and zoonotic diseases (e.g., rabies) are relatively uncommon in Waterloo Region. Similar to previous years, malaria was the most frequently reported illness in this category in Waterloo Region. However, the local rate is declining, and was significantly lower than the provincial rate in 2014. There were no cases of West Nile Virus infection among residents of Waterloo Region in 2014, and no cases of Lyme disease acquired in the Region. Public Health carries out mandated programs to reduce the risk of exposure to Lyme disease and West Nile Virus through public education, investigation of suspect human cases, vector surveillance, and the implementation of vector control measures. Although rare, the possibility of human rabies acquired from animal bites continues to exist, as animals with rabies can be found on occasion in Waterloo Region. Given that rabies is usually fatal, prevention is most important. To prevent the transmission of rabies from animals to humans, Public Health follows up on all reported potential human exposures to the rabies virus in a timely manner and dispenses post-exposure vaccine when appropriate to reduce the risk of human rabies.

Sexually Transmitted and Blood-borne Infections

Among all sexually transmitted and blood-borne infections, chlamydia, gonorrhea and hepatitis C contributed the greatest number of cases in Waterloo Region in 2014. As in previous years, chlamydia remains the most common infectious disease in Waterloo Region overall, with high rates in young adults 20 to 29 years of age. Rates are particularly high among 15 to 24 year old females. Local chlamydia rates have remained relatively stable over the last few years, and the 2014 rate was significantly lower than the provincial rate. The most common risk factors reported by chlamydia cases in 2014 included not using a condom and having multiple sexual partners. Region of Waterloo Public Health is specifically addressing high rates of chlamydia and other sexually transmitted infections among youth through the “Waterloo Region Sexual Health Youth Strategy”. This strategy involves partnership with several community stakeholders and outlines a multi-year action plan to promote healthy sexuality among youth in Waterloo.
Region, and to provide strategic direction for youth sexual health education, programs, and services. It focuses on three key focus areas: access to programs and services, education, and parents. Region of Waterloo Public Health also initiated a project to look at how to reduce incidence rates in our young adult (20 to 29 years of age) and other priority populations.

The rate of gonorrhea in Ontario has been increasing in recent years, and this trend has also been observed locally. The local rate of gonorrhea has been increasing since 2012, although rates in 2013 and 2014 have remained similar to those for the province as a whole. Reasons for the province-wide increase in rates are unclear, and are being studied by the provincial government. The most commonly reported risk factors for local cases of gonorrhea included not using a condom and having multiple sexual partners. The rate of infectious syphilis has also been gradually increasing over recent years primarily in men who have sex with men; although, local rates continue to be lower than that of the province. Rates of hepatitis B, hepatitis C, and HIV/AIDS all remained relatively stable and below those of the province. Region of Waterloo Public Health continues to address sexually transmitted and blood-borne infections by providing free testing, treatment and counselling for STIs at sexual health clinics and by engaging in harm reduction strategies which include the provision of needle syringe programs and other related services at several locations in the region.

**Vaccine Preventable Diseases**

Influenza was the most common vaccine preventable disease for the 2014-2015 season, accounting for approximately three-quarters of vaccine preventable diseases reported in Waterloo Region. There was an elevated level of influenza activity during the 2014-2015 season, although still within what can be expected for a busy influenza season, and the local rate was lower than that for the province as a whole. Region of Waterloo Public Health distributes vaccines to health care providers and provides influenza immunization clinics by appointment for families, to complement the many pharmacies, physicians’ offices and other providers of influenza vaccine in our region, works with long-term care and retirement homes to increase staff and resident immunization coverage rates, and follows up on influenza cases and outbreaks in Waterloo Region.

Local rates of invasive pneumococcal disease (IPD) have been decreasing since 2012, which is similar to the trend observed for all of Ontario; in 2014 local IPD rates were similar to the provincial rate. The most common risk factors for IPD include having an underlying or chronic illness and being partially or fully unimmunized. As such, Public Health is working to promote immunization for IPD among priority and high-risk individuals through health care providers.
Rates of varicella, mumps, invasive meningococcal disease (IMD), measles and pertussis were either stable or decreased in 2014, and remained similar to or lower than provincial rates. Region of Waterloo Public Health supports the prevention of vaccine-preventable illnesses through the provision of vaccine delivered through health care providers and public health immunization clinics, the achievement and maintenance of high immunization rates among children enrolled in publicly-funded elementary and secondary schools through the Immunization of School Pupils Act, as well as other health education and promotion activities to increase immunization coverage rates.

Other Infectious Diseases

Among other reportable infectious diseases, local rates for active and latent (i.e., inactive) tuberculosis, encephalitis/meningitis, and neonatal group B streptococcal disease were stable in 2014 compared to previous years and similar to those of the province. The local rate of invasive Group A streptococcal disease (iGAS) decreased from 2013 to 2014, with the local rate remaining statistically comparable to provincial iGAS rates.

After climbing steadily between 2009 and 2013, local and provincial rates of legionellosis have also started to decline. Cases have been sporadic and not linked to an outbreak. An important component of legionellosis prevention is proper maintenance of cooling towers. In recent years, Region of Waterloo Public Health has distributed legionellosis information to hospitals, schools, long-term care homes, retirement homes, and other identified cooling tower operators within the Region. The information included information on the provincial and local legionellosis disease trends, and recommended best practices for cooling tower maintenance.

Outbreaks

Waterloo Region experienced a busy season in terms of enteric outbreaks, most often due to norovirus-like illness, in daycares and long-term care homes in the 2014-2015 season, but still within what can be expected for an enteric season.

The number of non-influenza respiratory outbreaks was lower in 2014-2015 compared to previous seasons in Waterloo Region. Conversely, the number of influenza outbreaks in long-term care and retirement homes increased in 2014-2015 compared to previous seasons in Waterloo Region. This is reflective of an increase in influenza activity experienced both locally and provincially.

Region of Waterloo Public Health follows up with child care centres, hospitals, residential/group homes, long-term care homes and retirement homes that have reported an outbreak to assist with and support outbreak management efforts. In addition, Region
of Waterloo Public Health hosts infection control education forums for long-term care homes, retirement homes, and child care centres, and participates on committees and networks that address infection prevention and control issues in facility settings.

Conclusion

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. These activities include follow-up of all reportable disease cases and their contacts, as well as follow-up and management of outbreaks of infectious diseases. Prevention activities include inspections of food premises, recreational water, residential facilities, day nurseries and personal service settings, immunization programs and vector-borne control programs. Region of Waterloo Public Health also engages in a number of health promotion activities that target the general public, as well as more vulnerable group settings such as long-term care homes, hospitals, and child care centres.

The Infectious Diseases in Waterloo Region Surveillance Report for 2014 provides an update to the community on the local status of infectious diseases and the findings from this report will be used to inform and improve local public health programming in the prevention and transmission of reportable, infectious diseases in Waterloo Region.
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired immunodeficiency syndrome</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
</tr>
<tr>
<td>GBS</td>
<td>Group B streptococcus</td>
</tr>
<tr>
<td>HBV</td>
<td>Hepatitis B virus</td>
</tr>
<tr>
<td>HCV</td>
<td>Hepatitis C virus</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>HPI</td>
<td>Health Protection and Investigation</td>
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<td>HPPA</td>
<td>Health Protection and Promotion Act</td>
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<td>Infectious Diseases, Dental and Sexual Health</td>
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<td>iGAS</td>
<td>Invasive Group A streptococcal disease</td>
</tr>
<tr>
<td>IMD</td>
<td>Invasive meningococcal disease</td>
</tr>
<tr>
<td>IPD</td>
<td>Invasive pneumococcal disease</td>
</tr>
<tr>
<td>iPHIS</td>
<td>Integrated Public Health Information System</td>
</tr>
<tr>
<td>MOHLTC</td>
<td>Ministry of Health and Long-Term Care</td>
</tr>
<tr>
<td>MSM</td>
<td>Men who have sex with men</td>
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<td>NACRS</td>
<td>National Ambulatory Care Reporting System</td>
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<td>OPHS</td>
<td>Ontario Public Health Standards</td>
</tr>
<tr>
<td>PHO</td>
<td>Public Health Ontario</td>
</tr>
<tr>
<td>SRR</td>
<td>Standardized rate ratio</td>
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<td>Sexually transmitted infection</td>
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<td>Verotoxin producing <em>Escherichia coli</em></td>
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Introduction

Infectious diseases are illnesses caused by microorganisms, such as bacteria, viruses and parasites, which may cause serious illness or be transmitted to large numbers of individuals. As per Ontario’s Health Protection and Promotion Act (HPPA), any case of a number of diseases must be reported to the local Medical Officer of Health (refer to Appendix C for a full list).

This technical report, Infectious Diseases in Waterloo Region: Surveillance Report 2014, presents Waterloo Region’s rates of reportable diseases for 2014, provides comparisons of rates to previous years (2009 to 2013) for historical context, as well as comparisons to provincial rates. Cases of disease included in this report are for individuals who were residents of Waterloo Region at the time of the onset of their illness.

For ease of reference, the diseases in this report are categorized as follows:

- Enteric diseases
- Vector-borne and zoonotic diseases
- Sexually transmitted and blood-borne infections
- Vaccine preventable diseases
- Other infectious diseases
- Outbreaks

Disease-specific data is presented in alphabetical order within each section and follows a standard format. Diseases are described individually if five or more cases were reported during 2014 or if Public Health undertakes specific measures to prevent transmission of the disease.
## Overall Findings

Table 1. Numbers and age-standardized incidence rates per 100,000 for all reportable diseases, Waterloo Region, 2014 and 2009-2013

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disease</th>
<th># Cases in 2014</th>
<th>2014 Rate per 100,000</th>
<th>Five-year average rate per 100,000 (2009-2013)</th>
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<td>1</td>
<td>Chlamydia</td>
<td>1,266</td>
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</tr>
<tr>
<td>2</td>
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<td>414</td>
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<td>Gonorrhea</td>
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<tr>
<td>9</td>
<td>Syphilis, infectious³</td>
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<td>10</td>
<td>Group A streptococcal disease, invasive (iGAS)</td>
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<td>Group B streptococcal disease, neonatal</td>
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</tr>
<tr>
<td>26</td>
<td>Mumps³</td>
<td>1</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>27</td>
<td>Hepatitis B</td>
<td>1</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>28</td>
<td>Q Fever</td>
<td>0</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>29</td>
<td>Invasive meningococcal disease</td>
<td>0</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>30</td>
<td>Haemophilus influenza B (Hib)</td>
<td>0</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>31</td>
<td>Measles</td>
<td>0</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>32</td>
<td>Brucellosis</td>
<td>0</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>33</td>
<td>Botulism</td>
<td>0</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>34</td>
<td>Creutzfeldt-Jakob disease</td>
<td>0</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>35</td>
<td>West Nile virus (WNV)³</td>
<td>0</td>
<td>0.0</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Source: iPHIS 2009-2014, MOHLTC, extracted May 13, 2015 (July 27, 2015 for Influenza); Public Health Ontario Infectious Diseases Query 2009-2014, extracted May 21, 2015 (July 9, 2015 for Influenza);

1 Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
2 Does not include latent tuberculosis or varicella infections.
3 Includes both confirmed and probable cases of amebiasis, mumps, Lyme disease, pertussis and WNV due to case definition changes in 2009 (see Appendix B for more information).
4 Influenza data is reported for the 2009-10 season to the 2014-15 season which runs from September 1st through August 31st each year. Note that the 2014-15 data is not provided for the complete season and only includes data from September 1st, 2014 to May 31st, 2015.
5 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).
6 Other syphilis includes all other types of syphilis such as late latent or unspecified (the other category excludes early congenital syphilis).
Enteric Diseases

The following enteric diseases are included in this section:

- Amebiasis
- Brucellosis
- Campylobacteriosis
- Cryptosporidiosis
- Cyclosporiasis
- Giardiasis
- Hepatitis A
- Listeriosis
- Salmonellosis
- Shigellosis
- Typhoid/paratyphoid fever
- Verotoxin-producing *Escherichia coli* (VTEC)
- Yersiniosis
Table 2. Numbers and age-standardized incidence rates per 100,000 for enteric diseases, Waterloo Region & Ontario, 2014 and 2009-2013 (five-year annual average)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Waterloo Region</th>
<th>Ontario</th>
<th>2014 Standardized Rate Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Cases in 2014</td>
<td>2014 Rate per 100,000</td>
<td>5-year average rate per 100,000 (2009-2013)</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>156</td>
<td>27.8</td>
<td>27.6</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>127</td>
<td>23.4</td>
<td>23.4</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>48</td>
<td>9.1</td>
<td>14.0</td>
</tr>
<tr>
<td>Amebiasis*</td>
<td>17</td>
<td>3.1*</td>
<td>5.5</td>
</tr>
<tr>
<td>Cryptosporidosis</td>
<td>11</td>
<td>2.2*</td>
<td>4.1</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>9</td>
<td>1.9*</td>
<td>1.2</td>
</tr>
<tr>
<td>VTEC</td>
<td>7</td>
<td>1.5*</td>
<td>2.8</td>
</tr>
<tr>
<td>Cyclosporiasis</td>
<td>7</td>
<td>1.4*</td>
<td>0.5*</td>
</tr>
<tr>
<td>Typhoid/paratyphoid fever</td>
<td>6</td>
<td>1.2*</td>
<td>0.7*</td>
</tr>
<tr>
<td>Yersiniosis</td>
<td>6</td>
<td>1.2*</td>
<td>1.2</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>5</td>
<td>0.8*</td>
<td>1.7</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>3</td>
<td>0.4*</td>
<td>0.2*</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>0</td>
<td>0.0*</td>
<td>0.2*</td>
</tr>
</tbody>
</table>


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

2 Standardized rate ratio (SRR) refers to the ratio of the Waterloo Region age-standardized rate for 2014 compared to the Ontario age-standardized rate for 2014. The 95% confidence interval indicates the statistical significance of the SRR (if the 95% confidence interval contains 1.00, the two rates are not statistically different from one another).

3 Includes both confirmed and probable amebiasis cases.

Public Health Activities for Enteric Diseases

Region of Waterloo Public Health and Emergency Services:

- Receives, confirms, and investigates reports of enteric illness in the Region.
- Follows up with all cases and their contacts to adequately address and manage the infectious disease (e.g., reviews risk factors for disease acquisition; enforces work restrictions of food handlers and care providers; recommends that a case speak with their physician about treatment; etc.)
- Provides information on enteric diseases, transmission, risk factors and prevention strategies.
• Performs routine inspections of food premises, personal service settings, long-term care homes and retirement homes, residential facilities and day nurseries in order to prevent the occurrence and transmission of infectious and foodborne illness; the results of food premises and personal service settings inspections in the Waterloo Region are available on Public Health’s website at http://chd.region.waterloo.on.ca/en/index.asp.

• Performs routine inspections of recreation water facilities (e.g., pools, hot tubs, splash pads) in order to prevent the occurrence and transmission of infectious and waterborne illness.

• Works in cooperation with federal and provincial partners including the Ministry of Health and Long Term Care, Ontario Ministry of Agriculture and Rural Affairs, and Canada Food Inspection Agency to identify and remove sources of contaminated food products from the consumer marketplace.

• Conducts disease surveillance and provide timely updates on local disease status to area health care providers and other stakeholders.

• Provides health education for staff of daycares, long-term care homes and retirement homes.

