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British Columbia Annual Summary of Reportable Diseases

2015

Prepared by:

Communicable Disease Prevention and Control Services (CDPACS)

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Provincial Health Services Authority
Province-wide solutions. Better health.

BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Executive Summary

In 2015 within the province of British Columbia, massive efforts were devoted to preparing for possible cases of imported Ebola virus disease. Other significant events included a large *Vibrio parahaemolyticus* outbreak associated with consumption of raw oysters, a record number of syphilis cases and an ongoing *Salmonella* Enteritidis outbreak linked to poultry products including chicken meat and eggs. The epidemiology and response efforts associated with these events are addressed in more detail in a new section of this report called 2015 Noteworthy Diseases and Conditions which addresses diseases that are either uniquely topical, represent significant outbreaks, or are of ongoing concern.

The epidemiology of most other reportable diseases and conditions in British Columbia remained relatively stable in 2015 compared with previous years.

Vaccine-preventable diseases

The 2015-16 influenza season in BC began later and was milder than the historical average with mixed circulation of both influenza A and B viruses. Influenza B dominated the early season with H1N1 playing a greater role in the latter stages; there were fewer H3N2 infections than in previous years. Pertussis rates remained high in British Columbia with 2015 having the highest incidence observed in the past decade but with considerable variation across health authorities. While pertussis incidence was elevated in most of the province, Northern Health Authority reported a disproportionately high number of cases. The highest age-specific incidence occurred within the <1 year-old age group which is also the group most at risk for complications associated with pertussis infection. Ten cases of measles among British Columbians, all linked to a single importation event, reminds us of the importance of immunization for vaccine preventable diseases not commonly seen in Canada. Rates of invasive pneumococcal disease remain unchanged for 2015. Among the 21 serotyped cases identified in the less than or equal to 5 year-old age group, one case occurred in a toddler who had lapsed on their immunization series; there were two vaccine failures in vaccinated children infected with serotype 3. Provincial rates of invasive meningococcal disease in 2015 were the lowest reported in the last 10 years. Largely as the result of the provincial program to vaccinate infants and school age children with the serogroup C meningococcal vaccine, no cases of invasive serogroup C meningococcal disease were reported in 2015. Rates of mumps infection were low and within the historical norm with all cases among adults and half of the reported cases associated with likely travel acquisition. Immunization against type b *Haemophilus influenzae* infection is another immunization success story with no cases of invasive disease reported in 2015.

Sexually-transmitted and bloodborne pathogens

The most recent estimates suggest that there are approximately 12,000 HIV infected individuals living in British Columbia. While HIV diagnoses have been decreasing overall due primarily to fewer cases being found among people who use injection drugs, there has not been a corresponding decrease in HIV diagnoses among gay, bisexual, and other men who have sex with men. Effective therapies for HIV continue to make AIDS deaths less common. Chlamydia continues to be the most commonly reported communicable disease in the province with the BCCDC notified about more than 14,000 cases; women were diagnosed twice as often as men. There has been a 50% increase in reported cases of Chlamydia in the past decade which is likely the result of several factors. Similarly, gonorrhea rates are on a historical high; however the increase in incidence has been most significant over the past year with a 75% increase in reported cases. In contrast to chlamydia infections, in the case of gonorrhea, there were twice as many cases among men as there have been among women. Syphilis surveillance is described in more detail in the Noteworthy section.

Cases of hepatitis A and hepatitis B reported in BC have continued to decline due to effective vaccines. However, reported cases of hepatitis C increased in 2015, in part due to an increase in awareness and testing. The increased testing of 'baby boomers' will identify past hepatitis C infections.

For the fourth time in the past 6 years hepatitis A cases reported for the entire province in 2015 were below 30 and the majority of these were related to travel to endemic countries by unimmunized individuals. A publicly funded hepatitis B immunization program for adolescents in 1992, infants in 2001 and high risk individuals has resulted in a continued decline of reported acute hepatitis B cases. In 2015, for the first time, there were less than 10 cases of acute hepatitis B reported; no cases were aged below 20 and the

vast majority were male. However, more than a thousand cases of chronic and unknown hepatitis B continue to be reported in BC in 2015. The vast majority of chronic hepatitis B were identified in individuals who have emigrated to BC from endemic countries, thus most of these cases were identified in Vancouver Coastal and Fraser Health regions.

The incidence of active tuberculosis continues to fall in part due to screening vigilance and effective treatments for latent tuberculosis. The demographics of reported cases largely reflected immigration patterns to the Lower Mainland.

Enteric, food and waterborne diseases

Twenty-six enteric disease outbreaks were investigated in 2015 with the majority caused by a bacterium and the majority being foodborne. *Salmonella* continues to be one of the most common bacterial causes of enteric infection with the highest rates reported in twenty years. Most of this increase is due to *Salmonella* Enteritidis which constituted more than half of the reported serotypes. Of the domestically acquired *Shigella* infections, sexual transmission among men continues to play a significant role. *Shigella sonnei* replaced *Shigella flexneri* as the most frequently isolated species. The record number of *Vibrio parahemolyticus* infections reported in 2015 is detailed in the Noteworthy section.

Vectorborne and zoonotic diseases

Lyme disease remains rare in BC. In 2015, 21 cases of Lyme disease were documented with 10 of the cases reporting a travel history consistent with acquisition of the infection outside the province.

For the first time, we include a section on Reportable Zoonoses in Animals. Starting in 2015, the Chief Veterinary Officer has agreed to notify the Provincial Heath Officer in the event of detection of any of 14 reportable zoonotic diseases, or other new or unusual diseases of possible public health significance. Seven cases of zoonotic disease in animals were reported this year with details available in our report.

Analysis of trends in community antimicrobial resistance has revealed a reduction in the use of antibiotics for some indications such as upper respiratory infections. Further good news it that antibiotic resistance among gram positive organisms remains stable and the rapid increase in quinolone resistance in E. coli is no longer being observed.

New in this year's report is the inclusion of links to the BCCDC online Reportable Disease Dashboard. To get the latest data and additional charts for a disease, click the icon below whenever you see it.

Dr. Mark Tyndall

Executive Medical Director, BCCDC

Deputy Provincial Health Officer

2015 Year in Review:
Communicable Diseases in BC

Increased

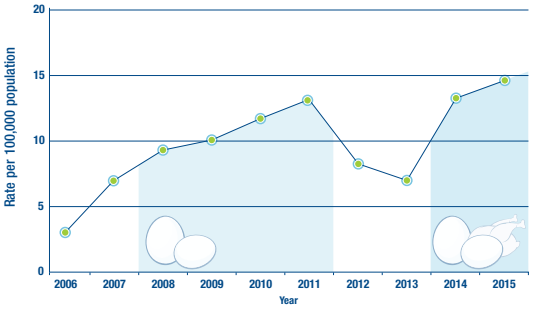
- Hepatitis C
- Pertussis
- Chlamydia
- Gonorrhea
  - 75% increase in 2015
  - 2x more common in males

Decreased

- Hepatitis A and B
- Invasive meningococcal disease
- Active Tuberculosis
- Antibiotic use for upper respiratory tract infections
- Mild Influenza

Salmonellosis

Provincial *Salmonella* Enteritidis incidence, 2006-2015



- First wave of the outbreak was in 2008-2011; linked to ungraded eggs.
- Second wave began in 2014 and continued in 2015; linked to eggs but also to chicken.

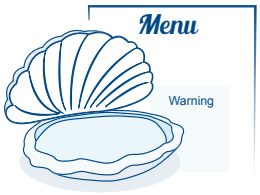
Vibriosis

Higher than average ocean water temperatures early in the year

13 cases were associated with exposure to BC ocean water.

60 cases were associated with the consumption of raw BC oysters.

Led to oyster recall, posting of warnings in restaurants about risk of consuming raw BC oysters.



Syphilis

759 cases in 2015

↑40% from 2014

>90% male

males 20-29 highest rate of increase

Imported Diseases

Ebola

Measles

11 school-trip associated cases were diagnosed, including one visitor to BC

- 9 of these cases were infected in China or during return travel
- 2 cases were infected in BC

NOTEWORTHY DISEASES AND CONDITIONS IN 2015

Ebola
Salmonella Enteritidis
Syphilis
Vibrio parahaemolyticus

Ebola

Ebola, a filovirus, is one of the causes of viral hemorrhagic fever. It usually leads to small outbreaks in isolated areas of western and central Africa. This changed when the largest Ebola outbreak ever reported affected West Africa from December 2013 to 2016 with 28,616 cases and 11,310 deaths to date.[1]

Although only a small number of cases were exported or were infected outside West Africa, the outbreak caused high levels of concern in many countries due to a real or perceived lack of preparedness. A BC Ebola Task Force involving the entire healthcare sector was formed in October 2014 to support provincial Ebola preparedness efforts.

No Ebola cases occurred in BC or Canada. However, the BC public health system did identify and monitor 173 Ebola contacts[2] in BC between August 2014 and February 2016. All of these individuals were travelers returning from Liberia, Guinea or Sierra Leone. A total of 134 (77.5%) contacts were categorized as low risk (i.e. were present in an affected country without any known exposure to Ebola) and 39 (22.5%) as medium risk (i.e. had contact with Ebola while wearing appropriate Personal Protective Equipment or was healthcare worker in affected country with no known Ebola contact). Only 3 contacts under monitoring developed symptoms compatible with Ebola and all tested negative for Ebola.

BC Ebola preparedness efforts increased the healthcare sector's capacity to respond to emerging infectious diseases and are being converted into more comprehensive and sustainable emergency preparedness plans.

1. WHO. Ebola Situation Report. 19 May 2016. Available from http://www.who.int/csr/disease/ebola/en/ Accessed on May 25 2016.

2. Provincial Ebola Expert Working Group. BC Ebola Virus Disease Contact Investigation and Management Guideline. Apr 22 2015. Available from: http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/british-columbia-ebola-virus-disease-evd-contact-investigation-and-management-guideline.pdf Accessed on May 25 2016.

Salmonella Enteritidis Investigation

Salmonella Enteritidis is a bacterium that causes gastrointestinal infection in humans. The main reservoir is poultry. Humans usually get infected by eating contaminated chicken meat or eggs.

BC's prolonged *Salmonella* Enteritidis (SE) outbreak continued in 2015. The first wave of the outbreak was in 2008-2011 and was linked to ungraded eggs[1]. Control measures such as improved communication, poultry vaccination, separation of flocks and a ban of hatching egg sales at farm gates brought the incidence of SE in BC down in 2012 and 2013. In 2014, SE incidence rates increased again; 2015 rates were higher than 2014 with 683 cases of SE reported in BC.

Three phage types (PT) accounted for over two thirds of BC cases – PT13a (34%), PT13 (17%) and PT8 (15%). This represents a shift in phage type from 2014, when PT8 was the most common (30%), followed by PT13 (24%) and PT13a (20%). All health authorities experienced increases in PT13a incidence in 2015.

Northern Health Authority and Interior Health had the highest SE incidence rates in 2015; in 2014, SE incidence had been highest in Fraser Health Authority and Vancouver Coastal Health (Figure 1.1). The reasons for this shift in geography are unknown.

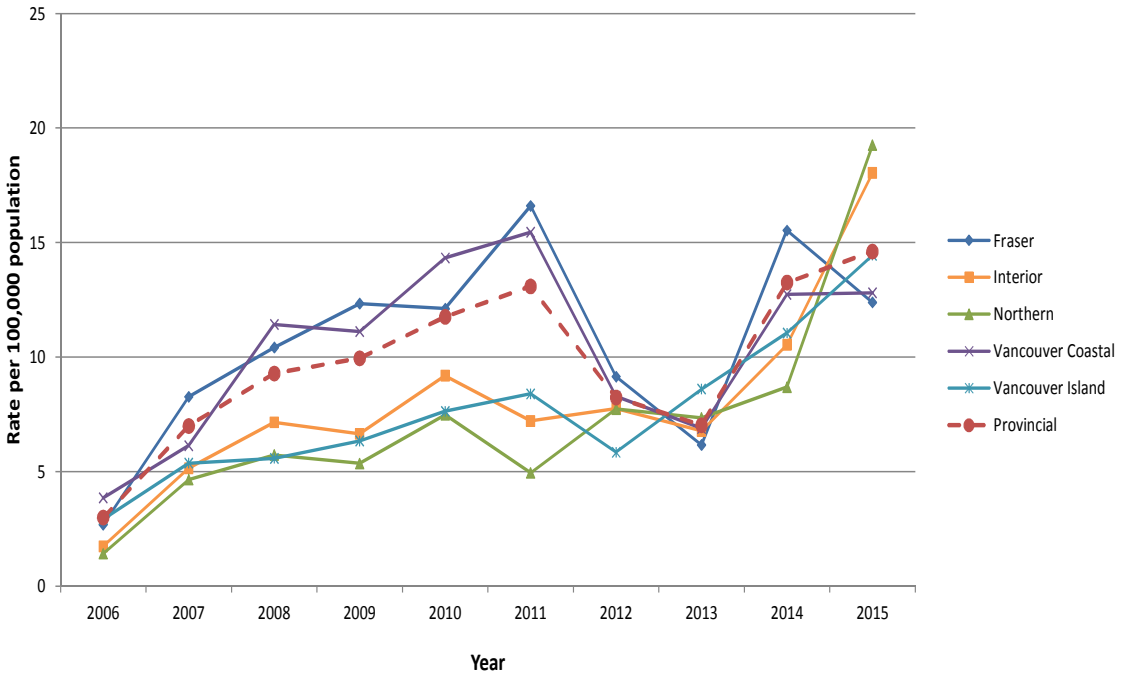
Investigations have led to the source of this outbreak being identified as poultry products. Chicken meat (78%) and eggs (73%) are the most commonly reported exposures among cases with these phage types. Retail testing of chicken meat in BC demonstrated that a substantially higher proportion of SE was isolated from retail chicken breasts in 2015 compared to previous years. PT8, PT13 and PT13a were all detected in retail chicken meat.

Two clusters of cases were detected and investigated within the larger outbreak in 2015. In the spring of 2015, a cluster of SE PT13a was associated with the handling of live chicks from a single Alberta hatchery. There were 19 cases in BC and a total of 61 cases nationally. The investigation led to actions to mitigate the source of infection at the hatchery, public notification, education of clients who received chicks from the hatchery and client flock testing. Another cluster of SE associated with a restaurant in Interior Health had three lab-confirmed and three clinical cases. Confirmed cases were PT 8 and PT13a. A menu item was identified as a suspected source; however, it was not confirmed by laboratory testing.

Public health actions taken in 2015 to address the increased rates of SE in BC included ongoing meetings of the SE multi-disciplinary provincial outbreak team, communication with poultry industry boards and government, education of food service establishments, planning for the use of whole genome sequencing and enhancing exposure information routinely collected from *Salmonella* cases. A provincial SE Working Group (SEWG) was formed in 2015, co-chaired by the Ministries of Agriculture and Health and with representation from the BCCDC and the Health Authorities. The purpose of the SEWG is to define the problem of food related SE in the province and develop a feasible food safety strategy to address the problem.

1. Taylor M, Leslie M, Ritson M, Stone J, Cox W, Hoang L, Galanis E, Outbreak Investigation Team. Investigation of the Concurrent Emergence of *Salmonella* Enteritidis in Humans and Poultry in British Columbia, Canada, 2008–2010. Zoonoses and Public Health 2012;59(8):584-592. http://onlinelibrary.wiley.com/doi/10.1111/j.1863-2378.2012.01500.x/full.

1.1 Salmonella Enteritidis incidence by Health Authority and Year, 2006-2015



Syphilis

Syphilis is a sexually transmitted infection (STI) caused by the spirochete bacterium *Treponema pallidum*. Its natural history is well-described and consists of multiple infectious stages, followed by a latent period during which the bacterium is present but there are little to no symptoms. The primary stage of syphilis typically presents as a painless ulcer, known as a chancre. The secondary stage of syphilis presents with systemic symptoms, such as a rash over the trunk. During the latent stage of syphilis, there are no symptoms. The latent stage is usually further separated into early latent (about one year after infection) and late latent (one year or more after infection). Only the primary, secondary, and early latent stages of syphilis are considered infectious and are reported here.

Untreated, up to one third of individuals will go on to develop late complications, which may lead to end-organ disease in the brain, peripheral nerves, eyes and cardiovascular system. If the infectious stages of syphilis are concurrent with pregnancy the child is at risk of developing congenital syphilis, a serious and potentially fatal condition. Syphilis in association with HIV presents additional public health challenges. In those co-infected with HIV, the clinical manifestations of syphilis may be unusual and difficult to diagnose. In addition, syphilis infection itself not only enhances the transmission of HIV but also one's susceptibility to HIV infection.

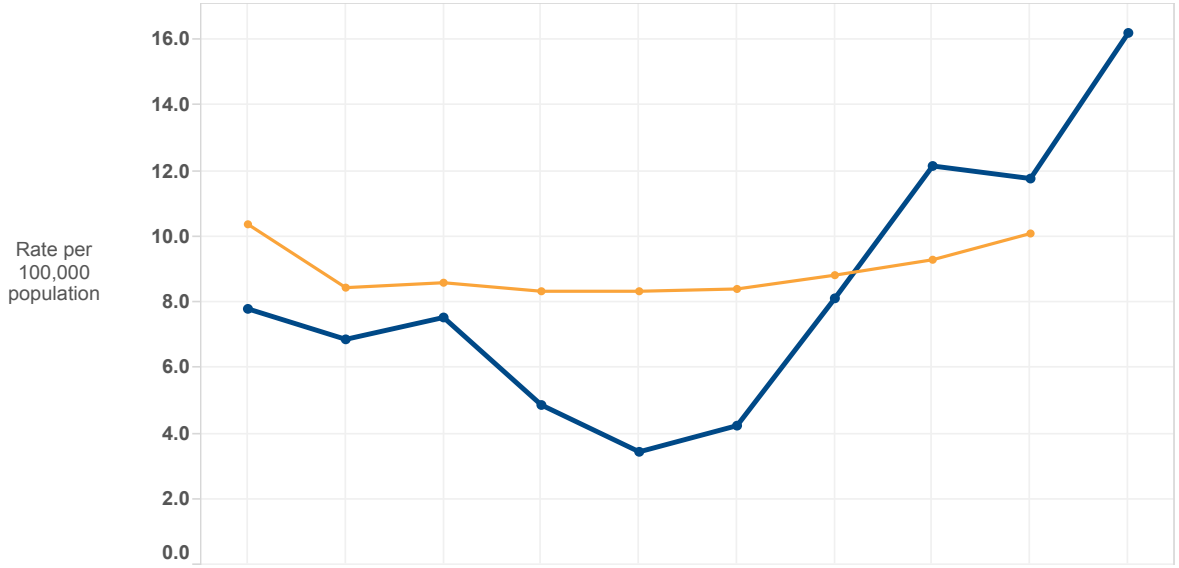
Following a decline in rates in BC in the early 1990s, infectious syphilis began to re-emerge in BC starting in 1997. Since 2010, the rates of syphilis have been rising dramatically. Over 90% of infectious syphilis cases are in males, primarily driven by infectious syphilis cases among gay, bisexual, and other men who have sex with men. In 2015, there were 759 cases reported – the highest number of new cases in the past decade - representing nearly a 40% increase in reported infectious syphilis compared with 2014. Almost a third of the diagnoses in 2015 were in September and October, raising concerns that BC may be entering a new phase of the syphilis epidemic.

From 2010 to 2015, the highest rates of infectious syphilis were in the Vancouver Coastal Health Authority and the majority of cases were among men 40-59 years old. However, since 2014, the greatest rate of increase appears to be in men 20-29 years old. There has also been a steady increase in the proportion of cases in the early latent stage (i.e. the stage without symptoms) from about 50% in 2005 to almost 65% in 2015, suggesting that an increasing proportion of cases are being detected by screening.

The recent changes in syphilis epidemiology prompted the the BC Centre for Disease Control (BCCDC) to develop a multi-pronged strategy with the regional health authorities, First Nations Health Authority, the BCCDC Public Health Laboratory, Perinatal Services BC, and the Office of the Provincial Health Officer to address this increase, which is currently being implemented. Some goals of this strategy are to increase awareness of syphilis among key populations and health care providers, enhance surveillance of syphilis, maintain high treatment completion rates, and optimize the care of partners, in order to prevent re-infection and onward transmission.

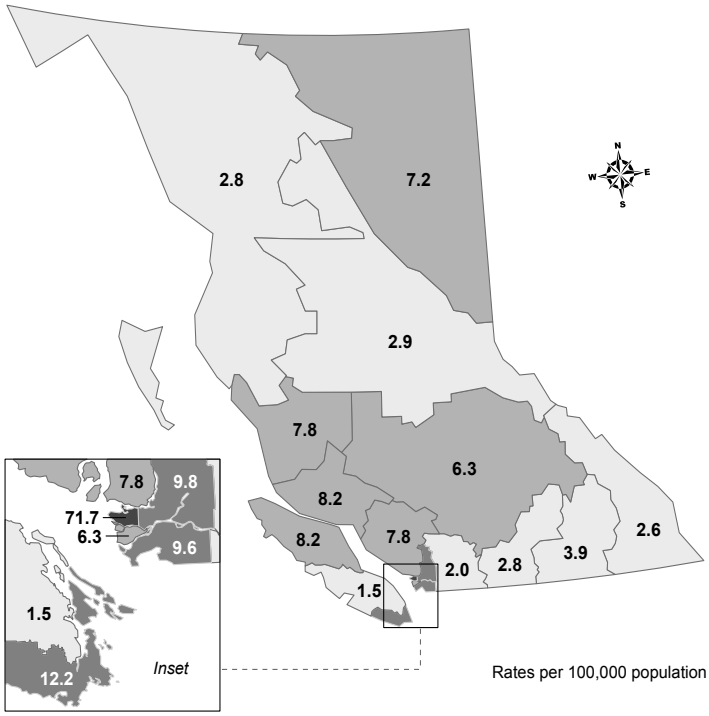
For more information on infectious syphilis, please see the STI Annual Report.

2.1 Infectious Syphilis Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	331	295	328	215	154	191	369	557	546	759
BC Rate	7.80	6.87	7.54	4.87	3.45	4.25	8.12	12.16	11.77	16.21
Canadian Rate	10.38	8.45	8.60	8.34	8.34	8.41	8.83	9.30	10.10	

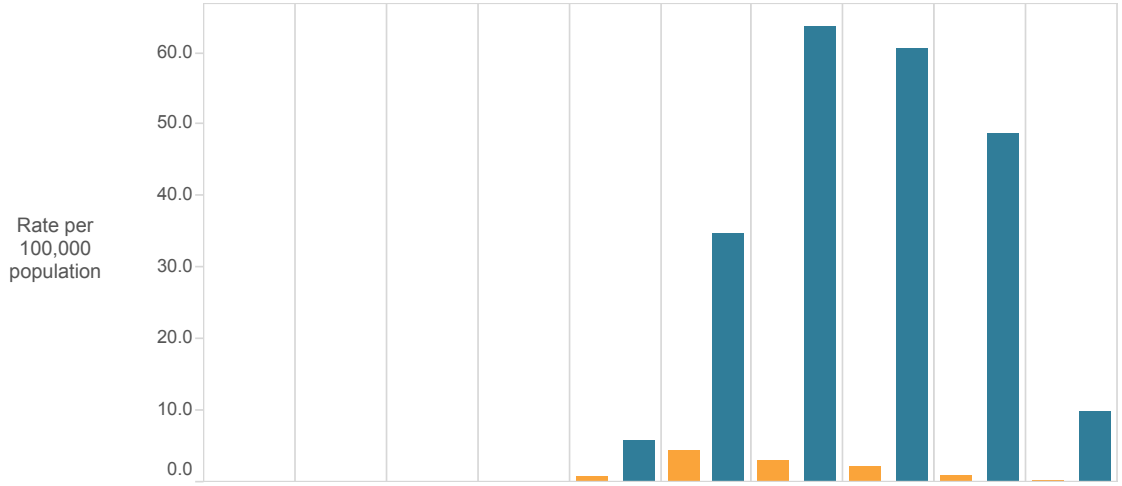
2.2 Infectious Syphilis Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	2	2.6
12	Kootenay Boundary	3	3.9
13	Okanagan	10	2.8
14	Thompson Cariboo Shuswap	14	6.3
21	Fraser East	6	2.0
22	Fraser North	64	9.8
23	Fraser South	76	9.6
31	Richmond	13	6.3
32	Vancouver	478	71.7
33	North Shore/Coast Garibaldi	22	7.8
41	South Vancouver Island	46	12.2
42	Central Vancouver Island	4	1.5
43	North Vancouver Island	10	8.2
51	Northwest	2	2.8
52	Northern Interior	4	2.9
53	Northeast	5	7.2

Rates per 100,000 population by HSDA

2.3 Infectious Syphilis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	1	7	5	7	7	2
	Male	0	0	0	0	8	59	101	188	322	52
	Total	0	0	0	0	9	66	106	195	329	54
BC Rate	Female	0.00	0.00	0.00	0.00	0.77	4.53	3.14	2.21	1.03	0.34
	Male	0.00	0.00	0.00	0.00	5.80	34.78	63.70	60.55	48.78	9.68
	Total	0.00	0.00	0.00	0.00	3.37	20.36	33.36	31.08	24.56	4.80

Vibrio parahaemolyticus

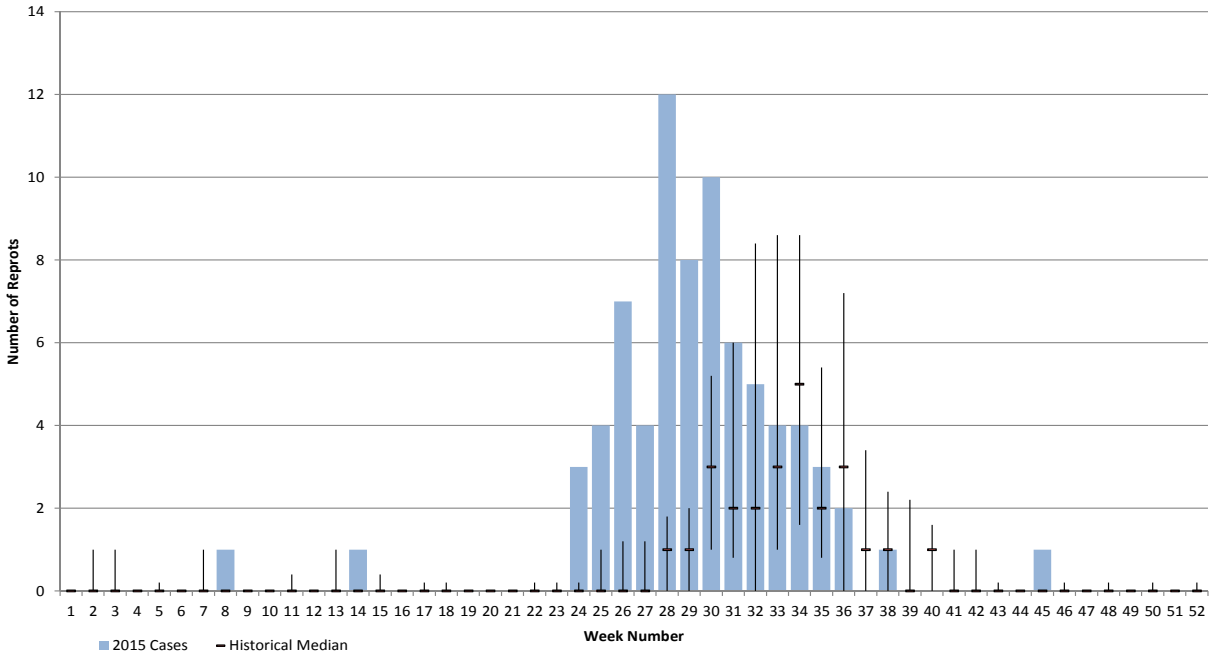
Vibrio parahaemolyticus (Vp) is a bacterium that is normally found in ocean water. When the water temperature increases in the summer, Vp proliferate in the water and concentrate in bivalve shellfish such as clams, oysters and mussels. People can get a gastro-intestinal infection by eating contaminated raw shellfish or by accidentally swallowing ocean water. They can also get ear or wound infections from contact with contaminated ocean water.

