Document 2

Infectious Disease Surveillance

October 2016

Infectious disease surveillance is the systematic collection, analysis, and dissemination of data that describes the epidemiology of infectious disease. It is used for planning, implementing and evaluating public health policies and practices aimed at controlling infectious disease in the population. Ottawa Public Health infectious disease surveillance focuses primarily on the over 70 diseases reportable under the *Health Protection and Promotion Act*[1]. Ottawa Public Health receives reports from laboratories, physicians and other health care providers, hospital infection control staff, schools, daycares, other institutions, and partner public health agencies.

This document organizes reportable infectious diseases into groups organized by mode of transmission. For each disease group, a broad summary as well as highlights of select diseases within each group are provided. Highlighted diseases include those with recent changes in epidemiology, large-scale investigations or enhanced responses, or diseases which require resource-intensive public health follow-up.

[1] Reportable disease means a disease specified as a reportable disease by regulation made by the Minister of Health and Long-Term Care to public health units.

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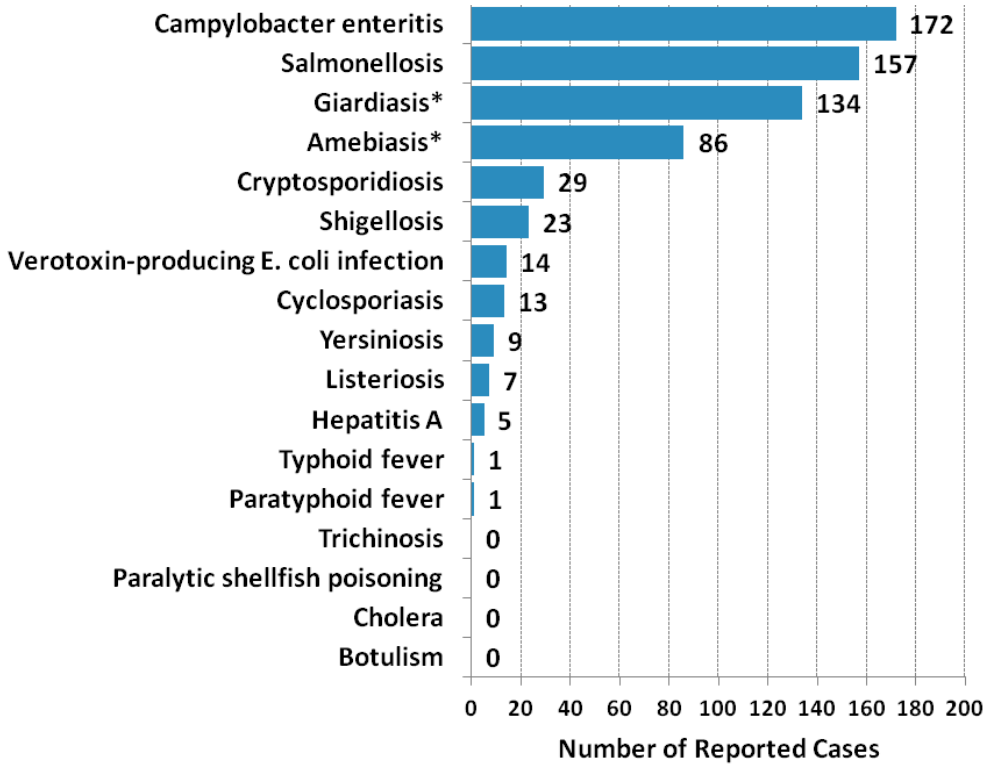
Enteric Infections

Enteric or gastrointestinal illnesses are acquired primarily through ingestion of contaminated food or water. However, they can also be transmitted person-to-person through direct or fecal-oral contact. Typical symptoms include diarrhea, nausea, vomiting and fever. Young children, the elderly and people with suppressed immune systems are more likely to develop serious complications but complications can also occur in young healthy adults.

For many diseases in this section, the number of cases reported to Ottawa Public Health is likely only a small proportion of the true number of cases occurring in Ottawa (Figure 1)[2]. For the most part, surveillance for these diseases is based on laboratory reporting and not solely on symptoms. To be reported to Ottawa Public Health, ill individuals must seek medical attention and provide stool samples for testing. Some of these diseases improve without medical care; hence not all affected individuals seek medical attention and complete testing.

For enteric illnesses such as *Campylobacter* enteritis and salmonellosis, acquisition is often in Ottawa but other illnesses such as typhoid fever and cholera are almost exclusively acquired while travelling internationally.

Figure 1: Number of cases of enteric infections reported by Ottawa residents in 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 13, 2016, by Ottawa Public Health.
Data note: * designates that case counts include both confirmed and probable cases as per the provincial case definition

[2] MK Thomas, SE Majowicz, PN Sockett, et al. Estimated numbers of community cases of illness due to Salmonella, Campylobacter and verotoxigenic Escherichia coli: Pathogen specific community rates. Can J Infect Dis Med Microbiol 2006;17(4):229-234.

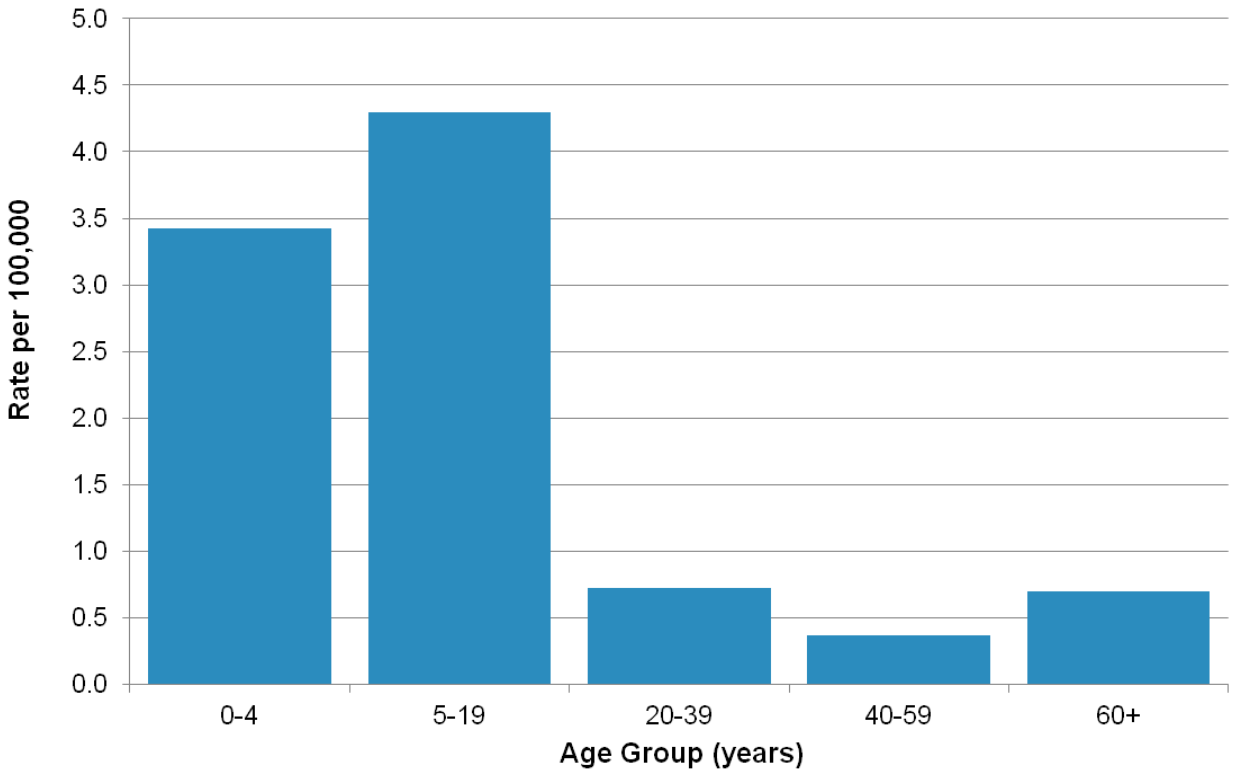
A Focus on Hepatitis A

Hepatitis A is a liver infection caused by the hepatitis A virus which is spread when a person ingests something that has been contaminated with the fecal matter of someone infected with hepatitis A. An effective vaccine is available to prevent hepatitis A infection. It is recommended for high-risk groups including individuals who are travelling to countries endemic for hepatitis A.

During the previous 10 years, an average of seven cases of hepatitis A was reported to Ottawa Public Health annually (range: 2 – 14 cases per year). The incidence of hepatitis A in Ottawa is highest amongst children and youth (Figure 2). Many infants and young children infected with hepatitis A do not develop any signs of the illness.

International travel was the most common source of exposure, accounting for over two-thirds of cases between 2011 and 2015. Since 2011, approximately 30% of the children and youth with reported hepatitis A had at least one other household member who was also diagnosed with hepatitis A. Situations like this can occur if all household members are exposed during international travel or if a household member is exposed during international travel and the infection spreads to other household members upon return.

Figure 2: Incidence rate of Hepatitis A by age, Ottawa, 2011 – 2015



Data source: Ontario Ministry of Health and Long-term Care, integrated Public Health Information System (iPHIS), extracted August 23, 2016, by Ottawa Public Health.

Hepatitis A case investigations can be resource-intensive due to the need to protect contacts within a case's household, daycare, and other high risk settings where transmission could occur. In 2012, a family cluster involving a young, asymptomatic child resulted in an investigation during which Ottawa Public Health immunized 250 contacts to prevent further spread of the infection.