• Provides access to free bacteriological testing for private well water by offering sample pick-up and drop-off at eight locations within Waterloo Region, encouraging private well owners to sample their well water.

• Assists private well owners with understanding well water testing results, and follows up on all samples that test positive for E. coli or are overgrown with bacteria.
Amebiasis

Background
- Amebiasis is caused by a parasite called *Entamoeba histolytica*, which lives in human intestines (i.e., the gut) and is passed in the feces.
- It is spread mainly through ingestion of contaminated food and water but can also be spread through fecal-oral contact.
- Some who are infected may have no symptoms while others may have severe diarrhea and pain. It could also lead to infections involving the liver, lungs and brain.
- Although anyone can acquire amebiasis, those who are most at risk include: recent immigrants or visitors who have returned from countries with poor sanitation; persons who live in institutions; and men who have sex with men. The very young, the elderly, and pregnant women are most at risk of developing complications from this infection.

Local Picture

Figure 1. Age-standardized amebiasis\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo probable cases</th>
<th>Waterloo confirmed cases</th>
<th>Waterloo rate</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>27</td>
<td>5.6</td>
<td>6.4</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>24</td>
<td>4.5</td>
<td>6.3</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>21</td>
<td>4.3</td>
<td>5.9</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>33</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>2013</td>
<td>31</td>
<td>0</td>
<td>6.1</td>
<td>6.3</td>
</tr>
<tr>
<td>2014</td>
<td>17</td>
<td>0</td>
<td>3.1</td>
<td>5.5</td>
</tr>
</tbody>
</table>


\(^1\)Includes both confirmed and probable amebiasis cases.

\(^2\)The Waterloo Region rate for 2014 is unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
• In 2014, there were 17 probable cases of amebiasis in Waterloo Region (incidence rate of 3.1 cases per 100,000) which is lower than the previous five-year annual average rate for 2009-2013 of 5.4 per 100,000.
• Due to changes in testing protocols from 2012 to 2013, nearly all amebiasis cases in the province since 2013 are defined as ‘probable’ cases. Previous provincial testing protocols typically yielded ‘confirmed’ amebiasis case results. This distinction in the case definition does not preclude the follow-up on cases performed by Region of Waterloo Public Health.
• Amebiasis rates in the region were significantly lower than those for the province (SRR = 0.56 [CI: 0.39-0.81]) in 2014.
• In 2014, there were a similar number of cases among males (N=10) and females (N=7), and the highest age-specific rate was in 30 to 34 year olds (7.4 per cases 100,000).
• Of the 2014 Waterloo Region cases that had risk factor information available (N=13), 62 per cent were related to travel outside of the province.
• Due to the small number of cases in 2014 and resulting unstable rate, caution should be used when interpreting this data.
Brucellosis

Background

- Brucellosis is an infectious disease caused by *Brucella* bacteria.
- People can get the disease when they consume infected meat or unpasteurized milk or if they come in close contact with an infected animal. Animals which are most commonly infected include sheep, cattle, goats, pigs, and dogs.
- In humans, brucellosis causes non-specific flu-like symptoms such as fever, sweating, anorexia (loss of appetite), headache, muscle pain, back pain, and physical weakness. Some severe infections of the brain or heart and long lasting symptoms (e.g., recurrent fevers, joint pain, pain in the testicles, fatigue, and depression) can also occur.
- Those at higher risk for the disease include slaughterhouse workers, meat inspectors, animal handlers, veterinarians, and laboratory workers.

Local Picture

- There were no cases of brucellosis in Waterloo Region in 2014. The last reported case in the region was in 2012.
- In 2014, there were 2 brucellosis cases in Ontario.
Campylobacteriosis

Background
- Campylobacteriosis is a disease caused by bacteria called *Campylobacter*. It is one of the most common causes of diarrhea-related illness in Canada and around the world.
- The most common way to become infected is by ingestion of undercooked poultry meats and/or raw or unpasteurized milk. The infection can also spread by cross-contamination (e.g., cutting poultry meat on a cutting board, and then using the unwashed cutting board or utensil to prepare vegetables or other raw or lightly cooked foods).
- Common symptoms include mild to severe diarrhea, stomach pain, cramps, nausea, vomiting, fever, headache, and muscle pain. Some people infected with *campylobacter* may not have symptoms but can still pass the infection onto others.
- Although anyone can acquire the infection, those at higher risk include infants and young children, pregnant women, the elderly, and people with weakened immune systems.

Local Picture

Figure 2. Age-standardized campylobacteriosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo cases</th>
<th>Waterloo rate</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>116</td>
<td>21.9</td>
<td>25.4</td>
</tr>
<tr>
<td>2010</td>
<td>150</td>
<td>29.7</td>
<td>26.1</td>
</tr>
<tr>
<td>2011</td>
<td>158</td>
<td>29.9</td>
<td>26.8</td>
</tr>
<tr>
<td>2012</td>
<td>147</td>
<td>28.4</td>
<td>29.3</td>
</tr>
<tr>
<td>2013</td>
<td>150</td>
<td>28.0</td>
<td>29.3</td>
</tr>
<tr>
<td>2014</td>
<td>156</td>
<td>27.8</td>
<td>27.2</td>
</tr>
</tbody>
</table>

- Campylobacteriosis is the most common enteric (intestinal-related) illness in Waterloo Region and Ontario.
- In 2014, there were 156 reported cases of campylobacteriosis in Waterloo Region (annual incidence rate of 27.8 cases per 100,000).
- The current year’s incidence rate was similar to the previous five-year annual average for 2009-2013 (27.6 cases per 100,000).
- In 2014, the local rate of campylobacteriosis remained very similar to the provincial rate (SRR = 1.02 [CI: 0.87-1.21]).
- In 2014, cases of campylobacteriosis were fairly evenly distributed among males (N=81) and females (N=75), and occurred in both young and older individuals; the highest age-specific rates were in the 0 to 4 year age group (41.9 cases per 100,000), 20 to 24 year age group (46.6 cases per 100,000) and 65 and older age group (43.0 cases per 100,000).
- Of the 2014 Waterloo Region cases that had risk factor information available (N=112), 30 per cent were related to travel outside of the province. Other risk factors included animal contact (e.g., pets, farm animals or petting zoo) and cross-contamination of ready-to-eat foods with raw poultry/meat.
Cryptosporidiosis

Background

- Cryptosporidiosis is a diarrheal illness caused by the parasite Cryptosporidium.
- It is transmitted through the fecal-oral route, which includes person-to-person contact, animal-to-person contact (e.g., from pets and farm animals), and food-borne transmission. Cryptosporidiosis can also be transmitted by waterborne contact, i.e., by drinking contaminated water or swallowing untreated recreational water (e.g., lakes or rivers).
- The main symptom is watery diarrhea. Other symptoms include abdominal cramps, fatigue, nausea, vomiting, and fever. Some infected people may have no symptoms.
- Children under the age of two, animal handlers, travellers, men who have sex with men, and close contacts of infected people are at higher risk of infection.

Local Picture

Figure 3. Age-standardized cryptosporidiosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


\(^1\)The Waterloo Region rates for 2012 and 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23\%) and should be interpreted with caution.
• In 2014, there were 11 cases of cryptosporidiosis in Waterloo Region (age-adjusted incidence rate of 2.2 cases per 100,000); this rate is lower than the previous five-year annual average for 2009-2013 (4.1 per 100,000).

• In 2014, local and provincial rates of cryptosporidiosis were similar (SRR = 0.71 [CI: 0.43-1.18]).

• Cryptosporidiosis cases were fairly evenly distributed between males (N=4) and females (N=7) in 2014 and the highest age-specific rate was among the 20 to 24 year age group (7.4 cases per 100,000).

• There were very few cases among adults older than 30 years, and there were no cases among adults older than 50 years.

• Of the 11 cases in Waterloo Region in 2014, five were related to travel outside of the province.

• Due to the small number of cases in 2012 and 2014 and resulting unstable rates, caution should be used when interpreting this data.
Cyclosporiasis

Background
- Cyclosporiasis is a disease caused by a parasite called *Cyclospora cayetanensis*. The parasite infects the small intestines of humans.
- It is not very common in Waterloo Region and is usually associated with travel; cyclosporiasis is more common in tropical or subtropical countries.
- *Cyclospora* is spread when people eat or drink food or water that has been contaminated with infected feces.
- Cyclosporiasis usually causes watery diarrhea. Other common symptoms include: loss of appetite, weight loss, stomach cramps, bloating/gas, nausea, vomiting, fever, and fatigue.

Local Picture

Figure 4. Age-standardized cyclosporiasis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


1 The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
• In 2014, there were seven cases of cyclosporiasis in Waterloo Region (incidence rate of 1.4 cases per 100,000); this rate is higher than that of the previous five-year annual average rate for 2009-2013 (0.5 per 100,000).
• Local incidence rates in 2014 are similar to those of the province (SRR=1.45 [CI: 0.58-3.62]), and have remained similar to or lower than provincial rates since 2009.
• There were no notable differences in case distribution by sex or age group.
• Of the five Waterloo Region cases that had risk factor information available, the most common risk factors reported were consumption of unwashed berries, fruits or vegetables.
• Three of the five cases reported eating imported blackberries and were part of a national cyclosporiasis outbreak.
• Two of the five cases were associated with travel outside the province and were not considered to be part of the national outbreak.
• Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Giardiasis

Background

- Giardiasis is a diarrheal infection caused by a parasite called *Giardia lamblia*.
- It is one of the most common waterborne illnesses in North America. Giardiasis can be spread through ingestion of contaminated food or water, such as through swallowing untreated recreational water (e.g., lakes or rivers), or directly from fecal-oral contact such as in child care settings or through sexual contact.
- Giardiasis causes watery diarrhea, foul smelling bowel movements, weight loss, bloating, and stomach pain/cramps. Some persons may have no symptoms.
- Travelers to countries where giardiasis is common, those who are in close contact with someone who has the illness, people who swallow contaminated drinking water (e.g., untreated water from lakes or rivers), and men who have sex with men are among those at higher risk.

Local Picture

Figure 5. Age-standardized giardiasis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

In Waterloo Region and Ontario, giardiasis was the third most common enteric disease reported in 2014.

In 2014, there were 48 reported cases of giardiasis in Waterloo Region (incidence rate of 9.1 cases per 100,000); this rate was lower than that of the previous five-year annual average rate of 14.0 cases per 100,000.

In Waterloo Region and Ontario, the rate of giardiasis has been decreasing since 2009, with only a slight increase in the local rate in 2013. In 2014, the local rate was similar to that of the province (SRR = 0.94 [CI: 0.70-1.24]).

Slightly more giardiasis cases were reported among males compared to females in Waterloo Region (N=29 in males versus N=19 in females). The local rate of giardiasis in 2014 was highest among children 4 years of age and younger (9.8 cases per 100,000), followed by children 5 to 9 years of age (7.0 cases per 100,000).

There was no marked seasonal trend in the incidence of giardiasis in Waterloo Region, although a higher number of cases occurred in August and December compared to other months in 2014.

Of those that had risk factor information available (N=39), the majority of 2014 local giardiasis cases reported travelling or living outside the province within the incubation period (N=23).
Hepatitis A

Background

- Hepatitis refers to the inflammation of the liver which can be due to a number of causes. In a hepatitis A infection, the cause is the hepatitis A virus.
- Hepatitis A is spread when the hepatitis A virus is taken in by mouth from contact with objects, food, or drinks contaminated by the feces of an infected person. This can occur through person to person contact or ingestion of contaminated food or water.
- Symptoms are often abrupt and include tiredness, fever, abdominal pain, loss of appetite, nausea, diarrhea and jaundice (yellowing of the skin and eyes). Some people may have no symptoms, and adults are more likely to have symptoms than children.
- Those at higher risk of contracting hepatitis A include travellers to regions with poor sanitation and/or high rates of hepatitis A, sexual contacts of infected persons, men who have sex with men, and household contacts of cases.

Local Picture

Figure 6. Age-standardized hepatitis A incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


1The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
In 2014, there were nine reported cases of hepatitis A in Waterloo Region (incidence rate of 1.9 cases per 100,000).

Since 2009, the local rate of hepatitis A has remained relatively similar over time, and the current year’s incidence rate is only slightly higher than that of the previous five-year annual average rate for 2009-2013 (1.2 cases per 100,000).

The local rate of hepatitis A in 2014 was higher than the provincial rate, although the difference was not statistically significant (SRR = 2.53 [CI: 0.92-7.01]).

In 2014, there were no notable differences in case distribution by sex, and there were very few cases among adults older than 30 years.

Of the eight local hepatitis A cases with risk factor information available, five had travelled outside of the province within the incubation period.

Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Listeriosis

Background

- Listeriosis is an illness caused by eating food contaminated with bacteria called *Listeria monocytogenes*. The bacteria are commonly found in the environment (i.e., water and soil).
- Some foods are more likely to carry listeria than others. Those that present a higher risk include raw or unpasteurized milk, soft cheeses and ready-to-eat meats such as hot dogs, pâté and deli meats.
- The disease primarily affects the elderly, newborns, pregnant women, and those with weakened immune systems. These individuals should avoid eating the foods mentioned above to reduce the risk of becoming infected with listeriosis.
- Listeriosis usually causes fever and muscle aches. More severe consequences of listeriosis include septicemia (infection of blood and organs) and meningitis (infection of the lining of the brain). Infections during pregnancy can lead to complications such as miscarriage and infection of the newborn.

Local Picture

Figure 7. Age-standardized listeriosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
In 2014, there were three reported cases of listeriosis in Waterloo Region (incidence rate of 0.4 cases per 100,000); this rate is similar to the previous five-year annual average for 2009-2013 (0.2 cases per 100,000).

The local rate of listeriosis in 2014 was similar to the provincial rate (SRR = 1.29 [CI: 0.35-4.72]).

All listeriosis cases in 2014 occurred among adults aged 60 years and older.

Among the 2014 Waterloo Region cases, two had an underlying medical condition or chronic illness, and one case reported being immunocompromised. Other risk factors identified included consumption of soft cheeses and contact with soil or untreated manure.

Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Salmonellosis

Background

- Salmonellosis is a common food-borne infection caused by bacteria known as *Salmonella*.
- Salmonella is spread by consuming food or water that is contaminated by feces of an infected animal or person. It can also be spread from person-to-person (e.g., through inadequate hand washing after using the toilet).
- Symptoms of salmonellosis include fever, headache, diarrhea, nausea and stomach cramps.
- Those at higher risk of getting the infection include infants, the elderly, and persons with weakened immunity (e.g., those with HIV or taking corticosteroids). Owning a bird or reptile can also put a person at risk, since these animals can be carriers of the bacteria without having any symptoms.

Local Picture

Figure 8. Age-standardized salmonellosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

• Salmonellosis was the second most common enteric infection in Waterloo Region, with 127 cases reported in 2014.

• In 2014, the local incidence rate of salmonellosis was 23.4 cases per 100,000 which was similar to that of the province (SRR = 1.01 [CI: 0.84-1.21]).

• Since 2009, the local rate has remained relatively stable; the current year’s rate is similar to the previous five-year annual average rate for 2009-2013 (23.4 cases per 100,000).

• In 2014, there were no notable differences in salmonellosis distribution by sex; the highest age-specific incidence rate occurred among the 0 to 4 year age group (58.1 per 100,000) which is consistent with trends in age distribution for the previous 5-years.