In 2015, BC experienced its largest Vp outbreak ever reported; 60 cases were associated with the consumption of raw BC oysters and another 13 cases were associated with exposure to BC ocean water. The outbreak lasted from week 24 (June 15) to week 36 (September 9), with an earlier start, an earlier peak and a longer season than in previous years (Figure 3.1). This outbreak also affected other provinces with a total of 82 cases Vp cases associated with BC oysters reported across Canada. The early season and high incidence were attributed to higher than average BC ocean water temperatures.

A series of communications and control measures were taken to minimise the public health risk. These included a public health alert, education of BC restaurant staff and posting of warnings in restaurants about the risks associated with consumption of raw BC oysters and an order to stop serving raw BC oysters in one Health Authority. The Canadian Food Inspection Agency recalled oysters intended for raw consumption that were harvested from BC waters and required testing of all lots of BC oysters intended for raw consumption. The incidence of Vp decreased rapidly from the beginning of August (week 31) onwards. The outbreak was declared over on September 17.

In the ensuing months, a National Vp Control Working Group, including the BCCDC, BC Health Authorities, BC Ministry of Agriculture, BC Shellfish Growers' Association, Canadian Food Inspection Agency, Health Canada and Public Health Agency of Canada developed a series of recommendations to address gaps and improve surveillance, control and communications in order to decrease the risk of Vp associated with BC oysters.

3.1 2015 Vibrio parahaemolyticus Reports Compared to Historical Median and the 10th and 90th Percentiles Around the Median (2006 to 2014)



Surveillance Summaries for Other Selected Diseases and Conditions

ANTIMICROBIAL RESISTANCE

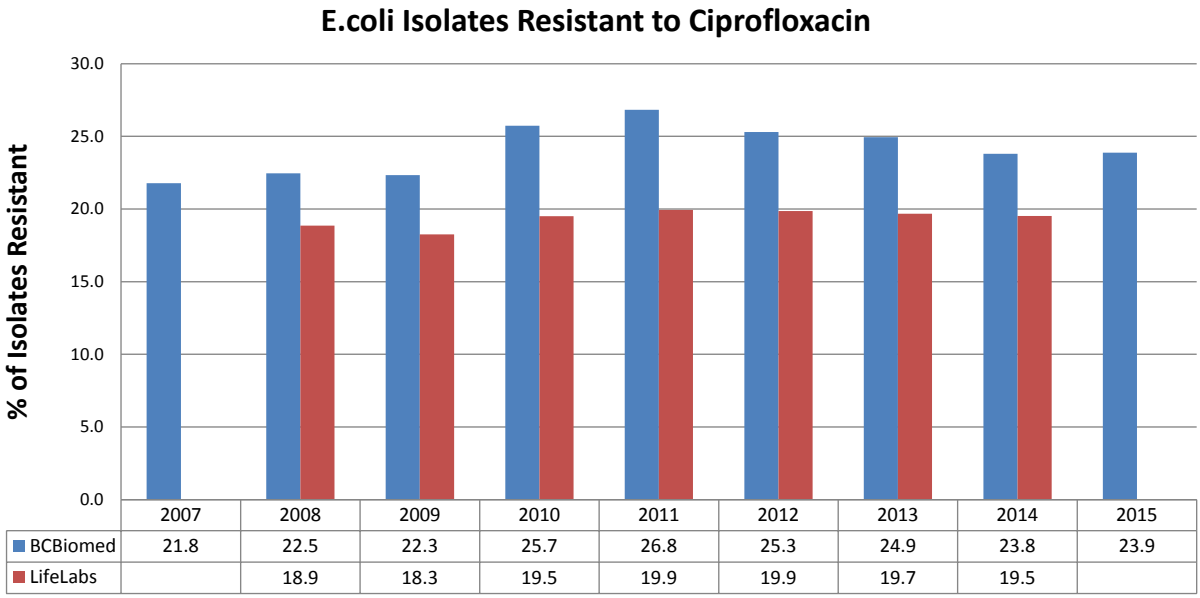
Antimicrobial Resistant Organism Surveillance in BC

As a component of the Do Bugs Need Drugs? program evaluation, trends in resistance are analyzed and compiled using anonymized, isolate-level antimicrobial susceptibility testing data from 90% of community laboratories in British Columbia (BC). The latest static report, entitled "Antimicrobial Resistance Trends in the Province of British Columbia", is available online at http://www.bccdc.ca/health-professionals/data-reports/do-bugs-need-drugs-evaluation-reports.

In summary, while antibiotic resistance remains a growing problem, patterns of resistance in gram positive organisms are largely stable and the previously oberved steep increases in fluoroquinolone resistance among E. coli isolates are no longer being seen. In addition, declining rates of utilization of antibiotics, particularly for Do Bugs Need Drugs target indications such as upper respiratory infection and otitis media, suggest a shift in prescribing practices that may reduce the selective pressure on organisms causing infection.

For healthcare-associated infections (e.g. MRSA, CPO, and C. difficile), please visit the Provincial Infection Control Network of British Columbia (PICNet) at: https://www.picnet.ca/surveillance/latest-surveillance-reports/

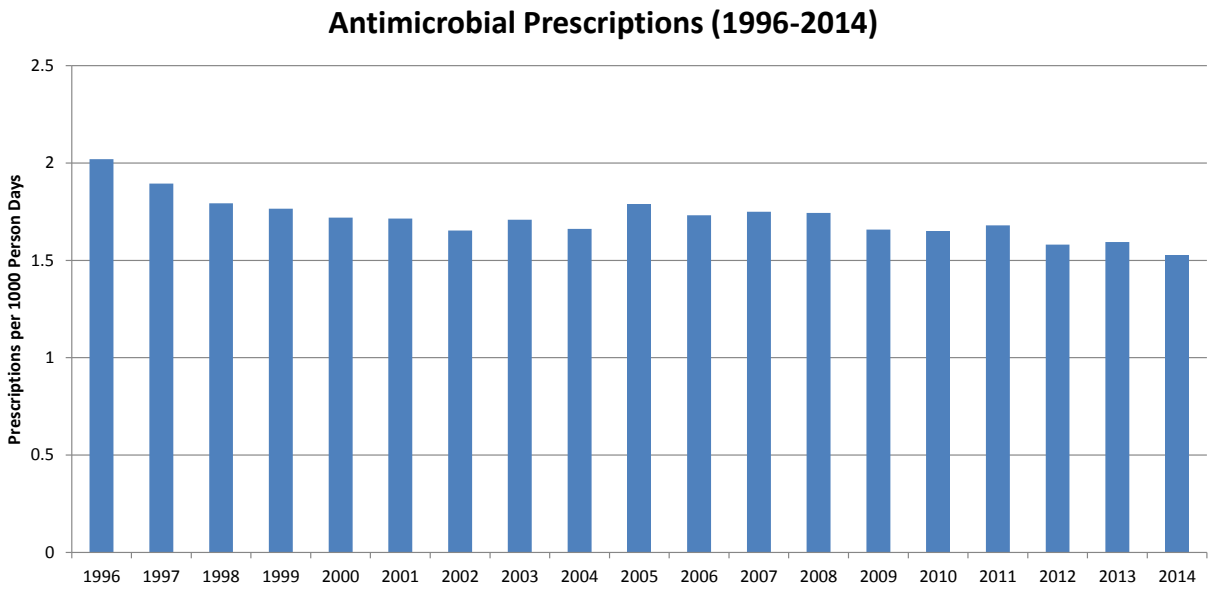
4.1 Ecoli Isolates Resistant to Ciprofloxacin (2007-2015)



	2007	2008	2009	2010	2011	2012	2013	2014	2015
BCBiomed	21.8	22.5	22.3	25.7	26.8	25.3	24.9	23.8	23.9
LifeLabs		18.9	18.3	19.5	19.9	19.9	19.7	19.5	

Source: LifeLabs Laboratories

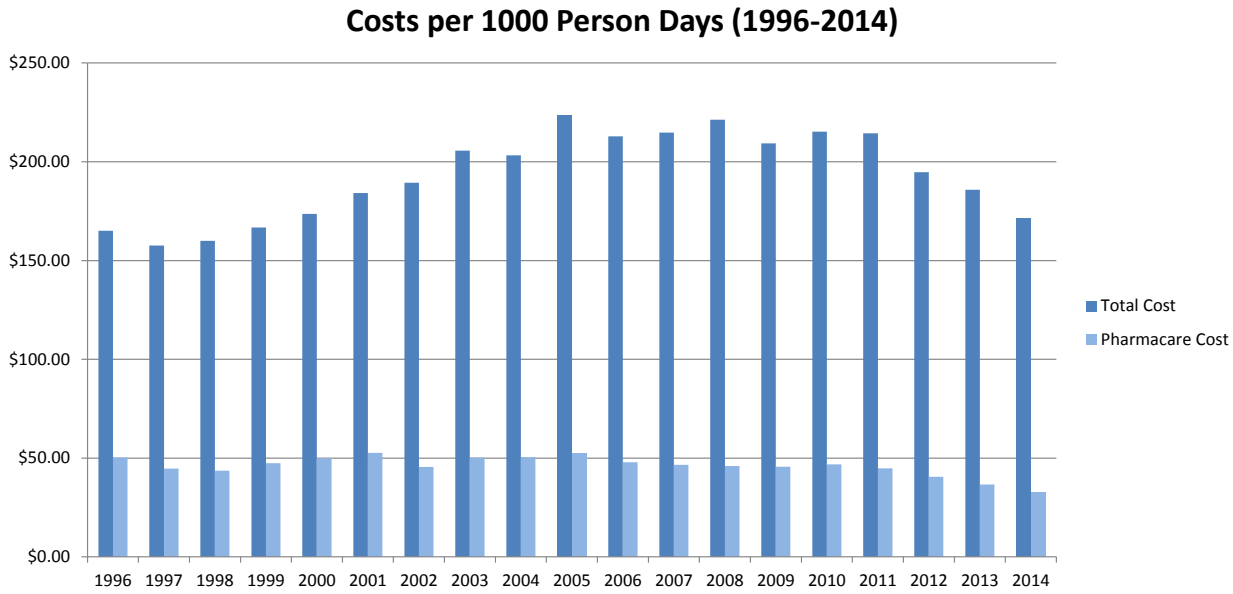
4.2 Antimicrobial Prescriptions per 1000 Person-Days (1996-2014)



*The Do Bugs Need Drugs program in BC was implemented in 2005

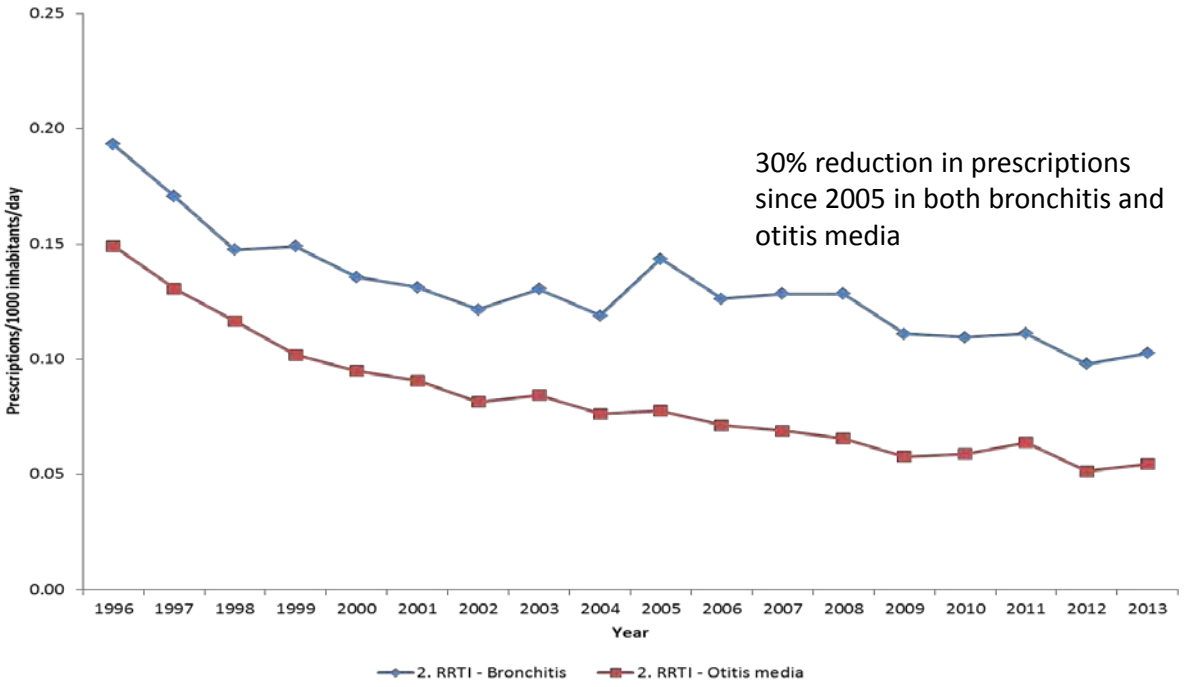
Source: BC Ministry of Health[creator] (2014): PharmaNet. BC Ministry of Health [publisher]. Data Extract. PharmaNet Committee (2009).

4.3 Costs per 1000 Person Days (1996-2014)



Source: BC Ministry of Health[creator] (2014): PharmaNet. BC Ministry of Health [publisher]. Data Extract. PharmaNet Committee (2009).

4.4 Antibiotic Prescribing for Target Indication (1996-2013)



Source: BC Ministry of Health[creator] (2014): PharmaNet. BC Ministry of Health [publisher]. Data Extract. PharmaNet Committee (2009).

Enteric, Food and Waterborne Diseases

Enteric Disease Outbreaks
Cyclosporiasis
*E. coli (*Shigatoxigenic*)*
Hepatitis A
Listeriosis
Salmonellosis, Typhoid Fever and Paratyphoid Fever
Shigellosis
Vibrio Infection

Enteric disease outbreaks in BC

In 2015, 26 outbreaks were investigated in BC (Table 5.1). The number of outbreaks was comparable with previous years, when 14-24 investigations were investigated each year (Figure 5.2). While 38.5% of the enteric outbreaks were reported by Interior Health, only 15.7% of the BC population resides there. This likely reflects different regional policies and practices for reporting enteric outbreaks, rather than increased outbreak incidence.

As in previous years, bacteria caused the greatest proportion (46.2%) of outbreaks (Figure 5.3). The high proportion of bacterial outbreaks is likely due to the fact that viral outbreaks in long-term care, acute care, and day care facilities are not reportable and excluded from analyses. In addition, viral outbreaks are less likely to get confirmed via laboratory testing. The pathogen was laboratory-confirmed in 19 (73.0%) outbreaks; this proportion is similar to previous years. In 2015, a greater variety of pathogens was reported; however, norovirus and *Salmonella* remained the two most frequently identified pathogens. No E. coli O157 outbreaks were reported in 2015. Outbreaks are reported with unknown pathogens for clusters of gastrointestinal illness with the same exposure, but no pathogen confirmed by laboratory testing. Unknown pathogens may be classified as one of the pathogen types (e.g., bacteria, viruses), based on the clinical presentations of the cases. Over 460 lab-confirmed cases were associated with a prolonged, province-wide *Salmonella* Enteritidis outbreak (see [SE section]). The majority of the clinical cases (212) were associated with one outbreak of *Clostridium perfringens* at a catered event.

Outbreaks occurred in a variety of settings, most commonly food service establishments and private functions (Table 5.4). In previous years, food service establishments and the community were the most commonly reported settings.

Similar to previous years, the most common mode of transmission was foodborne (Table 5.5). Among the 13 foodborne outbreaks, 10 (76.9%) identified a food source. Mixed foods and meat were the most commonly reported source types in 2015 (Table 5.6); however, all three meat-related outbreaks had different meats implicated (beef, chicken, duck). This is a shift from 2013 and 2014, when the most commonly identified sources of foodborne outbreaks were eggs, produce and seafood. A food handler was identified as contributing to the contamination of a food source in one foodborne outbreak, caused by norovirus.

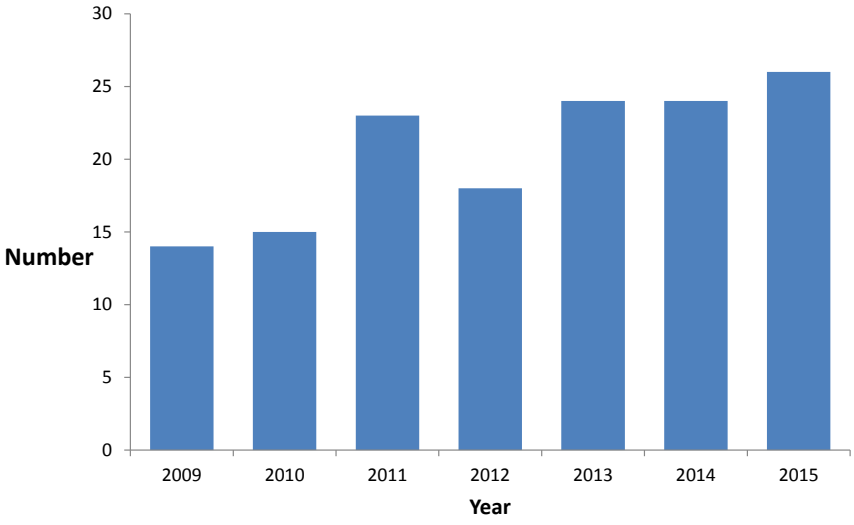
Among foodborne outbreaks, factors that contributed to the identification of a source included: cases with a history of exposure to the implicated source (11), environmental investigation identified critical control point failures linked to the implicated source (3), laboratory pathogen/toxin/chemical identified in a food sample (3), epidemiological case-control study showed elevated risk for cases exposed to the implicated source (1), and laboratory pathogen identified in a food handler (1).

Similar to previous years, education was the most common public health intervention used for foodborne outbreaks in 2015 (used in 8 outbreaks). Other interventions used in the 2015 foodborne outbreaks included closing the facility (2), press release (2), excluding staff (1) and sanitizing the facility (1).

5.1 Enteric disease outbreaks by reporting organization, BC, 2015

Reporting Organization	Number of outbreaks
Fraser Health Authority	2
Interior Health Authority	10
Northern Health Authority	3
Vancouver Coastal Health	4
Island Health Authority	2
BCCDC	5
Total	26

5.2 Number of Outbreaks By Year Investigation Started, BC, 2009-2015 (N=144)



5.3 Characteristics of Enteric Outbreaks by Pathogen Type, BC, 2015

	Bacterial (N=12)	Viral (N=10)	Parasitic (N=1)	Toxin/ Chemical Poison (N=1)	Unknown (N=2)	Total (N=26)
Number of lab confirmed outbreaks	11	7	1	0	0	19
Total number of lab confirmed cases	521	16	5	0	0	542
Total number of clinical cases	243	137	0	9	24	413
Total number of hospitalizations	90	0	1	0	0	91
Total number of deaths	0	0	0	0	0	0
Median duration of outbreak (days)	4	2.5	60	3	3.5	4
Causative agent	*Salmonella* (6) *Shigella* (2) *Bacillus* (1) *Campylobacter* (1) *Clostridium* (1) Unknown (1)	Norovirus (6) Hepatitis A (1) Unknown (2)	*Cyclospora* (1)	Unknown (1)		

5.4 Outbreak by Setting Type, BC, 2015

Outbreak setting	Number of outbreaks
Food service establishment	6 (23.1%)
Private Function	6 (23.1%)
Community	4 (15.4%)
Hotel/Motel/Lodge	3 (11.5%)
Other	5 (19.2%)
Unknown	2 (7.7%)
Total	26 (100%)

5.5 Outbreaks by Mode of Transmission, BC, 2015

Outbreak mode of transmission	Number of outbreaks
Foodborne	13 (50.0%)
Person-to-person	8 (30.8%)
Animal-to-person	1 (3.8%)
Unknown	4 (15.4%)
Total	26 (100%)

5.6 Source of Foodborne Outbreaks by Pathogen, BC, 2015

	Bacillus	Campylobacter	*Clostridium*	*Cyclospora*	*Norovirus*	*Salmonella*	Unknown	Total
Meat	0	1	0	0	0	1	1	3
Mixed Foods	1	0	1	0	1	0	0	3
Vegetables	0	0	0	0	0	0	1	1
Other	0	0	0	0	0	2	1	3
Unknown	0	0	0	1	1	1	0	3
Total	1	1	1	1	2	4	3	13

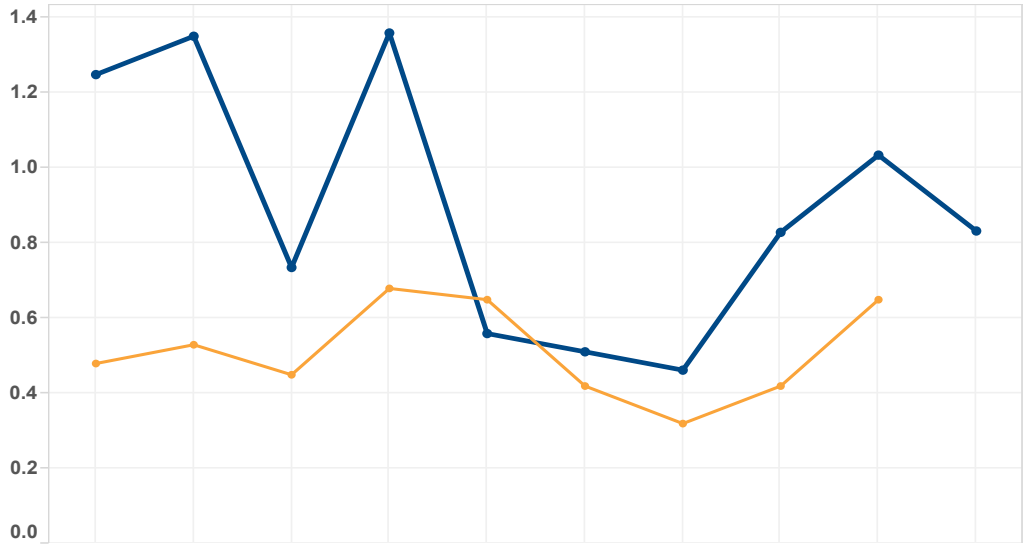
Cyclosporiasis

The incidence of cyclosporiasis in 2015 was similar to recent years in which most cases (61.8%) associated with travel to endemic areas. Five locally-acquired BC cases were associated with a national outbreak occurring from May to August. Although the outbreak remains unsolved, it was likely associated with imported blackberries. In 2013 and 2014, BC experienced outbreaks likely associated with fresh imported produce.

As usual, the incidence was highest in young adults. The highest rates were in the greater Vancouver area. The majority of cases were reported in the spring and summer, in accordance with the peak incidence in endemic countries.