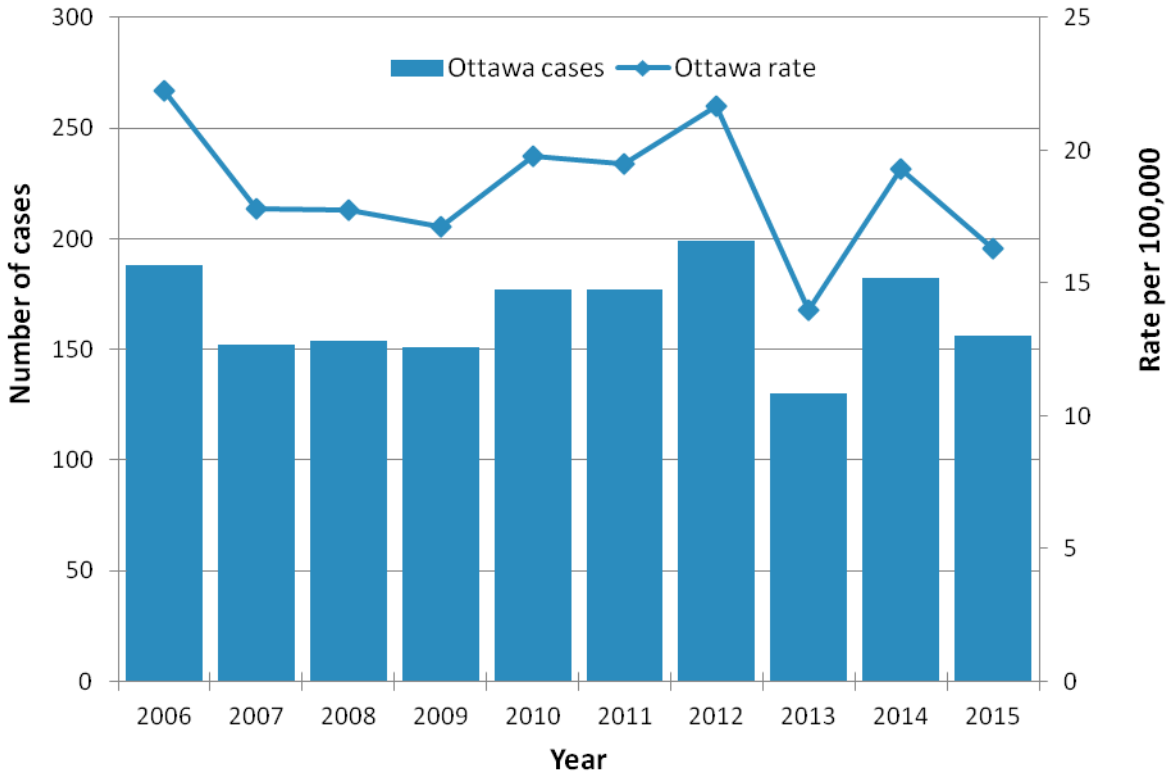
Food-borne exposure can also involve significant resources. In 2016, two Ottawa cases of hepatitis A were linked to the consumption of berries subsequently recalled by a national retailer across Canada. Approximately 8000 bags of fruit were sold in Ottawa in advance of the recall. In addition to vaccination clinics offered by the retailer, Ottawa Public Health vaccinated approximately 40 residents.

A Focus on Salmonellosis

Salmonellosis, commonly known as "salmonella," is a food-borne infection caused by *Salmonella* bacteria. Most people infected with salmonellosis develop diarrhea, fever, headache, and abdominal cramps. It is one of the main causes of food-borne illness worldwide. Based on the previous 10 years, an average of 166 cases of salmonellosis were reported to Ottawa Public Health annually (range: 151 – 227 cases per year) (Figure 3).

The incidence rate of salmonellosis was highest among children aged less than five years of age, and males and females were similarly affected.

Figure 3: Confirmed cases and incidence rate of salmonellosis, Ottawa, 2006 – 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted August 13, 2016, by Ottawa Public Health.

Although there may be annual fluctuations, based on the most recent 10 years, the most frequently reported salmonellosis serotypes were *Salmonella* Enteriditis (29%), *Salmonella* Typhimurium (15%), and *Salmonella* Heidelberg (9%). Epidemiological analysis within serotypes can help to identify or rule out a particular food source or exposure.

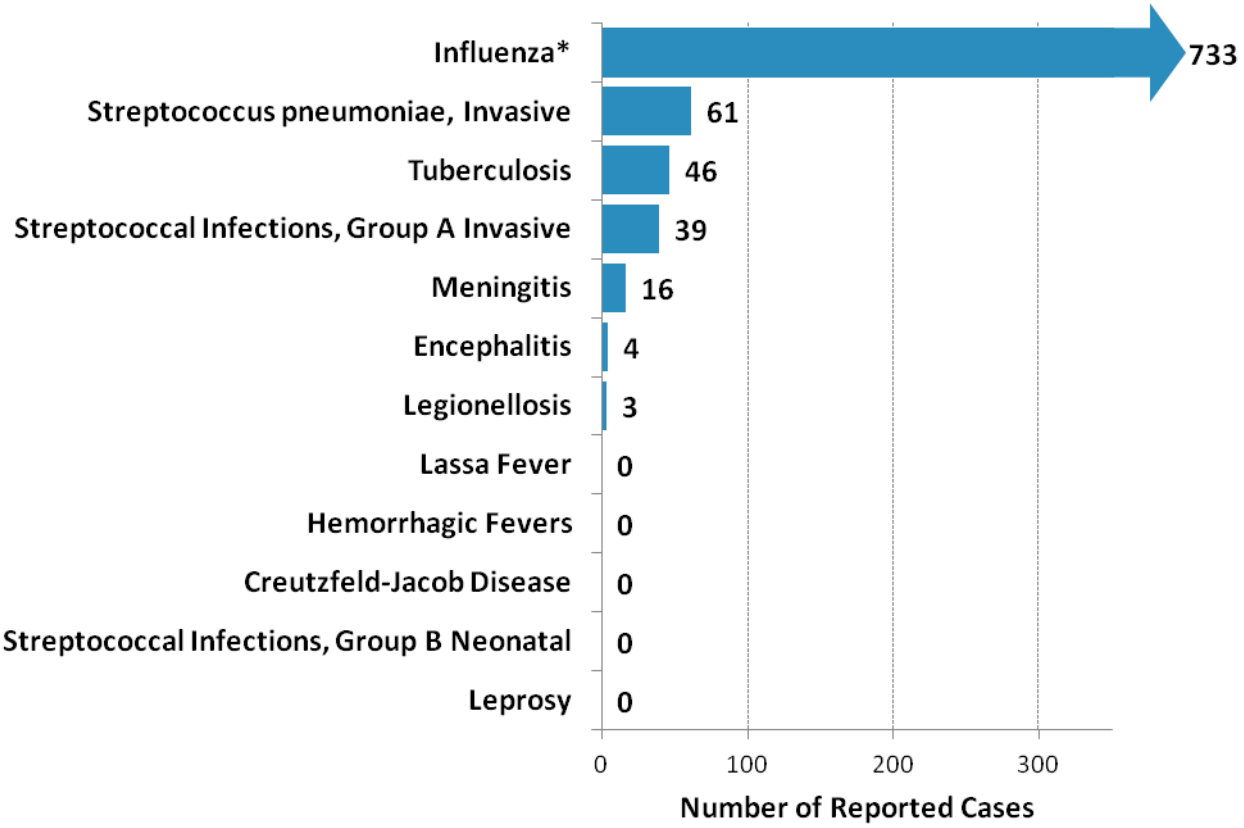
Salmonellosis is a disease which is often the cause of local, provincial, and national investigations which involve working closely with external partners to share information and identify possible sources of infection. When an increase or cluster requires provincial coordination, an enhanced surveillance directive (ESD) is issued. In 2015, the following local salmonellosis outbreaks and enhanced surveillance directives (ESD) from Public Health Ontario were investigated in Ottawa:

- February 2015 – an increase in salmonellosis cases in Ontario and Alberta linked to sesame/kalonji seeds. There were four related Ottawa cases, which involved extensive investigation due to the severity of the illness of the cases.
- February 2015 – an increase in salmonellosis cases in Ontario linked to frozen breaded chicken products with thirteen related Ottawa cases.
- May 2015 – an increase in salmonellosis cases in Ontario with a possible link to exposure to reptiles. There were two related Ottawa cases.
- September 2015 – an increase in Ontario linked to frozen breaded chicken products with three related Ottawa cases.
- October 2015 – a nationwide increase of unknown origin in cases of *Salmonella* Infantis with five related Ottawa cases.
- November 2015 – a local outbreak of four confirmed cases related to a shawarma restaurant. All the cases ate at separate times at the same restaurant.
- November 2015 – a local outbreak of six confirmed cases and two probable cases related to a pho restaurant. The eight cases represent five separate dining groups who all report eating at the same restaurant over the same time period.

Respiratory Infections and Diseases Transmitted by Direct Contact

These infections are caused by a variety of agents which can be spread via droplets in air (from a person coughing or sneezing), or via direct contact with an infected person (Figure 4). The symptoms can differ depending on the infection but many of these infections can be life-threatening.

Figure 4: Number of cases of respiratory infections and directly-transmitted infections reported among Ottawa residents in 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 13, 2016, by Ottawa Public Health.

Data notes: *Only laboratory-confirmed cases of influenza are included in this graphic.
Meningitis includes viral, bacterial (except meningococcal), and other causes.
Encephalitis includes primary viral infection, post-infectious, vaccine-related, subacute sclerosing panencephalitis (SSPE), and unspecified.

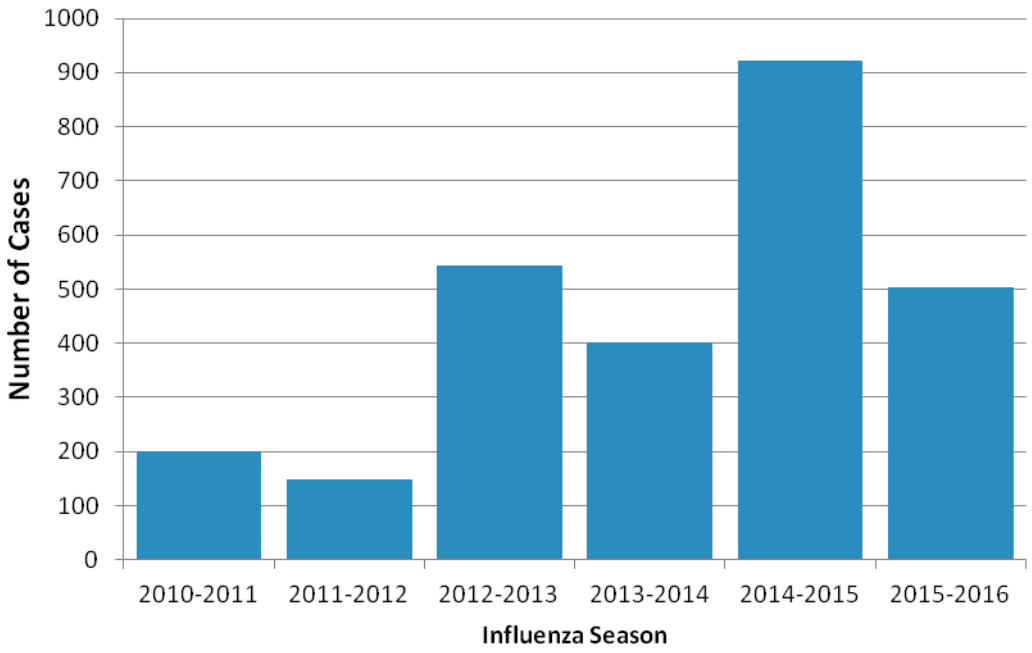
A Focus on Seasonal (non-pandemic) Influenza

Influenza is an acute viral respiratory infection which typically occurs in annual epidemics during the winter months from November to April. An influenza pandemic can occur when a novel influenza virus occurs as a result of virus mutation. The most recent influenza pandemic, involving the H1N1 virus, occurred in 2009.