• Among 2014 cases with risk factor information available (N=101), the most common risk factor reported was travel outside of the province during the incubation period.
Shigellosis

Background

- Shigellosis is an enteric infection that is caused by *Shigella* bacteria.
- *Shigella* is passed from person to person by the fecal-oral route. It can spread if hands are not properly washed, especially after going to the toilet or changing diapers, through certain sexual activities (e.g., anal-oral sex), and eating food or drinking water that has been contaminated with the bacteria.
- Shigellosis commonly causes diarrhea (even bloody diarrhea), fever, nausea, stomach cramps, and sometimes vomiting.
- Those at higher risk of infection include children, men who have sex with men, persons with weakened immune systems, and the elderly.

Local Picture

Figure 9. Age-standardized shigellosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014"
In 2014, there were 5 reported cases of shigellosis in Waterloo Region for an incidence rate of 0.8 cases per 100,000; this is slightly lower than the average annual rate for the previous five years (1.7 per 100,000).

Local rates have remained similar to or lower than provincial rates since 2009; in 2014 the rate was significantly lower than the provincial rate (SRR = 0.39 [CI: 0.22-0.69]).

The majority of cases were among males (80 per cent) and there were no discernible trends across age groups.

Due to the small numbers, seasonal trends were not apparent.

Of the five Waterloo Region cases reported in 2014, three were associated with travel outside the province during the incubation period.

Due to small numbers and resulting instability in rates, caution should be used when interpreting this data.
Typhoid/Paratyphoid Fever

Background

- Typhoid fever is a disease caused by bacteria called *Salmonella typhi*. Paratyphoid fever is caused by bacteria called *Salmonella paratyphi*. These diseases are similar, but typhoid fever tends to be more common and severe than paratyphoid fever.

- The bacteria that cause typhoid and paratyphoid fever are found in the feces of infected people. It is commonly spread by eating food or drinking water that has been contaminated with the bacteria. It is also spread from person to person by the fecal-oral route (e.g., hands not properly washed after going to the bathroom or changing diapers, or through certain sexual activities such as oral-anal sex).

- The symptoms can range from mild to severe and include fever, headache, malaise (general discomfort), lack of appetite, and constipation or diarrhea.

- The greatest risk of infection for Canadians occurs while they are traveling to areas with poor sanitation. Children and people with weakened immune systems are at greater risk of getting the infection.

Local Picture

Figure 10. Age-standardized typhoid/paratyphoid fever incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo Cases</th>
<th>Waterloo Rate</th>
<th>Ontario Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2</td>
<td>0.4</td>
<td>1.1</td>
</tr>
<tr>
<td>2010</td>
<td>2</td>
<td>0.4</td>
<td>1.3</td>
</tr>
<tr>
<td>2011</td>
<td>5</td>
<td>1.0</td>
<td>1.4</td>
</tr>
<tr>
<td>2012</td>
<td>5</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>2014</td>
<td>6</td>
<td>1.2</td>
<td>0.8</td>
</tr>
</tbody>
</table>


1The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
In 2014, there were six cases of typhoid/paratyphoid fever reported in Waterloo Region (incidence rate of 1.2 cases per 100,000); this is slightly higher than the previous five-year annual average for 2009-2013 (0.7 cases per 100,000).

Local incidence rates have remained similar to or lower than provincial rates over the previous five years; in 2014, the local typhoid/paratyphoid fever rate was slightly higher than that of the province, but the difference was not statistically significant (SRR = 1.41 [CI: 0.54-3.71]).

There were no notable differences in case distribution by age group or sex, and seasonal trends were not apparent.

Five of the six local cases in 2014 reported travel outside the region as a risk factor, and one of the six reported having had a lab exposure.

Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Verotoxin producing *Escherichia Coli* (VTEC)

**Background**

- *Escherichia coli* or *E. coli* is a bacterium with many subtypes. Most subtypes of *E. coli* are harmless and live in the intestine (gut) of humans and animals. However, there are other subtypes of *E. coli* such as verotoxin-producing *Escherichia coli* (VTEC) that produce toxins and can cause severe illness. The most common strain from the VTEC group is *E. coli* O157:H7.
- *E. coli* is spread through eating contaminated food or drinking contaminated fluids (e.g., water, unpasteurized juice or milk). *E. coli* is found in feces and can also spread from person to person as a result of inadequate hand washing, and through improper food handling.
- The symptoms of *E. coli* infection include severe stomach pain/cramps, diarrhea/bloody diarrhea, nausea, vomiting, and fever. Some people may develop complications involving the kidneys (hemolytic uremic syndrome), which can be life-threatening.
- Those at higher risk include: children, the elderly, and those with weakened immune systems. Eating undercooked ground beef, cheese or milk products made from raw or unpasteurized milk, and drinking unpasteurized milk and fruit juices are key risk factors for getting the infection.
Local Picture

Figure 11. Age-standardized VTEC incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


1The Waterloo Region rates for 2009-2011 and 2013-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were seven cases of VTEC reported in Waterloo Region, for an incidence rate of 1.5 cases per 100,000; this is lower than the previous five-year annual average for 2009-2013 (2.8 cases per 100,000)
- In 2014, the local incidence rate of VTEC was similar to the provincial rate (SRR = 1.37 [CI: 0.57-3.33]). The local incidence rate in 2012 was significantly higher than the provincial rate; otherwise local rates were not statistically different from provincial rates from 2009 to 2013.
- The increase in VTEC cases in 2012 was likely due to the 10 cases linked to family clusters (multiple family members becoming ill from a common source and then through person to person spread).
- In 2014, there were no notable trends in distribution of cases between males and females; the highest age-specific rate occurred in those aged 0 to 4 years (6.5 per 100,000), which is consistent with the age distribution of VTEC cases in the past five years.
• The incidence of VTEC in 2014 was highest during the month of August, which is consistent with the seasonality of the previous five years.

• Three of the seven cases in Waterloo Region in 2014 were linked to a national outbreak; no source was identified for the cluster of cases associated with this outbreak. The most common risk factors reported included consumption of ready-to-eat salads, animal contact (e.g., pets, farms animals or petting zoo) and consumption of raw, unwashed fruits or vegetables.

• Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Yersiniosis

Background

- Yersiniosis is an infection caused by a bacterium of the genus *Yersinia*. Most human infections are caused by *Yersinia enterocolitica*. Yersiniosis is more common in children.
- People get infected with yersiniosis by drinking contaminated fluids and eating contaminated food, especially raw or undercooked pork products.
- If proper hand washing is not practiced after using the toilet or handling raw meat, an infected person can transfer the bacteria to food and objects. A child can be infected if a parent or caretaker handles contaminated food and does not properly wash their hands. *Y. enterocolitica* can also be spread to humans by infected pets through fecal-oral transmission.
- The symptoms of yersiniosis include fever, abdominal pain and diarrhea (often bloody).
- Those who are at a higher risk of infection and severe illness include people with weakened immune system (e.g., with HIV/AIDS), those undergoing chemotherapy, young children, and the elderly.
Local Picture

Figure 12. Age-standardized yersiniosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

![Graph showing age-standardized yersiniosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014.]


The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were six cases of yersiniosis in Waterloo Region (incidence rate of 1.2 cases per 100,000); this is similar to the previous five-year annual average for 2009-2013 (1.2 per 100,000).
- The local rate of yersiniosis has fluctuated since 2009, but has been similar to or lower than that of the province; in 2014, the local incidence rate was similar to that of the province (SRR=0.96 [CI: 0.43-2.16]).
- In 2014, cases of yersiniosis in Waterloo Region were equally distributed between males and females; the highest age-specific rate occurred in those aged 0 to 4 years (6.5 per 100,000), which is consistent with trends in age distribution over the past five years.
- Of the five local cases of yersiniosis in 2014 with risk factor information, three reported travelling outside the province within the incubation period, one reported consumption of undercooked pork, and one reported contact with animal feces.
• Due to the small number of cases and resulting instability in rates, caution should be used in interpreting this data.
Vector-Borne and Zoonotic Diseases

For the purposes of this report, diseases transmitted by vectors and animals include:

- Lyme disease
- Malaria
- Rabies
- West Nile virus (WNV)

Table 3. Numbers and age-standardized incidence rates per 100,000 for vector-borne and zoonotic diseases, Waterloo Region & Ontario, 2014 and 2009-2013 (five-year annual average)

<table>
<thead>
<tr>
<th></th>
<th>Waterloo Region</th>
<th>Ontario</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Case s in 2014</td>
<td>2014 Rate per 100,000</td>
<td>5-year average rate per 100,000 (2009-2013)</td>
</tr>
<tr>
<td>Malaria</td>
<td>2</td>
<td>0.4(^1)</td>
<td>1.2</td>
</tr>
<tr>
<td>Lyme disease(^3)</td>
<td>1</td>
<td>0.2(^1)</td>
<td>0.4(^1)</td>
</tr>
<tr>
<td>West Nile virus(^3)</td>
<td>0</td>
<td>0.0(^1)</td>
<td>0.1(^1)</td>
</tr>
<tr>
<td>Rabies</td>
<td>0</td>
<td>0.0(^1)</td>
<td>0.0(^1)</td>
</tr>
</tbody>
</table>


1 Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
2 Standardized rate ratio (SRR) refers to the ratio of the Waterloo Region age-standardized rate for 2014 compared to the Ontario age-standardized rate for 2014. The 95% confidence interval indicates the statistical significance of the SRR (if the 95% confidence interval contains 1.00, the two rates are not statistically different from one another).
3 Includes both confirmed and probable Lyme disease and West Nile virus cases.
Public Health Activities for Vector-Borne and Zoonotic Diseases

Region of Waterloo Public Health and Emergency Services:

- Undertakes activities to reduce the occurrence of West Nile virus and Lyme disease and to prevent human rabies.
- Reduces the risk of exposure to Lyme disease and West Nile virus through public education, investigation of suspect human cases, vector surveillance, and the implementation of vector control measures.
- Raises awareness about diseases through the provision of information regarding the disease, its transmission, risk factors, and prevention strategies.
- Investigates all reported animal biting incidents, provides recommendations regarding post-exposure prophylaxis and dispenses rabies vaccine.
- Investigates and confirms human cases of malaria identified by health care providers and laboratories.
Lyme Disease

Background

- Lyme disease is an infection caused by the bacteria *Borrelia burgdorferi*. This bacterium is spread through the bite of blacklegged ticks, previously called deer ticks. These ticks can be found throughout Ontario, particularly in known risk areas including Long Point Provincial Park, Turkey Point Provincial Park, Rondeau Provincial Park, Point Pelee National Park, Prince Edward Point National Wildlife Area, Wainfleet Bog Conservation Area, St. Lawrence Islands National Park area, Rainy River, Pinery Provincial Park and the Rouge Valley.

- The common symptoms of Lyme disease include a red bull’s eye rash (also called erythema migrans), fever, headache, muscle/joint pain, and fatigue. If untreated, the disease can progress to cause infections of the heart, brain and lining surrounding the brain, and inflammation of joints.

- Spending time outdoors in woody or grassy areas where blacklegged ticks are present; having exposed areas of skin while visiting places where such ticks are commonly found; not using an insect repellant containing DEET or Icaridin; and not removing blacklegged ticks attached to the body within 24 hours, could increase the risk of acquiring the infection.
Local Picture

Figure 13. Age-standardized Lyme disease\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)

In 2014, the rate of Lyme disease among Waterloo Region residents was 0.2 cases per 100,000 (N=1); this is similar to the previous five-year average annual rate for 2009-2013 (0.4 cases per 100,000).

The local rate of Lyme disease has remained lower than that of the province since 2009; in 2014, the incidence rate was significantly lower than that of the province (SRR=0.11 [CI: 0.06-0.20]).

The one case reported in Waterloo Region in 2014 was not locally acquired. At the present time, Waterloo Region is not an endemic area for the blacklegged tick.

Lyme disease acquisition typically occurs in the warmer summer months (i.e., June to September). The one Lyme disease case reported in a Waterloo Region resident in 2014 is consistent with this seasonal trend and occurred in the month of August.

---

\(^1\) Includes both confirmed and probable Lyme disease cases.

\(^2\) The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Malaria

Background

- Malaria is a common and life-threatening parasitic disease in many tropical and subtropical countries. The disease is transmitted by the female *Anopheles* mosquitoes.
- Malaria is currently endemic in over 100 countries, many of which are popular travel destinations. It is not endemic to Canada and cases diagnosed in Canada are acquired during travel to an endemic area.
- Infection may be marked by an acute fever and other clinical symptoms. Some forms of malaria may remain dormant in the liver and cause relapses in illness for up to five years after initial exposure.
- Travellers to endemic areas and persons returning to visit their country of origin in such areas are at increased risk for infection if anti-malarial medication and precautions to reduce mosquito bites are not taken.
- Young children, pregnant women and persons with human immunodeficiency virus (HIV) are most at risk from malaria and its complications.

Local Picture

Figure 14. Age-standardized malaria incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
In 2014, there were two cases of malaria reported among residents of Waterloo Region. The incidence rate for 2014 was 0.4 cases per 100,000 which is lower than the previous five-year average annual rate for 2009-2013 (1.2 per 100,000).

The local malaria rate in 2014 was significantly lower than the provincial rate (SRR = 0.30 [CI: 0.14-0.64]).

Due to the small number of cases and resulting instability in rates, caution should be used in interpreting this data.
Rabies

Background
- Rabies is a disease of the central nervous system that can affect humans and other mammals.
- Infection can occur if a rabid animal bites a person, if the saliva of a rabid animal enters a cut or scratch, or if the saliva comes in contact with the moist tissues of the mouth, nose or eyes.
- Although the risk of humans encountering a rabid animal in Ontario is low, rabies infection in humans is almost always fatal, making prevention extremely important.
- Risk factors include coming in contact with animals, especially animals that are common rabies carriers, and travel to a rabies endemic country.

Local Picture
- There have been no reports of human cases of rabies in the Waterloo Region from 2009 to 2014.
- Although rare, the possibility of human rabies acquired from animal bites continues to exist, as rabies in animals can be found on occasion in Waterloo Region.
- The last case of (fatal) human rabies reported by the province occurred in 2012, but this case contracted the disease outside of Canada.
West Nile Virus (WNV)

Background
- West Nile virus (WNV) is a virus transmitted through the bite of an infected mosquito (which becomes infected by feeding on an infected bird).
- The risk of infection is low with less than one per cent of people infected becoming ill enough to be hospitalized. Around one in five people will experience symptoms. Symptoms can include fever, headache, nausea/vomiting, body ache, skin rash and swollen glands.
- Anyone can be infected with WNV, but the elderly and those with a weakened immune system (e.g., having HIV/AIDS, undergoing chemotherapy, taking corticosteroids) are at greater risk.