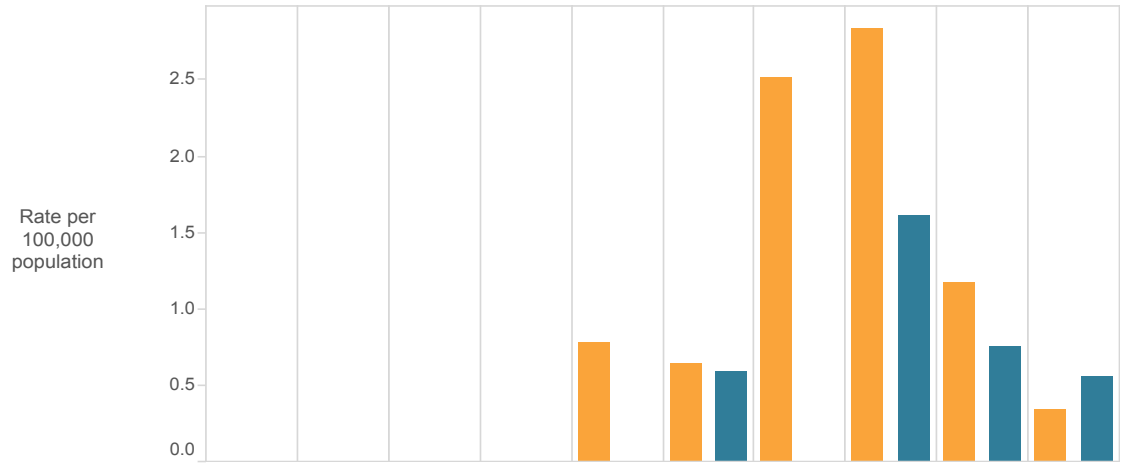
interactive dashboard

6.1 Cyclosporiasis Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	53	58	32	60	25	23	21	38	48	39
BC Rate	1.25	1.35	0.74	1.36	0.56	0.51	0.46	0.83	1.04	0.83
Canadian Rate	0.48	0.53	0.45	0.68	0.65	0.42	0.32	0.42	0.65	

6.2 Cyclosporiasis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	1	1	4	9	8	2
	Male	0	0	0	0	0	1	0	5	5	3
	Total	0	0	0	0	1	2	4	14	13	5
BC Rate	Female	0.00	0.00	0.00	0.00	0.77	0.65	2.51	2.84	1.18	0.34
	Male	0.00	0.00	0.00	0.00	0.00	0.59	0.00	1.61	0.76	0.56
	Total	0.00	0.00	0.00	0.00	0.37	0.62	1.26	2.23	0.97	0.44

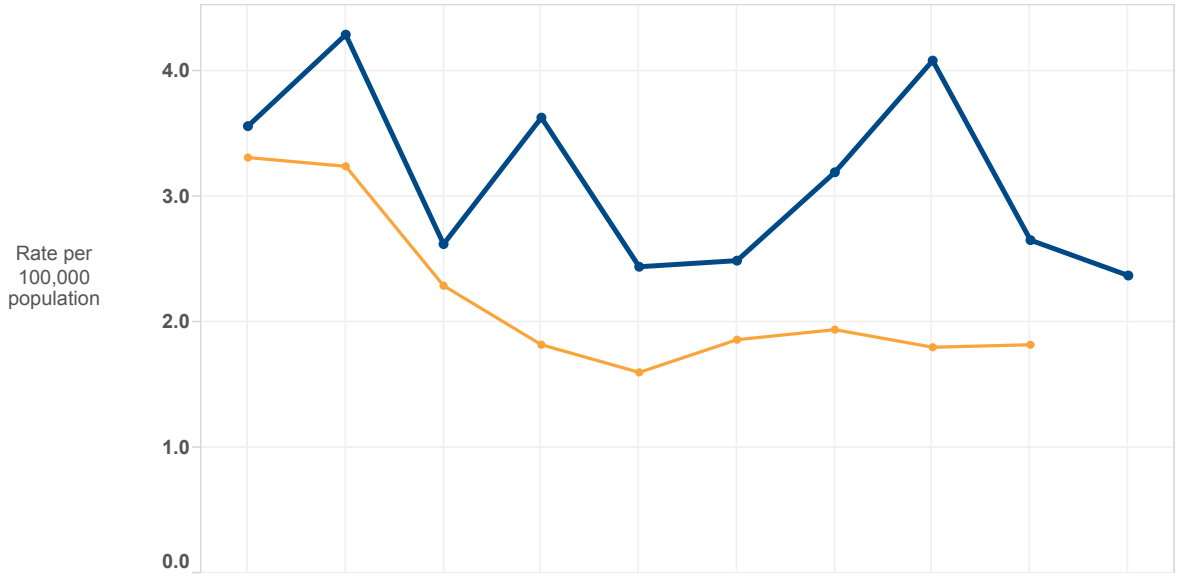
E.coli (shigatoxigenic)

Shigatoxigenic *E. coli*, also known as verotoxigenic *E. coli* and enterohemorrhagic *E. coli*, causes the most serious type of *E. coli* infection which can lead to hemolytic uremic syndrome (or kidney failure) and death.

In 2015, 111 cases of shigatoxigenic *E. coli* infection were reported; 30.0% were associated with international travel. The incidence rate (2.4/100,000) was the lowest in ten years. This may be associated with improvements in food safety. Incidence rates were highest among children under 10 years of age, particularly in infants. This is similar to other enteric diseases and is due to lower immunity in infants and young children as well as behaviours that increase the risk of infection (e.g. use of diapers). Residents of North Vancouver Island and the Northwest had the highest rates, but these were associated with low case numbers. As in previous years, cases were reported throughout the year. The end of summer peak is similar to other enteric diseases and is believed to be associated with an increase in infection rates in reservoir animals and environmental load. No *E. coli* outbreaks were reported in 2015.

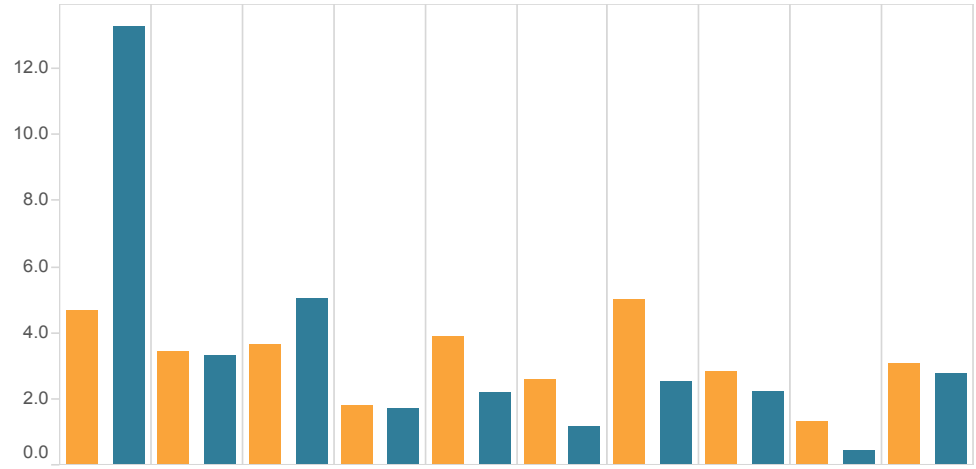
O157 continued to be the most common serogroup reported in BC. The proportion of O157 cases increased slightly compared to 2014 (35.0%), but remained lower than 2013 (76.9%) and 2012 (57.8%). The proportion of samples diagnosed as Shiga toxin-positive only decreased compared to 2014 (40.6%), but remained high; the reasons for this are unknown.

7.1 Shigatoxigenic E. coli by Year, 2006-2015



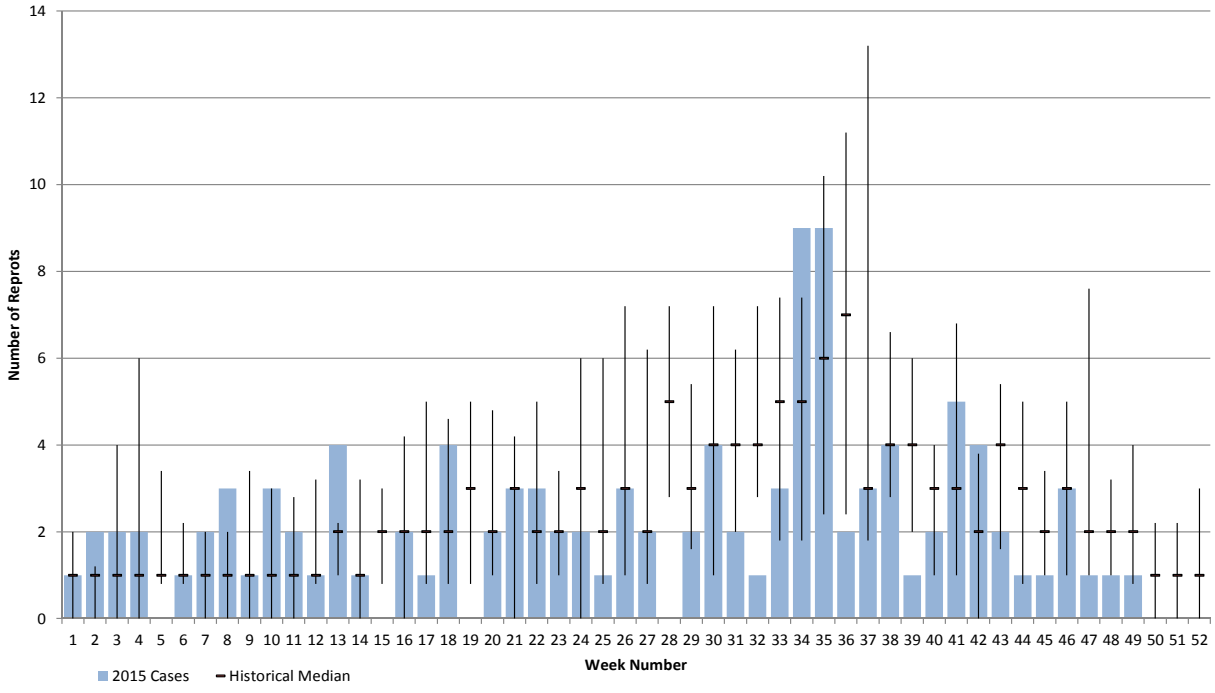
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	151	184	114	160	109	112	145	187	123	111
BC Rate	3.56	4.29	2.62	3.63	2.44	2.49	3.19	4.08	2.65	2.37
Canadian Rate	3.31	3.24	2.29	1.82	1.60	1.86	1.94	1.80	1.82	

7.2 Shigatoxigenic E. coli Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	1	3	4	2	5	4	8	9	9	18
	Male	3	3	6	2	3	2	4	7	3	15
	Total	4	6	10	4	8	6	12	16	12	33
BC Rate	Female	4.65	3.48	3.63	1.80	3.87	2.59	5.02	2.84	1.32	3.06
	Male	13.29	3.30	5.04	1.69	2.17	1.18	2.52	2.25	0.45	2.79
	Total	9.07	3.38	4.36	1.74	2.99	1.85	3.78	2.55	0.90	2.93

7.3 2015 Shigatoxigenic E. coli Reports Compared to Historical Median and the 10th and 90th Percentiles Around the Median (2006 to 2014)



7.4 2014 Shigatoxigenic E. coli Serogroup Distribution, 2015

Rank	Serogroup	Number of Isolates	Proportion
1	O157	47	46.5%
2	O26	8	7.9%
3	O121	6	5.9%
4	O117	5	5.0%
5	O103	3	3.0%
5	O111	3	3.0%
	Other	2	2.0%
	Shiga toxin positive only	27	26.7%
	Total	101	100.0%

Note: Serogroup distribution is based on BCCDC Public Health Laboratory (BCCDC PHL) data. Numbers may vary from those reported in Panorama.

Hepatitis A

Twenty six cases of hepatitis A were reported in BC in 2015, with an equal number (13) in males and females (see figure 8.1). This follows a trend of decreasing numbers over time from over 1000 cases reported in 1992. Less than 40 cases per year have been reported since 2008 with the exception of 2011 when an outbreak occurred in Central Vancouver Island[1]. The decline is related to the general improvement in hand hygiene and an effective hepatitis A vaccine which is publicly available for high risk groups and post exposure. The majority of hepatitis A cases seen in BC are related to unimmunized travelers to endemic countries, despite hepatitis A vaccine being recommended to this group.

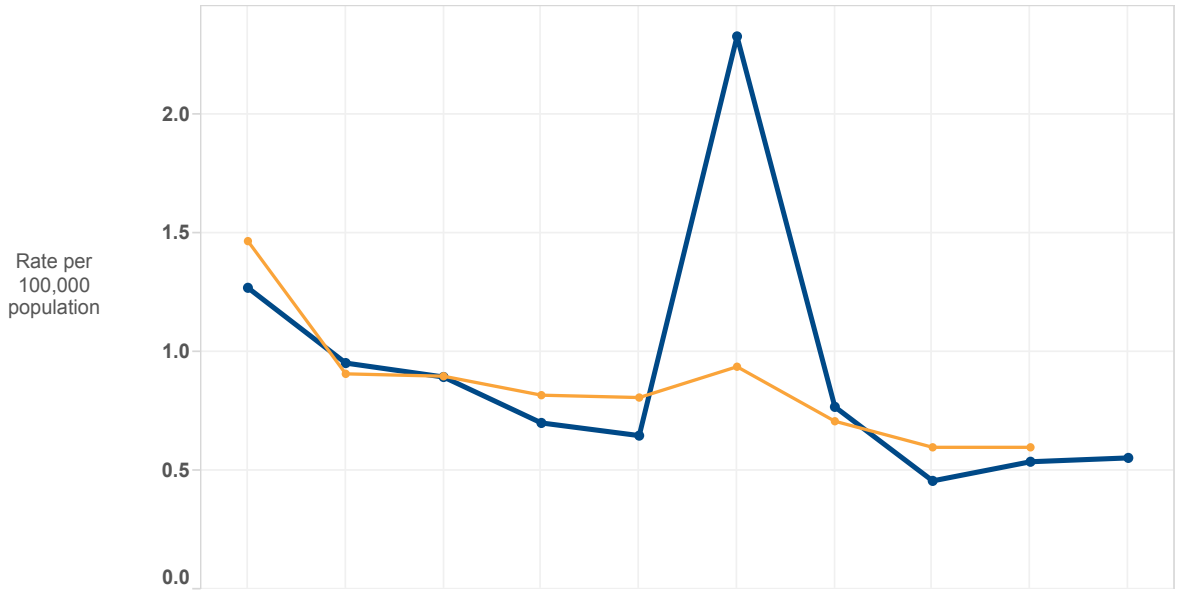
Typing of hepatitis A specimens allows clusters of cases with identical genotypes to be identified and investigated. In 2012, a cluster was associated with consumption of a frozen berry blend[2]. No clusters were identified in 2015. However, the number of hepatitis A cases reported is likely a considerable underestimate of actual infections as many children and some adults may have mild or no symptoms and may not seek medical attention and diagnosis.

As shown in Figure 8.2 Fraser Health reported 10 cases and Vancouver reported 3. The highest rate was in North East with 4 cases, but with a small population this rate is unstable. As in previous years cases were reported across all age groups (figure 8.3) and fewer cases were identified in the summer months (figure 8.4).

1. Kuo M, Buxton J. Hepatitis A in British Columbia, 2010-2011. http://www.bccdc.ca/resource-gallery/Documents/Educational%20Materials/Epid/Other/HepatitisAUpdateBC2010-2011.pdf

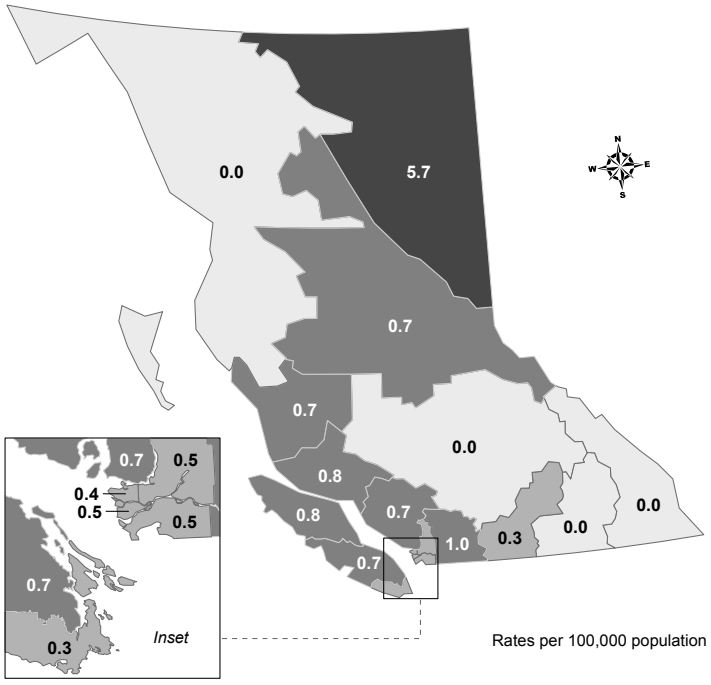
2. Swinkels H, Kuo M, Embree G, Stone J, Trerise S, Brisdon S, Louie K, Asplin R, Stiller A, Abraham T, Gill I, Rice G, Andonov A, Henry B, Buxton JA. Established surveillance, loyalty cards and collaboration allow early identification of a hepatitis A outbreak in British Columbia, Canada 2012. Eurosurveillance (2014) 19(18) http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20792

8.1 Hepatitis A Rates by Year, 2006-2015



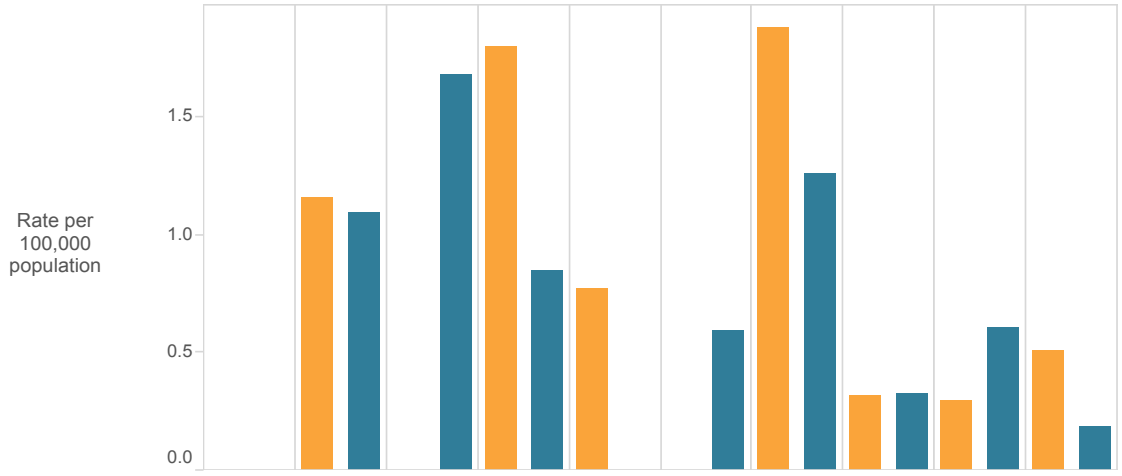
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	54	41	39	31	29	105	35	21	25	26
BC Rate	1.27	0.96	0.90	0.70	0.65	2.33	0.77	0.46	0.54	0.56
Canadian Rate	1.47	0.91	0.90	0.82	0.81	0.94	0.71	0.60	0.60	

8.2 Hepatitis A Rates by HSDA, 2015



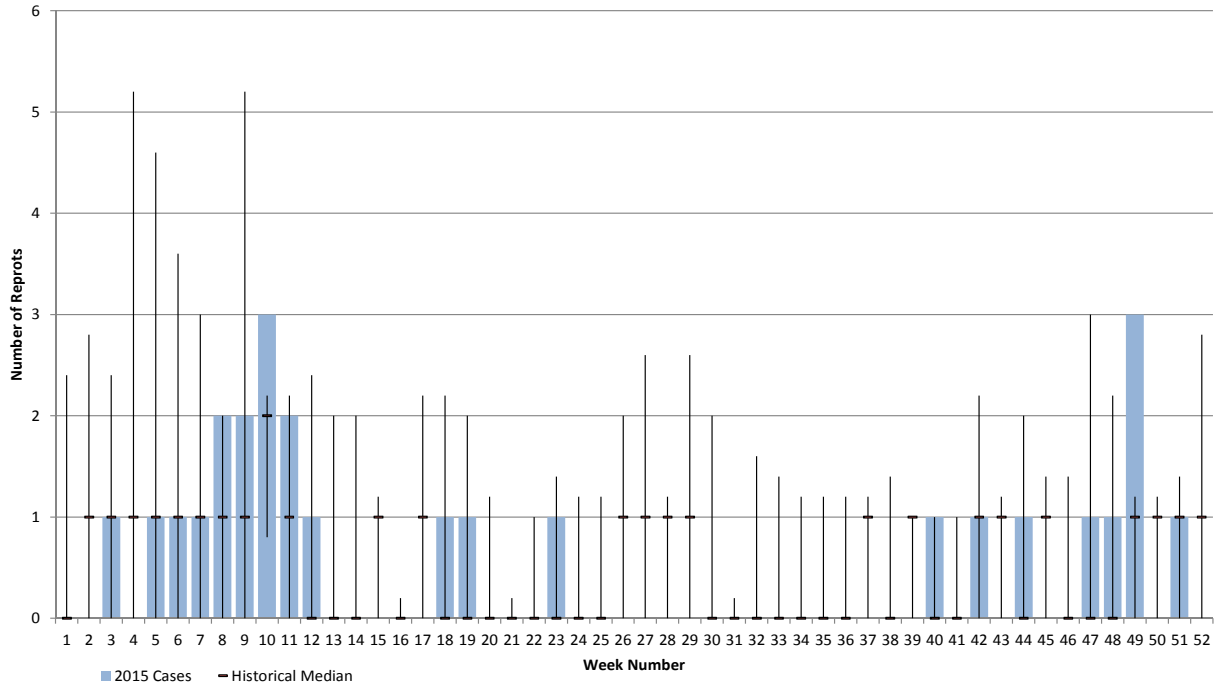
ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	1	0.3
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	3	1.0
22	Fraser North	3	0.5
23	Fraser South	4	0.5
31	Richmond	1	0.5
32	Vancouver	3	0.4
33	North Shore/Coast Garibaldi	2	0.7
41	South Vancouver Island	1	0.3
42	Central Vancouver Island	2	0.7
43	North Vancouver Island	1	0.8
51	Northwest	0	0.0
52	Northern Interior	1	0.7
53	Northeast	4	5.7

8.3 Hepatitis A Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	1	0	2	1	0	3	1	2	3
	Male	0	1	2	1	0	1	2	1	4	1
	Total	0	2	2	3	1	1	5	2	6	4
BC Rate	Female	0.00	1.16	0.00	1.80	0.77	0.00	1.88	0.32	0.29	0.51
	Male	0.00	1.10	1.68	0.85	0.00	0.59	1.26	0.32	0.61	0.19
	Total	0.00	1.13	0.87	1.31	0.37	0.31	1.57	0.32	0.45	0.36

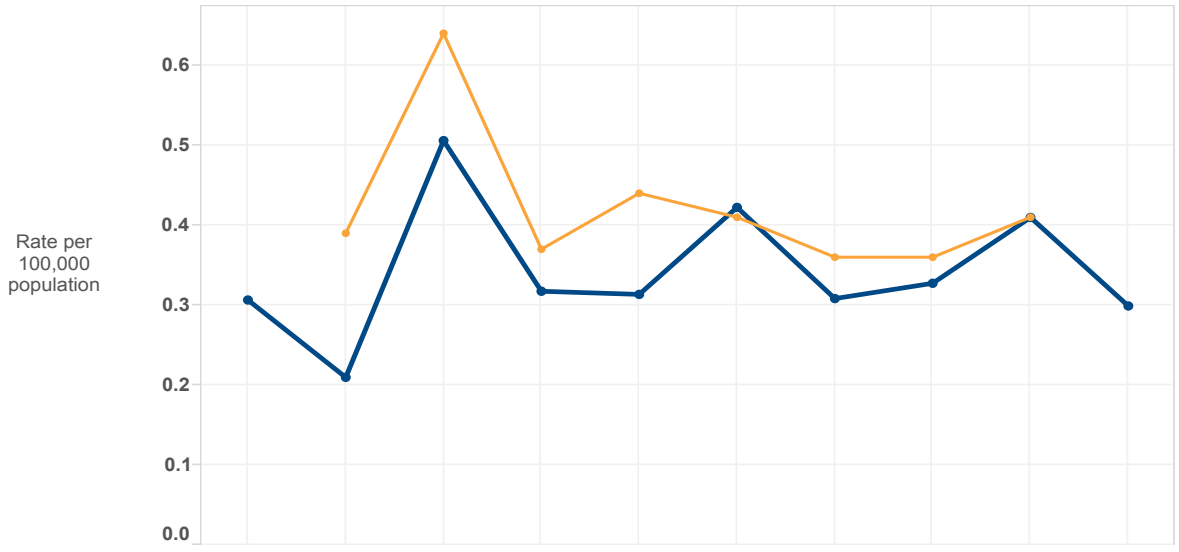
8.4 2015 Hepatitis A Reports Compared to Historical Median and the 10th and 90th Percentiles Around the Median (2006 to 2014)



Listeriosis

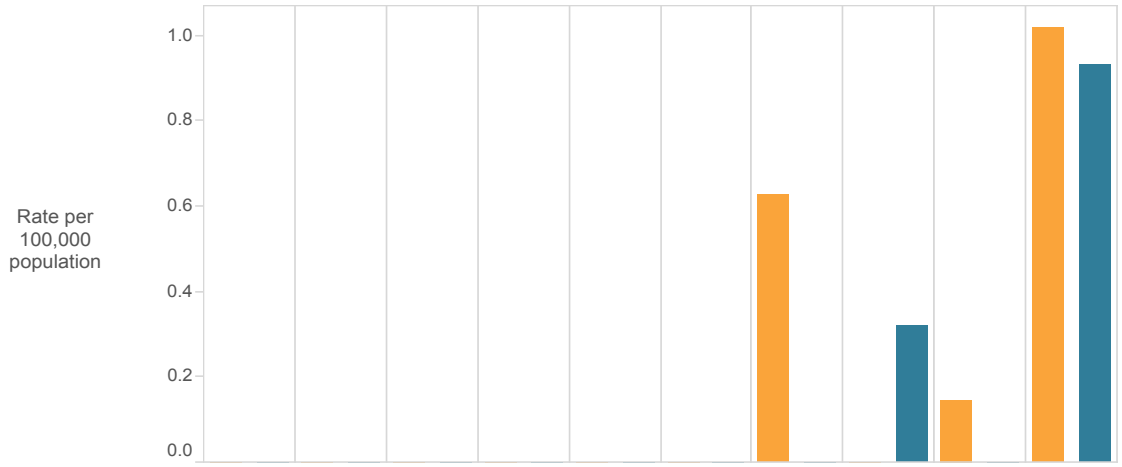
The incidence of invasive listeriosis has remained stable since 2009. Fourteen cases were reported in 2015; none were attributed to international travel. As expected due to waning cellular immunity, rates were highest among adults aged sixty years and older. No outbreaks were reported. There was no clustering in time or space.