The number of cases reported to Ottawa Public Health represents a fraction of the true number of cases in the community[3]. In order to be reported to public health, cases must seek medical attention and be tested within the first four days of illness. Many individuals may be too sick to attend school or work, but not necessarily sick enough to seek care or be diagnosed clinically by a physician without laboratory testing.

The number of influenza cases reported to Ottawa Public Health varies significantly from season to season depending on the circulating strain and subtype. Since the 2009 pandemic, the number of reported influenza cases has ranged from 148 (September 2011 – August 2012) to 922 (2014 – 2015) (Figure 5).

Figure 5: Laboratory-confirmed influenza cases by season (September – August), Ottawa, 2010 – 2011 to 2015 – 2016



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted August 26, 2016, by Ottawa Public Health.

[3] The U.S. Centers for Disease Control and Prevention estimates that every year in the U.S., on average, 5% to 20% of the population is infected with influenza.

Typically, young children and adults over the age of 65 years have the highest reported incidence of influenza, but the most affected groups are dependent on the circulating strain. In the 2015 – 2016 season, which was predominantly influenza A H1N1, the highest incidence occurred in children under the age of five (226.4 cases in children under 5 years of age out of every 100,000 children under 5 years of age). However, in the previous 2014 – 2015 season, which was predominantly influenza A H3N2, the highest incidence occurred in adults over 65 years (471.1 cases/100,000 population).

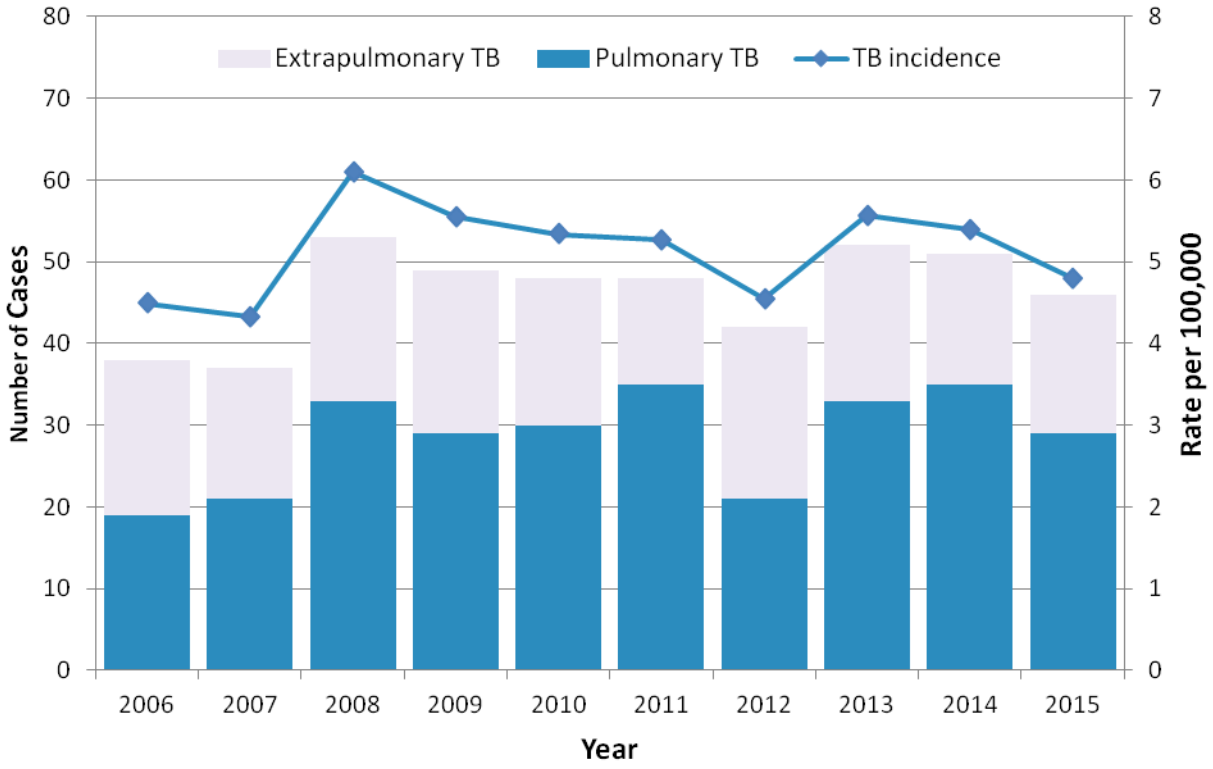
Influenza is also a cause of outbreaks in institutions such as long term care homes and retirement homes. This is discussed in the Institutional Outbreaks section of this document.

A Focus on Tuberculosis

Tuberculosis (TB) is a reportable infectious disease caused by the bacterium *Mycobacterium tuberculosis*, which spreads from person to person through the air. In most people, the infection remains dormant (latent TB infection or LTBI) and the person does not ever develop TB disease. However, about one in ten infected people will go on to develop TB disease, which can occur many years after a person is initially infected. TB disease typically affects the lungs (pulmonary TB), but can also infect other parts of the body such as the brain, the kidneys or the spine (extrapulmonary TB).

Both LTBI and TB disease are reportable under the *Health Protection and Promotion Act*. There were approximately 46 cases of TB disease reported to Ottawa Public Health annually (2006 – 2015) (Figure 6). The average age of cases was 44 years of age with slightly more males (56%) than females (44%). The majority of cases (88%) acquired their infection outside of Canada when living in or travelling to countries endemic for tuberculosis. In contrast to other parts of Canada, less than 5% of TB cases in Ottawa were among Indigenous people.

Figure 6: Confirmed cases and incidence rate of pulmonary and extrapulmonary tuberculosis, Ottawa, 2006 – 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 23, 2016, by Ottawa Public Health.

Case and contact management of tuberculosis is complex and intensive. The average length of treatment is over seven months and approximately 90% of cases receive directly-observed treatment (DOT) where Ottawa Public Health nurses observe the case taking their medication, often daily. In 2015, of the 29 reported pulmonary TB cases, 215 possible contacts were assessed.

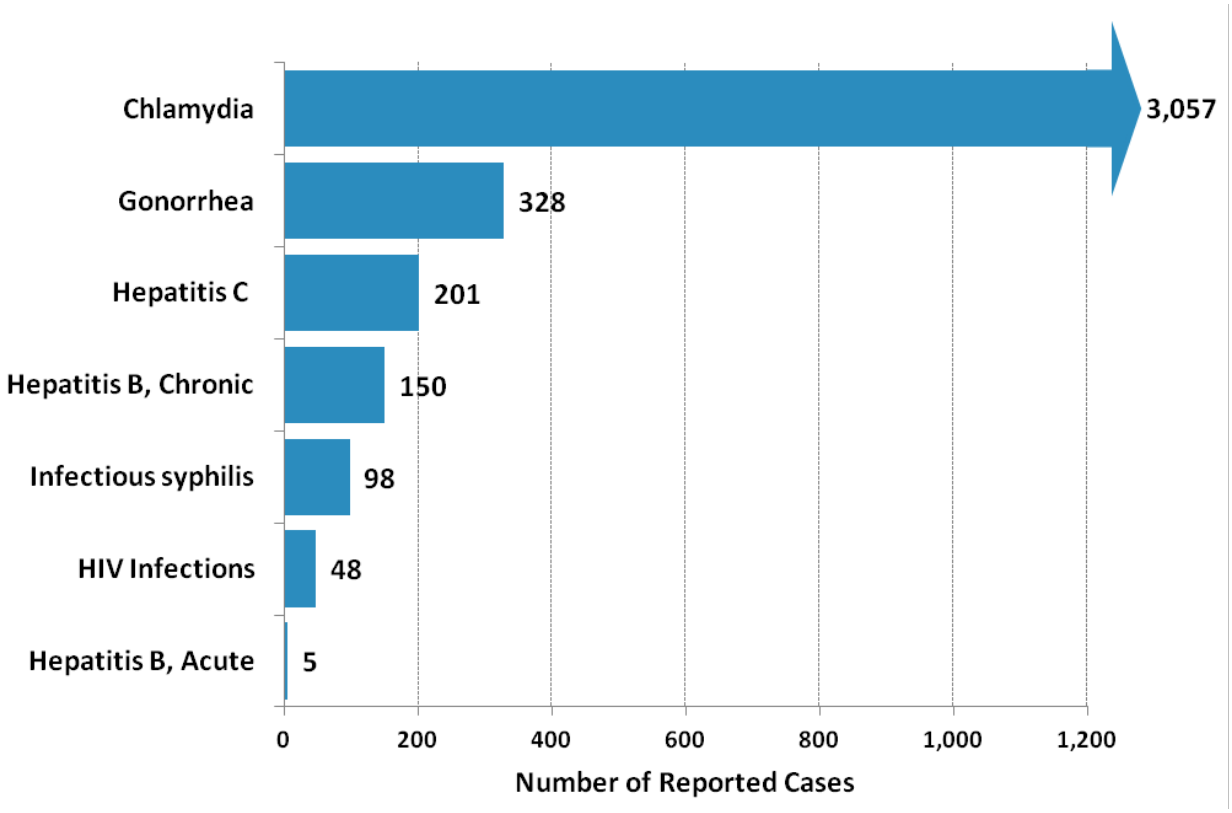
Samples from all pulmonary TB cases and some extrapulmonary cases are sent to the Public Health Ontario Laboratory (PHOL) for genetic testing to identify the individual strain of TB. Genetic testing results can identify the area of the world where the TB was likely acquired and, more importantly, identify individuals with identical strains of TB. Genetic results have identified TB clusters that traditional investigative techniques have not.