Local Picture

Figure 15. Age-standardized West Nile virus\(^1\) incidence rates per 100,000\(^1\), by year, Waterloo Region & Ontario, 2009-2014\(^2\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo probable cases</th>
<th>Waterloo confirmed cases</th>
<th>Waterloo rate</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>1</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
<td>3</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>


\(^1\) Includes both confirmed and probable West Nile virus cases.
\(^2\) The Waterloo Region rates for 2011 and 2012 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
- There were no cases of West Nile virus in Waterloo Region in 2014; there were 13 cases of West Nile virus reported in Ontario during the same year.
- There was a spike in West Nile Virus activity across the province in 2012, but the incidence has decreased since that time; local incidence rates have remained similar to or lower than provincial rates since 2009.
- Due to the small number of cases locally and resulting instability in rates, caution should be used when interpreting the data.
Sexually Transmitted and Blood-borne Infections

For the purposes of this report, sexually transmitted and blood-borne infections include:

- Chlamydia
- Gonorrhea
- Hepatitis B
- Hepatitis C
- HIV/AIDS
- Syphilis (infectious and other)

Table 4. Numbers and age-standardized incidence rates per 100,000 for sexually transmitted and blood-borne infections, Waterloo Region & Ontario, 2014 and 2009-2013 (five-year annual average)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Waterloo Region</th>
<th></th>
<th>Ontario</th>
<th></th>
<th>2014 Standardized rate ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Cases in 2014</td>
<td>2014 Rate per 100,000</td>
<td>5-year average rate per 100,000 (2009-2013)</td>
<td># Cases in 2014</td>
<td>2014 Rate per 100,000</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>1,266</td>
<td>248.1</td>
<td>245.3</td>
<td>35,933</td>
<td>299.2</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>260</td>
<td>51.5</td>
<td>22.9</td>
<td>5,838</td>
<td>48.1</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>122</td>
<td>20.8</td>
<td>21.7</td>
<td>4,217</td>
<td>29.7</td>
</tr>
<tr>
<td>Syphilis, infectious³</td>
<td>31</td>
<td>6.0</td>
<td>3.1</td>
<td>860</td>
<td>6.5</td>
</tr>
<tr>
<td>Syphilis, other⁴</td>
<td>24</td>
<td>4.2</td>
<td>3.9</td>
<td>590</td>
<td>3.9</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>4</td>
<td>0.6¹</td>
<td>2.5</td>
<td>816</td>
<td>6.4</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>1</td>
<td>0.2¹</td>
<td>0.7¹</td>
<td>105</td>
<td>0.7</td>
</tr>
</tbody>
</table>


¹ Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
² Standardized rate ratio (SRR) refers to the ratio of the Waterloo Region age-standardized rate for 2014 compared to the Ontario age-standardized rate for 2014. The 95% confidence interval indicates the statistical significance of the SRR (if the 95% confidence interval contains 1.00, the two rates are not statistically different from one another).
³ 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).
⁴ Other syphilis includes all other types of syphilis such as late latent or unspecified (the other category excludes early congenital syphilis).
Public Health Activities for Sexually Transmitted and Blood-Borne Infections

Region of Waterloo Public Health and Emergency Services:

- Provides sexual health clinics at Public Health offices and other community locations which offer free testing, treatment and counselling for sexually transmitted and blood-borne infections.
- Receives, investigates, and confirms laboratory reports of sexually transmitted and blood-borne infections in the Region.
- Actively promotes healthy sexuality through general preventive counselling, including risk reduction counselling, and the promotion and distribution of free condoms.
- Provides free and confidential testing for HIV, provides counselling (pre- and post test) regarding exposure, HIV disclosure requirements, risk reduction and safer/safe sex practices.
- Distributes free medication for sexually transmitted infections (STIs) to family physicians and nurse practitioners for the treatment of chlamydia, gonorrhea and syphilis.
- Developed and is implementing the Waterloo Region Sexual Health Youth Strategy in partnership with several community stakeholders. The strategy outlines a multi-year action plan to promote healthy sexuality among youth in Waterloo Region, and to provide strategic direction for youth sexual health education, programs, and services for implementation. It focuses on three key focus areas: access to programs and services, education, and parents.
- Collaborates with community partners to improve harm reduction programs and services. Harm reduction strategies are most effective against blood-borne infections such as hepatitis B, C and HIV/AIDS.
- Performs inspections of personal service settings (i.e., beauty and body art businesses) in order to prevent the occurrence and transmission of infectious diseases.
- Provides free hepatitis B vaccine to students in Grade 7 through the Region of Waterloo Public Health school immunization program, as well as providing the vaccine to those at higher risk of acquiring hepatitis B.
- Provides presentations about healthy sexuality to parents, community professionals, and community groups.
Chlamydia

Background

- Chlamydia is one of the most common sexually transmitted infections (STIs). It is caused by a bacterium called *Chlamydia trachomatis*, and is both preventable and curable.
- Chlamydia is spread through unprotected anal, oral, or vaginal sex with an infected person. It can also be passed from an infected mother to her baby during delivery. A person remains infectious until properly treated.
- Chlamydia can occur in both men and women. Many may not have any symptoms, especially women. Women who have symptoms experience increased vaginal discharge and/or irritation, bleeding during or after sexual intercourse, pain during sex, and painful or burning urination. Untreated chlamydia can lead to infertility and complicated (ectopic) pregnancy in women. Men who have symptoms experience discharge and/or itching from the penis, pain or swelling in the testicles, and painful or burning urination.
- Those at risk of acquiring Chlamydia include any sexually active person, particularly individuals:
  - Having more than one sexual partner in the last six months
  - Having a new sexual partner in the last two months
  - Who do not use condoms.
Chlamydia is the most commonly reported infectious disease in Waterloo Region and constitutes the vast majority of STI cases both locally (74.1 per cent) and provincially (74.3 per cent).

In 2014, there were 1,266 chlamydia cases reported in Waterloo Region, with an incidence rate of 248.1 cases per 100,000. This rate is similar to the previous five-year annual average for 2009-2013 (245.3 per 100,000).

The local rate of chlamydia in 2014 was significantly lower than the provincial rate (SRR = 0.83 [CI: 0.79-0.87]), and has remained significantly lower since 2009.
Figure 17. Chlamydia cases and age-specific incidence rates per 100,000 among 15 to 24 year olds, by sex and year, Waterloo Region, 2009-2014

- Rates of chlamydia are particularly high among females in the 15 to 24 year age group; in 2014, females aged 20 to 24 years had the highest age-specific incidence rate (1,604.1 per 100,000), followed by females aged 15 to 19 years (1,234.9 per 100,000).
- In 2014, males aged 20 to 24 years had the highest age-specific incidence rate (923.9 per 100,000), followed by males aged 25 to 29 years (563.6 per 100,000) and males aged 15 to 19 years (369.0 per 100,000).
- In 2014, 70 cases of chlamydia were concurrently infected with gonorrhea; co-infections were highest in the 15 to 19 year age group and the 25 to 29 year age group (N=22 each), followed by 20 to 24 year olds (N=13). Slightly more cases were female (N=40) than male (N=30).
- Among chlamydia cases in Waterloo Region with self-reported risk factor information in 2014 (N= 1,144), the most common risk factors included not using a condom (85.5 per cent), having more than one sexual partner in the last six months (38.6 per cent), and having a new sexual partner in the last two months (28.1 per cent).
Gonorrhea

Background

- Gonorrhea is one of the most common sexually transmitted infections (STIs). It is caused by a bacterium called *Neisseria gonorrhoeae*, and is both preventable and curable.
- Gonorrhea is spread through unprotected anal, oral or vaginal sex with an infected person. It can also be passed from an infected mother to her baby during birth.
- Gonorrhea can occur in both men and women. Many may not have any symptoms. The common symptoms that may occur for women include pain during urination, bleeding during or after sex, and white or yellow foul vaginal discharge. Symptoms that may be seen in men include discharge from the penis, itching around the penis, frequent or painful urination and pain or swelling in the testicles.
- If untreated, gonorrhoea can lead to serious and permanent complications such as pelvic inflammatory disease in women and epididymitis (inflammation of the tubes of the testicles) in men. Gonorrhrea can also spread to the blood and joints. Untreated gonorrhea can increase a person’s risk of acquiring or transmitting HIV.
- Those at risk of acquiring Gonorrhea include any sexually active person, particularly individuals:
  - Who do not use condoms
  - Having more than one sexual partner in the last six months
  - Having a new sexual partner in the last two months.
In 2014, the local rate of gonorrhea was 51.5 cases per 100,000 (N=260),
making it the second most common reportable STI/blood-borne infection in
Waterloo Region; this rate was higher than the previous five-year average annual
rate for 2009-2013 (22.9 per 100,000).

The rate of gonorrhea has been increasing locally and provincially since 2013; in
2014, the local rate was similar to that of the province (SRR = 1.07 [CI: 0.94-
1.22]). Reasons for the increases are not known, and are being studied by the
provincial government.

Gonorrhea age-specific incidence rates were highest among 20 to 24 year olds
(178.9 per 100,000) followed by 15 to 19 year olds (127.3 per 100,000) and 25 to
29 year olds (114.2 per 100,000); there were no notable differences between
males and females.

Of the 2014 Waterloo Region gonorrhea cases that reported risk factor
information (N=220), the most commonly reported risk factors included not using
a condom (80.0 per cent), having more than one sexual partner in the last six
months (48.6 per cent), and having a new sexual partner in the past two months (40.0 per cent).
Hepatitis B

Background

- Hepatitis B infection is an infection of the liver caused by the hepatitis B virus (HBV). About six to ten per cent of all those infected in adulthood will carry the virus for life and can infect others. Chronic hepatitis can lead to cirrhosis and liver cancer. HBV is 100 times more infectious than HIV.
- Hepatitis B is spread through contact with infected blood, semen, and other body fluids, mainly through sexual contact with an infected person; sharing of contaminated needles, syringes or other injection drug equipment; needle stick/sharp instrument injuries; and transmission at birth. Babies born to hepatitis B carriers have a 90 per cent chance of developing the disease unless they are vaccinated immediately after birth.
- Symptoms may include feeling weak, nausea, vomiting, dark urine, and jaundice (yellowing of the skin and eyes).
- Those at risk of getting hepatitis B include unimmunized people with multiple sexual partners; men who have sex with men; sexual partners of those infected; people who use injection drugs, those who received an unsterilized tattoo or body piercing; occupations with a high risk of exposure to blood and body fluids (e.g., healthcare workers, police officers, etc.); and those who have come from countries with high rates of HBV.
- There is a vaccine for hepatitis B which is an effective way to help prevent the infection.
Local Picture

Figure 19. Age-standardized hepatitis B incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

![Graph showing hepatitis B incidence rates per 100,000 by year for Waterloo Region and Ontario, 2009-2014.](image)


The Waterloo Region rates for 2009 to 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there was one acute hepatitis B case reported in Waterloo Region for an incidence rate of 0.2 cases per 100,000; there were 105 cases in Ontario the same year.
- From 2009 to 2011, the local hepatitis B incidence rate was not statistically different from that of the province; since 2012, the local rate has been significantly lower than the provincial rate (SRR for 2014 = 0.32 [CI: 0.11-0.96]).
- Due to the small number of cases and the resulting instability in rates, caution should be used when interpreting this data.
Hepatitis C

Background

- Hepatitis C infection is an infection of the liver caused by the hepatitis C virus (HCV). Up to 80 per cent of people with HCV become chronically infected. HCV is a slowly progressive disease that may lead to liver cirrhosis (scarring) or liver cancer.

- HCV spreads through contact with the blood of an infected person, mainly through: sharing of contaminated needles, syringes or other drug equipment; blood transfusions prior to 1992 before screening became available; unsafe tattoos/piercings; sexual contact with an infected person; and/or, being born to an infected mother.

- The early symptoms may include fatigue, loss of appetite, nausea, or jaundice (yellowing of the skin and/or eyes). Many infected people do not initially have symptoms and may look and feel well for many years.

- Those at risk of getting HCV include: current or past injection drug users; those who received blood or blood products or an organ transplant before 1992; those who received an unsterilized tattoo or body piercing; occupations with a high risk of exposure to blood and body fluids (e.g., healthcare workers, police officers, etc.); people with multiple sexual partners; sexual partners of those infected; and those born to an infected mother.

- There is no vaccine to prevent against HCV infection.
Local Picture

Figure 20. Age-standardized hepatitis C incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

- In Waterloo Region in 2014, the rate of HCV was 20.8 cases per 100,000 (N=122), making it the third most common reportable STI/blood-borne infection in Waterloo Region.
- Local incidence rates of HCV have fluctuated over the past five years; the rate in 2014 was lower than that of the previous five-year average annual rate for 2009-2013 (21.6 per 100,000).
- Local rates have been consistently and significantly lower than those of the province since 2009 (SRR for 2014 = 0.70 [CI: 0.60-0.82]).
- In 2014, the rate of HCV was higher among males compared to females in Waterloo Region (29.1 and 14.9 per 100,000, respectively). The age-specific rate was highest among 60 to 64 year olds (48.0 per 100,000), followed by 55 to 59 year olds (42.6 per 100,000) and 30 to 34 year olds (32.0 per 100,000). Age-specific rates were lowest in the youngest age groups (incidence rate of 0.0 per 100,000 in those less than 15 years of age).
- Of 2014 HCV cases in Waterloo Region that had risk factor information available (N=120), the most common risk factors reported included injection drug use (55.0
per cent), inhalation drug use (42.5 per cent), and receiving a tattoo or piercing (35.8 per cent).
HIV/AIDS

Background

- Human immunodeficiency virus (HIV) infection is a blood-borne infection that attacks the immune system (the body's internal defence system). HIV can lead to acquired immunodeficiency syndrome (AIDS) which is a disease of the immune system that makes the person at risk of getting other infections and diseases.
- HIV is spread through direct blood-to-blood contact and direct contact with certain infected body fluids such as semen, and vaginal or rectal fluids.
- People at risk of getting HIV/AIDS include: people who have unprotected anal or vaginal sex; those who have multiple sex partners; people who use injection drugs; people who received blood transfusions before 1985; and those born to an infected mother. Effective treatment of an HIV positive mother can lower the risk of her child becoming infected to less than two per cent.
- People infected with HIV may initially feel tired and have swollen lymph nodes. They can then be symptom free for years. Over time, the immune system continues to weaken and leads to the person becoming vulnerable to other infections.
Local Picture

Figure 21. Age-standardized HIV/AIDS incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014¹


¹The Waterloo Region rates for 2009-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were four HIV/AIDS cases in Waterloo Region with an incidence rate of 0.6 cases per 100,000.
- In 2014, Public Health adjusted how it defined Waterloo Region cases. Individuals who were previously diagnosed with HIV (outside of Ontario or Canada) were not included in Waterloo Region case counts as they were in previous years. This may affect comparability to data from previous years.
- There appears to be an overall decreasing trend in provincial incidence rates of HIV over the last five-year period.
- Of the HIV cases in 2014 in Waterloo Region, two also had AIDS.
- In 2014, the rate among males (1.1 per 100,000) was higher than that among females (0.4 per 100,000) and all cases were 20 years of age or older.
- Of the HIV/AIDS cases in 2014 in Waterloo Region, 75 per cent (N=3) reported not using a condom.
- Due to the small number of cases and resulting instability in rates, caution should be used in interpreting this data.
Syphilis

Background

- Syphilis is a sexually transmitted infection (STI) caused by the *Treponema pallidum* bacterium.
- Syphilis is spread by unprotected vaginal, anal or oral sex. Syphilis can be transmitted during pregnancy from a mother to her unborn baby, and cause fetal deformity or stillbirth.
- Symptoms vary according to the progression of the infection. Initially, a painless sore or ulcer (called chancre) appears in the mouth, anus, penis, cervix or vagina. Other symptoms such as fever, hair loss, fatigue, and warts around the anus could also appear. Later stages of syphilis, which can be many years after the initial infection, can cause irreversible damage to the brain and spinal cord (neurosyphilis), heart, eyes and bones.
- Those at risk of getting syphilis include any sexually active person, particularly those with multiple partners, those who do not use condoms, men who have sex with men, people who use injection drugs, and babies born to infected mothers.
- Syphilis is considered infectious in the early latent, primary or secondary forms; otherwise, syphilis is generally considered to be non-infectious.
Local Picture

Figure 22. Age-standardized infectious syphilis\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)

- In 2014, the age-standardized incidence rate of infectious syphilis in Waterloo Region was 6.0 cases per 100,000 (N=31); this is higher than the previous five-year annual average for 2009-2013 (3.1 cases per 100,000).
- Local infectious syphilis rates appear to have been generally increasing since 2009, and are now approaching the provincial rate.
- Waterloo Region rates were significantly lower than those of the province between 2009 and 2012; in 2013 and 2014, the local rate remained lower than that of Ontario, although the difference was no longer significant (SRR in 2014 = 0.92 [CI: 0.65-1.30]).
- All infectious syphilis cases in 2014 were among males (N=31); the age-specific rate was highest among 20 to 24 year olds (22.1 per 100,000), followed by 25 to 29 year olds (18.7 per 100,000) and 40 to 44 year olds (9.9 per 100,000).