9.1 Listeriosis Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	13	9	22	14	14	19	14	15	19	14
BC Rate	0.31	0.21	0.51	0.32	0.31	0.42	0.31	0.33	0.41	0.30
Canadian Rate		0.39	0.64	0.37	0.44	0.41	0.36	0.36	0.41	

9.2 Listeriosis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	0	1	0	1	6
	Male	0	0	0	0	0	0	0	1	0	5
	Total	0	0	0	0	0	0	1	1	1	11
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.15	1.02
	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.93
	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.16	0.07	0.98

Salmonellosis, Typhoid Fever and Paratyphoid Fever*

In 2015 1,242 cases of salmonellosis were reported (incidence rate 26.5/100,000); 27.0% were associated with international travel. *Salmonella* infection continues to be the second most commonly reported enteric disease in BC. *Salmonella* incidence decreased in 2012 and 2013, and then increased in 2014 and again in 2015, to the highest rate in BC in over twenty years. This increase is mainly due to the ongoing *S.* Enteritidis outbreak (see *SE* Investigation).

Rates were highest in children under five years of age and among residents of East Kootenay, Northwest, Fraser East and Kootenay Boundary. As in previous years and similarly to other enteric diseases, cases were reported throughout the year with a slight peak in the summer.

The incidence rates of typhoid fever (0.4/100,000) and paratyphoid fever (0.4/100,000) have continued to decline for unknown reasons. Travel history was available for 26 typhoid and paratyphoid fever cases. All 26 had travelled outside of Canada during their incubation periods; 23 of these had travelled to South Asia.

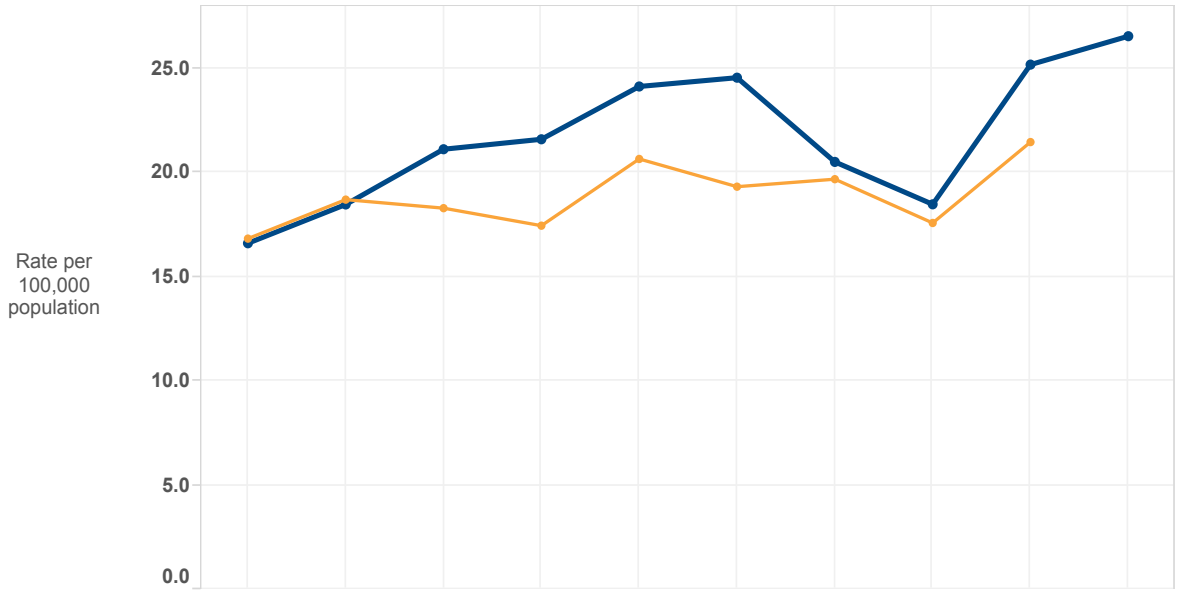
Typhoid and paratyphoid fever cases clustered in the first quarter of the year and at the end of April, a temporal reflection of the travel patterns of BC residents. Most cases (79%) were reported from Fraser Health Authority. The highest incidence of typhoid fever was in children aged 15-19 and 5-9 years. The highest incidence for paratyphoid fever was in adults aged 25-39 years.

S. Enteritidis, *S.* Heidelberg and *S.* Typhimurium were the most commonly reported *Salmonella* serotypes in 2015. *S.* Enteritidis continued to account for more than half of the salmonellosis cases in BC (see *SE* Investigation). *S.* Heidelberg and *S.* Typhimurium have historically been among the 3-5 most frequently identified serotypes annually. A regional cluster of five cases of *S.* Heidelberg was investigated in 2015, but no source was identified. No outbreaks associated with *S.* Typhimurium were identified in 2015. Two *S.* Infantis outbreaks were investigated in 2015. Fresh raw chicken was identified as a potential source in one *S.* Infantis investigation; no source was identified in the other.

Additional analyses comparing human and food chain surveillance data are available through BC Integrated Surveillance of Foodborne Pathogens program (www.bccdc.ca/integratedfoodchainsurveillance).

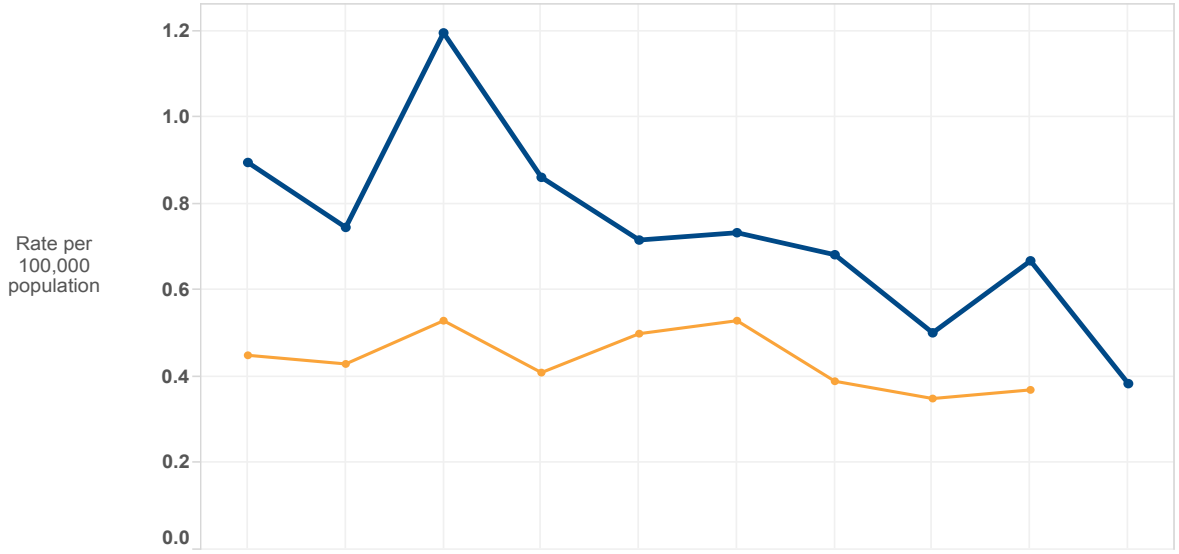
*All cases of *Salmonella* infection reported through Panorama, including S. Typhi and S. Paratyphi, have been included in the overall numbers and rates by year, the rates by age and sex, the geographical distribution of cases and the cases reported by week. S. Typhi (typhoid fever) and S. Paratyphi (paratyphoid fever) cases and rates by year have also been presented separately.

10.1 Salmonellosis Rates by Year, 2006-2015



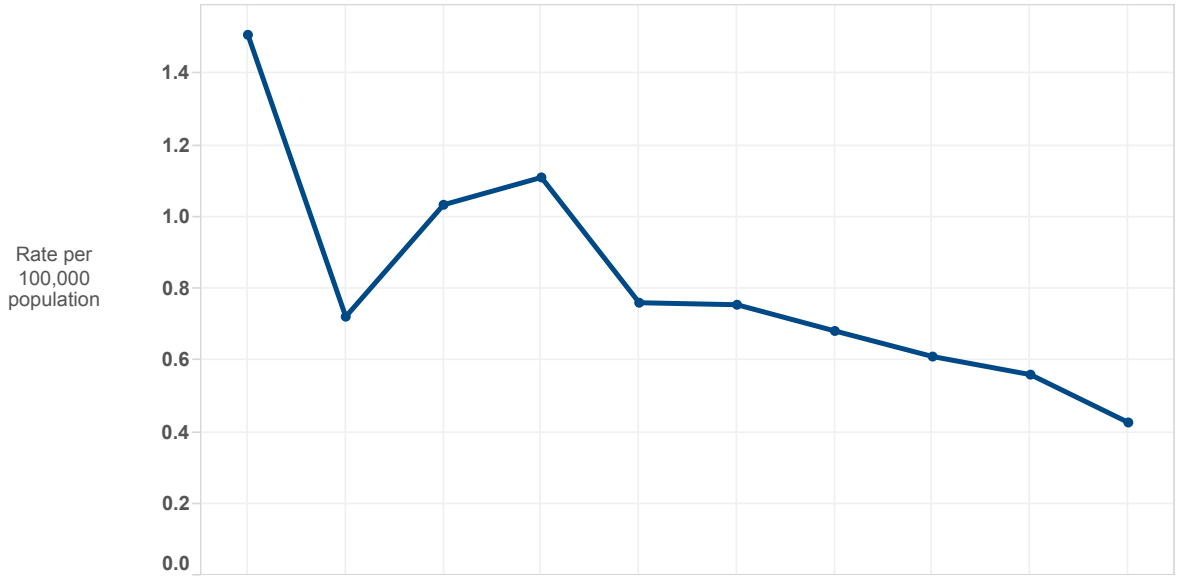
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	704	792	918	952	1,077	1,104	931	846	1,167	1,242
BC Rate	16.60	18.46	21.11	21.58	24.12	24.54	20.50	18.46	25.17	26.53
Canadian Rate	16.82	18.69	18.28	17.44	20.64	19.31	19.67	17.57	21.45	

10.2 Salmonella Typhoid Fever Rates by Year, 2006-2015



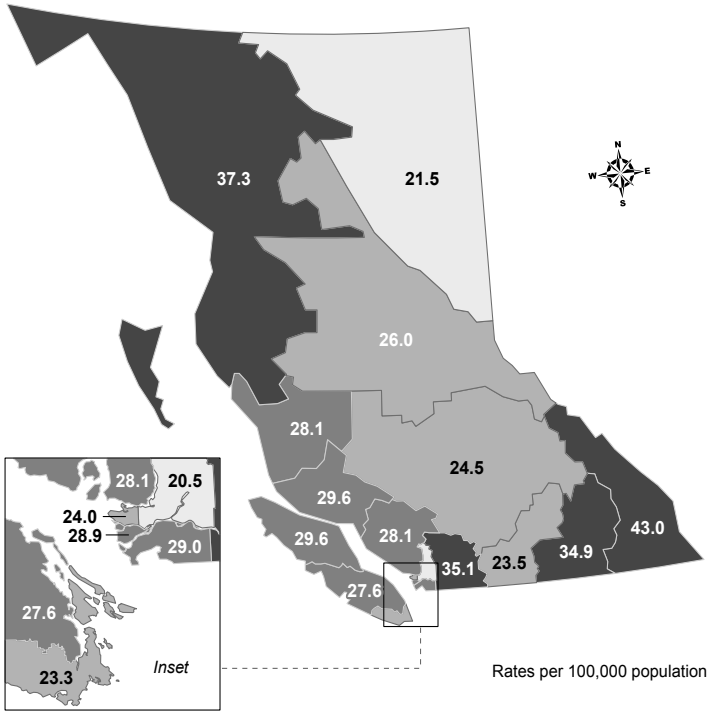
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	38	32	52	38	32	33	31	23	31	18
BC Rate	0.90	0.75	1.20	0.86	0.72	0.73	0.68	0.50	0.67	0.38
Canadian Rate	0.45	0.43	0.53	0.41	0.50	0.53	0.39	0.35	0.37	

10.3 Salmonella Paratyphoid Fever Rates by Year, 2006-2015



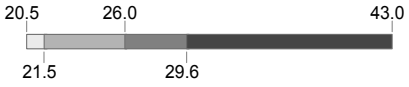
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	64	31	45	49	34	34	31	28	26	20
BC Rate	1.51	0.72	1.03	1.11	0.76	0.76	0.68	0.61	0.56	0.43

10.4 Salmonellosis Rates by HSDA, 2015

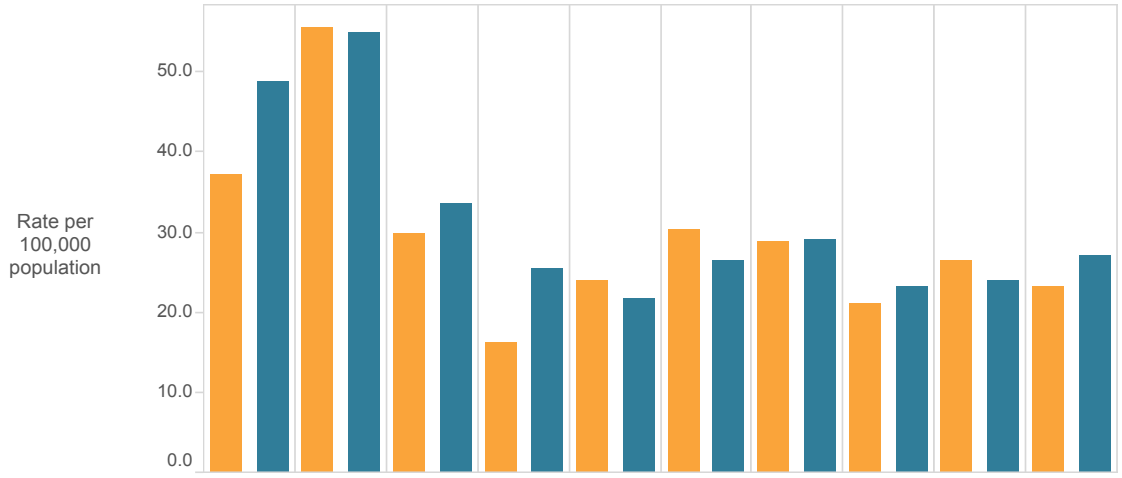


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	33	43.0
12	Kootenay Boundary	27	34.9
13	Okanagan	85	23.5
14	Thompson Cariboo Shuswap	54	24.5
21	Fraser East	104	35.1
22	Fraser North	134	20.5
23	Fraser South	230	29.0
31	Richmond	60	28.9
32	Vancouver	160	24.0
33	North Shore/Coast Garibaldi	79	28.1
41	South Vancouver Island	88	23.3
42	Central Vancouver Island	74	27.6
43	North Vancouver Island	36	29.6
51	Northwest	27	37.3
52	Northern Interior	36	26.0
53	Northeast	15	21.5

Rates per 100,000 population by HSDA

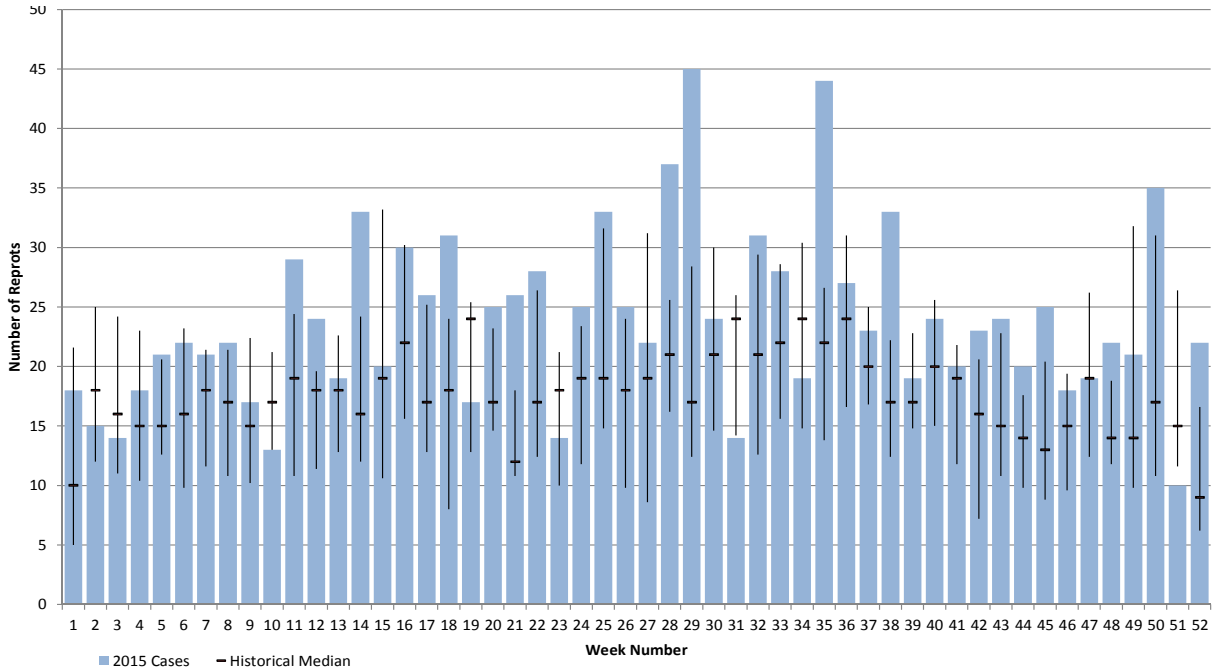


10.5 Salmonellosis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	8	48	33	18	31	47	46	67	180	136
	Male	11	50	40	30	30	45	46	72	159	145
	Total	19	98	73	48	61	92	92	139	339	281
BC Rate	Female	37.18	55.61	29.92	16.19	24.00	30.41	28.89	21.14	26.49	23.10
	Male	48.73	54.97	33.63	25.38	21.74	26.53	29.01	23.19	24.09	27.00
	Total	43.09	55.28	31.84	20.92	22.83	28.38	28.95	22.16	25.31	24.96

10.6 2015 Salmonellosis Reports Compared to Historical Median and the 10th and 90th Percentiles Around the Median (2006 to 2014)



10.7 Salmonella Serotype Distribution, 2015

Rank	Serotype	Number of Cases	Proportion
1	Enteritidis	683	52.5%
2	Heidelberg	61	4.7%
2	Typhimurium	61	4.7%
4	Infantis	39	3.0%
5	Newport	38	2.9%
6	*Salmonella* ssp I 4,5,12:i:	32	2.5%
7	Saintpaul	24	1.8%
8	Paratyphi B var Java	22	1.7%
9	Stanley	21	1.6%
10	Javiana	18	1.4%
10	Paratyphi A	18	1.4%
	Others	246	18.9%
	Unknown/unspecified	38	2.9%
	Total	1301	100.0%

Note: Serotype distribution is based on BCCDC PHL data. Numbers may vary from those reported in Panorama.

Shigellosis

In 2015, 182 cases of shigellosis were reported; 58.8% were associated with international travel. The 2015 incidence rate (3.9/100,000) was higher than the previous two years, but similar to the years prior to that. Incidence rates were highest in Vancouver and among males aged 25-59 years. Shigellosis can be transmitted via food and from person-to-person, including via sexual contact. Previous analyses of BC data have demonstrated that higher rates of shigellosis in adult males may in part be due sexual transmission among men who have sex with men[1]. Males were at a greater risk of acquiring shigellosis locally compared to females, especially among those aged 20-59 years[1].

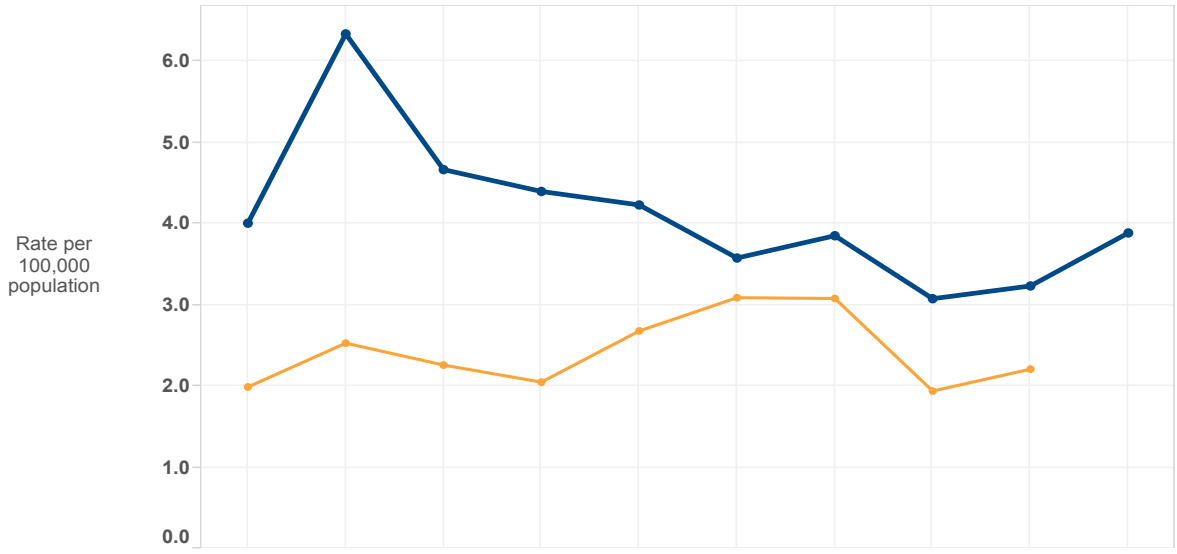
Cases were reported throughout the year with a large increase the week of October 18 (week 42), and an increase during the winter months. Twelve of the 15 cases reported during the week of October 18 were Shigella sonnei infections in adult males from Metro-Vancouver and four cases traveled internationally. Multiple different strains were involved and no specific outbreak or common exposure was identified.

In 2015, *S. sonnei* surpassed *S. flexneri* as the most common species reported. During 2009-2014, *S. flexneri* was the prevalent infecting species (50.7%) and *S. sonnei* accounted for 42.1% of cases. In 2003-2008, *S. sonnei* accounted for 65.0% of shigellosis cases[1]. The reasons for this shift are unknown. Nationally, the annual incidence of *S. sonnei* exceeded that of *S. flexneri* in 2004-2013, with the exception of 2009, when the two species had similar incidence rates[2].

Two regional outbreaks of *Shigella sonnei* were reported in 2015; one in a homeless shelter and one associated with a restaurant. Each outbreak had four lab-confirmed cases identified.

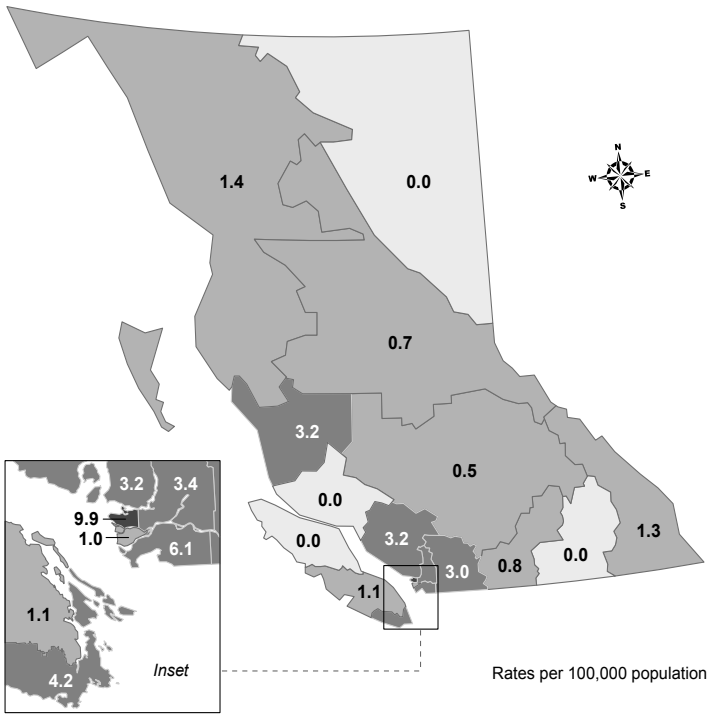
1. Narayan S, Galanis E, BC STEI Group. Are enteric infections sexually transmitted in British Columbia? CCDR: Volume 42-2, February 4, 2016. http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/16vol42/dr-rm42-2/ar-01-eng.php.
2. Government of Canada. National Enteric Surveillance Program Annual Summary 2013: Public Health Agency of Canada, Guelph, 2015.