Sexually Transmitted and Blood-borne Infections

Untreated sexually transmitted and blood-borne infections (STBBIs) can have immediate and long-term consequences for health, including reproductive and neurological complications. Some reportable sexually transmitted infections (STIs) (e.g., chlamydia, gonorrhea, and syphilis) are transmitted only sexually, and some (e.g., hepatitis B and HIV) are transmitted both sexually and via blood. While hepatitis C is the most common reportable blood-borne infection (BBI), it is not efficiently transmitted sexually. STIs require timely follow up to ensure that individuals and their sexual contacts are properly counseled and treated to reduce the risks associated with infection. BBIs are tracked to ensure that cases are properly treated, that cases and their contacts are appropriately counseled, and to monitor possible transmission in health care or personal care settings.

Rates of chlamydia, gonorrhea, and syphilis are increasing. Youth, and gay, bisexual, and other men who have sex with men are at greatest risk for infection.

Figure 7: Number of cases of STBBIs reported among Ottawa residents in 2015



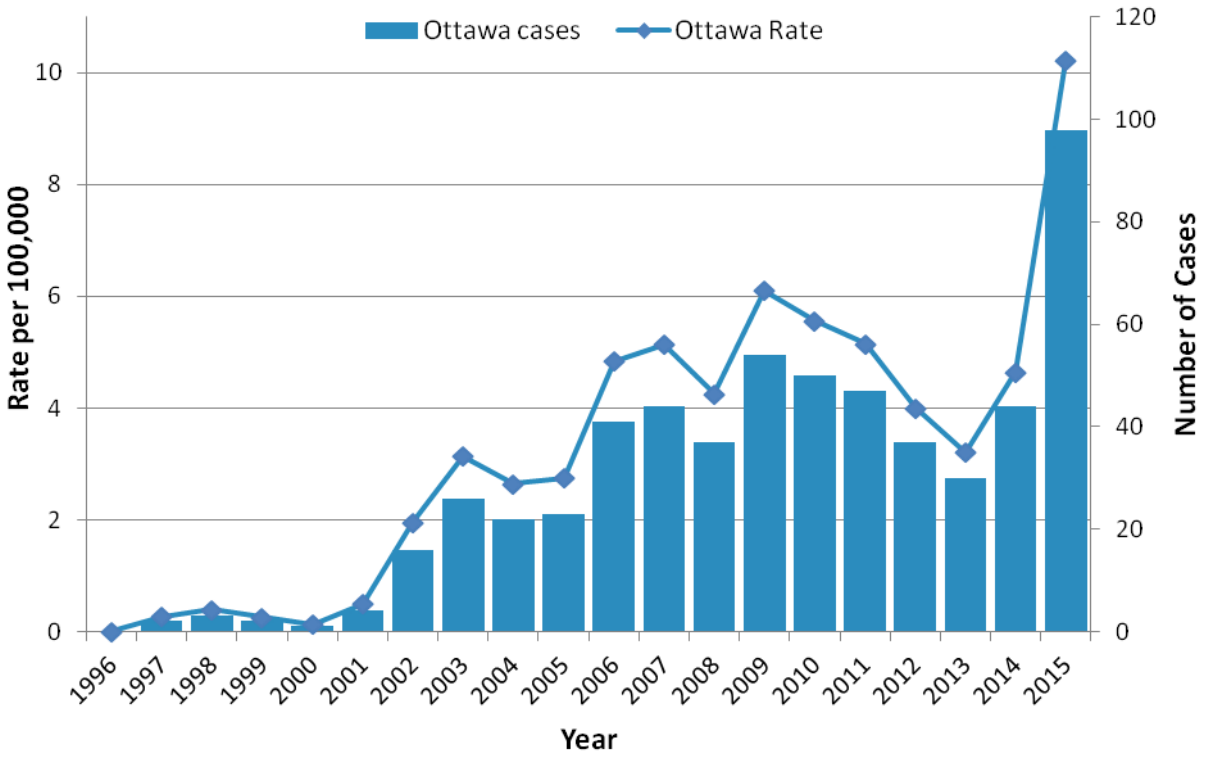
Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 13, 2016, by Ottawa Public Health.

A Focus on infectious syphilis

Syphilis, caused by the bacterium *Treponema pallidum*, is transmitted through direct contact (oral, genital, or anal) with a contagious lesion or rash, or from an infected mother to her infant during pregnancy and delivery. Untreated infection can cause serious neurological and cardiovascular complications. Infection of an infant, known as congenital syphilis, is life-threatening and is prevented through testing mothers in pregnancy. There has not been a case of congenital syphilis in Ottawa since 1992.

Prior to 2001, infectious syphilis was rare, with fewer than five cases reported each year. However, infectious syphilis has re-emerged in the last 15 years. In 2015, Ottawa surpassed its previous record by having 98 cases reported (Figure 8).

Figure 8: Number of cases and incidence rate of infectious syphilis, Ottawa, 1996 – 2015



Data source: Ontario Ministry of Health and Long-term Care, integrated Public Health Information System (iPHIS), extracted August 16, 2016, by Ottawa Public Health.

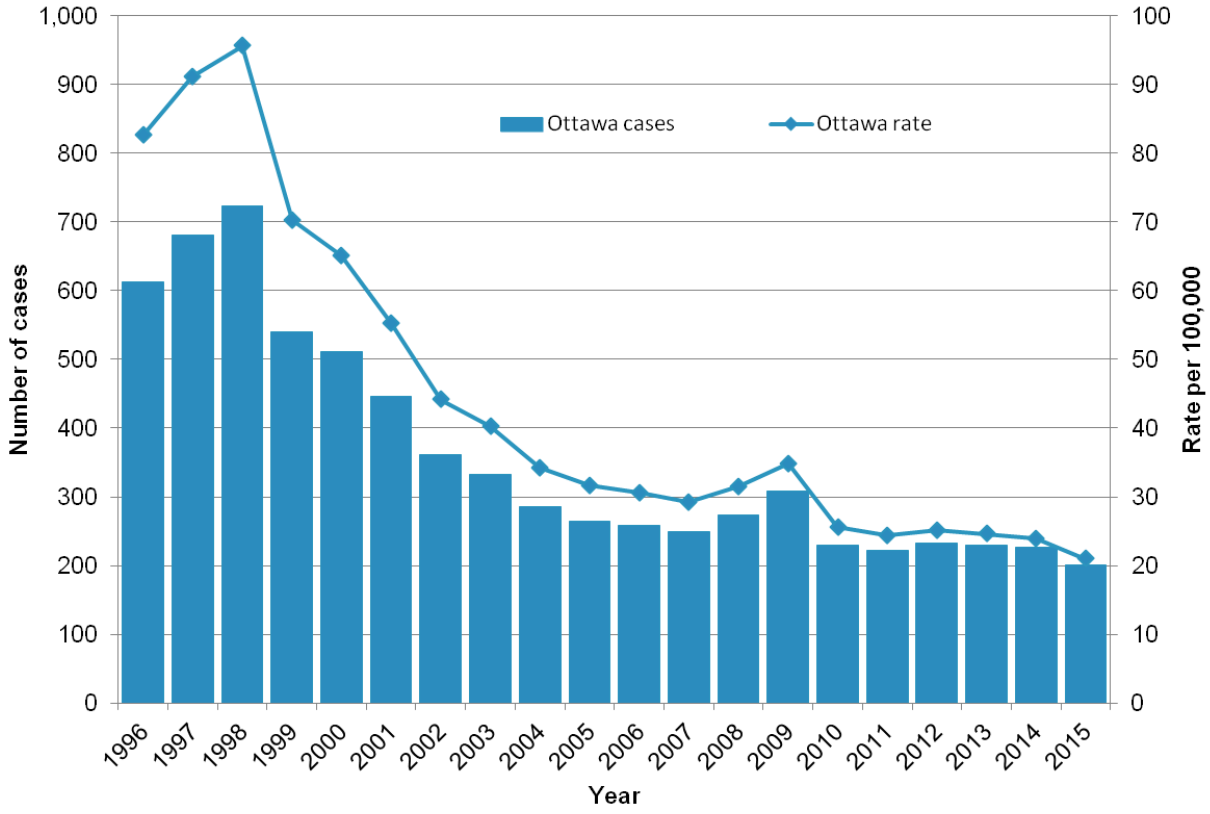
Most infectious syphilis cases are among men: 98% of cases in 2015 were male, and among these cases, 90% reported sex with other males. The average age at diagnosis among men having sex with men was 47 years.

A Focus on hepatitis C

Hepatitis C is a virus that affects the liver. Many individuals with hepatitis C will not develop symptoms for many years after infection. Some individuals will "clear," or get rid of, the virus on their own with no ill effects, while others will remain infected and require medical treatment. Although there are vaccines that protect against hepatitis A and B, there is currently no vaccine for hepatitis C.

Before routine blood screening was well-established in 1992, many people were infected with hepatitis C via receipt of blood or blood components, and there was a surge of diagnoses in the years following the disclosure of contamination of the blood supply (Figure 9). Since that time, however, at least half of new infections with hepatitis C are acquired through sharing equipment used for injecting drugs. To reduce this risk, Ottawa Public Health's Site Needle & Syringe Program offers health education, testing for STBBIs, and sterile injection and inhalation equipment.