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\(^1\)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)

\(^2\)The Waterloo Region rates for 2009-2011 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
Among Waterloo Region cases in 2014, the most common self-reported risk factors included not using a condom (83.9 per cent), male cases having sex with other men (77.4 per cent), and having more than one sexual partner in the last six months (67.7 per cent).

Due to the small number of cases and resulting instability in rates for 2009 to 2011, caution should be used in interpreting the data.

In Waterloo Region in 2014, there were 24 cases of non-infectious and unspecified syphilis with an incidence rate of 4.2 cases per 100,000. This rate is slightly higher than the previous five-year annual average for 2009-2013 (3.9 per 100,000).

Between 2009 and 2013, local rates have generally been lower than or similar to that of Ontario; in 2014, the local rate was only slightly higher than the provincial rate, but not significantly higher (SRR = 1.08 [CI: 0.70-1.67]).
- There were more non-infectious and unspecified syphilis cases among males (N=17) than females (N=7); all cases occurred among individuals aged 20 years or older.
- Among Waterloo Region cases in 2014 with risk factor information (N=19), the most frequently reported risk factor was not using a condom (52.6 per cent).
- Due to the small number of cases and the resulting instability in rates, caution should be used in interpreting this data.
Vaccine Preventable Diseases

Vaccine preventable diseases presented in this section of the report include:

- Influenza
- Invasive meningococcal disease (IMD)
- Invasive pneumococcal disease (IPD)
- Measles
- Mumps
- Pertussis
- Varicella

Table 5. Numbers and age-standardized incidence rates per 100,000 for vaccine preventable diseases, Waterloo Region & Ontario, 2014 and 2009-2013 (five-year annual average)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Waterloo Region</th>
<th>Ontario</th>
<th>2014 Standardized rate ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Cases in 2014</td>
<td>2014 Rate per 100,000</td>
<td>5-year average rate per 100,000 (2009-2013)</td>
</tr>
<tr>
<td>Influenza</td>
<td>414</td>
<td>64.9</td>
<td>51.6</td>
</tr>
<tr>
<td>Invasive pneumococcal disease</td>
<td>48</td>
<td>7.5</td>
<td>11.8</td>
</tr>
<tr>
<td>Pertussis (whooping cough)</td>
<td>10</td>
<td>2.1¹</td>
<td>4.2</td>
</tr>
<tr>
<td>Mumps</td>
<td>1</td>
<td>0.2¹</td>
<td>0.8¹</td>
</tr>
<tr>
<td>Invasive meningococcal disease</td>
<td>0</td>
<td>0.0¹</td>
<td>0.4¹</td>
</tr>
<tr>
<td>Measles</td>
<td>0</td>
<td>0.0¹</td>
<td>0.3¹</td>
</tr>
</tbody>
</table>


¹ Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
² Standardized rate ratio (SRR) refers to the ratio of the Waterloo Region age-standardized rate for 2014 compared to the Ontario age-standardized rate for 2014. The 95% confidence interval indicates the statistical significance of the SRR (if the 95% confidence interval contains 1.00, the two rates are not statistically different from one another).
³ Does not include varicella. Reporting of individual cases of varicella is incomplete. As such, ambulatory care visits (visits to emergency departments and hospital outpatient visits) were used as a proxy measure to determine severity of the disease.
⁴ Influenza data is reported for the 2009-10 season to the 2014-15 season which runs from September 1st through August 31st each year. Note that the 2014-15 data is not provided for the complete season and only includes data from September 1st, 2014 to May 31st, 2015.
Public Health Activities for Vaccine Preventable Diseases

Region of Waterloo Public Health and Emergency Services:

- Offers immunization at Region of Waterloo Public Health’s clinics and in school settings, to protect individuals against vaccine preventable diseases.
- Distributes vaccine to health care providers, including family physicians, hospitals, long-term care homes, retirement homes, and pharmacies.
- Enforces the Immunization of School Pupils Act (ISPA) to ensure all students attending school are immunized as per the Act. Three new immunizations were added to the ISPA in 2014: meningococcal, pertussis and varicella. Students who are not up-to-date with these immunizations, or do not have a valid exemption on file, may be suspended from school.
- Collects and maintains the immunization records of children enrolled in licensed child care centres.
- Provides health education (e.g., via website, written resources, site visits, educational forums) for health care providers, including family physicians, long-term care homes, pharmacies, etc.
- Provides health promotion activities to increase immunization coverage rates, especially among priority and/or high risk populations.
- Receives and investigates reports of vaccine preventable diseases from health providers, laboratories, and members of the community.
- Investigates contacts of confirmed cases of vaccine preventable diseases and recommends post-exposure prophylaxis or immunization as required.
- Receives and investigates reports of adverse events following immunization, and reports them to the Ministry of Health and Long-Term Care.
- Conducts disease surveillance and provides timely updates on local disease status to area health care providers and other stakeholders as needed.
Influenza

Background

- Influenza (commonly known as the “flu”) is a viral infection that circulates on a yearly basis causing seasonal outbreaks (October to April in Canada) of respiratory illness. The severity of the influenza season varies each year and can be mild to severe.
- The flu is spread by breathing in droplets that an infected person coughs or sneezes into the air. The influenza virus can also survive outside the body on unwashed hands, tissues or clothing, and on surfaces.
- Influenza symptoms can include headache, runny nose, sneezing, chills, cough, fever, loss of appetite, muscle aches and fatigue (feeling weak). Nausea, vomiting and diarrhea may also occur, particularly in children.
- Influenza vaccine is produced every year to provide protection against the strains of influenza that are expected to circulate that year.
- All individuals are at risk for contracting the influenza virus. Individuals who receive the seasonal vaccine are offered protection against the anticipated circulating strains. Certain segments of the population, such as older people, young children and those with underlying health conditions, are more susceptible to acquiring influenza and may experience further complications.
Infectious Diseases in Waterloo Region – Surveillance Report 2014

Local Picture

Figure 24. Age-standardized influenza incidence rates per 100,000, by season, Waterloo Region & Ontario, 2009-2010 to 2014-15¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo cases</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-10</td>
<td>238</td>
<td>57.8</td>
</tr>
<tr>
<td>2010-11</td>
<td>274</td>
<td>43.1</td>
</tr>
<tr>
<td>2011-12</td>
<td>160</td>
<td>30.5</td>
</tr>
<tr>
<td>2012-13</td>
<td>394</td>
<td>65.4</td>
</tr>
<tr>
<td>2013-14</td>
<td>314</td>
<td>70.2</td>
</tr>
<tr>
<td>2014-15</td>
<td>414</td>
<td>74.5</td>
</tr>
</tbody>
</table>


¹ Data is reported for the 2009-10 season to the 2014-15 season which runs from September 1st through August 31st each year. Note that the 2014-15 data is not provided for the complete season and only includes data from September 1st, 2014 to May 31st, 2015.

- Influenza accounts for approximately three-quarters of vaccine preventable diseases reported in Waterloo Region.
- During the 2014-2015 flu season (Sept 1, 2014 to May 31, 2015), there were 414 laboratory confirmed cases of influenza in Waterloo Region. The incidence rate was 64.9 cases per 100,000. This is higher than the previous five-year annual average rate for the 2009-2010 to 2013-2014 seasons (51.6 per 100,000) and denotes an elevated level of influenza activity, although still within what can be expected for an influenza season.
- The influenza rate for the 2014-2015 season for Waterloo Region was significantly lower than that for the province (SRR=0.87 [CI: 0.79-0.96]).
- A total of 189 confirmed cases of influenza in Waterloo Region were hospitalized in the 2014-2015 influenza season, for a rate of 35.3 hospitalizations per 100,000. In the previous flu season, there were 114 influenza-related
hospitalizations in the Region. The average number of hospitalizations per season over the previous five influenza seasons in Waterloo Region was 89.6.

- During the 2014-2015 season, there were 11 deaths in Waterloo Region where influenza was a contributing cause of death; this is slightly higher than the number of deaths in the previous 2013-2014 influenza season, where influenza was a contributing cause of death for eight cases, and is commensurate with the increased number of cases of influenza in the 2014-2015 season. This is also related to the circulating strain (H3N2) which increased morbidity and mortality. The average number of deaths for the previous five influenza seasons in Waterloo Region was 5.2 deaths per season.

- The trends in the 2014-2015 flu season in Waterloo Region were consistent with previous seasons; activity peaked in early January, followed by a gradual decline in flu activity through late May (typically the annual flu season tends to end around April). A second, smaller wave of Influenza B cases primarily associated with institutional outbreaks occurred in early April. This late, lingering activity seen in the latter half of the 2014-2015 season is consistent with normal variations in annual seasonal influenza activity.

- Influenza A was the overall predominant circulating virus type for the 2014-2015 season, although influenza B became the predominant circulating strain in the latter part of the season.
Invasive Meningococcal Disease (IMD)

Background

- Meningococcal disease is caused by the *Neisseria meningitidis* bacterium. About 10 per cent of people carry the bacteria in their throat or nose without feeling sick. In less common cases, the bacteria can cause serious diseases such as meningitis (inflammation of the lining surrounding the brain) and septicemia (widespread infection of the blood and organs).
- Invasive meningococcal disease (IMD) is spread from person to person, by coming in contact with infected mucus or saliva (through kissing, sharing food or drinks, etc.).
- IMD can cause high fever, neck stiffness, headache, vomiting, sensitivity to light, rash, confusion and in severe cases, coma.
- Children under one year of age and adolescents between 15 to 18 years are at a higher risk of acquiring IMD in addition to those living in crowded conditions, having medical conditions involving the spleen or cochlear implants, and travellers to areas with high rates of IMD (e.g., sub-Saharan Africa).
Local Picture

Figure 25. Age-standardized invasive meningococcal disease (IMD) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

The Waterloo Region rates for 2009-2011 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were no cases of IMD in Waterloo Region; this is less than the annual average of 0.4 cases per 100,000 for the previous five years.
- Provincially, there were 25 cases of IMD in 2014 (incidence rate of 0.2 cases per 100,000).
- Due to the small number of cases and resulting instability in rates, caution should be used in interpreting this data.
Invasive Pneumococcal Disease (IPD)

Background

- Invasive pneumococcal disease (IPD) is a serious infection which is caused by the bacterium known as *Streptococcus pneumoniae*. It can cause infections such as pneumonia (lungs), meningitis (the lining of the brain), and sepsis (infection of the blood).
- IPD can cause a number of symptoms including fever, chills, headache, ear pain, cough, chest pain, neck stiffness, and breathing difficulty.
- Risk factors for IPD include being under two years of age or over 65 years of age; chronic diseases of the lung, heart, kidney, or liver; diabetes; cancer; intravenous (IV) drug use; a weakened immune system (e.g., those with HIV/AIDS); smoking; and alcoholism.
- Many strains of IPD are preventable by immunization.

Local Picture

Figure 26. Age-standardized invasive pneumococcal disease (IPD) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

In Waterloo Region in 2014, there were 48 cases of IPD with an incidence rate of 7.5 cases per 100,000.

The IPD incidence rate has been declining since 2012 in Waterloo Region, which is similar to the provincial trend over the same period. The local incidence rate in 2014 is lower than the previous five-year annual average for 2009-2013 (11.8 cases per 100,000).

Since 2009, local IPD incidence rates have been higher than those of the province except in 2014, when the local rate was not significantly higher than the Ontario rate (SRR = 1.19 [CI: 0.86-1.64]).

In 2014, cases of IPD in Waterloo Region were equally distributed among males and females, and adults 60 years and older had the highest age-specific rates; the age-specific incidence rate for those aged 60-64 years and 65 years or older was 24.0 and 24.9 per 100,000, respectively.

There were seven deaths associated with IPD in Waterloo Region in 2014; this is similar to the number of IPD-associated deaths reported in the previous five years (the average annual number of deaths for 2009-2013 was 7.0).

Among the 2014 Waterloo Region cases with risk factor information available (N=48), the most common self-reported risk factors included having a chronic illness or underlying medical condition (75.0 per cent), being unimmunized (58.3 per cent), being under two years of age or over 65 years of age (43.8 per cent), and being immunocompromised (10.4 per cent).
Measles

Background

- Measles is a very contagious infection caused by the measles virus. It is easily spread from person to person by direct contact with nasal or throat secretions from an infected person. The infected person can spread the droplets while talking, coughing or sneezing.
- Symptoms can include fever, cough, runny nose and a rash that initially appears on the face and then spreads to the rest of the body. Complications of measles can involve ear infection, pneumonia (lung infection), and encephalitis (infection of the brain) which could lead to brain damage.
- All persons who have not had the disease or who have not been fully immunized are susceptible to acquiring the infection, particularly individuals who travel to measles endemic areas, young children, individuals with a chronic disease, and those with weakened immunity.

Local Picture

Figure 27. Age-standardized measles incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


1 The Waterloo Region rate for 2009 is unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
• There were no cases of measles in 2014 in Waterloo Region.
• Provincially, there were 22 cases of measles in 2014 and rates have been increasing since 2013. In general, most cases of measles are acquired through travel, or in individuals who came to Ontario from other jurisdictions. However, an increase in measles cases which were not linked to travel outside of the province was documented in Ontario in 2014. The vast majorities of these cases occurred in unimmunized or under-immunization populations, and were likely related to measles infection that was originally imported to Canada.
• In 2009 there was a small local outbreak of measles in six unimmunized or inadequately immunized persons. The disease was imported from an unimmunized child who had travelled outside of Canada. Increased immunization and isolation measures implemented by Region of Waterloo Public Health prevented further spread of this highly infectious disease.
• Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Mumps

Background

- Mumps is a viral infection caused by the mumps virus.
- Mumps is spread from person to person by coming in contact with an infected person’s saliva. Symptoms include fever, headache and swollen glands of the face. Complications can involve meningitis (infection of the lining of the brain), deafness and swollen testicles.
- All persons who have not had the disease or who have not been fully immunized are at risk of acquiring mumps.

Local Picture

Figure 28. Age-standardized mumps\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)


\(^1\)Includes both confirmed and probable mumps cases.