11.1 Shigellosis Rates by Year, 2006-2015

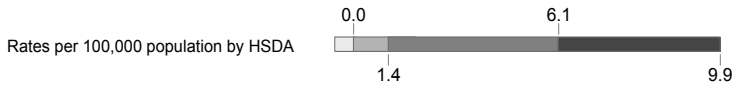


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	170	272	203	194	189	161	175	141	150	182
BC Rate	4.01	6.34	4.67	4.40	4.23	3.58	3.85	3.08	3.23	3.89
Canadian Rate	1.99	2.53	2.26	2.05	2.68	3.09	3.08	1.94	2.21	

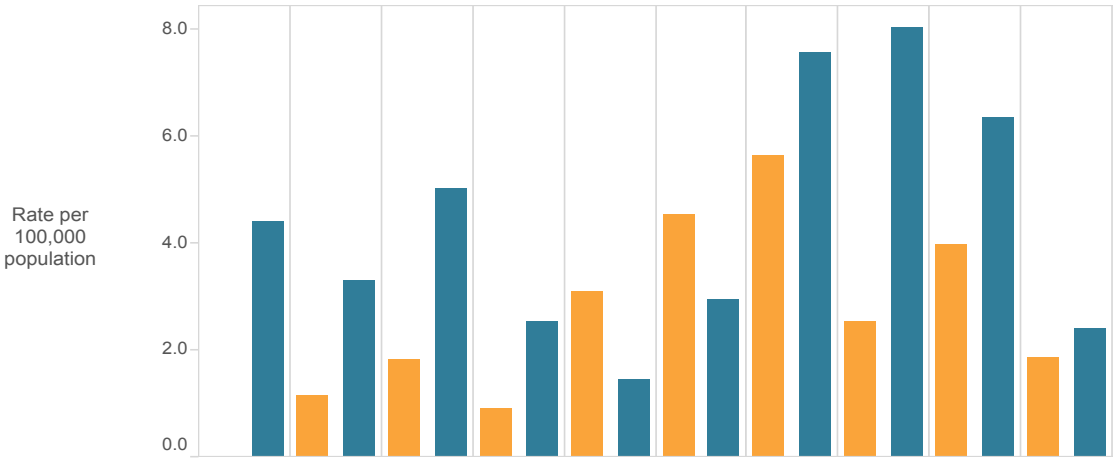
11.2 Shigellosis Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	1	1.3
12	Kootenay Boundary	0	0.0
13	Okanagan	3	0.8
14	Thompson Cariboo Shuswap	1	0.5
21	Fraser East	9	3.0
22	Fraser North	22	3.4
23	Fraser South	48	6.1
31	Richmond	2	1.0
32	Vancouver	66	9.9
33	North Shore/Coast Garibaldi	9	3.2
41	South Vancouver Island	16	4.2
42	Central Vancouver Island	3	1.1
43	North Vancouver Island	0	0.0
51	Northwest	1	1.4
52	Northern Interior	1	0.7
53	Northeast	0	0.0

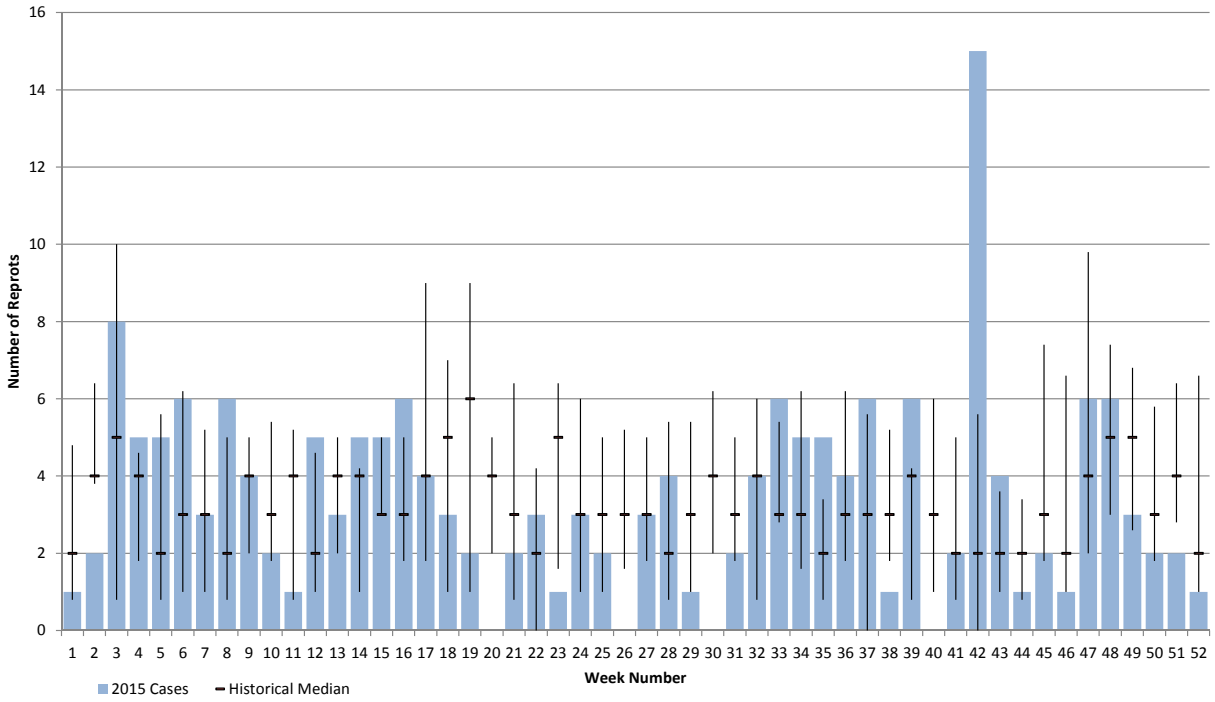


11.3 Shigellosis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	1	2	1	4	7	9	8	27	11
	Male	1	3	6	3	2	5	12	25	42	13
	Total	1	4	8	4	6	12	21	33	69	24
BC Rate	Female	0.00	1.16	1.81	0.90	3.10	4.53	5.65	2.52	3.97	1.87
	Male	4.43	3.30	5.04	2.54	1.45	2.95	7.57	8.05	6.36	2.42
	Total	2.27	2.26	3.49	1.74	2.25	3.70	6.61	5.26	5.15	2.13

11.4 2015 Shigellosis Reports Compared to Historical Median and the 10th and 90th Percentiles Around the Median (2005 to 2014)



11.5 Shigella Species Distribution, 2015

Rank	Species	Number of Cases	Proportion
1	*sonnei*	104	66.2%
2	*flexneri*	42	26.8%
3	*boydii*	5	3.2%
3	*dysenteriae*	5	3.2%
	Unknown/unspecified	1	0.6%
	Total	157	100.0%

Note: Species distribution is based on BCCDC PHL data. Numbers may vary from those reported in Panorama.

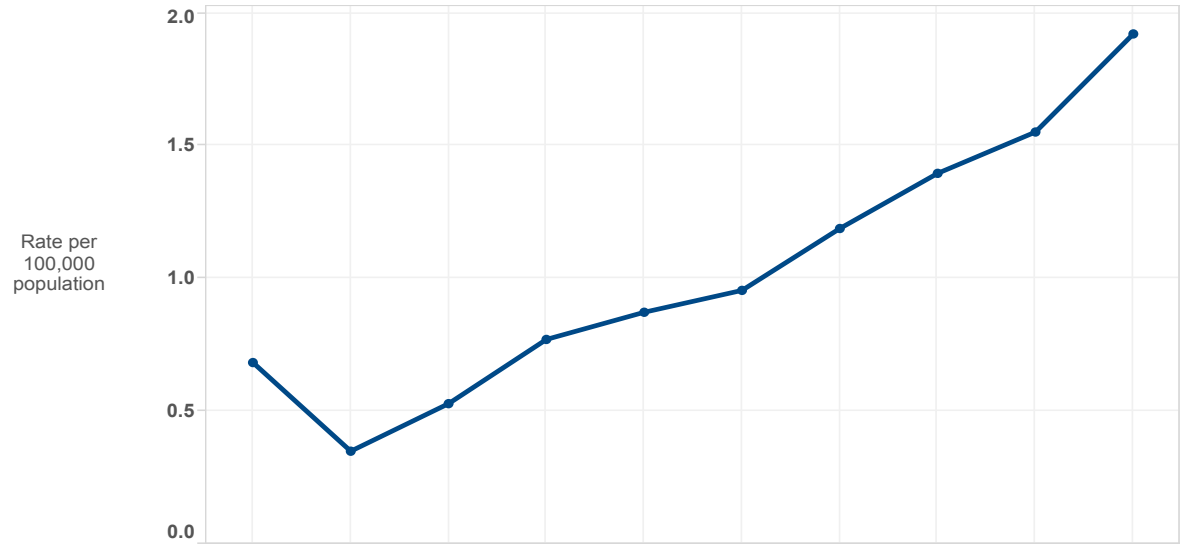
Vibrio Infection*

The incidence of *Vibrio* infections has been increasing since 2008 with the highest rate reported in 2015 (1.9/100,000). The increase is attributable to *Vibrio* parahaemolyticus (Vp) which accounts for the majority of cases; other *Vibrio* sp. rates have remained low. In 2015, BC experienced its largest Vp outbreak ever reported (see Vp in the "Noteworthy Disease and Conditions in 2015" section).

The reasons for this ongoing increase in incidence are unclear; it may be due to environmental changes (e.g. warming ocean temperatures) or to behavioural changes (i.e. increasing consumption of raw oysters). As in previous years, the highest rates were reported from coastal regions with greater access to fresh raw oysters. In 2015 the highest number of cases was reported from Vancouver (26) and the highest incidence rates, from North Shore/Coast Garibaldi, North Vancouver Island and the Northwest. The vast majority of cases occurred in adults, with the highest incidence in males aged >24 years.

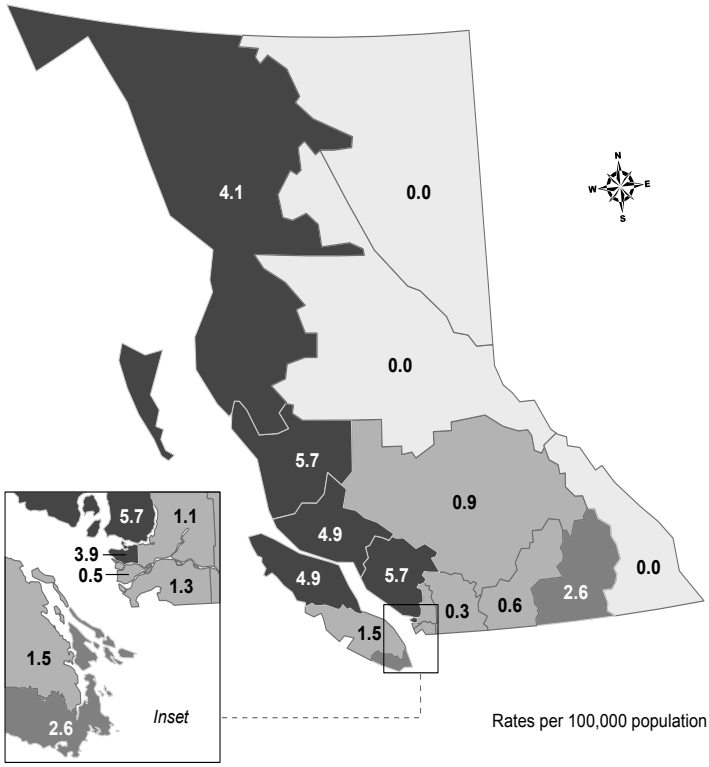
* Includes all *Vibrio* infections except *Vibrio* cholera.

12.1 Vibrio Infection Rates by Year, 2006-2015

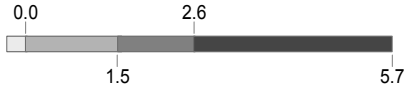


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	29	15	23	34	39	43	54	64	72	90
BC Rate	0.68	0.35	0.53	0.77	0.87	0.96	1.19	1.40	1.55	1.92

12.2 Vibrio Infection Rates by HSDA, 2015

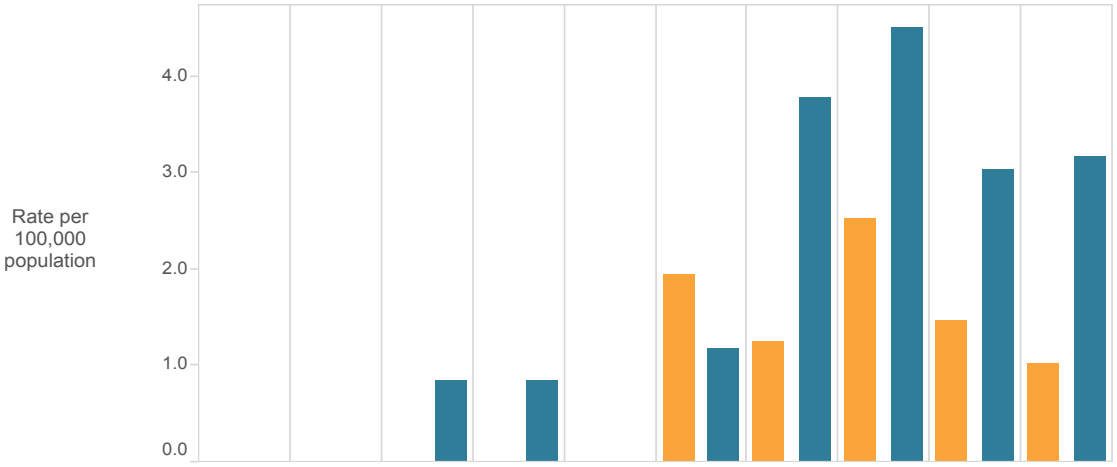


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	2	2.6
13	Okanagan	2	0.6
14	Thompson Cariboo Shuswap	2	0.9
21	Fraser East	1	0.3
22	Fraser North	7	1.1
23	Fraser South	10	1.3
31	Richmond	1	0.5
32	Vancouver	26	3.9
33	North Shore/Coast Garibaldi	16	5.7
41	South Vancouver Island	10	2.6
42	Central Vancouver Island	4	1.5
43	North Vancouver Island	6	4.9
51	Northwest	3	4.1
52	Northern Interior	0	0.0
53	Northeast	0	0.0



Rates per 100,000 population by HSDA

12.3 Vibrio Infection Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	3	2	8	10	6
	Male	0	0	1	1	0	2	6	14	20	17
	Total	0	0	1	1	0	5	8	22	30	23
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	1.94	1.26	2.52	1.47	1.02
	Male	0.00	0.00	0.84	0.85	0.00	1.18	3.78	4.51	3.03	3.17
	Total	0.00	0.00	0.44	0.44	0.00	1.54	2.52	3.51	2.24	2.04

*12.4 Vibrio Species Distribution, 2015**

Rank	Species	Number of Cases	Proportion
1	*Parahaemolyticus*	76	84.4%
2	*Fluvalis*	2	2.2%
3	*Other*	2	2.2%
	Unknown	10	11.1%
	Total	90	100.0%

*Species distribution is based on Panorama data.

Environmental Pathogens

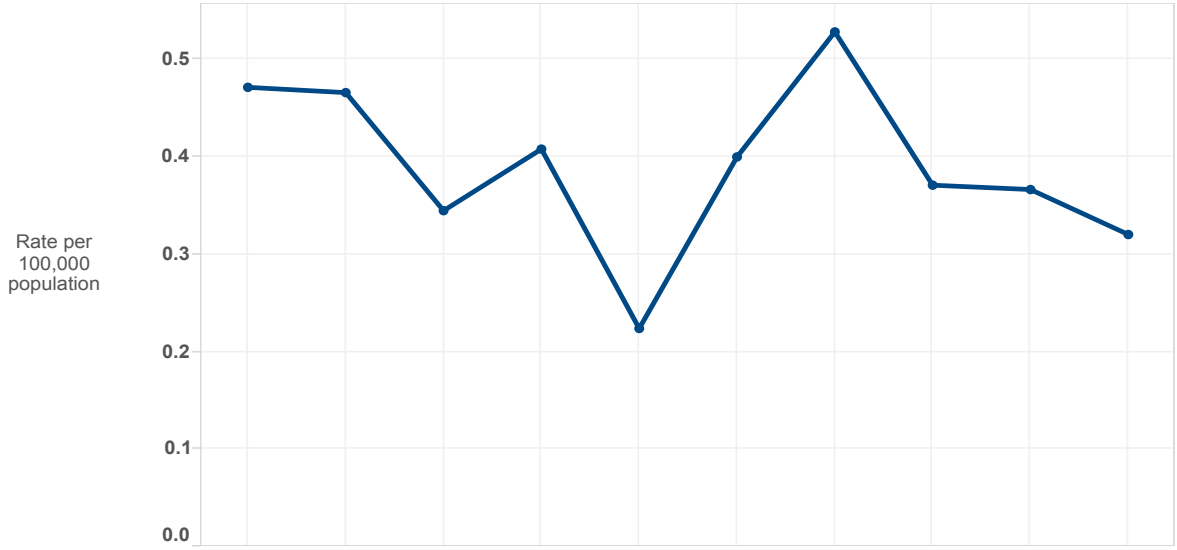
Cryptococcus gattii
Legionellosis

Cryptococcus gattii Infection

The incidence of *Cryptococcus gattii* infection has remained relatively low and stable in the last few years. In 2015, 15 cases were reported. As seen in previous years, the majority of cases occurred in adults with the highest rate in those aged 60 years and over. Older age is one of the most important risk factors in *C. gattii* infection. The central and southern east coast of Vancouver Island and the Lower Mainland are considered endemic areas. Half of the cases (8) were reported from the mainland. As expected, the highest rate was reported from Central Vancouver Island. The next highest rate was in North Shore/Coast Garibaldi. While the Sunshine Coast has had positive environmental samples in the past[1], previous incidence rates in this region have been low.

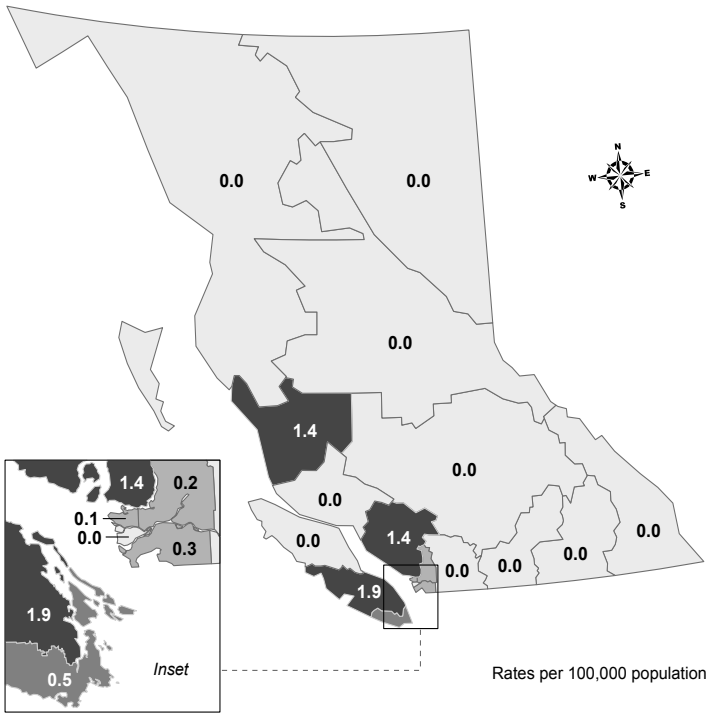
1. Mak S, Klinkenberg B, Bartlett K, Fyfe M. Ecological Niche Modelling of Crytptoccus gattii in British Columbia, Canada. Environ H Persp. 2010;118(5):653-8.

13.1 Crytococcus gattii Rates by Year, 2006-2015

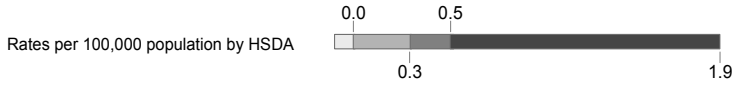


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	20	20	15	18	10	18	24	17	17	15
BC Rate	0.47	0.47	0.34	0.41	0.22	0.40	0.53	0.37	0.37	0.32

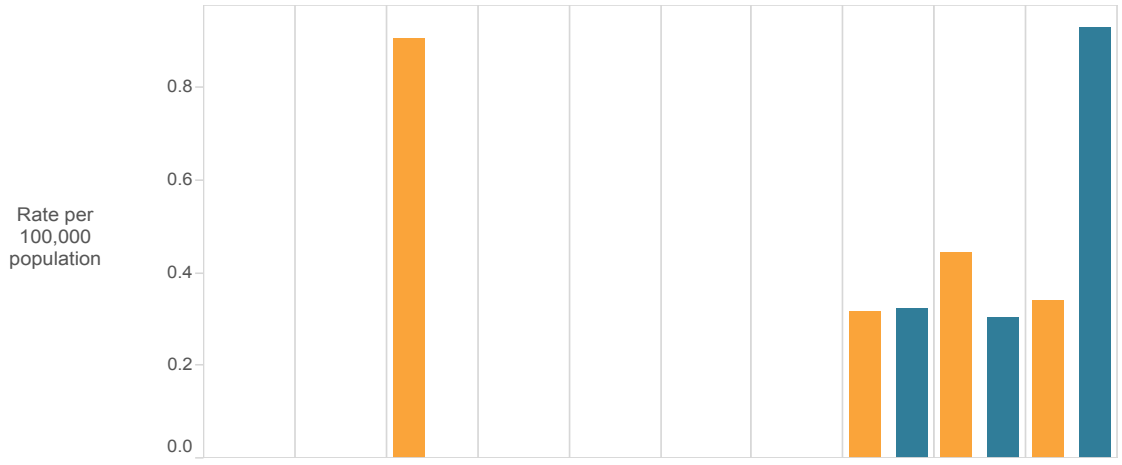
13.2 *Crytococcus gattii Rates by HSDA, 2015*



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	0	0.0
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	0	0.0
22	Fraser North	1	0.2
23	Fraser South	2	0.3
31	Richmond	0	0.0
32	Vancouver	1	0.1
33	North Shore/Coast Garibaldi	4	1.4
41	South Vancouver Island	2	0.5
42	Central Vancouver Island	5	1.9
43	North Vancouver Island	0	0.0
51	Northwest	0	0.0
52	Northern Interior	0	0.0
53	Northeast	0	0.0



13.3 *Crytococcus gattii Rates by Age Group and Sex, 2015*



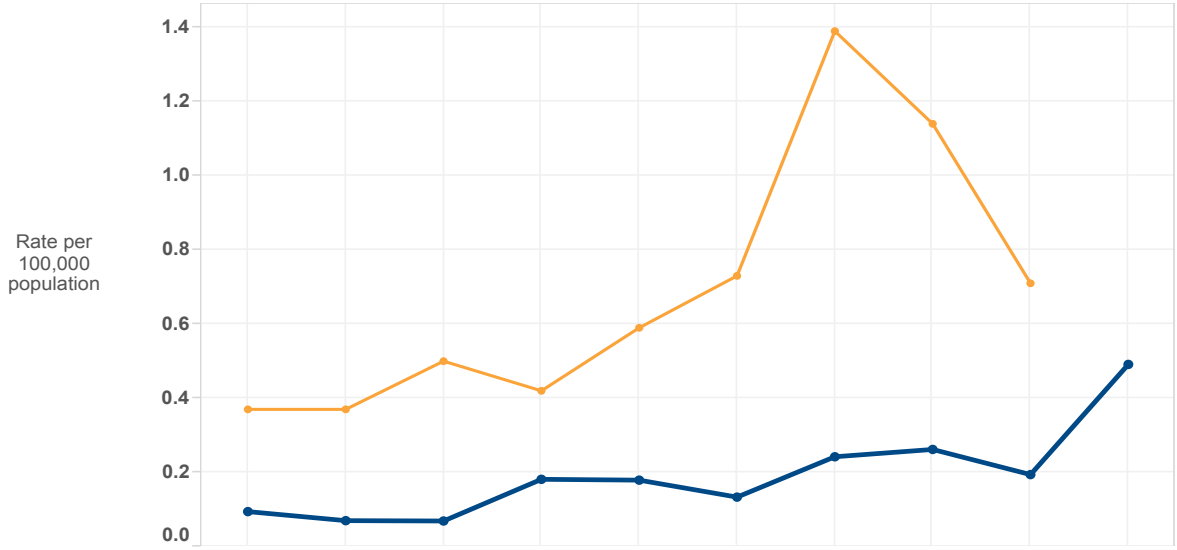
		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	1	0	0	0	0	1	3	2
	Male	0	0	0	0	0	0	0	1	2	5
	Total	0	0	1	0	0	0	0	2	5	7
BC Rate	Female	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.32	0.44	0.34
	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.30	0.93
	Total	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.32	0.37	0.62

Legionellosis

In 2015, the incidence of legionellosis increased considerably to 0.5/100,000 or 23 cases. The reasons for this are unclear but may be related to increasing use of urine antigen testing in the last few years (Morshed 2015).[1] No outbreaks were identified. For unclear reasons, the majority of cases were once again reported from Fraser Health Authority (n=13). The highest rates were observed in adults >60 years; older age and comorbidities are risk factors for infection. Cases were reported throughout the year, although, as in previous years, a higher proportion of cases occurred in the fall and early winter. This may be due to a true seasonal pattern or increased detection due to respiratory illness testing.

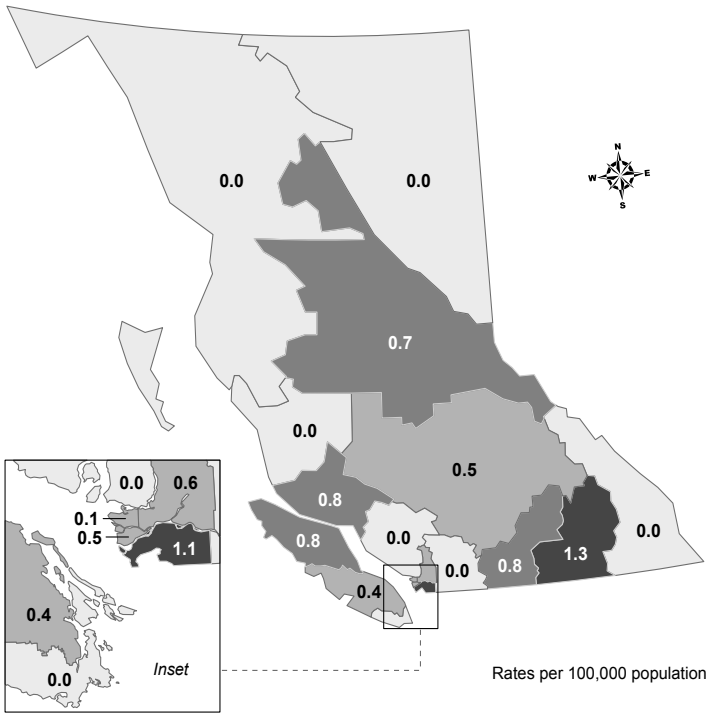
1. Morshed M, Chang Y, Hoang L. Diagnostic testing for Legionnaires' Disease: Trends in BC. BCMJ. 2015;57(10):452-3.