Figure 9: Number of cases and incidence rate of hepatitis C, Ottawa, 1996 – 2015



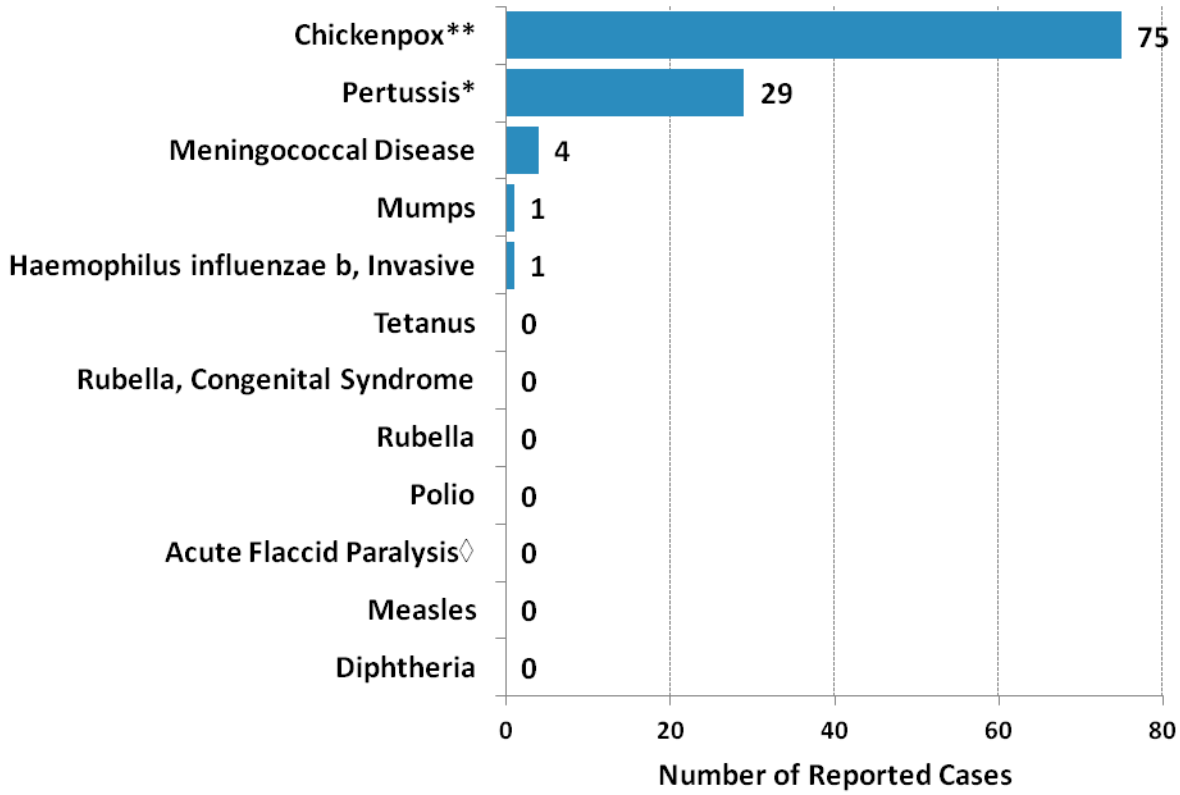
Data source: Ontario Ministry of Health and Long-term Care, integrated Public Health Information System (iPHIS), extracted August 15, 2016, by Ottawa Public Health.

The rate of reported hepatitis C diagnoses has remained steady, with an average of 223 cases reported each year during the last five years, but we cannot be sure of the true incidence of infection. This is because many people infected with hepatitis C do not develop symptoms for many years and so are not diagnosed when they are initially infected. As a result, they are reported late in the course of their infection. In 2015, the average age at diagnosis was 48 years and 60% of cases were in males.

Vaccine Preventable Diseases

Vaccine preventable diseases (VPDs) can be spread through various modes of transmission but, for each, there is an effective vaccine that is routinely used to prevent infection. The majority of these diseases used to be extremely common, especially in childhood, but now occur rarely in Canada due to the effectiveness of their respective vaccines. There are many areas of the world where these diseases continue to be endemic; they therefore can be re-introduced to the local population through international travel and spread to unimmunized and under-immunized individuals locally.

Figure 10: Number of cases of routine vaccine-preventable infections reported among Ottawa residents in 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 13, 2016, by Ottawa Public Health.

Data notes: * designates that pertussis counts include both confirmed and probable cases as per the provincial case definition; ** chicken pox cases are reported from schools and daycares and are not all lab-confirmed cases; ◊ Surveillance of Acute flaccid paralysis (AFP) is conducted to investigate all reported cases for evidence to rule out poliomyelitis (polio),

A Focus on Pertussis

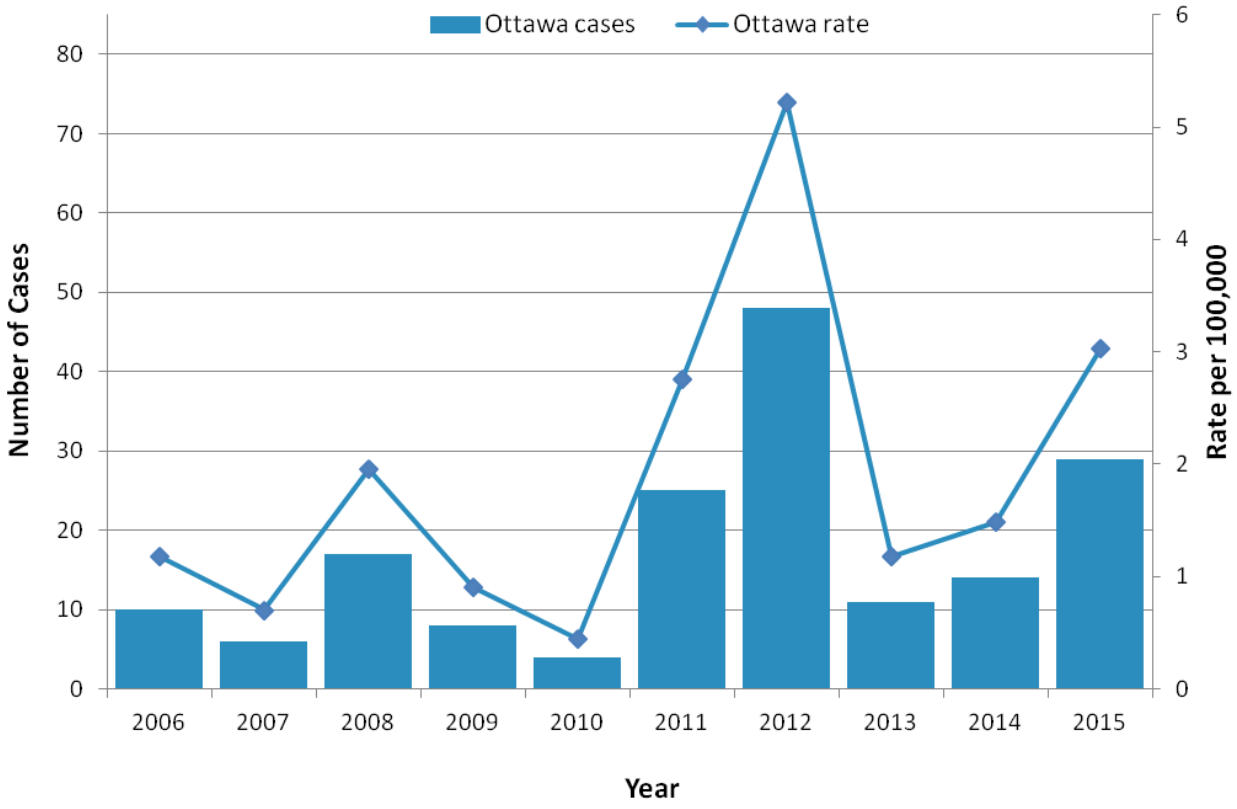
Pertussis, or whooping cough, is a highly communicable acute bacterial upper respiratory tract infection caused by *Bordetella pertussis*. Paroxysmal cough is the clinical hallmark where, after a series of repeated violent coughs, the patient inhales deeply which can cause a "whooping" sound.

An average of 20 cases of pertussis was reported to Ottawa Public Health annually from 2009 to 2015 (Figure 11). Pertussis is likely underreported in the community because symptoms can be similar to other respiratory infections, especially in older children and adults. There was a peak of cases in Ottawa in 2012 that was seen across Canada and that may have been due to the cyclical nature of pertussis incidence[4]. Three large family clusters accounted for 16 of the 29 cases (55%) reported in 2015.

The last community-wide outbreak of pertussis in Ottawa occurred in 1998 and 1999 with 435 confirmed cases.

The highest incidence of pertussis occurs in children of less than one year of age (31.9/100,000) with the next highest incidence in the 10 to 14 year age group (6.4/100,000). Children aged less than one year are more likely to have serious disease as they are unimmunized or incompletely immunized.

Figure 11: Cases and incidence rate of pertussis, Ottawa, 2006 – 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted August 23, 2016, by Ottawa Public Health.

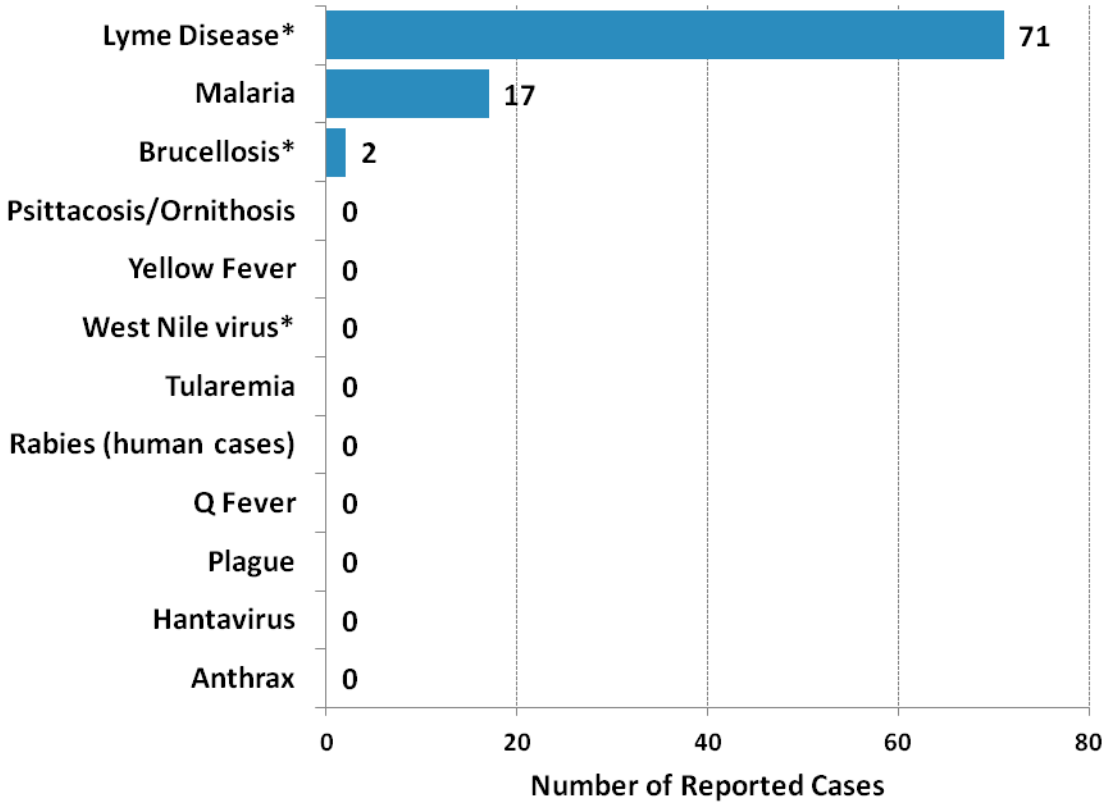
[4] http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/14vol40/dr-rm40-03/dr-rm40-03-per-eng.php

Zoonotic and Vectorborne Infections

Zoonotic infections can be spread from animals to humans. Some zoonotic diseases can pass directly from animals to humans, such as rabies, which is transmitted by saliva after an animal bite. Other zoonotic diseases are vectorborne, meaning that they are spread from animals to humans or from human to human by a vector such as a mosquito or tick.