\(^2\)The Waterloo Region rates for 2009-2012 and 2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
• In 2014, there was one case of mumps reported in Waterloo Region (incidence rate of 0.2 cases per 100,000); this is lower than the previous five-year annual average for 2009-2013 (0.8 cases per 100,000).
• Since 2010, local incidence rates have fluctuated but remained similar to or lower than provincial rates, including in 2014 (SRR = 1.71 [CI: 0.13-22.19]).
• In 2009, there was an increased incidence of mumps in Ontario and throughout Canada, mainly in university and college students. There were 12 cases in Waterloo Region; the cases were primarily young male university or college students and were in the cohort of individuals who would have been given only one dose of mumps vaccine.
• Due to the small number of cases and resulting instability in rates, caution should be used when interpreting this data.
Pertussis

Background

- Pertussis or whooping cough is a respiratory infection caused by the *Bordetella pertussis* bacterium. The disease can affect people of any age but it is more severe in children less than one year of age.
- It is spread from person to person through direct contact of respiratory secretions (e.g., cough of an infected person).
- It initially causes cold-like symptoms such as a runny nose and a cough. The cough then worsens progressing into coughing spells which can be severe leading to vomiting, feeling short of breath, gagging, and a ‘whoop’ like sound when the person takes a breath. Complications can include seizures, brain damage and pneumonia (lung infection).
- Pertussis is preventable through immunization and is part of the routine childhood immunization schedule and a booster dose is given to adolescents and adults.
- Anyone can get whooping cough but unimmunized or inadequately immunized individuals and those people living in the same household as someone with whooping cough are at higher risk of acquiring pertussis.
Local Picture

Figure 29. Age-standardized pertussis\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)

\(^1\)Includes both confirmed and probable pertussis cases.
\(^2\)The Waterloo Region rates for 2009, 2011 and 2013-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were 10 cases of pertussis in Waterloo Region (incidence rate of 2.1 cases per 100,000). This rate is lower than the previous five-year average of 4.2 cases per 100,000.
- The local pertussis incidence rate in 2014 was similar to the provincial rate (SRR = 0.85 [CI: 0.47-1.53]).
- The youngest age groups had the highest age-specific incidence rates in 2014; the highest rate was among 10 to 14 year olds (15.9 per 100,000), followed by 5 to 9 year olds (6.2 per 100,000) and those less than five years of age (3.2 per 100,000).
- In 2012, there was a significant increase in pertussis cases compared to previous years, both locally (incidence rate of 14.5 cases per 100,000) and across all of Ontario (incidence rate of 9.1 cases per 100,000). Pertussis is naturally cyclic in nature, with peaks in disease every three to five years. Local cases were sporadic and not associated with an outbreak.
Varicella

Background

- Varicella infection (or chickenpox) is a common childhood illness caused by the varicella zoster virus. The virus can reactivate and cause a painful rash called shingles.
- Chickenpox can spread from person to person through the air by coughing or sneezing or by directly touching the rash (blisters). It is contagious from one to two days before the rash appears until the rash has scabbed over. The symptoms include fever, cough, sore throat, general aches, and a generalized itchy rash.
- Chickenpox usually gets better on its own without the use of any medication. Immunization is available for children who have not had chickenpox and there is also another vaccine (Zostavax) for adults above the age of 50, to prevent the occurrence of shingles.
- All persons who have not had varicella or who have not been fully immunized are at risk of acquiring the virus.

Local Picture

Figure 30. Age-standardized varicella ambulatory care visit\(^1\) rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014


\(^1\)Varicella ambulatory care visits from IntelliHEALTH are reported as a proxy measure to determine severity of disease. They include both visits to emergency departments as well as hospital outpatient visits.
• Local and provincial varicella data was sourced from the National Ambulatory Care Reporting System (NACRS) rather than the integrated Public Health Reporting System for reportable diseases (iPHIS). As such, only severe cases of varicella are captured in the following findings, rather than a true measure of total incidence.

• In 2014, there were 71 ambulatory care visits for varicella in Waterloo Region (visit rate of 14.2 cases per 100,000).

• Between 2010 and 2013, the rate of varicella ambulatory care visits has generally declined both locally and provincially; in 2014, the ambulatory visit rate for varicella increased slightly over the previous year, but was lower than the previous five-year annual average for 2009-2013 (16.1 per 100,000).

• Since 2009, the local rates of varicella ambulatory care visits were consistently lower than those of the province; in 2014, the local rate remained lower than that for Ontario, but not significantly lower (SRR = 0.82 [CI: 0.66-1.02]).

• In 2014, there were slightly more varicella ambulatory care visits among males (62.0 per cent) compared to females, and the younger age groups had the highest proportion of varicella ambulatory care visits; 43.7 per cent of varicella visits occurred in individuals 10 years of age or younger.
### Other Infectious Diseases

Reportable diseases categorized into this section include:

- Encephalitis/meningitis
- Group A streptococcal disease, invasive (iGAS)
- Group B streptococcal disease (neonatal)
- Legionellosis
- Tuberculosis (TB) – active and latent

#### Table 6. Numbers and age-standardized incidence rates per 100,000 for other infectious diseases, Waterloo Region & Ontario, 2014 and 2009-2013 (five-year annual average)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Waterloo Region</th>
<th>Ontario</th>
<th>2014 Standardized rate ratio (95% confidence interval)²</th>
</tr>
</thead>
<tbody>
<tr>
<td># Cases in 2014</td>
<td># Cases in 2014</td>
<td>2014 Rate per 100,000</td>
<td>5-year average rate per 100,000 (2009-2013)</td>
</tr>
<tr>
<td>Tuberculosis (latent)</td>
<td>289</td>
<td>52.9</td>
<td>70.8</td>
</tr>
<tr>
<td>Group A streptococcal disease, invasive</td>
<td>25</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>Encephalitis/meningitis³</td>
<td>14</td>
<td>2.4¹</td>
<td>2.1</td>
</tr>
<tr>
<td>Legionellosis</td>
<td>10</td>
<td>1.4¹</td>
<td>1.3</td>
</tr>
<tr>
<td>Tuberculosis (active)</td>
<td>10</td>
<td>1.8¹</td>
<td>2.2</td>
</tr>
<tr>
<td>Group B streptococcal disease, neonatal</td>
<td>3</td>
<td>0.7¹</td>
<td>0.1¹</td>
</tr>
</tbody>
</table>


¹ Rates are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

² Standardized rate ratio (SRR) refers to the ratio of the Waterloo Region age-standardized rate for 2014 compared to the Ontario age-standardized rate for 2014. The 95% confidence interval indicates the statistical significance of the SRR (if the 95% confidence interval contains 1.00, the two rates are not statistically different from one another).

³ Viral and bacterial cases of encephalitis and meningitis are combined since most reported cases were undifferentiated; includes encephalitis primary viral, encephalitis/meningitis, meningitis (bacterial), meningitis (viral).
Region of Waterloo Public Health Activities for Tuberculosis (TB)

Region of Waterloo Public Health:
- Provides accessible and effective tuberculosis (TB) clinic services in partnership with a local group of respirologists.
- Provides TB skin test clinic for medically indicated and third party testing.
- Manages all active TB cases reported to Region of Waterloo Public Health.
- Investigates and follows-up contacts of cases.
- Follows up on all immigrant notifications for medical surveillance.
- Provides early screening for populations at highest risk.
- Provides free medication to individuals with TB infection (active and latent).
- Reports confirmed and probable cases of tuberculosis to the Ministry of Health and Long-Term Care.
- Conducts disease surveillance and provides timely updates on local disease status to area health care providers and other stakeholders.
- Provides health education (e.g., via website, brochures, site visits, forums) for health care providers, including family physicians, long-term care homes, and retirement homes.

Region of Waterloo Public Health Activities for Encephalitis/Meningitis, Group A Streptococcal Disease, Neonatal Group B Streptococcal Disease, Legionellosis

Region of Waterloo Public Health:
- Receives and investigates reports of these diseases from health providers and laboratories.
- Investigates contacts of confirmed cases of these diseases and recommends immunization and/or prophylaxis as required.
- Reports confirmed and probable cases of diseases to the Ministry of Health and Long-Term Care.
- Conducts disease surveillance and provide timely updates on local disease status to area health care providers and other stakeholders.
- Provides health education (e.g., via website, brochures, site visits, forums) for health care providers (physicians, hospitals, long-term care/retirement homes).
- In recent years, Region of Waterloo Public Health has distributed legionellosis information to hospitals, schools, long-term care homes, retirement homes, and other identified cooling tower operators within the Region. The information included information on the provincial and local legionellosis disease trends, and recommended best practices for cooling tower maintenance.
Encephalitis/Meningitis

Background

- Encephalitis refers to inflammation of the brain. Meningitis refers to inflammation of the meninges, which are membranes that surround the brain and spinal cord.
- These two conditions cause a range of symptoms including fever, headache, confusion, and/or muscle weakness. In severe cases, permanent brain damage or death may occur due to injury of nerve or brain cells.
- Meningitis and encephalitis may have a variety of infectious causes (viral, bacterial and fungal) and non-infectious causes (cancer, lupus, etc.). In many cases it is impossible to identify a reason for the inflammation.
- The causes and risk factors vary by case. Those at higher risk include people with a weakened immune system, the elderly, persons who recently had a neurosurgical procedure, and those in contact with an infected person.
Local Picture

Figure 31. Age-standardized encephalitis and meningitis\(^1\) incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014\(^2\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo cases</th>
<th>Waterloo rate</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>6</td>
<td>1.1</td>
<td>2.0</td>
</tr>
<tr>
<td>2010</td>
<td>11</td>
<td>2.2</td>
<td>2.5</td>
</tr>
<tr>
<td>2011</td>
<td>16</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>2012</td>
<td>8</td>
<td>1.6</td>
<td>2.4</td>
</tr>
<tr>
<td>2013</td>
<td>14</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>2014</td>
<td>14</td>
<td>2.4</td>
<td>2.3</td>
</tr>
</tbody>
</table>


\(^1\)Viral and bacterial cases are combined since most reported cases were undifferentiated; includes encephalitis primary viral, encephalitis/meningitis, meningitis (bacterial), meningitis (viral).

\(^2\)The Waterloo Region rates for 2009-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014, there were 14 cases of encephalitis and meningitis in Waterloo Region with an incidence rate of 2.4 cases per 100,000; this rate is similar to the previous five-year annual average rate for 2009-2013 (2.1 cases per 100,000)
- Local rates have fluctuated around the provincial rate from 2009 to 2013; in 2014 the local rate remained similar to that of Ontario (SRR = 1.04 [CI: 0.59-1.83]).
- In 2014, 57.1 per cent of cases were over 40 years of age. There were no discernible trends in encephalitis and meningitis incidence between males and females.
- There was no marked seasonal trend in the incidence of encephalitis and meningitis in Waterloo Region in 2014, although a higher number of cases occurred in December and January (N=6) compared to other months of the year.
Group A Streptococcal Disease, Invasive (iGAS)

Background

- Group A streptococcal (GAS) bacteria are very common causes of minor infections such as "strep throat," cellulitis (bacterial infection below the skin), skin abscesses (boils) or impetigo (skin infection). Persons may also carry these bacteria on the skin or in their throat for periods of time without any symptoms or illness.

- More serious or invasive infections (iGAS) occur more rarely. These infections include necrotizing fasciitis (flesh eating disease), toxic shock syndrome (failure of all body systems) or sepsis (overwhelming infection of the blood stream).

- The symptoms with iGAS vary and depend on the affected area. They can include fever, sore throat, rash, or sores on the skin. In severe infections, the skin can be red, swollen, and very painful and can progress to blisters or necrosis (tissue death).

- Those most at risk for iGAS include the elderly, people with chronic disease (such as cancer, diabetes, kidney, heart and lung disease), those with skin lesions, adults with a history of alcohol abuse, injection drug use, and those taking some specific medications such as steroids. Children with chickenpox have a higher risk of developing skin infections from group A streptococcus.
Local Picture

Figure 32. Age-standardized invasive Group A streptococcal disease incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

1The Waterloo Region rate for 2011 is unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014 there were 25 cases of iGAS in Waterloo Region, for an incidence rate of 4.2 cases per 100,000. This rate is slightly lower than the previous five-year average annual rate for 2009-2013 (4.7 cases per 100,000).
- Local rates of iGAS have fluctuated around the provincial rate since 2009. In 2014, the local rate was similar to that of the province (SRR = 0.88 [CI: 0.60-1.29]).
- In Waterloo Region in 2014, over half of the cases occurred among females (68.0 per cent), and the highest age-specific rate occurred in those aged 65 years and older (15.2 per 100,000).
- There was no marked seasonal trend in the incidence of iGAS in 2014, although a peak in cases occurred in April (N=5). According to the previous five-year average rates, cases occur regularly throughout the year, with slight increases expected through the winter months (November to April).
• Among the 2014 Waterloo Region cases with risk factor information available (N=25), the most common self-reported risk factor was having an underlying medical condition or chronic illness (60.0 per cent), followed by having a dermatological condition or wound causing a break in skin integrity (32.0 per cent), and being immunocompromised (16.0 per cent).
Group B Streptococcal Disease (Neonatal)

Background

- Group B Streptococcus (GBS) are common bacteria often found in the vagina, rectum or urinary bladder of women. It is estimated that 10 to 35 per cent of pregnant women will have GBS in their vagina and/or rectum at any time. The bacteria usually do not harm the mother, but it can be transmitted to the newborn during delivery.
- Reported cases of neonatal GBS infections have been low due to routine screening of pregnant women between the 35th and 37th weeks of pregnancy. Additionally, antibiotics given to GBS positive mothers during labour are effective in preventing transmission.
- Risk factors for having a baby with GBS infection include: having a positive GBS screening/urine test during pregnancy, delivering early (less than 37 weeks), having fever during labor, and previously having had a child with GBS infection.
### Local Picture

Figure 33. Age-standardized group B streptococcal disease incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Waterloo cases</th>
<th>Waterloo rate</th>
<th>Ontario rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
<td>0.7</td>
<td>0.5</td>
</tr>
</tbody>
</table>


1The Waterloo Region rates for 2011 and 2013-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014 there were three cases of neonatal GBS in Waterloo Region (incidence rate of 0.7 cases per 100,000); this is slightly higher than the previous five-year average rate (0.1 cases per 100,000).
- In Ontario in 2014, there were 55 cases of neonatal GBS; the provincial incidence rate has remained relatively stable since 2009.
- Due to small numbers and the resulting instability in rates, caution should be used in interpreting this data.
Legionellosis

Background

- Legionellosis is an infection which is caused by the bacterium known as *Legionella pneumophila*. This bacterium is naturally found in the environment (in water, soil and dust). Outbreaks have often involved hot tubs, water tanks, water fountains and cooling towers. Legionellosis is comprised of two diseases caused by the same bacterium: the more severe form, known as Legionnaire’s Disease, and the milder illness known as Pontiac Fever.

- It is spread by people inhaling the bacteria when they breathe in contaminated droplets of water in air. The bacteria are not spread from person-to-person.

- Legionnaires’ disease can have symptoms related to pneumonia (lung infection) which include: fever, chills, cough, muscle aches and headache. Pontiac Fever is a milder infection which causes fever and muscle aches, but not pneumonia.