14.1 Legionellosis Rates by Year, 2006-2015

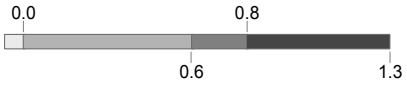


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	4	3	3	8	8	6	11	12	9	23
BC Rate	0.09	0.07	0.07	0.18	0.18	0.13	0.24	0.26	0.19	0.49
Canadian Rate	0.37	0.37	0.50	0.42	0.59	0.73	1.39	1.14	0.71	

14.2 Legionellosis Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	1	1.3
13	Okanagan	3	0.8
14	Thompson Cariboo Shuswap	1	0.5
21	Fraser East	0	0.0
22	Fraser North	4	0.6
23	Fraser South	9	1.1
31	Richmond	1	0.5
32	Vancouver	1	0.1
33	North Shore/Coast Garibaldi	0	0.0
41	South Vancouver Island	0	0.0
42	Central Vancouver Island	1	0.4
43	North Vancouver Island	1	0.8
51	Northwest	0	0.0
52	Northern Interior	1	0.7
53	Northeast	0	0.0



Rates per 100,000 population by HSDA

14.3 Legionellosis Rates by Age Group and Sex, 2015

		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	0	0	0	4	5
	Male	0	0	0	0	0	0	0	1	4	9
	Total	0	0	0	0	0	0	0	1	8	14
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.85
	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.61	1.68
	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.60	1.24

Disease Transmitted by Respiratory Routes

Streptococcal Disease (invasive) Group A
Tuberculosis

Streptococcal Disease (invasive) Group A (iGAS)

There were 234 cases of confirmed invasive Group A Streptococcal disease (iGAS) reported in 2015, with an incidence rate of 5.0 cases per 100,000 population. This is an increase compared to recent years, with the prior peaks observed in 2007 and 2008.

The highest incidence rate was in males aged <1 based on 2 cases, for a rate of 8.9 cases per 100,000 population. This was followed by females aged ≥60 years, and males aged 25-29 years, with rates of 7.0 cases and 6.9 cases per 100,000 population, respectively.

Cases occurred in 14 of the 16 Health Service Delivery Areas, with rates ranging from 2.1 to 7.9 cases per 100,000 population. The highest rate was in the Northern Interior, with 11 sporadic cases aged 1-74 years over 11 months, with six different emm types identified.

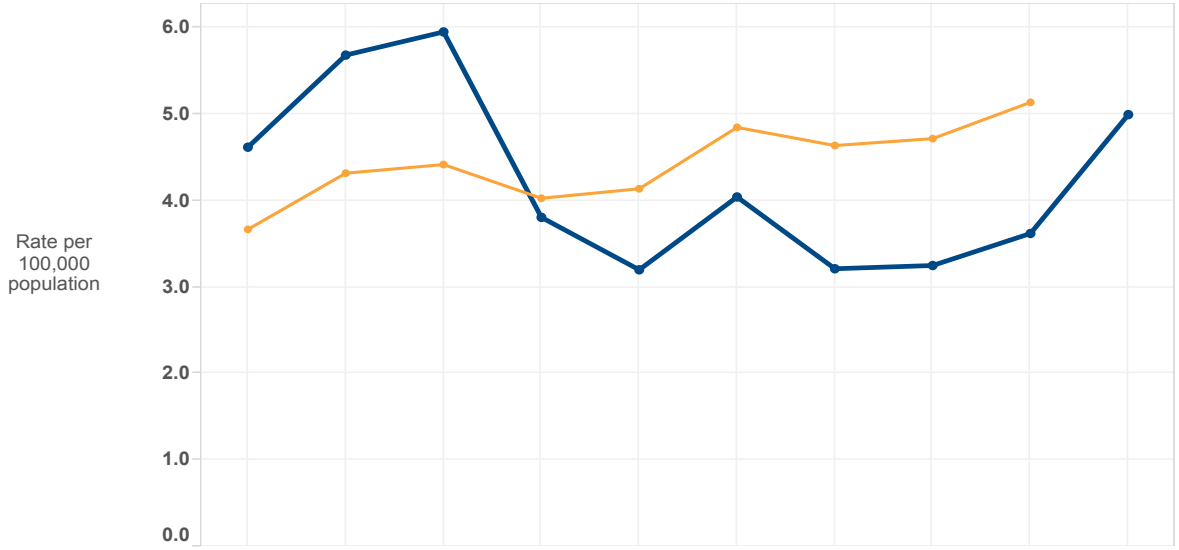
The case fatality rate was 7.3%. Between 2006 and 2014, annual case fatality rates ranged from 6.0% to 13.2%. Of the seventeen deaths in 2015, one was in a child and the other sixteen deaths were in adults over the age of 30 years.

Nineteen cases (8.1%) were reported with clinical syndromes of necrotizing fasciitis and seventeen (7.3%) with toxic shock syndrome.

Isolates from 187 (79.9%) confirmed cases were typed by the National Microbiology Laboratory. The most common emm types were 1 (9.6%), 82 (9.6%) and 11 (7.5%). From 2006 to 2014, the most common emm types among cases with typing results were types 1 (12.1%), 59 (8.9%) and 89 (5.3%).

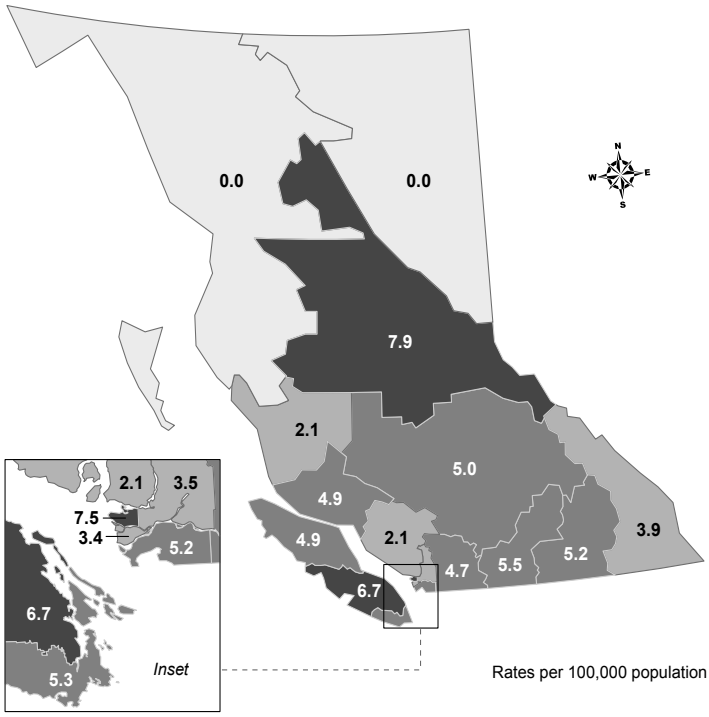
interactive dashboard

15.1 Streptococcal Disease (invasive) Group A Rates by Year, 2006-2015

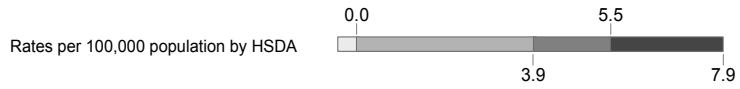


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	196	244	259	168	143	182	146	149	168	234
BC Rate	4.62	5.69	5.95	3.81	3.20	4.05	3.21	3.25	3.62	5.00
Canadian Rate	3.67	4.32	4.42	4.03	4.14	4.85	4.64	4.72	5.14	

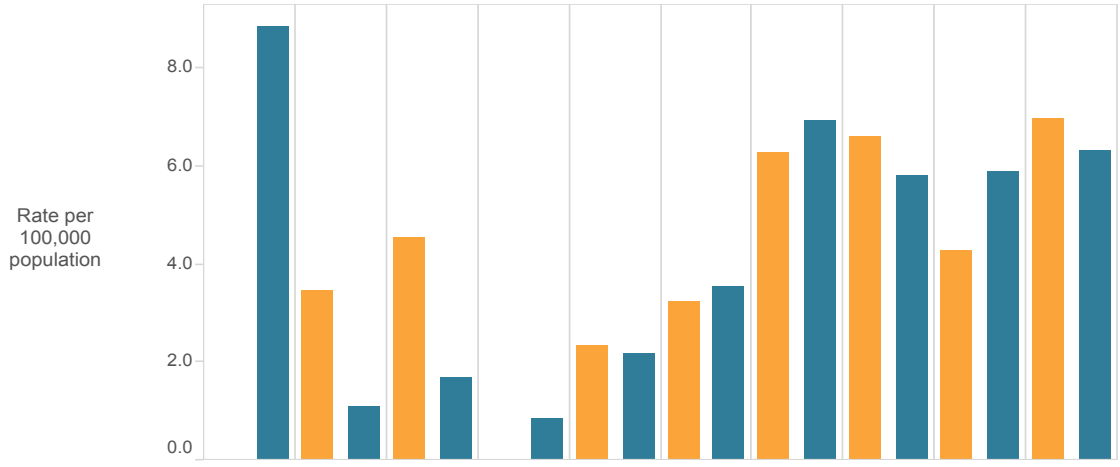
15.2 Streptococcal Disease (invasive) Group A Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	3	3.9
12	Kootenay Boundary	4	5.2
13	Okanagan	20	5.5
14	Thompson Cariboo Shuswap	11	5.0
21	Fraser East	14	4.7
22	Fraser North	23	3.5
23	Fraser South	41	5.2
31	Richmond	7	3.4
32	Vancouver	50	7.5
33	North Shore/Coast Garibaldi	6	2.1
41	South Vancouver Island	20	5.3
42	Central Vancouver Island	18	6.7
43	North Vancouver Island	6	4.9
51	Northwest	0	0.0
52	Northern Interior	11	7.9
53	Northeast	0	0.0



15.3 Streptococcal Disease (invasive) Group A Rates by Age Group and Sex, 2015



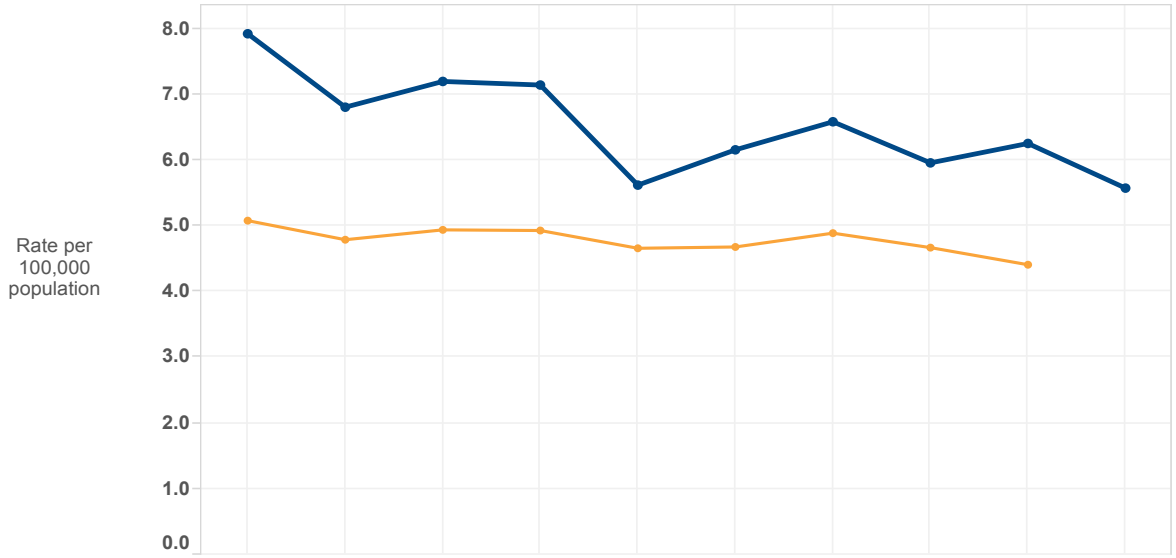
		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	3	5	0	3	5	10	21	29	41
	Male	2	1	2	1	3	6	11	18	39	34
	Total	2	4	7	1	6	11	21	39	68	75
BC Rate	Female	0.00	3.48	4.53	0.00	2.32	3.23	6.28	6.63	4.27	6.97
	Male	8.86	1.10	1.68	0.85	2.17	3.54	6.94	5.80	5.91	6.33
	Total	4.54	2.26	3.05	0.44	2.25	3.39	6.61	6.22	5.08	6.66

Tuberculosis

The rate of tuberculosis in BC has generally been declining over the previous two decades, mirroring the trend observed across Canada. The highest rates of tuberculosis are in the Vancouver Coastal and Fraser Health authorities, due primarily to the greater proportion of individuals living in those areas who were born in areas where tuberculosis is endemic. The Ministry of Health, BCCDC, regional health authorities, First Nations Health Authority, and other public health partners, have developed a Strategic Plan for Tuberculosis Prevention, Treatment and Control which is being implemented to reduce the burden of tuberculosis in BC.

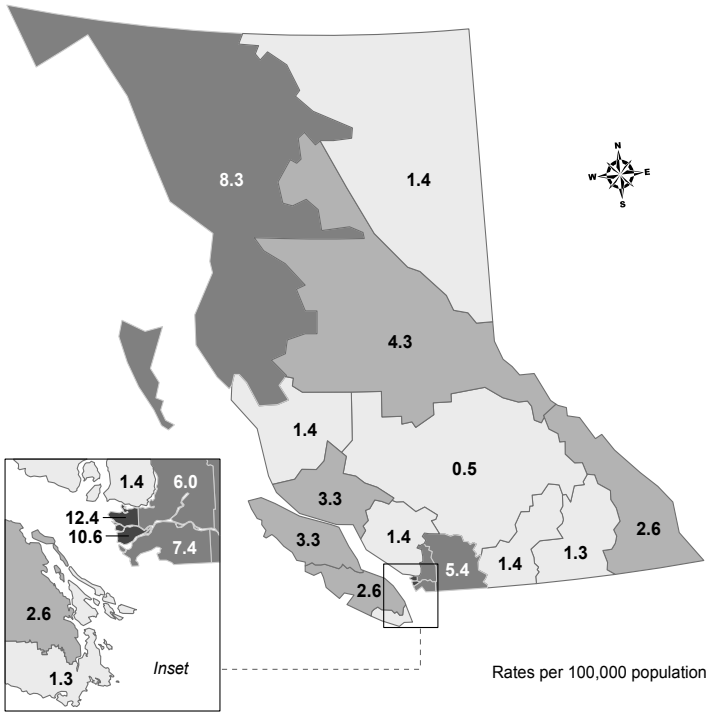
For more information on tuberculosis, please see the TB Annual Report.

16.1 Tuberculosis Rates by Year, 2006-2015

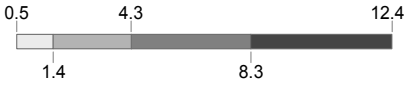


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	336	292	313	315	251	277	299	273	290	261
BC Rate	7.92	6.80	7.20	7.14	5.62	6.16	6.58	5.96	6.25	5.57
Canadian Rate	5.08	4.79	4.94	4.93	4.66	4.68	4.89	4.67	4.41	

16.2 Tuberculosis Rates by HSDA, 2015

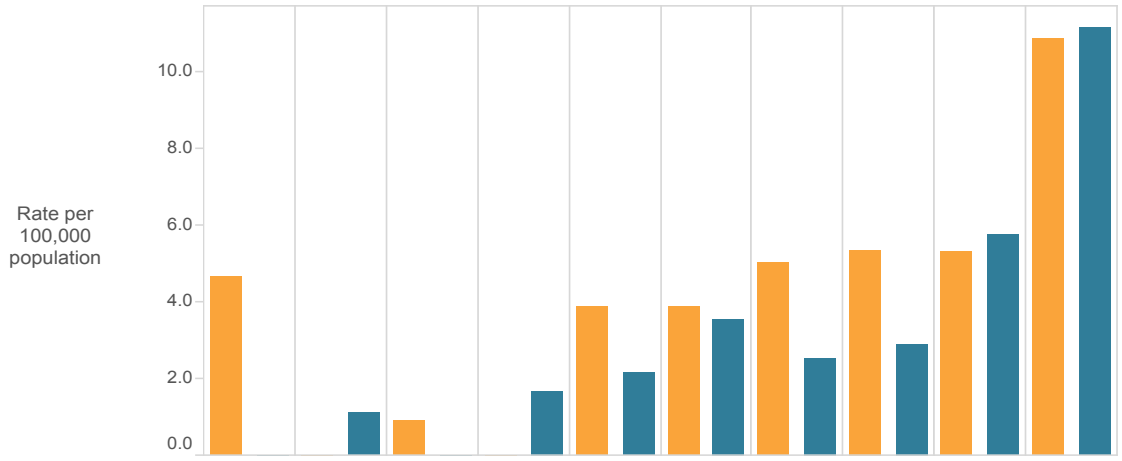


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	2	2.6
12	Kootenay Boundary	1	1.3
13	Okanagan	5	1.4
14	Thompson Cariboo Shuswap	1	0.5
21	Fraser East	16	5.4
22	Fraser North	39	6.0
23	Fraser South	59	7.4
31	Richmond	22	10.6
32	Vancouver	83	12.4
33	North Shore/Coast Garibaldi	4	1.4
41	South Vancouver Island	5	1.3
42	Central Vancouver Island	7	2.6
43	North Vancouver Island	4	3.3
51	Northwest	6	8.3
52	Northern Interior	6	4.3
53	Northeast	1	1.4



Rates per 100,000 population by HSDA

16.3 Tuberculosis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	1	0	1	0	5	6	8	17	36	64
	Male	0	1	0	2	3	6	4	9	38	60
	Total	1	1	1	2	8	12	12	26	74	124
BC Rate	Female	4.65	0.00	0.91	0.00	3.87	3.88	5.02	5.36	5.30	10.87
	Male	0.00	1.10	0.00	1.69	2.17	3.54	2.52	2.90	5.76	11.17
	Total	2.27	0.56	0.44	0.87	2.99	3.70	3.78	4.14	5.52	11.02

Sexually Transmitted and Bloodborne Pathogens

Chlamydia (genital)
Gonorrhea (genital)
Hepatitis B
Hepatitis C
HIV and AIDS
Syphilis

Chlamydia (genital)

Genital chlamydia is the most common reportable infection in BC. As the majority of chlamydia infections are asymptomatic, the reported number of chlamydia infections is only a fraction of the total population burden. If untreated, genital chlamydia may lead to complications such as pelvic inflammatory disease (a major cause of infertility, ectopic pregnancy, and chronic pain) in women and epidymo-orchitis in men.

Mirroring the national trend, genital chlamydia rates have been steadily increasing since the late 1990s. There are multiple reasons thought to be responsible for this increase, some of which are related to surveillance such as the increases in the sensitivity of laboratory tests and uptake of testing (e.g. greater acceptability of urine-based tests among men). Changes in behaviour, such as decreased condom use, may also be contributing to increasing chlamydia incidence.

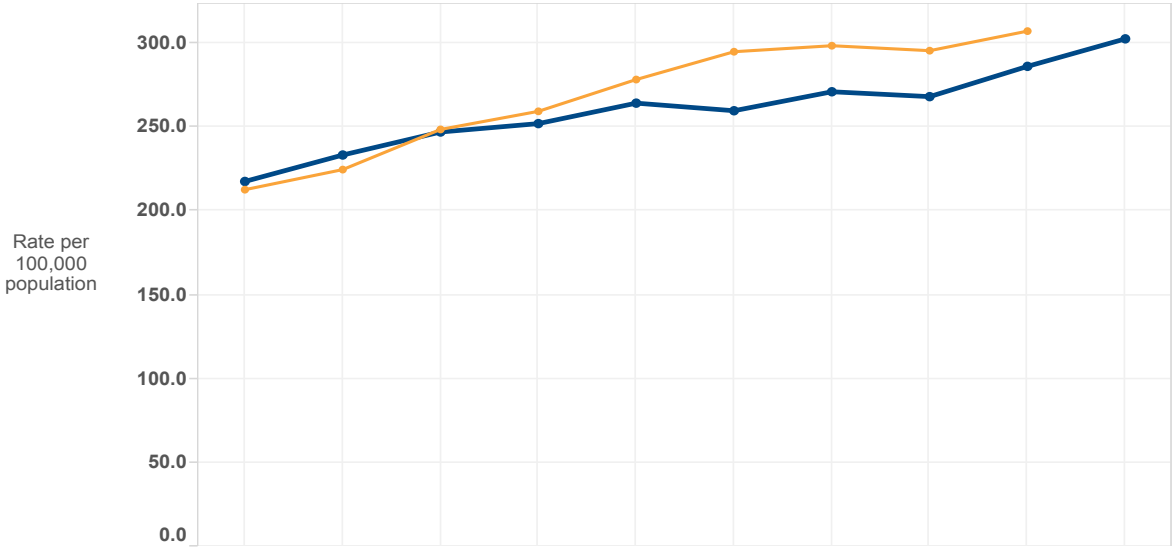
Females are more likely to be diagnosed with chlamydia compared to males. The greater number of infections among females is partially due to routine screening performed at the time of visits that were for other reasons (e.g. pap testing or contraception counselling).

Of concern is the rising number of lymphogranuloma venereum (LGV) reported. LGV is a caused by three specific serovars of chlamydia (L1, L2, and L3). The clinical presentation of LGV includes genital papules, ulcers, inguinal lymphadenopathy and hemorrhagic proctitis. If left untreated, LGV can cause serious sequelae such as lymphatic obstruction or anogenital ulcerations. LGV was first reported in Canada in 2003 and in BC in 2004. A provincial enhanced surveillance program for LGV was initiated in 2004. Since 2011, positive rectal chlamydia samples are routinely sent to the National Microbiology Laboratory for LGV serovar testing.

For more information on chlamydia and LGV, please see the STI Annual Report.

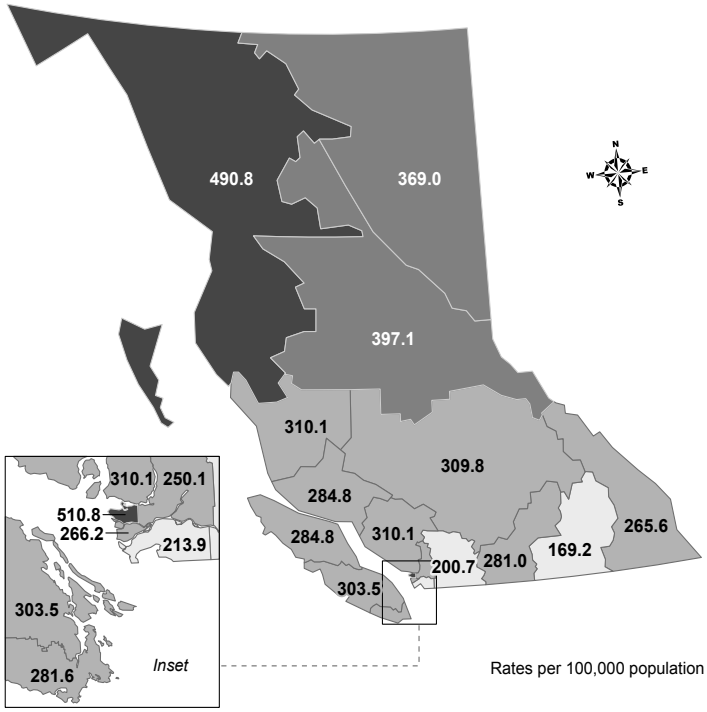
interactive dashboard

17.1 Genital Chlamydia Rates by Year, 2006-2015

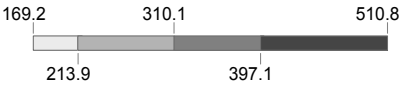


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	9,237	10,021	10,754	11,127	11,811	11,695	12,320	12,295	13,282	14,178
BC Rate	217.77	233.54	247.25	252.27	264.47	259.94	271.26	268.35	286.41	302.82
Canadian Rate	212.86	224.84	248.79	259.59	278.55	295.14	298.72	295.76	307.43	

17.2 Genital Chlamydia Rates by HSDA, 2015

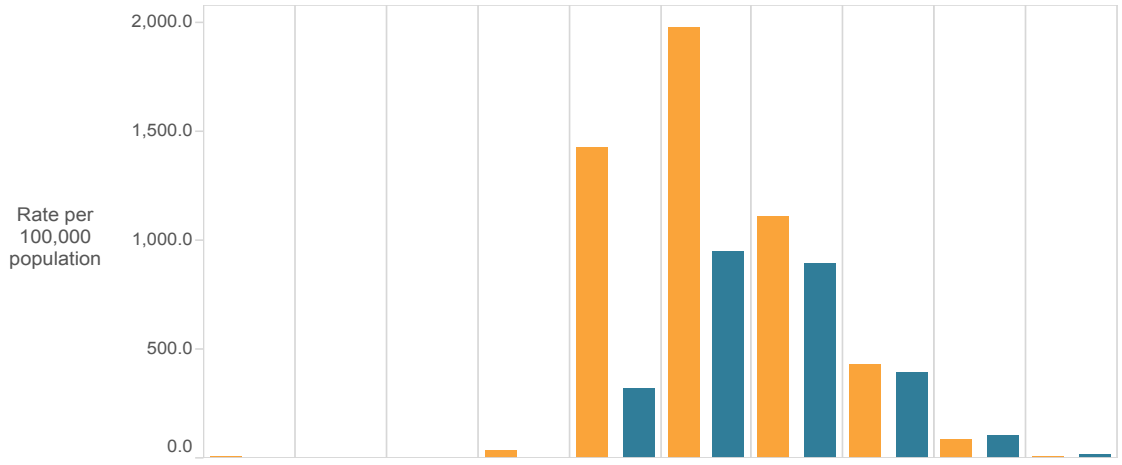


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	204	265.6
12	Kootenay Boundary	131	169.2
13	Okanagan	1017	281.0
14	Thompson Cariboo Shuswap	684	309.8
21	Fraser East	594	200.7
22	Fraser North	1635	250.1
23	Fraser South	1695	213.9
31	Richmond	553	266.2
32	Vancouver	3407	510.8
33	North Shore/Coast Garibaldi	873	310.1
41	South Vancouver Island	1064	281.6
42	Central Vancouver Island	813	303.5
43	North Vancouver Island	346	284.8
51	Northwest	355	490.8
52	Northern Interior	550	397.1
53	Northeast	257	369.0



Rates per 100,000 population by HSDA

17.3 Genital Chlamydia Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	1	0	0	44	1,850	3,065	1,762	1,352	585	33
	Male	0	0	0	2	441	1,616	1,410	1,220	679	89
	Total	1	0	0	46	2,295	4,691	3,176	2,574	1,264	122
BC Rate	Female	4.65	0.00	0.00	39.57	1,432.18	1,982.95	1,106.51	426.67	86.09	5.61
	Male	0.00	0.00	0.00	1.69	319.52	952.54	889.34	392.91	102.85	16.57
	Total	2.27	0.00	0.00	20.05	858.93	1,446.86	999.42	410.28	94.35	10.84

Gonorrhea (genital)

As is the case for genital chlamydia infection, only a portion of genital gonorrhea infections are asymptomatic and as a result, the infection is under-diagnosed and under-reported. If untreated, genital gonorrhea may lead to complications such as pelvic inflammatory disease (a major cause of infertility, ectopic pregnancy, and chronic pain) in women and epididymitis and prostatitis in men.