Diseases like Lyme disease and West Nile virus can be acquired locally because the vector that can spread the infection can survive in the local environment. Other infections (e.g., malaria, Zika virus, and yellow fever) are associated with international travel since the vector required to transmit the infection is not currently found in Ottawa. However, the epidemiology of vectorborne infections is sensitive to changes in the environment which allow vectors to survive in new areas.

Figure 12: Number of cases of vectorborne and zoonotic infections reported among Ottawa residents in 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted July 13, 2016, by Ottawa Public Health.

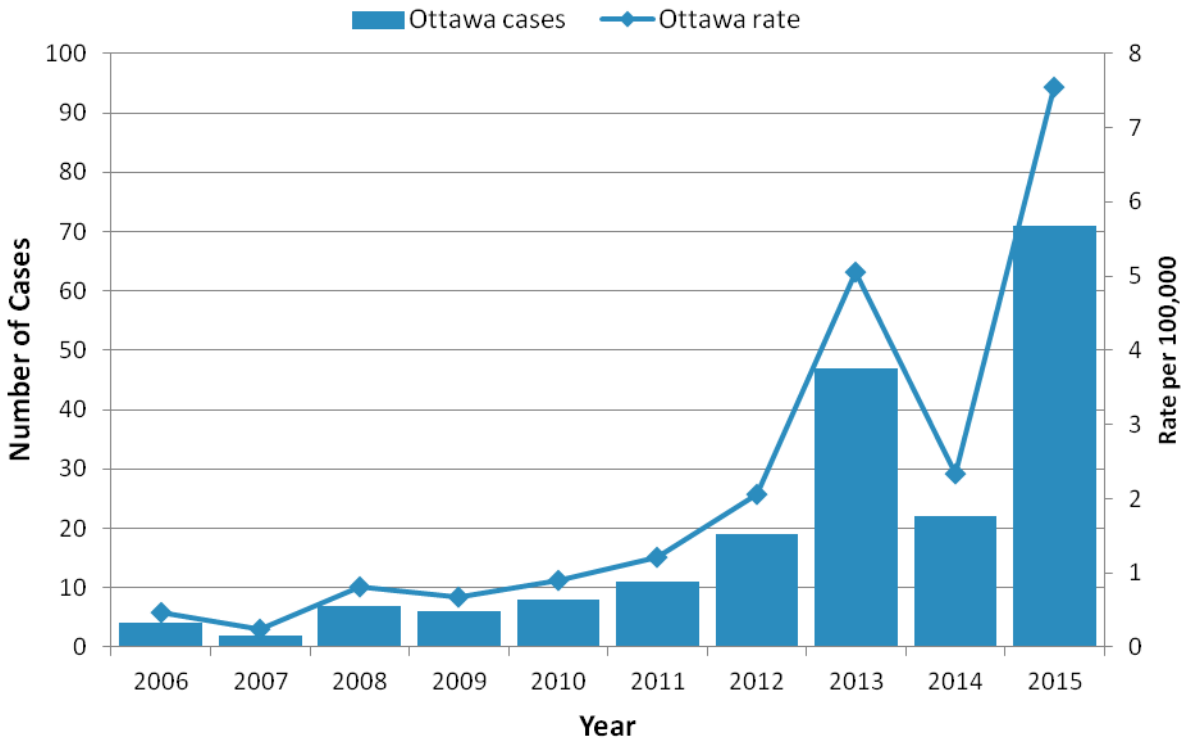
Data note: * designates that case counts include both confirmed and probable cases as per the provincial case definition.

A Focus on Lyme Disease

Lyme disease, an infection with the bacterium *Borrelia burgdorferi*, is transmitted via a bite from an infected tick. Not all ticks carry Lyme disease. In Ontario, Lyme disease is spread by the black-legged tick (*Ixodes scapularis*) otherwise known as the deer tick. Ottawa's neighbouring regions have established infected blacklegged tick populations and infected ticks have been found in the Ottawa area as well. In 2015, there were 71 cases of Lyme disease reported to Ottawa Public Health. This is the highest annual number of cases since Lyme disease became a reportable disease (Figure 13).The mean age of cases was 49 years with a range of 4 to 80 years of age.

In recent years, Ottawa Public Health has seen an increase in Lyme disease cases transmitted from locally acquired ticks. Approximately 25% of the 2015 cases reported that they were possibly exposed in Ottawa compared to only 13% of cases reported that they were possibly exposed in Ottawa in 2014.

Figure 13: Cases and incidence rate of Lyme disease, Ottawa, 2006 – 2015



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted August 23, 2016, by Ottawa Public Health.

Lyme disease cases are most common in the summer months with most cases reporting an onset of symptoms in June and July.

Ottawa Public Health monitors the proportion of black-legged ticks that are infected with *Borrelia burgdorferi* to assist in assessing risk to the population and in making recommendations to physicians as to whether or not antibiotic prophylaxis is locally recommended. Ticks that were found attached to Ottawa residents can be submitted to Ottawa Public Health for testing. Physicians and veterinarians also accept tick submissions for testing. In 2015, of the 288 Ottawa tick submissions, 17% were found to be positive for the bacteria.

Institutional Outbreaks

Outbreaks that occur in institutions such as long-term care facilities, retirement homes, and acute care hospitals are reportable to public health. As of August 2016, there are 29 long-term care facilities, 79 retirement homes, and 6 acute care hospitals in Ottawa. Most outbreaks affect the respiratory tract or the gastrointestinal tract, but there are numerous different viruses or bacteria that can be responsible (Table 1). Public health staff assist in managing these outbreaks when they occur. The burden on staff and residents caused by outbreaks can be extensive as the average outbreak lasts for two weeks (Table 2).

Table 1: Institutional outbreaks by agent, September 2015 to August 2016

Primary Agent	Total number of reported outbreaks
Gastroenteritis, unspecified agent	22
Norovirus	18
Influenza A	14
Respiratory Infection, unspecified agent	13
Respiratory Syncytial virus (RSV)	12
Coronavirus	11
Parainfluenza virus	7
Metapneumovirus	4
Clostridium difficile	3
Influenza B	3
Rhinovirus	2
Total	**123**

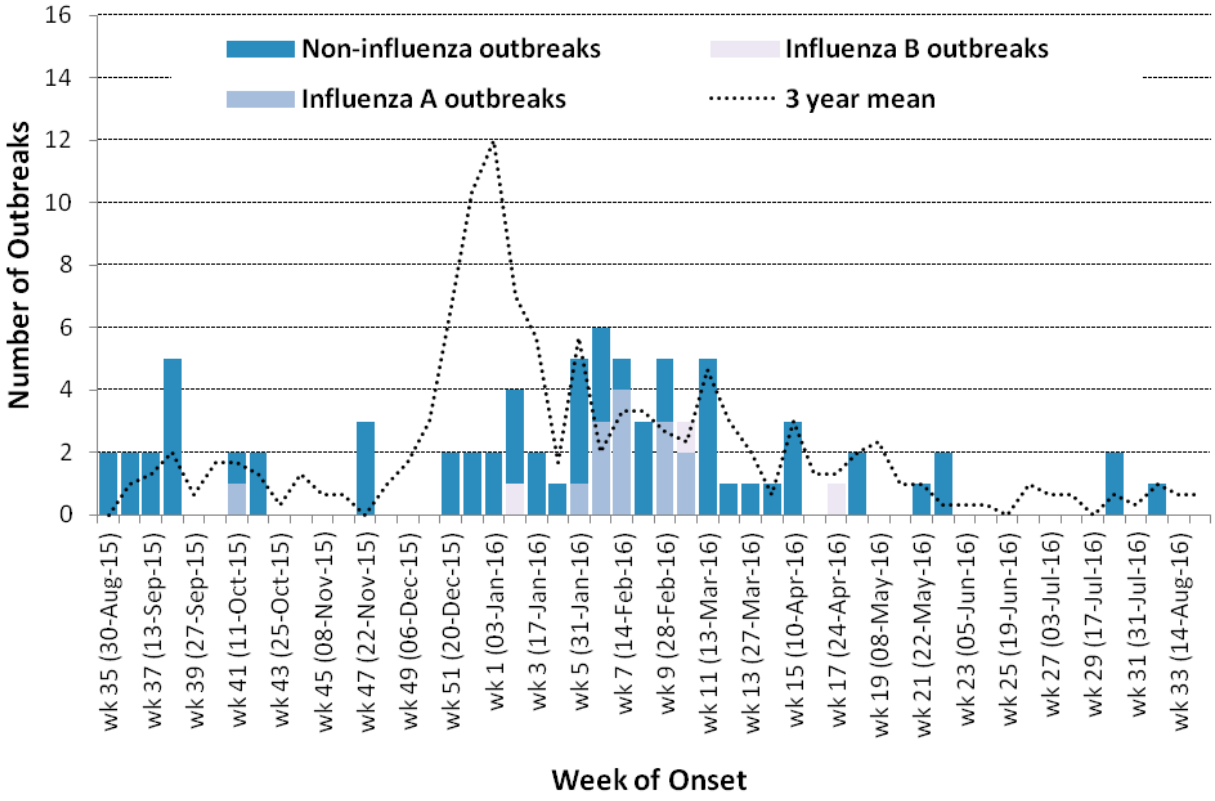
Table 2: Institutional Outbreak Summary, September 2015 to August 2016

Indicator	Influenza A	Influenza B	Non-influenza respiratory	Enteric (non-CDI)	*Clostridium difficile* infections (CDI) outbreaks in acute care
Total number of outbreaks	14	3	61	42	3
Median duration in days (range)	15.5 (8 – 29)	20 (19 – 22)	15 (5 – 42)	12 (5 – 32)	61 (39 – 104)
Total number of cases	159	53	813	958	16
Staff cases	31	13	207	275	0
Resident/Patient cases	128	40	606	683	16
Resident/Patient hospitalizations	14	3	23	15	-
Resident/Patient deaths related to outbreak	2	3	9	6	0

The number and type of outbreaks vary from year to year depending on the circulating strains of the causative agents. For example, in the 2014 – 2015 season, the circulating strain of influenza A (H3N2) affected predominantly elderly adults and resulted in 102 influenza outbreaks reported that season compared to 17 influenza outbreaks reported in the 2015 – 2016 season, which was predominantly influenza A (H1N1).