- Older adults (65 years or older), smokers, those with lung disease, weakened immune systems or kidney disease, and those with cancer are at higher risk of becoming infected.
Local Picture

Figure 34. Age-standardized legionellosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

- After climbing steadily between 2009 and 2013, provincial incidence rates of legionellosis have started to decline.
- In Waterloo Region in 2014, the legionellosis incidence rate was 1.4 cases per 100,000 (N=10). This rate is similar to the previous five-year annual average rate for 2009-2013 (1.3 per 100,000).
- Although the local rate of legionellosis in 2014 was higher than that of the province, the difference was not significantly different (SRR=1.98 [CI: 0.82-4.76]).
- The majority of 2014 cases were males (80.0 per cent) and all cases occurred among adults 45 years of age or older; the highest age-specific rate occurred among 55 to 59 year olds (8.5 per 100,000).
- A review of Waterloo Region cases in 2014 did not find any common link between the individual cases, nor any common exposures. Among 2014 cases with risk factor information available, the most common self-reported risk factors were recent exposure to aerosolized water or being a smoker.
• Due to small numbers and the resulting instability in rates, caution should be used in interpreting this data.
Tuberculosis

Background

- Tuberculosis (TB) is a curable infectious disease caused by a bacterium called *mycobacterium tuberculosis*. TB disease usually affects the lungs (pulmonary or respiratory TB); however, the bacteria can travel through the blood and infect other parts of the body (extrapulmonary or non-respiratory TB).
- Active TB disease occurs when the body’s immune system is unable to stop the growth and spread of the bacteria after the individual becomes infected. Latent TB infection (LTBI), or inactive TB, occurs when a person is infected, but is neither ill nor contagious from the infection. Five to ten per cent of individuals with inactive TB later develop the active form of the disease.
- Risk factors for acquiring TB disease include:
  - Having lived or being born in an endemic country
  - Immunosuppression or underlying medical conditions (e.g., human immunodeficiency virus)
  - Close contact with an individual infected with respiratory TB
  - Inadequate treatment of a previous TB infection
  - Priority populations are at greater risk (e.g., person experiencing homelessness, the under-housed, persons who use substances, aboriginal persons)
- Latent TB infection (LTBI) is most likely to develop into active TB within the first two years of becoming infected. Risk factors that also increase the likelihood of LTBI developing into active TB include:
  - Immunosuppression or underlying medical conditions (e.g., human immunodeficiency virus, organ transplant)
  - Treatment with certain medications (e.g., glucocorticoids, tumour necrosis factor-alpha inhibitors)
  - Having diabetes
  - Being under weight
  - Being under five years of age when first infected
  - Smoking cigarettes daily
  - Heavy alcohol consumption
Local Picture

Figure 35. Age-standardized active tuberculosis incidence rates per 100,000, by year, Waterloo Region & Ontario, 2009-2014

The Waterloo Region rates for 2009-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.

- In 2014 there were 10 cases of active TB in Waterloo Region with an incidence rate of 1.8 cases per 100,000. This rate is lower than the previous five-year annual average rate for 2009-2013 (2.2 per 100,000).
- Local rates of active TB have been significantly lower than those of the province since 2009, and this trend continued in 2014 (SRR = 0.45 [CI: 0.29-0.70]).
- Active TB was most common among 20 to 29 year olds in Waterloo Region in 2014, and slightly more cases were reported among males (N=7) compared to females (N=3).
- There were no TB-related deaths in Waterloo Region in 2014.
- Of the 10 active TB cases in 2014, nine were born outside of Canada; five cases originated from Asia, three cases originated from Africa, and one case originated from Eastern Europe.
- Eight of the active TB cases in Waterloo Region in 2014 had completed their treatment regimen and two cases were still being treated.


1The Waterloo Region rates for 2009-2014 are unstable due to small numbers (Relative Standard Error [RSE] >23%) and should be interpreted with caution.
• Of the eight cases with information available on drug resistance in 2014, none demonstrated resistance to one or more TB drugs.
• In Waterloo Region in 2014, there were 289 cases of latent TB infection (LTBI) for an annual incidence rate of 52.9 cases per 100,000.
• In 2014, the local rate of LTBI was significantly lower than the provincial rate (SRR = 0.82 [CI: 0.74-0.92]).
• In 2014 there were more LTBI cases among females (60.2 per cent) than males (39.8 per cent) in Waterloo Region. Most cases occurred in people aged 15 years or older.
Outbreaks

Public Health Activities for Outbreaks

- Region of Waterloo Public Health and Emergency Services follows up on all enteric and respiratory outbreaks reported by child care centres, hospitals, residential/group homes, long-term care homes and retirement homes.
- The health unit supports these providers in investigating the source of the outbreak and implementing appropriate infection prevention and control practices to minimize the spread of illness as per Ministry of Health and Long-Term Care guidelines.
- Other activities that contribute to outbreak management including:
  - Consultation with individual facilities (e.g. long-term care homes, retirement homes);
  - Education sessions to increase health care worker immunization rates;
  - Hosting health education forums with staff from local facilities to provide skill enhancement training regarding infection prevention and control, and outbreak management.
Enteric Outbreaks

Local Picture

Figure 36. Number of enteric outbreaks by month and year, Waterloo Region, 2009-2010 to 2014-2015

- Waterloo Region experienced a busy enteric season and a higher number of enteric outbreaks in the 2014-2015 season (September 1, 2014 to May 31, 2015) as compared to the previous five-year average (74 versus 57). This is within the expected fluctuation of enteric activity, from season to season.
- In the 2014-2015 season, enteric outbreaks demonstrated a peak during the winter months with most outbreaks occurring between January and March. This seasonal trend is typical for enteric outbreaks and has been observed in previous years.

Prev. 5-yr avg. = the average number of outbreaks for the previous five seasons (2009-2010 to 2013-2014 combined).
Table 7. Proportion of enteric outbreaks by exposure setting, Waterloo Region, 2014-2015* and previous five-season average

<table>
<thead>
<tr>
<th>Exposure Setting</th>
<th>2014-2015 Season*</th>
<th>Previous 5-Season Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Outbreaks</td>
<td>Per cent of Total</td>
</tr>
<tr>
<td>Child Care Facility</td>
<td>27</td>
<td>36.5</td>
</tr>
<tr>
<td>Long-Term Care Home</td>
<td>19</td>
<td>25.7</td>
</tr>
<tr>
<td>Hospital</td>
<td>4</td>
<td>5.4</td>
</tr>
<tr>
<td>Retirement Home</td>
<td>18</td>
<td>24.3</td>
</tr>
<tr>
<td>Group Home</td>
<td>4</td>
<td>5.4</td>
</tr>
<tr>
<td>Community</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>74</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>


Previous 5-season average = the average number of outbreaks for the previous five seasons (2009-2010 to 2013-2014 combined).

- In the 2014-2015 season (September 1, 2014 to May 31, 2015), approximately one-third (36.5 per cent) of enteric outbreaks occurred in child care facilities, followed by long-term care homes (25.7 per cent) and retirement homes (24.3 per cent).
- When a responsible organism could be identified, the most frequently detected agent was Norovirus.
Respiratory Outbreaks

Local Picture

Figure 37. Number of non-influenza respiratory outbreaks, by month and year, Waterloo Region, 2009-2010 to 2014-2015

- In the 2014-2015 season (September 1, 2014 to May 31, 2015), there were 14 non-influenza respiratory outbreaks. This is slightly lower than the previous five-season average of 19 outbreaks.

- There was a small peak in the number of non-influenza respiratory outbreaks in October for the 2014-2015 season; this varied somewhat from the previous five seasons which typically experienced peak activity in January followed by a gradual decline.
Table 8. Proportion of non-influenza respiratory outbreaks by exposure setting, Waterloo Region, 2014-2015 and the previous five-season average

<table>
<thead>
<tr>
<th>Exposure Setting</th>
<th>2014-2015 Season*</th>
<th>Previous 5-Season Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Outbreaks</td>
<td>Per cent of Total</td>
</tr>
<tr>
<td>Long-Term Care Home</td>
<td>8</td>
<td>57.1</td>
</tr>
<tr>
<td>Retirement Home</td>
<td>5</td>
<td>35.7</td>
</tr>
<tr>
<td>Hospital</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other**</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

*2014-2015 data is partial from September 1, 2014 to May 31, 2015
**Other includes Child Care Facilities, Group Homes, Community, and Other Outbreaks.
Prev. 5-yr avg. = the average number of outbreaks for the previous five seasons (2009-2010 to 2013-2014 combined).

- In the 2014-2015 season (September 1, 2014 to May 31, 2015), most non-influenza respiratory outbreaks occurred in long-term care homes (57.1 per cent) and retirement homes (35.7 per cent).
There were 37 influenza outbreaks in the 2014-2015 season (September 1, 2014 to May 31, 2015); this is considerably higher than the previous five-season average of 13 outbreaks, but consistent with the increased influenza activity seen both locally and provincially in 2014-2015.

The influenza outbreaks peaked in January in the 2014-2015 season, which is consistent with previous years where most outbreaks typically occurred in December and January.
Table 9. Proportion of influenza outbreaks by exposure setting, Waterloo Region, 2014-2015* and the previous five-season average

<table>
<thead>
<tr>
<th>Exposure Setting</th>
<th>2014-2015 Season*</th>
<th>Previous 5-Season Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Outbreaks</td>
<td>Per cent of Total</td>
</tr>
<tr>
<td>Long-Term Care Home</td>
<td>20</td>
<td>54.1</td>
</tr>
<tr>
<td>Retirement Home</td>
<td>10</td>
<td>27.0</td>
</tr>
<tr>
<td>Hospital</td>
<td>3</td>
<td>8.1</td>
</tr>
<tr>
<td>Other**</td>
<td>4</td>
<td>10.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*2014-2015 data is partial from September 1, 2014 to May 31, 2015
**Other includes Child Care Facilities, Group Homes, Community, and Other Outbreaks.
Prev. 5-yr avg. = the average number of outbreaks for the previous five seasons (2009-2010 to 2013-2014 combined).

- In the 2014-2015 season (September 1, 2014 to May 31, 2015), over half of the influenza outbreaks occurred in long-term care homes (54.1 per cent), followed by retirement homes (27.0 per cent).
References


Appendix A: Glossary of Terms

**Accurate Episode 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.

**Active Transmission:** The spread of an infectious agent from one person to another.

**Age Standardization:** A method of adjusting rates to minimize the effects that different age compositions have on populations. This method is used when comparing two or more populations with potentially different age distributions. For example, an older population would be more likely to have higher rates of chronic diseases compared to a younger population. Standardizing controls for these differences. For the purposes of this report, the standard 1991 Canadian population was used as the standard.

**Agent of Disease:** A factor whether microorganism, chemical substance, radiation or nutrient whose presence or absence is essential for the onset of disease. A disease may require more than one agent to develop.

**Asymptomatic:** A person infected with an illness or disease who does not exhibit any symptoms.

**Average:** See “Mean”.

**Burden of Disease:** The amount of ill health from a specific cause, such as disease or injury, in a population. It can be measured by financial cost, mortality, morbidity, or lost healthy years.

**Case:** A case is an individual with an episode of a reportable disease. For each reportable disease there is a case definition which outlines the criteria to confirm that episode of disease. Case definitions are determined by the Ministry of Health and Long-Term Care.

**Carrier:** A person or animal without evident clinical disease (signs or symptoms) who harbours an infectious agent and is able to transmit the agent to others.

**Co-infection:** Having two infections at the same time. The progression of both (or either) disease(s) may be more severe as a result of the infection with the other disease. A person with a co-infection is counted as two separate cases.
Confidence Interval: A calculated range of values in which the actual value (such as mean, proportion or rate) is contained with a certain degree of confidence. For the purposes of this report 95 per cent confidence intervals were used, meaning that there is a 95 per cent probability that the actual value falls within this range.

Contact: A person who may have acquired an infection from a case.

Endemic: The constant presence of a disease or infectious agent within a geographic area or population group. It may also refer to a disease that is usually present at a relatively high prevalence and incidence rate in comparison with other areas or populations.

Immunocompromised: Incapable of developing a normal immune response, usually as a result of disease (e.g., cancer), irradiation, malnutrition, or immunosuppressive medication.

Incidence: The number of new events (such as new cases of a disease) among a population within a specific point in time.

Incidence Rate: The rate at which new events, or new cases, occur in a specified time in a defined population that is “at risk” of experiencing the condition or event.

Incubation Period: The time from the moment of exposure to an infectious agent until signs and symptoms of the disease appear.

Indirect Transmission: The transmission of an infectious agent carried from a reservoir to a susceptible host by air particles or by living (vector) or non-living (vehicle) intermediaries.

Infectious Disease: An illness that results from the transmission of an infectious agent or its toxins from an infected person, animal, or reservoir to a susceptible host, either directly or indirectly through an intermediate plant or animal host, vector or inanimate objects.

Mean: The mean or average is the sum of all the individual values in a set of measurements divided by the total number of values in the set of measurements.

Non-endemic: A disease or infectious agent that is rarely observed within a geographic area or population group. It may also refer to a disease that is not usually present at a relatively high prevalence and incidence rate in comparison with other areas or populations.
**Outbreak**: When the occurrence of cases of a disease or condition is in excess of the expected number of cases in a localized area over a given period of time. There is no set number of cases required to declare an outbreak as it varies by disease and local conditions.

**Prevalence**: The number of individuals with a disease or condition in a specific population at a designated time.

**Proportion**: A proportion is a type of ratio in which the numerator is included in the denominator. A proportion is calculated by dividing the number of people with a common characteristic at a given time period by the total population that shares the same event in the same time period.

**Range**: The range describes the spread of scores. It often represents the difference between the largest and smallest items in a set of numerical values. In this report, it is used to describe the highest and lowest numerical values.

**Relative Standard Error (RSE)**: A relative standard error is the standard error divided by the mean and expressed as a percentage. Rates with an RSE >23% are considered unstable and should be interpreted with caution.

**Reportable Disease**: A human disease that is required to be reported to public health authorities in Ontario according to Regulation 559/91 (Specification of Reportable Diseases) made under the *Health Protection and Promotion Act* (HPPA) (available at [http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm)). Under this legislation, physicians, laboratories, hospital administrators, principals of schools and superintendents of institutions must notify local health units about the occurrence or suspected occurrence of these diseases.

**Risk Factor**: An aspect of someone’s behaviour or lifestyle, a characteristic that a person was born with, or an event that s/he has been exposed to that is associated with acquiring a disease.

**Risk Setting**: The place or environment where the case may have acquired the infection. Risk settings reported by cases include: hospital, long-term care home, residential facility, retirement home, child care facility and community setting.

**Socio-demographic**: A variety of individual characteristics that may influence health status. Socio-demographic factors include age, sex, ethnicity, marital status, socioeconomic status and others.

**Sporadic**: When a disease occurs infrequently and irregularly. This term is also used to refer to non-outbreak associated cases of disease.
Standardized Rate Ratio (SRR): An SRR is the ratio of the age-standardized rate of cases observed in one population compared to the age-standardized rate of cases that occurred in another population. The 95 per cent confidence interval indicates the statistical significance of the SRR. If the 95 per cent confidence interval contains one, the two rates are not statistically different from one another.

Surveillance: The ongoing, systematic collection, collation, analysis, and interpretation of data with prompt dissemination of the results to those who need to know, particularly those who are in a position to take action.

Trends: Trends are changes in frequencies, proportions or rates of a disease, or an event observed over time. Trends may be irregular, flat, or move in one direction.

Travel-associated: In this report, travel-associated refers to cases of disease that were acquired during travel outside of Canada.

Vector-borne disease: A class of miscellaneous diseases which are transmitted to humans by vectors, predominately insects (e.g., mosquito-borne diseases caused by viruses, bacteria, etc.).