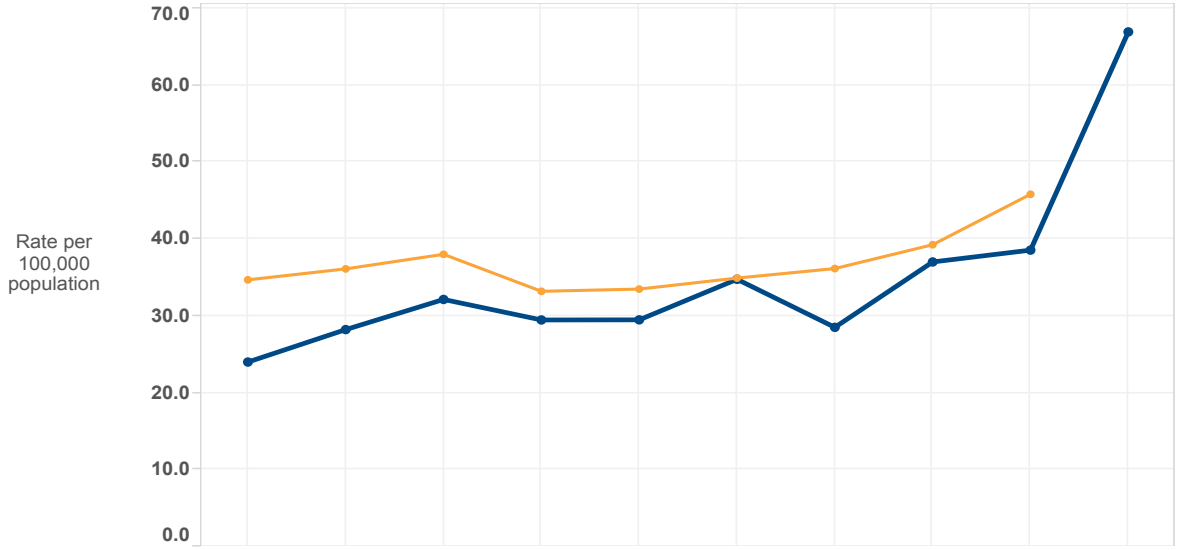
Rates of genital gonorrhea have been increasing since the late 1990s across Canada. However, from 2014 to 2015, there was a 70% increase in the rate of gonorrhea in British Columbia resulting in the highest number of cases reported in over a decade. This increase in gonorrhea cases was observed in all five regional health authorities and among both genders, with the greatest increase reported among females. As seen in previous years, the age groups with the greatest proportion of cases among females were 20-24 years old and among males 30-39 years old. The diagnosis rate of gonorrhea among men is approximately twice that among females which is partially due to the greater likelihood of males infected with gonorrhea to have symptoms. Gonorrhea is also more likely to be concentrated in sexually active networks and another reason for the higher rates of gonorrhea in males is, in part, due to higher rates of gonorrhea among gay, bisexual, and other men who have sex with men. While provincial surveillance data do not permit identification of cases among gay, bisexual, and other men who have sex with men, this has been observed in other jurisdictions.

Reasons for the overall increase in gonorrhea are being investigated, but could include changes to both testing frequency and testing methods or to differences in the prevalent gonorrhea strain. The BCCDC is collaborating with the provincial laboratory and the National Microbiology Laboratory (NML) to investigate reasons for the dramatic increase in gonorrhea cases.

For more information on gonorrhea, please see the STI Annual Report.

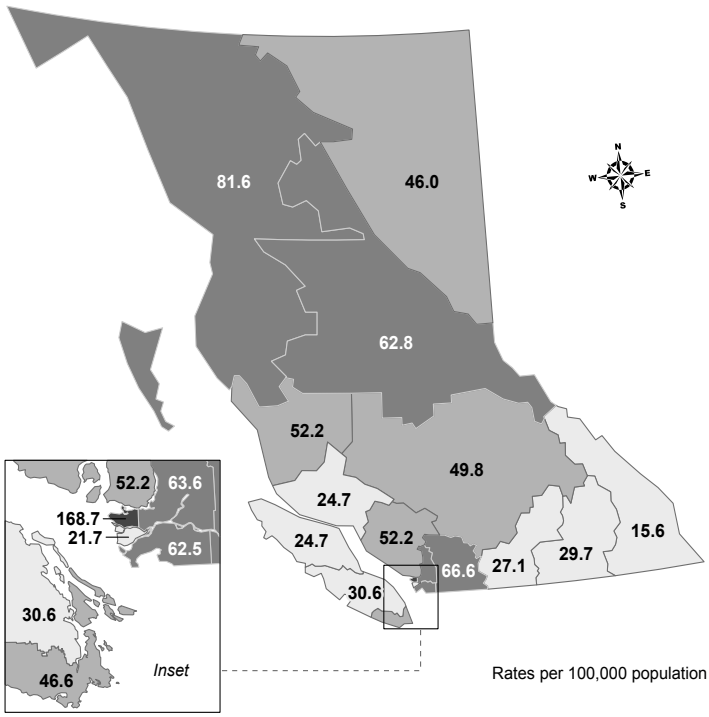
interactive dashboard

18.1 Genital Gonorrhea Rates by Year, 2006-2015

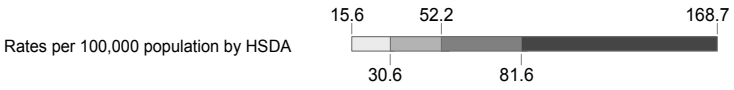


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	1,018	1,211	1,398	1,300	1,317	1,564	1,295	1,696	1,788	3,134
BC Rate	24.00	28.22	32.14	29.47	29.49	34.76	28.51	37.02	38.56	66.94
Canadian Rate	34.69	36.12	38.01	33.20	33.49	34.92	36.16	39.26	45.82	

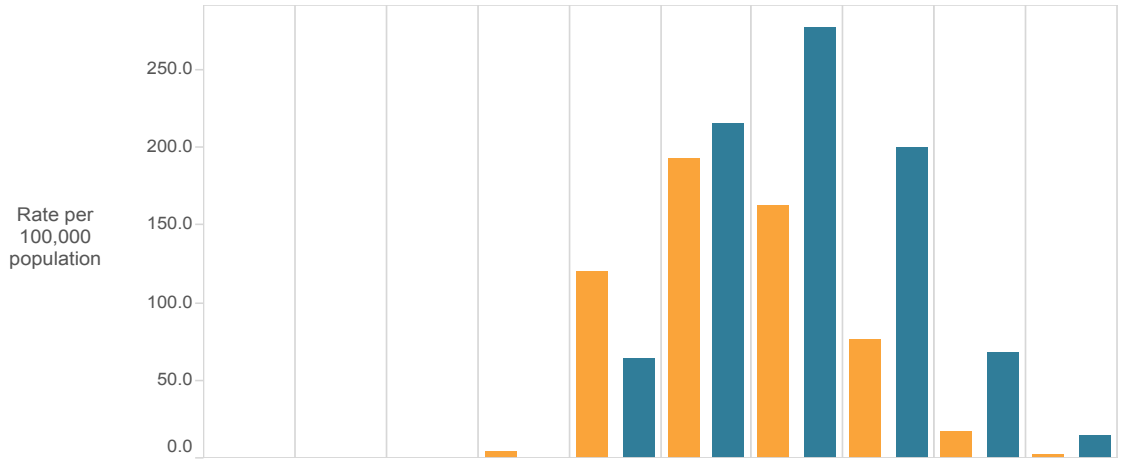
18.2 Genital Gonorrhea Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	12	15.6
12	Kootenay Boundary	23	29.7
13	Okanagan	98	27.1
14	Thompson Cariboo Shuswap	110	49.8
21	Fraser East	197	66.6
22	Fraser North	416	63.6
23	Fraser South	495	62.5
31	Richmond	45	21.7
32	Vancouver	1125	168.7
33	North Shore/Coast Garibaldi	147	52.2
41	South Vancouver Island	176	46.6
42	Central Vancouver Island	82	30.6
43	North Vancouver Island	30	24.7
51	Northwest	59	81.6
52	Northern Interior	87	62.8
53	Northeast	32	46.0



18.3 Genital Gonorrhea Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	4	155	298	258	242	114	13
	Male	0	0	0	0	88	366	440	621	448	79
	Total	0	0	0	4	244	664	700	866	562	92
BC Rate	Female	0.00	0.00	0.00	3.60	119.99	192.80	162.02	76.37	16.78	2.21
	Male	0.00	0.00	0.00	0.00	63.76	215.74	277.52	200.00	67.86	14.71
	Total	0.00	0.00	0.00	1.74	91.32	204.80	220.28	138.04	41.95	8.17

Hepatitis B

Hepatitis B infections are either acute hepatitis B, which are new and usually symptomatic infections, or chronic hepatitis B when the hepatitis B surface antigen (HBsAg) is detectable for more than six months. Most hepatitis B cases reported in BC are chronic infections in people who have emigrated from endemic countries such East, South and South East Asia, and Africa. A person with chronic hepatitis B may have no symptoms and be identified when testing a person at high risk or during an insurance medical. Routine testing occurs in pregnancy as transmission of hepatitis B from mother to infant can be prevented by the administration of hepatitis B vaccine and hepatitis B immune globulin to the infant soon after birth. Testing may also be performed in someone with symptoms of chronic liver disease i.e. cirrhosis. When it is not known if a case is acute or chronic and no follow up is available the case is usually chronic but may be classified as unknown/undetermined.

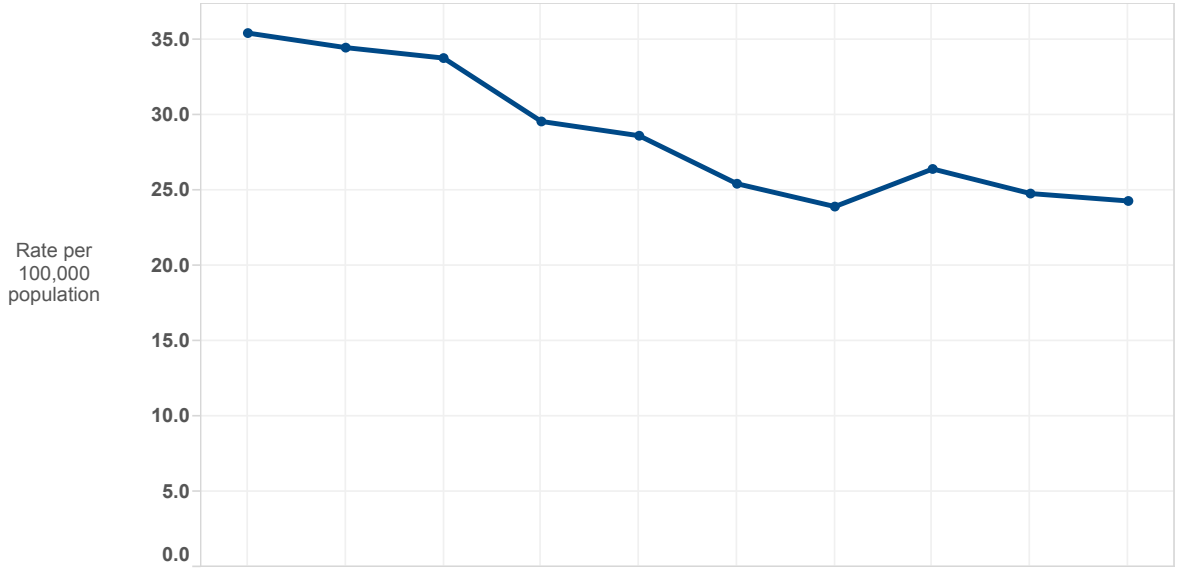
Hepatitis B - Chronic and Unknown

The number and rate of chronic and unknown hepatitis B cases reported in BC have continued to decline from more than 3,000 cases in 1990 to less than half that number in 2015 see figure 19.1. Due to variations in provincial standards for tracking hepatitis B it is not possible to compare BC rates of chronic hepatitis B to a national rate. As in previous years and seen in figure 19.2 cases occur in BC regions where immigrants from endemic countries reside; over 90% of cases occurred in Vancouver Coastal and Fraser Health Authorities. Vancouver reported the highest number of cases in a single Health Service Delivery Area (over one-third of the total cases); while Richmond had the highest rate of hepatitis B reported (figure 19.2). Most cases are identified in adults (20+ years) with higher rates in females in childbearing years (aged 20-39 years) that are likely tested during pregnancy (figure 19.3).

Hepatitis B - Acute

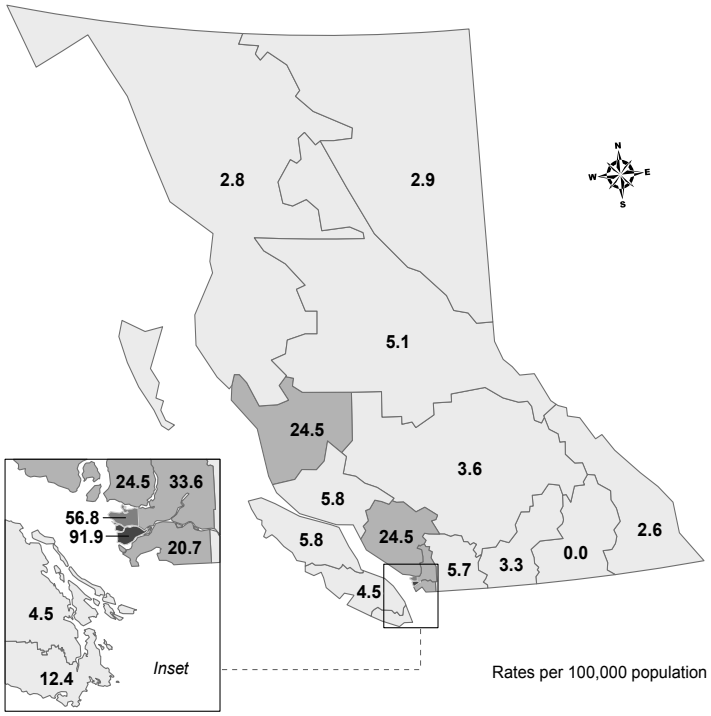
In 2015, six cases of acute hepatitis B were identified, the lowest number ever reported (figure 19.4). The cases occurred in 6 of the 16 Health Service Delivery Areas with no cases reported in Interior Health. Only one case was female (see figures 19.5 and 19.6). This decline reflects the success of the hepatitis B publicly funded vaccination program introduced in grade 6 students in 1992 and the infant program introduced in 2001.

19.1 Chronic and Unknown Hepatitis B Rates by Year, 2006-2015



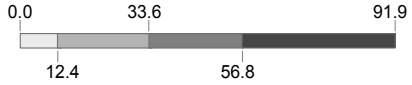
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	1,505	1,481	1,471	1,306	1,280	1,146	1,088	1,212	1,151	1,139
BC Rate	35.48	34.51	33.82	29.61	28.66	25.47	23.96	26.45	24.82	24.33

19.2 Chronic and Unknown Hepatitis B Rates by HSDA, 2015

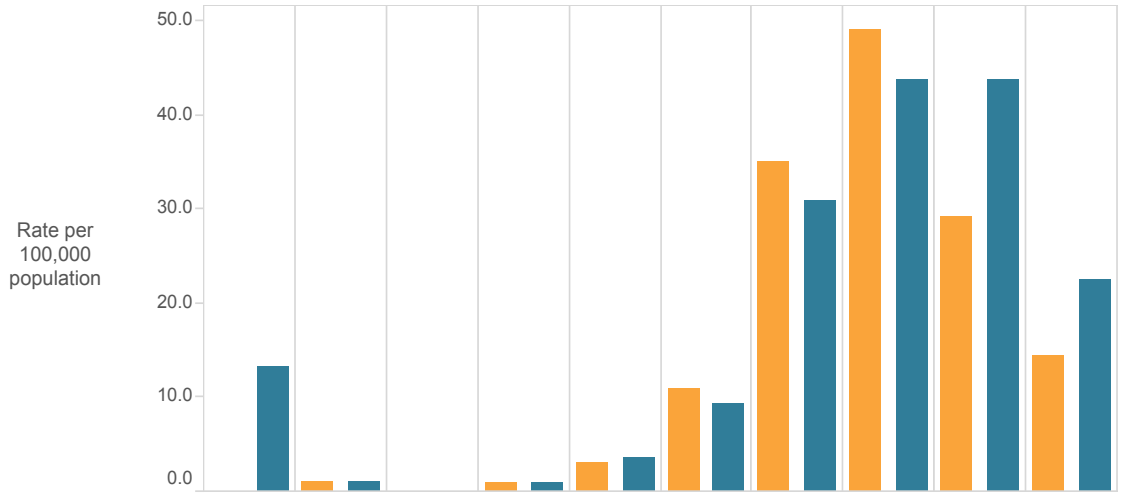


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	2	2.6
12	Kootenay Boundary	0	0.0
13	Okanagan	12	3.3
14	Thompson Cariboo Shuswap	8	3.6
21	Fraser East	17	5.7
22	Fraser North	220	33.6
23	Fraser South	164	20.7
31	Richmond	191	91.9
32	Vancouver	379	56.8
33	North Shore/Coast Garibaldi	69	24.5
41	South Vancouver Island	47	12.4
42	Central Vancouver Island	12	4.5
43	North Vancouver Island	7	5.8
51	Northwest	2	2.8
52	Northern Interior	7	5.1
53	Northeast	2	2.9

Rates per 100,000 population by HSDA

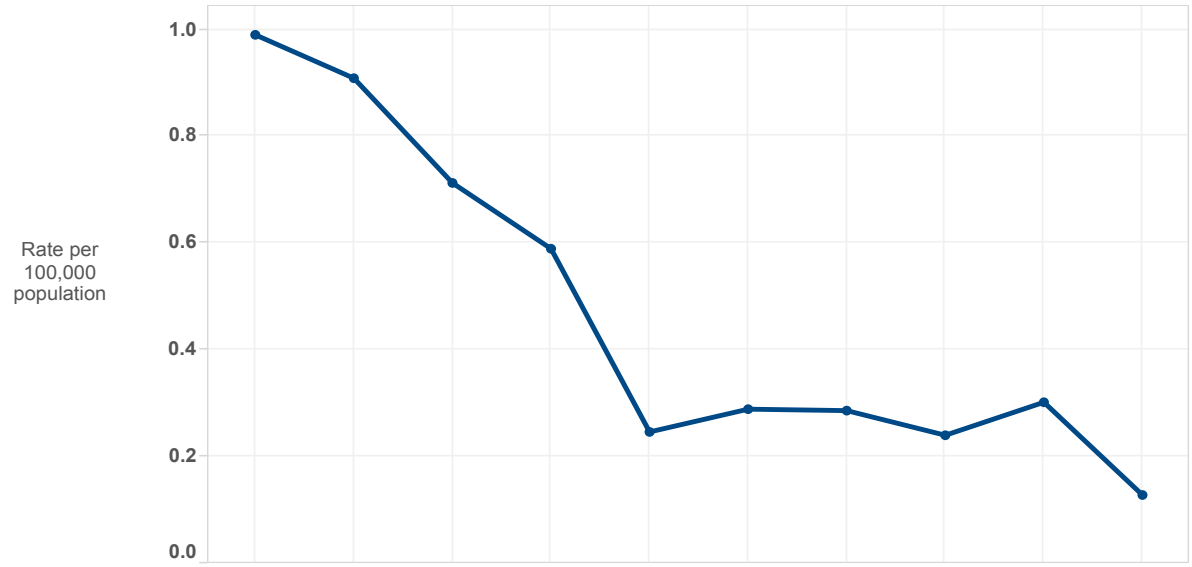


19.3 Chronic and Unknown Hepatitis B Rates by Age Group and Sex, 2015



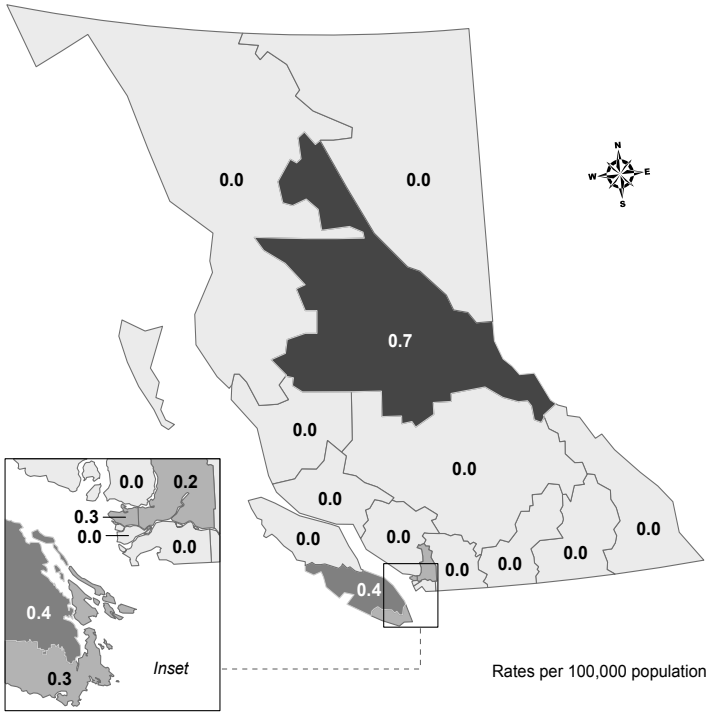
		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	1	0	1	4	17	56	156	198	85
	Male	3	1	0	1	5	16	49	136	289	121
	Total	3	2	0	2	9	33	105	292	487	206
BC Rate	Female	0.00	1.16	0.00	0.90	3.10	11.00	35.17	49.23	29.14	14.44
	Male	13.29	1.10	0.00	0.85	3.62	9.43	30.91	43.80	43.78	22.53
	Total	6.80	1.13	0.00	0.87	3.37	10.18	33.04	46.54	36.35	18.30

19.4 Acute Hepatitis B Rates by Year, 2006-2015

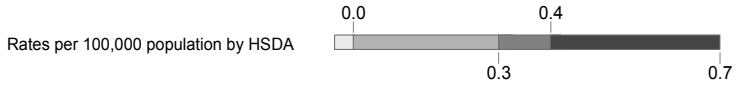


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	42	39	31	26	11	13	13	11	14	6
BC Rate	0.99	0.91	0.71	0.59	0.25	0.29	0.29	0.24	0.30	0.13

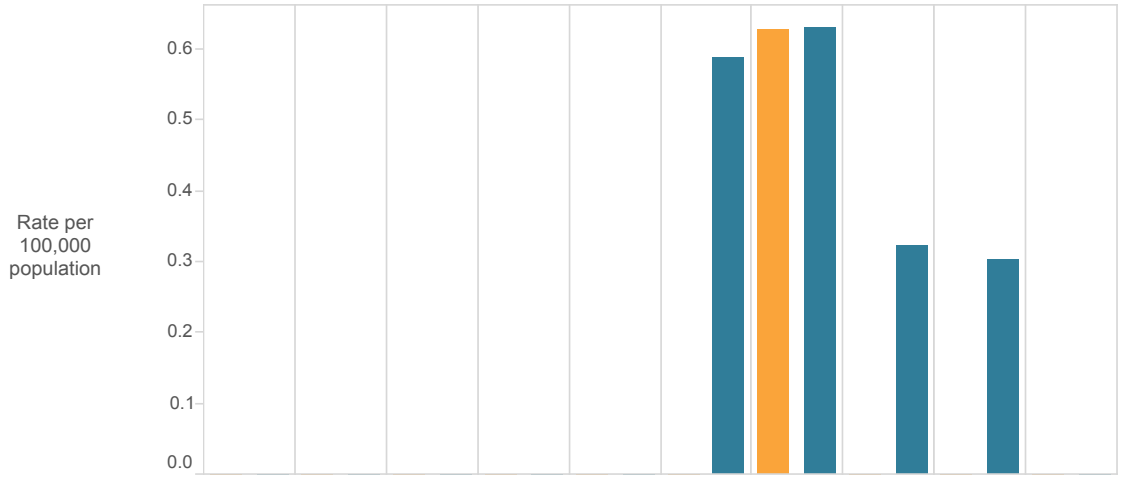
19.5 Acute Hepatitis B Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	0	0.0
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	0	0.0
22	Fraser North	1	0.2
23	Fraser South	0	0.0
31	Richmond	0	0.0
32	Vancouver	2	0.3
33	North Shore/Coast Garibaldi	0	0.0
41	South Vancouver Island	1	0.3
42	Central Vancouver Island	1	0.4
43	North Vancouver Island	0	0.0
51	Northwest	0	0.0
52	Northern Interior	1	0.7
53	Northeast	0	0.0