With the exception of the 2009 influenza pandemic year, in which the rate of infection onsets peaked at the end of October, institutional outbreaks typically peak in late December or early January. However, the length and onset of each season is dependent on the primary circulating strain of influenza. The 2015–2016 season demonstrated a later onset of influenza outbreaks (Figure 14).

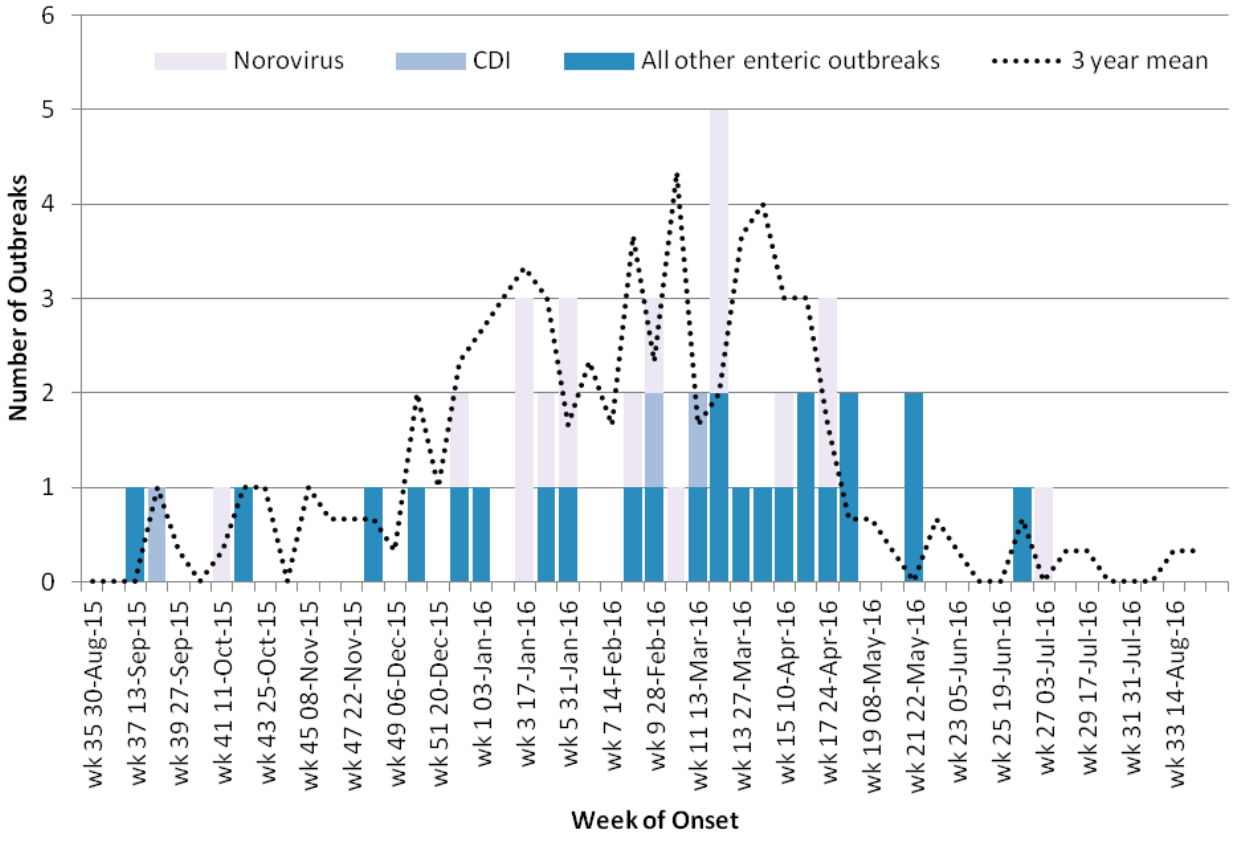
Figure 14: Number of institutional respiratory outbreaks by week of symptom onset, Ottawa, September 2015 – August 2016



Data source: Ontario Ministry of Health and Long-term care, integrated Public Health Information System (iPHIS), data extracted August 26, 2016, by Ottawa Public Health.

The number of institutional enteric outbreaks also varies from season to season (Figure 15). Norovirus is a highly infectious agent which spreads easily from person to person or from a contaminated object or surface to a person, fecal-orally. In 2015 – 2016, there were 18 norovirus outbreaks compared to 30 norovirus outbreaks in the previous 2014 – 2015 season.

Figure 15: Number of institutional enteric outbreaks by week of symptom onset, Ottawa, September 2015 – August 2016



Data source: Ontario Ministry of Health and Long-Term Care, integrated Public Health Information System (iPHIS), extracted August 26, 2016, by Ottawa Public Health.

Emerging Infections

The scope of infectious disease surveillance is ever-changing and must be flexible in order to detect new or changing public health threats. In addition to closely monitoring changes in local epidemiology of current reportable disease (e.g., syphilis and Lyme disease), Ottawa Public Health is also monitoring emerging diseases that are changing in other parts of the world and which present a possible threat to the Ottawa population. In recent years, this includes Ebola virus disease (EVD), Middle East Respiratory Syndrome Coronavirus (MERS co-V), Zika virus, and new influenza strains such as avian influenza A (H7N9).

A Focus on Ebola Virus Disease (EVD)

The 2014 Ebola outbreak in West Africa was the largest Ebola outbreak in history[5]. Local health units in Ontario were requested to conduct surveillance of travellers returning from affected countries from July 2014 to April 2016 with the goal of detecting symptomatic individuals before they could transmit the infection to others. Many returning travellers were identified by federal officials upon arrival at the airport and instructed to contact Ottawa Public Health. Others were reported to Ottawa Public Health by the governmental or aid agency for which they were working in the affected area.

Returning travellers were assessed to determine their level of risk for contracting the disease while in Africa and were assigned a monitoring category based on that risk[6]. Depending on their risk level, returning travellers were contacted by Ottawa Public Health on a daily or weekly basis or were asked to self monitor and report any symptoms to Ottawa Public Health for three weeks after they had left an Ebola-affected country.

During the surveillance period, 258 returning travellers were assessed by Ottawa Public Health (Table 3). There were no cases of EVD detected.

Table 3: The number of individuals under surveillance for Ebola virus disease by type of surveillance, July 2014 to February 2016

Type of Surveillance	Number of individuals
Daily Monitoring	15
Weekly Monitoring	209
Self Monitoring	34
	258

[5] 2014 Ebola Outbreak in West Africa downloaded from https://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/ on August 26, 2016

[6] Ebola Virus Disease – Interim Public health follow-up form downloaded from http://www.publichealthontario.ca/en/eRepository/EVD_public_health_followup_form.pdf on August 26, 2016

A Focus on Middle East Respiratory Syndrome Coronavirus (MERS co-V)

MERS-CoV is a severe respiratory infection, caused by a coronavirus, which has been identified in many countries in the Middle East with the highest number of cases reported in Saudi Arabia[7]. There have also been reports of cases exported to Europe, Asia, and the United States of America. The virus does not pass easily from person to person without close contact or patient care. Suspect cases of MERS-CoV are identified in local health care settings as per guidance from Ontario's Provincial Infectious Disease Advisory Committee (PIDAC) and reported to public health for surveillance assessment. Since 2013, and prior to the Hajj season of 2016, 42 individuals have been reported to Ottawa Public Health as suspect MERS-CoV. None of the suspect individuals reported to Ottawa Public Health were diagnosed with MERS-CoV.