Vector: A living creature, typically an animal, which carries an infectious pathogen to a susceptible host. It is an intermediary without evident clinical disease who harbours an infectious agent and is able to transmit the agent to others.

Zoonotic pathogen: An agent of disease (e.g., bacteria or virus) that can be transmitted between animals and humans.
Appendix B: Data Sources and Methodology

Data Sources
All information related to cases of infectious disease for Waterloo Region included in this report was collected by Region of Waterloo Public Health under the authority of the Health Protection and Promotion Act (HPPA), which mandates health care practitioners to notify the Medical Officer of Health (MOH) where the patient resides of all confirmed and probable cases of reportable disease. Case reports are investigated by Public Health staff as part of their routine activities.

Cases are entered into a provincially-mandated information and surveillance (monitoring) system, the integrated Public Health Information System (iPHIS), maintained by Public Health Ontario (PHO) and the Public Health Protection and Prevention Branch of the Ontario Ministry of Health and Long-term Care (MOHLTC). The only data included in this report that was not extracted from iPHIS was ambulatory care visits for varicella which was sourced from the National Ambulatory Care Reporting System (NACRS) and obtained through the IntelliHEALTH Ontario portal.

Sporadic Cases
All sporadic infectious disease data for Waterloo Region with accurate episode dates between January 1, 2009 and December 31, 2014 (September 1, 2009 to May 31, 2015 for influenza) were extracted from iPHIS on May 21, 2015 (except for HIV which was extracted by encounter date, tuberculosis which was extracted by diagnosis date, and varicella ambulatory care visits which were extracted from IntelliHEALTH Ontario on May 13, 2015). 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.

Unless otherwise noted, all cases reported in this report are confirmed as described by the Infectious Diseases Protocol of the Ontario Public Health Standards (2014). However, with revisions to case definitions of all reportable diseases in 2009, some cases that had previously met the confirmed case definition were then required to be reported as probable cases. For amebiasis, Lyme disease, mumps, pertussis, and West Nile virus, the impact of the change was substantial. Thus, for this report, both confirmed and probable cases of the above-mentioned diseases are included in the analysis to ensure valid comparisons of historical trends in incidence.

Syphilis case classifications for infectious and other categories were taken from the December 2009 Provincial Epidemiological Infectious Diseases Summary on the Ontario Public Health Portal. 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). Other syphilis includes all other types of syphilis such as late latent; neurosyphilis, non-infectious; or unspecified (the other category excludes early congenital syphilis).

Provincial case summaries are compiled by Public Health Ontario. Provincial data was downloaded from the Public Health Ontario Infectious Diseases Query on May 21, 2015 and includes all infectious diseases reported in the province of Ontario with an accurate episode date between January 1, 2009 and December 31, 2014 (September 1, 2009 to May 31, 2015 for influenza).

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 MOHLTC at the date of data extraction recorded with the stipulation that these data are provisional and subject to change.

**Outbreaks**

Outbreak data is included in this report for enteric and respiratory diseases, both influenza and non-influenza respiratory outbreaks. For every confirmed outbreak, staff in Public Health complete detailed outbreak summary reports that document information pertaining to the outbreak, including the aetiologic agent, duration of the outbreak, reporting information, exposure setting, control measures and specimen information if available. An outbreak is defined as the occurrence of two or more cases of illness linked to each other in terms of time, exposure to source, and most often location. All data were reviewed by Public Health staff to ensure that final counts and outbreak information were accurate.

For this report, outbreak data for Waterloo Region was extracted from the iPHIS database. All outbreak records (outbreaks with a reportable enteric or respiratory disease identified as the aetiologic agent) that met the provincial surveillance case definition and had a reported date between September 1, 2009 and May 31, 2015 were extracted. All outbreak data was analyzed by seasonal year (September 1st of any given year to August 31st of the following year) and is partial up to May 31, 2015 for the 2014-2015 season.

**Exposure Data**

Exposure and risk factor information were included for diseases which demonstrated consistently higher rates than the province, diseases that demonstrated increasing local
rates, as well as diseases that caused a significant burden of disease in 2014. When reporting exposure or risk factor proportions, those that were lost to follow-up and did not have exposure or risk factor information available were excluded from the denominator. In addition, more than one risk factor can be reported by a case resulting in proportions that do not sum to 100 per cent.

For every case of infectious disease reported to Region of Waterloo Public Health, detailed case follow-up is conducted by Public Health staff. A pre-defined set of exposure or risk factor information is collected and input into iPHIS. However, exposure and risk factor information can be missing for individuals that were lost to follow-up.

It is also important to note that risk factors in iPHIS are self-reported and may not necessarily reflect the true exposure history of the individual. In addition, the risk factor and exposure setting variables in iPHIS provide investigators with a pre-defined set of categories of risk factors from which to choose which may not be adequate or specific enough to represent all potential risk factors and exposures for a disease.

**Population Data**

Incidence rates were calculated using population estimates and projections obtained from the Ontario MOHLTC, Public Health Planning Data Base (PHPDB). The PHPDB is an information resource provided by the Health Data Branch of the Ontario MOHLTC. Queries on PHPDB are completed via an online portal called IntelliHEALTH. Population estimates for 2009 to 2013 are post-censal estimates based on the 2006 census counts adjusted for net under-coverage and changes in the population between Census Day and July 1. Census subdivision post-censal estimates are extrapolated by applying the growth rates by age and sex of each census division to the adjust census counts of each census subdivision.

The 2014 population data is a projection, not an estimate. Population projections are demographic, founded on assumptions about births, deaths, and migration over the projection period. Assumptions are based on the analysis of the long-term and the most recent trends of these components, as well as expectations of future direction. The population estimates and projections in this report may differ from those presented elsewhere due to differences in methodology. Population data used in this report was downloaded from IntelliHEALTH on April 20, 2015 and reflect the latest population estimates and projections at the time of this report.

**Methodology**

All diseases were extracted from iPHIS by accurate episode date (except for HIV which was extracted from iPHIS by encounter date, tuberculosis which was extracted from
iPHIS by diagnosis date, and varicella ambulatory care visits which were extracted from IntelliHEALTH Ontario). All reportable diseases with one or more cases reported in the last five years in Waterloo Region were included in analysis. Cases that resided in Waterloo Region and met the provincial surveillance case definition were included. All data were reviewed by Public Health staff to ensure final case counts were accurate.

Varicella ambulatory care visits were extracted for Waterloo Region and Ontario for 2009-2014 from IntelliHEALTH’s Ambulatory All Visit All Tables which is sourced from the National Ambulatory Care Reporting System (NACRS). Ambulatory care visits include emergency visits as well as other hospital-based outpatient clinics. Visits were filtered to include only unscheduled emergency visits (Ambulatory Case Type = EMG). Ambulatory care visits were used instead of iPHIS reportable disease counts because iPHIS reports varicella as aggregated case counts rather than individual cases. Additionally, monitoring ambulatory care visits rather than reported cases helps to determine which varicella cases are more severe in nature. It must be noted that ambulatory care visit rates are not comparable to the incidence rates reported for other reportable diseases and that varicella counts presented in this report are an underestimate of the true number of cases.

For each reportable infectious disease, data on the number of cases and incidence rates were presented. Where relevant, disease case counts and rates were further broken down by:

- Sex (male and female – analysis by gender does not include those with unknown, transgender or other gender)
- Age group (0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64 and 65+ years)
- Seasonality (month)

Note that latent tuberculosis infection (LTBI) was the only exception to this standard method of analysis; LTBI cases were only reported for 2013 and 2014, due to an inability to confirm case counts through normal data quality assurance processes for cases from 2009 to 2012. LTBI case counts and rates were still broken down by sex, age group and seasonality as relevant.

As age can be a factor in whether a person acquires a disease and how the disease progresses, it is necessary to control for differences in age distribution when comparing two populations. 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. For this report, when comparisons between Waterloo Region and
Ontario were made, rates were directly age-standardized using the 1991 Canadian Standard population from Statistics Canada. For each disease, age-standardized incidence rates were presented for Waterloo Region and Ontario on an annual basis and refer to the number of new cases of disease per 100,000 population. The age groups (in years) used for direct age-standardization were: 0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89, and 90+. Cases that had missing age were not included in the calculation of the age-standardization.

Standardized Rate Ratios (SRR) with 95 per cent confidence intervals were also calculated for all reportable diseases, where possible. The SRR reported is the ratio of the age-standardized rate of cases observed in Waterloo 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 2009 to 2013 were also calculated which were defined as the average of the age-standardized rates for each year from 2009 to 2013. Age-standardized rates for 2014 were compared to the previous five-year annual average rate for 2009 to 2013 but these differences are not implied to be statistically different.

Proportions and rates were rounded to one decimal place. As much as possible, data were presented in a consistent format with a figure highlighting the age-standardized overall rates for Waterloo Region and Ontario. Select diseases were highlighted with further in-depth analysis (e.g., mortality, risk factors). These diseases were selected for a variety of reasons including: local rates were significantly different than provincial rates, there are emerging issues related to the disease such as a provincial or local campaign, or because Region of Waterloo Public Health has undertaken specific measures related to the prevention or containment of the disease.

**Data Limitations**
The published literature reveals variation in infectious disease reporting completeness. According to a review of the literature by Doyle (2002), reporting completeness was significantly greater for TB, AIDS and sexually transmitted diseases as a group than for all other reportable diseases combined. Other studies estimate that for each reported
case of enteric illness, there are at least several hundred undiagnosed or unreported cases in the community (Majowicz, 2005). Individuals that experience less severe manifestations of a disease may not experience symptoms, or only mild symptoms and may not seek medical assistance or be tested for the presence of a disease. Disease reports rely on a passive surveillance system, wherein laboratories, physicians, other health care providers and institution administrators are entrusted to know the regulations, recognize a disease that is on the reportable disease list, and inform public health.

In some instances, the number of reported cases may change in subsequent years due to periodic data quality assurance checks and corrections that result in the reclassification of cases (i.e., case status). In addition, there may be a lag in reporting of some cases due to the time required to collect a specimen, carry out a diagnostic test and inform the local public health department and Ontario MOHLTC which could lead to future changes in the number of reported cases. Chance, as well as statistical artifacts, may also account for some of the variation in infectious disease incidence over time and for different geographic areas (within Ontario).

While the provincial case summaries allowed for local data comparisons with Ontario rates, comparisons with other health units can be problematic due to inconsistencies in data collection and reporting across health units. Also, some cases may be double-counted among people who move to other health units. This double-counting is not an issue with the provincial data due to regular efforts to resolve inter-health unit duplicate records.

It is important to note that the number of outbreaks does not necessarily reflect the magnitude of individual outbreak investigations or burden of outbreak-related illness. Institutional outbreaks are likely well reported compared with other outbreaks because institutions often have infection control staff on-site, there are usually a large number of persons affected, and the agent, most often a virus transmitted person-to-person, is relatively easy to diagnose. However, prior to 2012, only long-term care homes were required to report outbreaks to Public Health; retirement homes were not required to report outbreaks which thereby affected the comparison between 2012 and previous years. Similarly, community outbreaks are not required to be reported to Public Health. At times Public Health will become aware of them due to (voluntary) reports if a number of people become ill (e.g., group of people who ate a common meal or attended a common event. Therefore, the data presented in this report would reflect an underestimation of the true burden of community outbreaks.

For some diseases, case definitions have changed over time. As of April 28, 2009, new provincial case definitions for reportable diseases came into effect. The Ontario
MOHLTC released the new case definitions as an appendix to the Infectious Diseases Protocol, 2009 (Ontario Ministry of Health and Long-Term Care, 2009). Ontario’s new case definitions were updated 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 West Nile virus 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.

Due to the unavailability of case level data for varicella in iPHIS, ambulatory care visits from IntelliHEALTH were used instead. However, incidence and ambulatory care visits cannot be compared directly since ambulatory care visits represent the more severe varicella cases, thus underestimating the true number of varicella cases occurring locally and provincially.

Finally, the data presented in this report only relate to data collected on cases residing in Waterloo Region. Therefore, caution should be used when attempting to generalize these results beyond Waterloo Region.
## Appendix C: List of Reportable Diseases (2014)

The following specified Reportable Diseases (Ontario Regulations 559/91 and amendments under the Health Protection and Promotion Act) are to be reported to the local Medical Officer of Health:

<table>
<thead>
<tr>
<th>Disease</th>
<th>*</th>
</tr>
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<tbody>
<tr>
<td>Leprosy</td>
<td>I</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>H</td>
</tr>
<tr>
<td>Lyme Disease</td>
<td>H</td>
</tr>
<tr>
<td>Malaria</td>
<td>I</td>
</tr>
<tr>
<td>Measles</td>
<td>I</td>
</tr>
<tr>
<td>Meningitis, acute</td>
<td></td>
</tr>
<tr>
<td>Mumps</td>
<td>I</td>
</tr>
<tr>
<td>Ophthalmia neonatorum</td>
<td>I</td>
</tr>
<tr>
<td>Paralytic Shellfish Poisoning</td>
<td>H</td>
</tr>
<tr>
<td>Paratyphoid fever</td>
<td>H</td>
</tr>
<tr>
<td>Pertussis (Whooping Cough)</td>
<td>I</td>
</tr>
<tr>
<td>Plague</td>
<td>H</td>
</tr>
<tr>
<td>Pneumococcal disease, invasive</td>
<td>I</td>
</tr>
<tr>
<td>Poliomyelitis, acute</td>
<td>I</td>
</tr>
<tr>
<td>Psittacosis / Ornithosis</td>
<td>H</td>
</tr>
<tr>
<td>Q Fever</td>
<td>H</td>
</tr>
<tr>
<td>Rabies</td>
<td>H</td>
</tr>
<tr>
<td>Respiratory Infection Outbreaks in Institutions</td>
<td>I</td>
</tr>
<tr>
<td>Rubella</td>
<td>I</td>
</tr>
<tr>
<td>Rubella, congenital syndrome</td>
<td>I</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>H</td>
</tr>
<tr>
<td>Severe Acute Respiratory Syndrome (SARS)</td>
<td>I</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>H</td>
</tr>
<tr>
<td>Smallpox</td>
<td>I</td>
</tr>
<tr>
<td>Transmissible Spongiform Encephalopathy including</td>
<td></td>
</tr>
<tr>
<td>Creutzfeldt-Jakob Disease, all types</td>
<td>I</td>
</tr>
<tr>
<td>Syphilis</td>
<td>S</td>
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<tr>
<td>Tetanus</td>
<td>I</td>
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<tr>
<td>Trichinosis</td>
<td>H</td>
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<tr>
<td>Tuberculosis</td>
<td>I</td>
</tr>
<tr>
<td>i. active infection</td>
<td></td>
</tr>
<tr>
<td>ii. latent infection (positive TB skin test)</td>
<td></td>
</tr>
<tr>
<td>Tularemia</td>
<td>H</td>
</tr>
<tr>
<td>Typhoid Fever</td>
<td>H</td>
</tr>
<tr>
<td>Verotoxin – producing E. coli infection indicator conditions</td>
<td></td>
</tr>
<tr>
<td>include Hemolytic Uremic Syndrome (HUS)</td>
<td>H</td>
</tr>
<tr>
<td>West Nile Virus Illness (WNV)</td>
<td>I</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>I</td>
</tr>
<tr>
<td>Yersiniosis</td>
<td>H</td>
</tr>
</tbody>
</table>

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