[7] Middle East respiratory syndrome coronavirus (MERS-CoV) downloaded from http://www.who.int/emergencies/mers-cov/en/ on August 26, 2016

Appendix 1: Data Tables

Table 4: Number of cases of enteric infections reported among Ottawa residents in 2015 (Figure 1)

Disease	Number of Cases
Campylobacter enteritis	172
Salmonellosis	157
Giardiasis	134
Amebiasis	86
Cryptosporidiosis	29
Shigellosis	23
Verotoxin-producing E. coli infection	14
Cyclosporiasis	13
Yersiniosis	9
Listeriosis	7
Hepatitis A	5
Paratyphoid fever	1
Typhoid fever	1
Botulism	0
Cholera	0
Paralytic shellfish poisoning	0
Trichinosis	0

Table 5: Incidence rate of Hepatitis A by age, Ottawa, 2011 – 2015 (Figure 2)

Age group (years)	Rate per 100,000 Population
0-4	3.4
5-19	4.3
20-39	0.7
40-59	0.4
60+	0.7

Table 6: Confirmed cases and incidence rate of salmonellosis, Ottawa, 2006 – 2015 (Figure 3)

Year	Number of Cases	Rate per 100,000 Population
2006	188	22.2
2007	152	17.8
2008	154	17.7
2009	151	17.1
2010	177	19.8
2011	177	19.5
2012	199	21.6
2013	130	14.0
2014	182	19.3
2015	156	16.3

Table 7: Number of cases of respiratory infections and directly-transmitted infections reported among Ottawa residents in 2015 (Figure 4)

Disease	Number of Cases
Influenza	733
Streptococcus pneumoniae, Invasive	61
Tuberculosis	46
Streptococcal Infections, Group A Invasive	39
Meningitis	85
Encephalitis	52
Legionellosis	3
Leprosy	0
Streptococcal Infections, Group B Neonatal	0
Creutzfeld-Jacob Disease	0
Hemorrhagic Fevers	0
Lassa Fever	0

Table 8: Laboratory-confirmed influenza cases by season (September – August), Ottawa, 2010 – 2011 to 2015 – 2016 (Figure 5)

Season (years)	Number of Cases
2010-2011	200
2011-2012	148
2012-2013	544
2013-2014	401
2014-2015	922
2015-2016	504

Table 9: Confirmed cases and incidence rate of pulmonary and extrapulmonary tuberculosis, Ottawa, 2006 – 2015 (Figure 6)

Year	Number of Extrapulmonary TB Cases	Number of Pulmonary TB Cases	Combined Rate per 100,000 Population
2006	19	19	4.5
2007	16	21	4.3
2008	20	33	6.1
2009	20	29	5.5
2010	18	30	5.3
2011	13	35	5.3
2012	21	21	4.5
2013	19	33	5.6
2014	16	35	5.4
2015	17	29	4.8

Table 10: Number of cases of STBBIs reported among Ottawa residents in 2015 (Figure 7)

Disease	Number of cases
Chlamydia	3057
Gonorrhea	328
Hepatitis C	201
Hepatitis B, Chronic	150
Infectious syphilis	98
HIV Infections	48
Hepatitis B, Acute	5

Table 11: Incidence rate of infectious syphilis, Ottawa, 1996 – 2015 (Figure 8)

Year	Number of Cases	Rate per 100,000 Population
1996	0	0.0
1997	2	0.3
1998	3	0.4
1999	2	0.3
2000	1	0.1
2001	4	0.5
2002	16	2.0
2003	26	3.1
2004	22	2.6
2005	23	2.7
2006	41	4.8
2007	44	5.1
2008	37	4.3
2009	54	6.1
2010	50	5.6
2011	47	5.2
2012	37	4.0
2013	30	3.2
2014	44	4.7
2015	98	10.2

Table 12: Number of cases and incidence rate of hepatitis C, Ottawa, 1996 – 2015 (Figure 9)

Year	Number of Cases	Rate per 100,000 Population
1996	613	82.7
1997	681	91.2
1998	723	95.6
1999	540	70.3
2000	512	65.1
2001	446	55.3
2002	361	44.1
2003	333	40.3
2004	285	34.2
2005	265	31.6
2006	259	30.6
2007	250	29.2
2008	274	31.5
2009	308	34.9
2010	230	25.6
2011	222	24.3
2012	232	25.1
2013	230	24.6
2014	226	23.9
2015	201	21.0

Table 13: Number of cases of routine vaccine-preventable infections reported among Ottawa residents in 2015 (Figure 10)

Disease	Number of Cases
Chickenpox	75
Pertussis	29
Meningococcal Disease	4
Haemophilus influenzae b, Invasive	1
Mumps	1
Diphtheria	0
Measles	0
Acute Flaccid Paralysis	0
Polio	0
Rubella	0
Rubella, Congenital Syndrome	0
Tetanus	0

Table 14: Number of cases and incidence rate of pertussis, Ottawa, 2006 – 2015 (Figure 11)

Year	Number of Cases	Rate per 100,000 Population
2006	10	1.2
2007	6	0.7
2008	17	2.0
2009	7	0.9
2010	4	0.4
2011	17	2.8
2012	33	5.2
2013	8	1.2
2014	13	1.5
2015	29	3.0

Table 15: Number of cases of vectorborne and zoonotic infections reported among Ottawa residents in 2015 (Figure 12)

Disease	Number of Cases
Lyme Disease	71
Malaria	17
Brucellosis	2
Anthrax	0
Hantavirus	0
Plague	0
Q Fever	0
Rabies (human cases)	0
Tularemia	0
West Nile virus	0
Yellow Fever	0
Psittacosis/Ornithosis	0

Table 16: Number of cases and incidence rate of Lyme disease, Ottawa, 2006 – 2015 (Figure 13)

Year	Number of Cases	Rate per 100,000 Population
2006	4	0.5
2007	2	0.2
2008	7	0.8
2009	6	0.7
2010	8	0.9
2011	11	1.2
2012	19	2.1
2013	47	5.0
2014	22	2.3
2015	71	7.5

Table 17: Number of institutional respiratory outbreaks by week of symptom onset, Ottawa, September 2015 – August 2016 (Figure 14)

Week of Onset	Number of Influenza A Outbreaks	Number of Influenza B Outbreaks	Number of Non-influenza Outbreaks	Three-year Average Number of Total Outbreaks
August 30, 2015	0	0	2	0.0
September 06, 2015	0	0	2	1.0
September 13, 2015	0	0	2	1.3
September 20, 2015	0	0	5	2.0
September 27, 2015	0	0	0	0.7
October 04, 2015	0	0	0	1.7
October 11, 2015	1	0	1	1.7
October 18, 2015	0	0	2	1.3
October 25, 2015	0	0	0	0.3
November 01, 2015	0	0	0	1.3
November 08, 2015	0	0	0	0.7
November 15, 2015	0	0	0	0.7
November 22, 2015	0	0	3	0.0
November 29, 2015	0	0	0	1.0
December 06, 2015	0	0	0	1.7
December 13, 2015	0	0	0	3.0
December 20, 2015	0	0	2	6.7
December 27, 2015	0	0	2	10.3
January 03, 2016	0	0	2	12.0
January 10, 2016	0	1	3	7.0
January 17, 2016	0	0	2	5.7
January 24, 2016	0	0	1	1.7
January 31, 2016	1	0	4	5.7
February 07, 2016	3	0	3	2.0
February 14, 2016	4	0	1	3.3
February 21, 2016	0	0	3	3.3
February 28, 2016	3	0	2	2.7
March 06, 2016	2	1	0	2.3

Week of Onset	Number of Influenza A Outbreaks	Number of Influenza B Outbreaks	Number of Non-influenza Outbreaks	Three-year Average Number of Total Outbreaks
March 13, 2016	0	0	5	4.7
March 20, 2016	0	0	1	3.0
March 27, 2016	0	0	1	2.0
April 03, 2016	0	0	1	0.7
April 10, 2016	0	0	3	3.0
April 17, 2016	0	0	0	1.3
April 24, 2016	0	1	0	1.3
May 01, 2016	0	0	2	2.0
May 08, 2016	0	0	0	2.3
May 15, 2016	0	0	0	1.0
May 22, 2016	0	0	1	1.0
May 29, 2016	0	0	2	0.3
June 05, 2016	0	0	0	0.3
June 12, 2016	0	0	0	0.3
June 19, 2016	0	0	0	0.0
June 26, 2016	0	0	0	1.0
July 03, 2016	0	0	0	0.7
July 10, 2016	0	0	0	0.7
July 17, 2016	0	0	0	0.0
July 24, 2016	0	0	2	0.7
July 31, 2016	0	0	0	0.3
August 07, 2016	0	0	1	1.0
August 14, 2016	0	0	0	0.7
August 21, 2016	0	0	0	0.7

Table 18: Number of institutional enteric outbreaks by week of symptom onset, Ottawa, September 2015 – August 2016 (Figure 15)

Week of Onset	Number of CDI Outbreaks	Number of Norovirus Outbreaks	Number of All Other Enteric Outbreaks	Three-year Average Number of Total Outbreaks
August 30, 2015	0	0	0	0.0
September 06, 2015	0	0	0	0.0
September 13, 2015	0	0	1	0.0
September 20, 2015	1	0	0	1.0
September 27, 2015	0	0	0	0.3
October 04, 2015	0	0	0	0.0
October 11, 2015	0	1	0	0.3
October 18, 2015	0	0	1	1.0
October 25, 2015	0	0	0	1.0
November 01, 2015	0	0	0	0.0
November 08, 2015	0	0	0	1.0
November 15, 2015	0	0	0	0.7
November 22, 2015	0	0	0	0.7
November 29, 2015	0	0	1	0.7
December 06, 2015	0	0	0	0.3
December 13, 2015	0	0	1	2.0
December 20, 2015	0	0	0	1.0
December 27, 2015	0	1	1	2.3
January 03, 2016	0	0	1	2.7
January 10, 2016	0	0	0	3.0
January 17, 2016	0	3	0	3.3
January 24, 2016	0	1	1	3.0
January 31, 2016	0	2	1	1.7
February 07, 2016	0	0	0	2.3
February 14, 2016	0	0	0	1.7
February 21, 2016	0	1	1	3.7
February 28, 2016	1	1	1	2.3
March 06, 2016	0	1	0	4.3
March 13, 2016	1	0	1	1.7

Week of Onset	Number of CDI Outbreaks	Number of Norovirus Outbreaks	Number of All Other Enteric Outbreaks	Three-year Average Number of Total Outbreaks
March 20, 2016	0	3	2	2.0
March 27, 2016	0	0	1	3.7
April 03, 2016	0	0	1	4.0
April 10, 2016	0	1	1	3.0
April 17, 2016	0	0	2	3.0
April 24, 2016	0	2	1	1.7
May 01, 2016	0	0	2	0.7
May 08, 2016	0	0	0	0.7
May 15, 2016	0	0	0	0.3
May 22, 2016	0	0	2	0.0
May 29, 2016	0	0	0	0.7
June 05, 2016	0	0	0	0.3
June 12, 2016	0	0	0	0.0
June 19, 2016	0	0	0	0.0
June 26, 2016	0	0	1	0.7
July 03, 2016	0	1	0	0.0
July 10, 2016	0	0	0	0.3
July 17, 2016	0	0	0	0.3
July 24, 2016	0	0	0	0.0
July 31, 2016	0	0	0	0.0
August 07, 2016	0	0	0	0.0
August 14, 2016	0	0	0	0.3
August 21, 2016	0	0	0	0.3
August 28, 2016	0	0	0	0.0