19.6 Acute Hepatitis B Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	0	1	0	0	0
	Male	0	0	0	0	0	1	1	1	2	0
	Total	0	0	0	0	0	1	2	1	2	0
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00
	Male	0.00	0.00	0.00	0.00	0.00	0.59	0.63	0.32	0.30	0.00
	Total	0.00	0.00	0.00	0.00	0.00	0.31	0.63	0.16	0.15	0.00

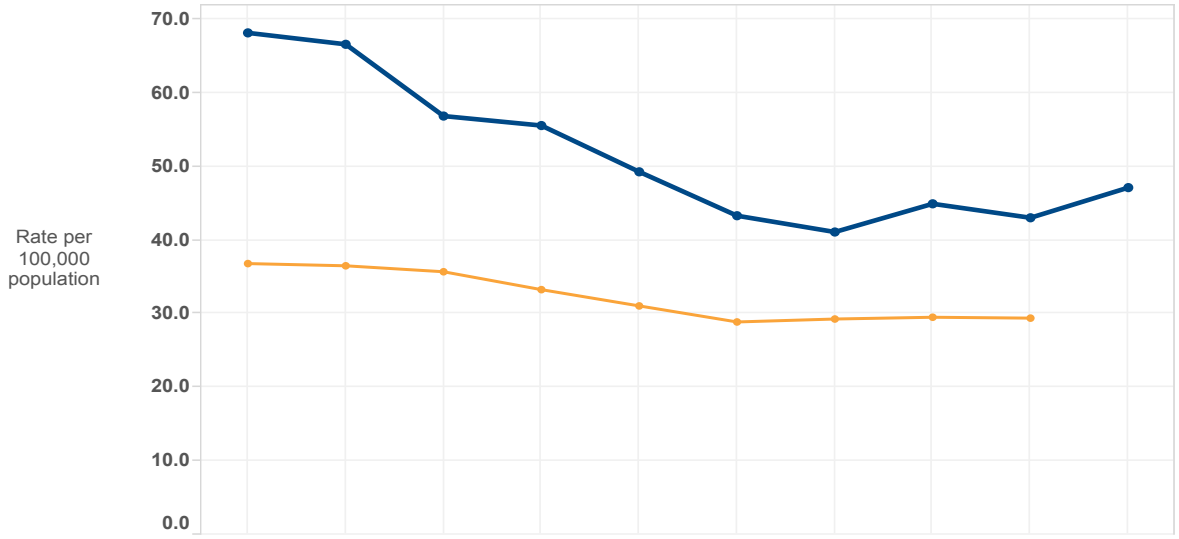
Hepatitis C

Hepatitis C infections are identified through laboratory testing of individuals with past or current risk factors such as injection drug use, to investigate symptoms of liver disease or as a component of medical insurance testing. Hepatitis C testing in BC has increased since 2012 partly due to the US Centres for Disease Control and Prevention's recommendation for "baby boomers" to be tested, the BC Generation hepatitis program and awareness of new and effective hepatitis C treatment regimens (1,2). This increase in testing has resulted in more cases being identified and reported. In 2015 there were 2,208 cases of hepatitis C reported up from less than 2,000 cases in 2014 see figure 20.1. Cases were reported in all health service delivery areas (HSDA) with Vancouver having the highest number of cases reported. Figure 20.2 shows the highest rates were in Northern Interior followed by Fraser East, North Vancouver Island and East Kootenay, all these regions were above 60 cases per 100,00 population compared to a mean BC rate of 47/100,000. The lowest rate was in Richmond HSDA.

1. Recommendations for the Identification of Chronic Hepatitis C Virus Infection Among Persons Born During 1945–1965. MMWR (2012) 61(4)

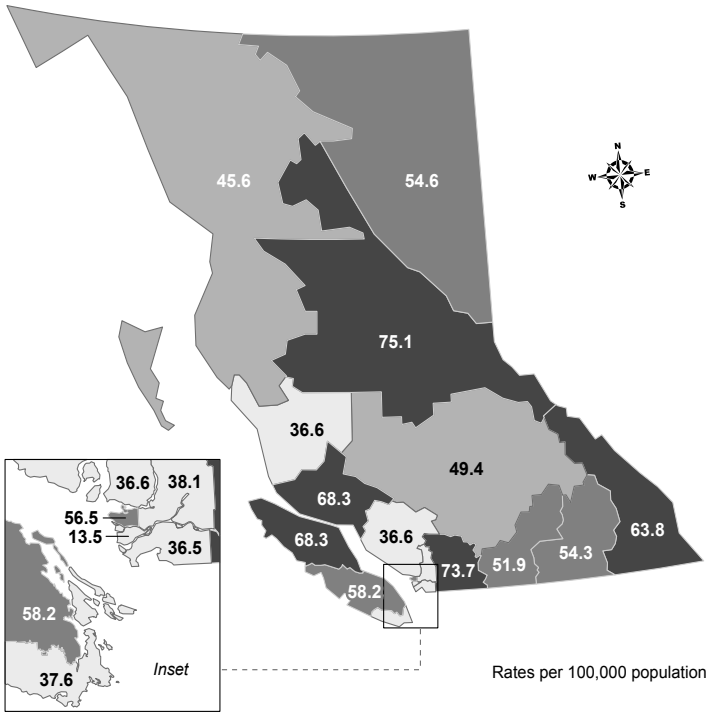
2. Generation Hep. Generation Hep.com. Downloaded from http://www.generationhep.com on July 27, 2015.

20.1 Hepatitis C Rates by Year, 2006-2015

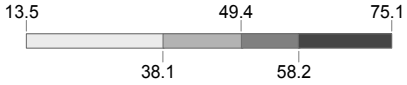


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	2,892	2,859	2,474	2,452	2,202	1,950	1,868	2,060	1,997	2,208
BC Rate	68.18	66.63	56.88	55.59	49.31	43.34	41.13	44.96	43.06	47.16
Canadian Rate	36.84	36.54	35.73	33.30	31.09	28.91	29.31	29.55	29.43	

20.2 Hepatitis C Rates by HSDA, 2015

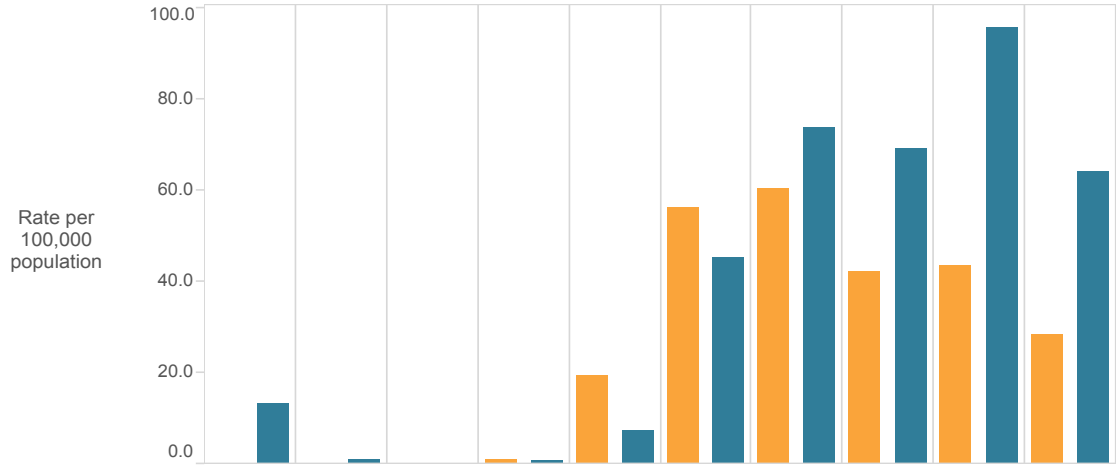


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	49	63.8
12	Kootenay Boundary	42	54.3
13	Okanagan	188	51.9
14	Thompson Cariboo Shuswap	109	49.4
21	Fraser East	218	73.7
22	Fraser North	249	38.1
23	Fraser South	289	36.5
31	Richmond	28	13.5
32	Vancouver	377	56.5
33	North Shore/Coast Garibaldi	103	36.6
41	South Vancouver Island	142	37.6
42	Central Vancouver Island	156	58.2
43	North Vancouver Island	83	68.3
51	Northwest	33	45.6
52	Northern Interior	104	75.1
53	Northeast	38	54.6



Rates per 100,000 population by HSDA

20.3 Hepatitis C Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	1	25	87	96	133	295	167
	Male	3	1	0	1	10	77	117	215	633	345
	Total	3	1	0	2	35	164	213	348	929	513
BC Rate	Female	0.00	0.00	0.00	0.90	19.35	56.29	60.29	41.97	43.41	28.37
	Male	13.29	1.10	0.00	0.85	7.25	45.39	73.80	69.24	95.89	64.24
	Total	6.80	0.56	0.00	0.87	13.10	50.58	67.03	55.47	69.35	45.57

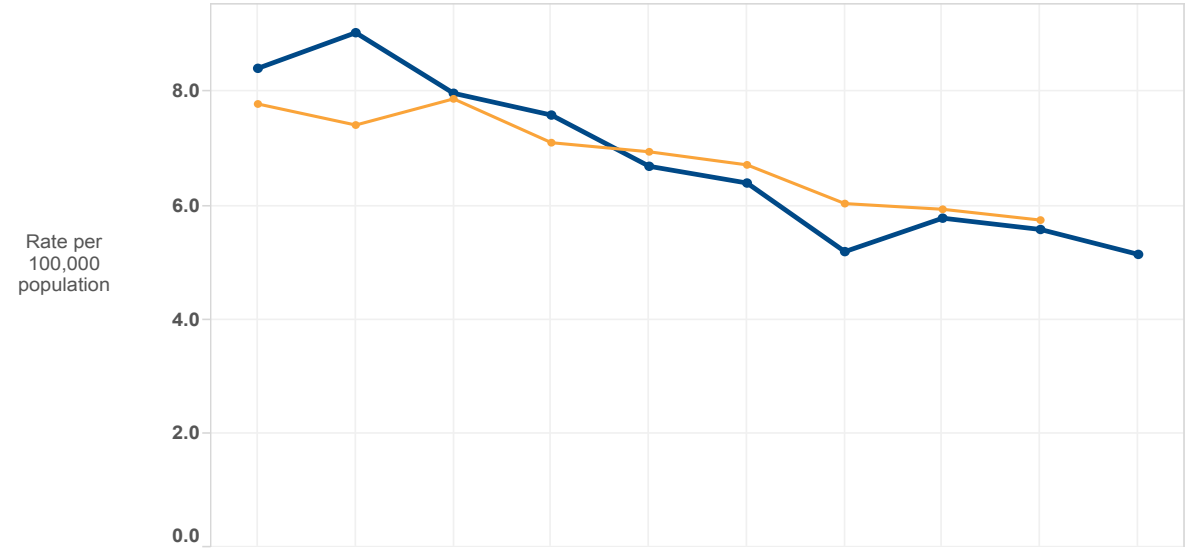
HIV and AIDS

HIV has been a reportable infection since 2003. The rate of HIV diagnoses has been declining over the past decade, primarily driven by decreases in HIV diagnoses among people who use injection drugs. However, over half of all HIV diagnoses are among gay, bisexual, and other men who have sex with men. The number of new HIV diagnoses in this group of individuals has not changed in the last decade. The highest rate of new HIV diagnoses is in the Vancouver Health Service Delivery Area, likely due to the greater concentration of gay, bisexual, and other men who have sex with men living in this area. For more information on the epidemiology of HIV in BC, please see the HIV Annual Report

It should be noted that because an individual may be living with HIV for years or decades before being diagnosed, we typically report on HIV diagnoses rather than HIV incidence. However, the Public Health Agency of Canada (PHAC) uses models and multiple data sources to estimate the number of new (incidence) HIV infections and prevalent cases of HIV (i.e. number of people living with HIV). In BC, an estimated 305 (range 210-400) persons were newly infected with HIV in 2014. At the end of 2014, there was an estimated 12,100 (range 9,700-14,500) persons living with HIV in BC. More information on these estimates can be found at the PHAC website.

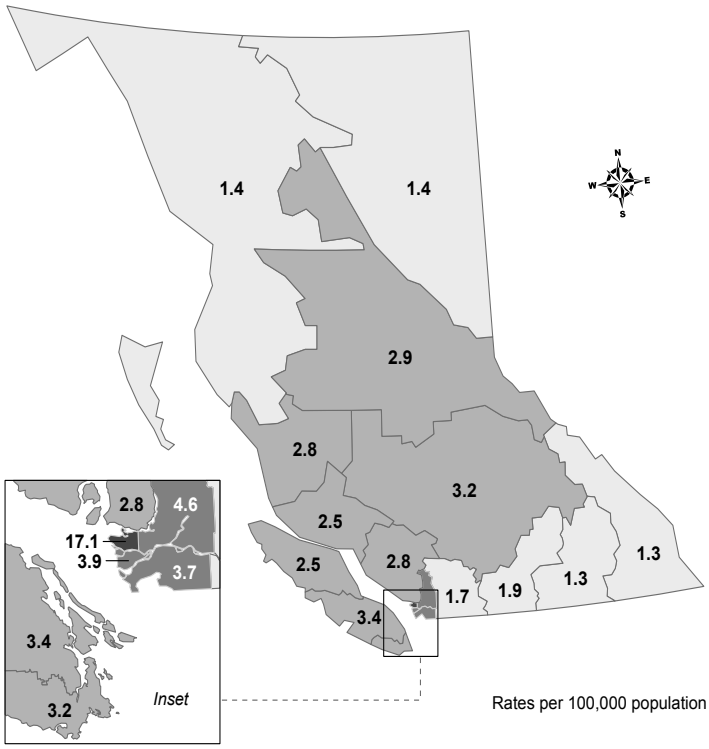
interactive dashboard

21.1 HIV Rates by Year, 2006-2015

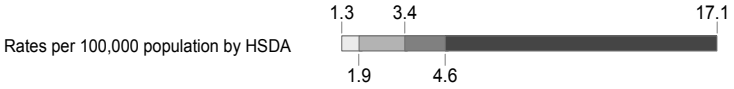


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	357	388	347	335	299	288	236	265	259	241
BC Rate	8.42	9.04	7.98	7.60	6.70	6.40	5.20	5.78	5.59	5.15
Canadian Rate	7.79	7.42	7.88	7.11	6.95	6.72	6.04	5.94	5.75	

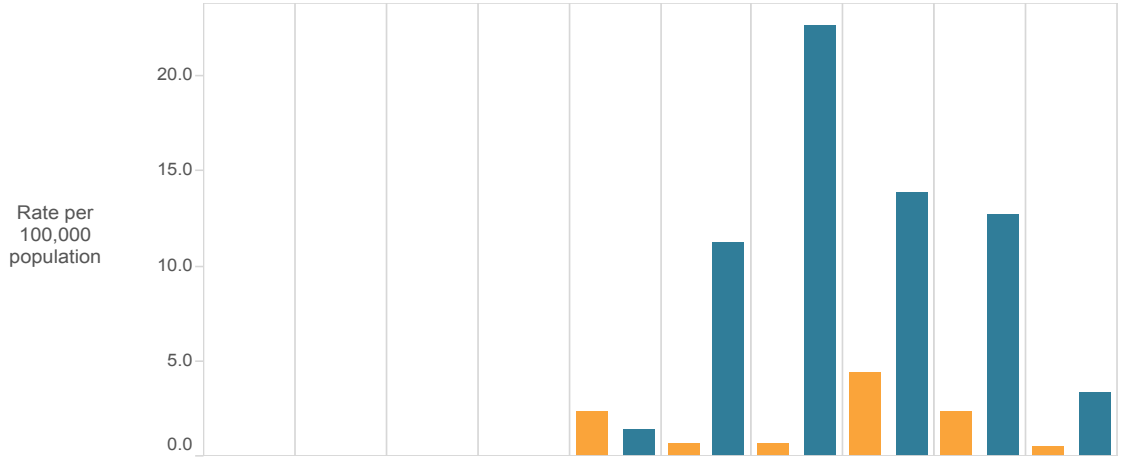
21.2 HIV Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	1	1.3
12	Kootenay Boundary	1	1.3
13	Okanagan	7	1.9
14	Thompson Cariboo Shuswap	7	3.2
21	Fraser East	5	1.7
22	Fraser North	30	4.6
23	Fraser South	29	3.7
31	Richmond	8	3.9
32	Vancouver	114	17.1
33	North Shore/Coast Garibaldi	8	2.8
41	South Vancouver Island	12	3.2
42	Central Vancouver Island	9	3.4
43	North Vancouver Island	3	2.5
51	Northwest	1	1.4
52	Northern Interior	4	2.9
53	Northeast	1	1.4



21.3 HIV Rates by Age Group and Sex, 2015

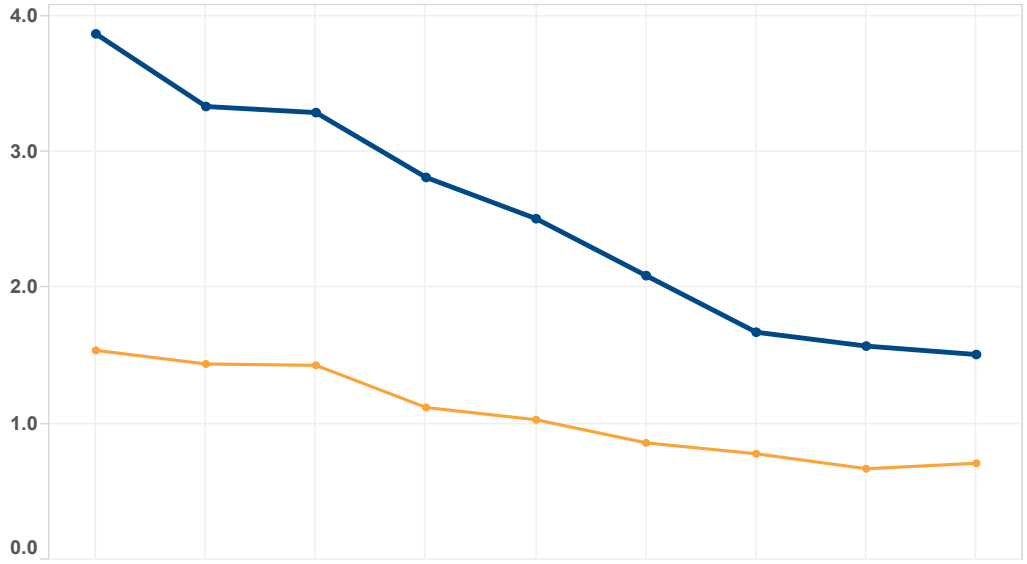


		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	3	1	1	14	16	3
	Male	0	0	0	0	2	19	36	43	84	18
	Total	0	0	0	0	5	20	37	58	100	21
BC Rate	Female	0.00	0.00	0.00	0.00	2.32	0.65	0.63	4.42	2.35	0.51
	Male	0.00	0.00	0.00	0.00	1.45	11.20	22.71	13.85	12.72	3.35
	Total	0.00	0.00	0.00	0.00	1.87	6.17	11.64	9.24	7.46	1.87

The AIDS surveillance system is a passive system and relies on clinicians reporting a case to the BC-CDC. In BC, the majority of AIDS cases are reported through the Provincial HIV Treatment Program at the BC Centre for Excellence in HIV/AIDS which has comprehensive clinical data on all individuals accessing antiretroviral therapy in BC. For this reason, AIDS cases presented here are from the previous year.

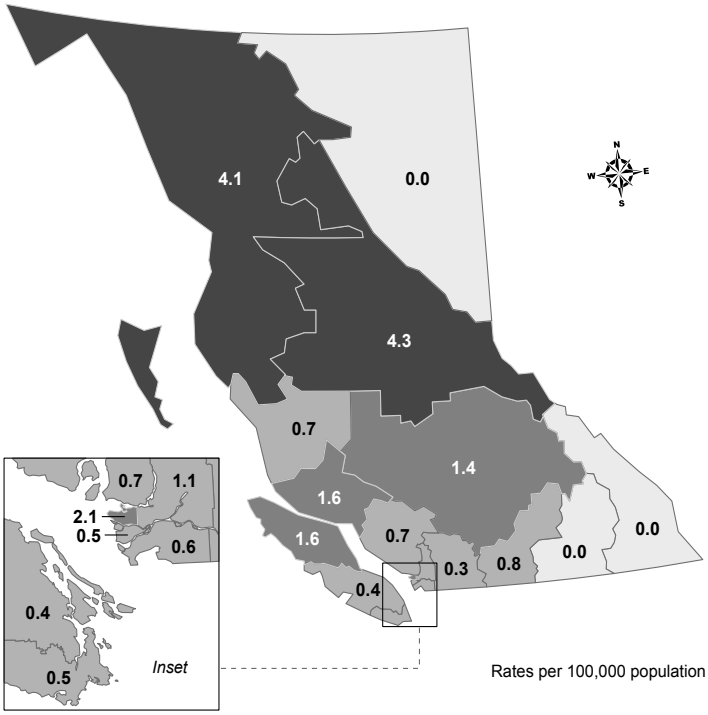
The rate of AIDS in BC has been decreasing since 1993, due primarily to advances in HIV treatment and more individuals living with HIV accessing treatment earlier. While Northern Health Authority had the highest rate of AIDS cases reported, this is likely due to the relatively smaller population size in this region. More information on AIDS is available in the HIV Annual Report.

22.1 AIDS Rates by Year, 2006-2014

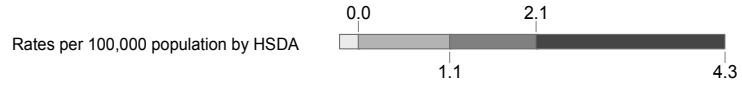


	2006	2007	2008	2009	2010	2011	2012	2013	2014
Reports	164	143	143	124	112	94	76	72	70
BC Rate	3.87	3.33	3.29	2.81	2.51	2.09	1.67	1.57	1.51
Canadian Rate	1.54	1.44	1.43	1.12	1.03	0.86	0.78	0.67	0.71

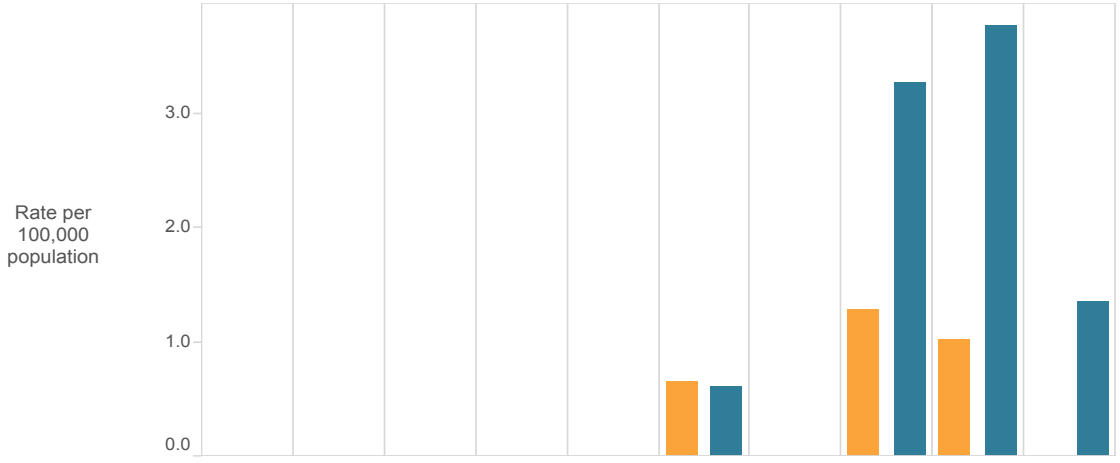
22.2 AIDS Rates by HSDA, 2014



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	3	0.8
14	Thompson Cariboo Shuswap	3	1.4
21	Fraser East	1	0.3
22	Fraser North	7	1.1
23	Fraser South	5	0.6
31	Richmond	1	0.5
32	Vancouver	14	2.1
33	North Shore/Coast Garibaldi	2	0.7
41	South Vancouver Island	2	0.5
42	Central Vancouver Island	1	0.4
43	North Vancouver Island	2	1.6
51	Northwest	3	4.1
52	Northern Interior	6	4.3
53	Northeast	0	0.0



22.3 AIDS Rates by Age Group and Sex, 2014



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	1	0	4	7	0
	Male	0	0	0	0	0	1	0	10	25	7
	Total	0	0	0	0	0	2	0	15	42	11
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	0.65	0.00	1.28	1.03	0.00
	Male	0.00	0.00	0.00	0.00	0.00	0.60	0.00	3.27	3.78	1.35
	Total	0.00	0.00	0.00	0.00	0.00	0.63	0.00	2.43	3.13	1.01

Syphilis

Information about Syphilis can be found in the "Noteworthy Disease and Conditions in 2015" section.

Vaccine Preventable Diseases

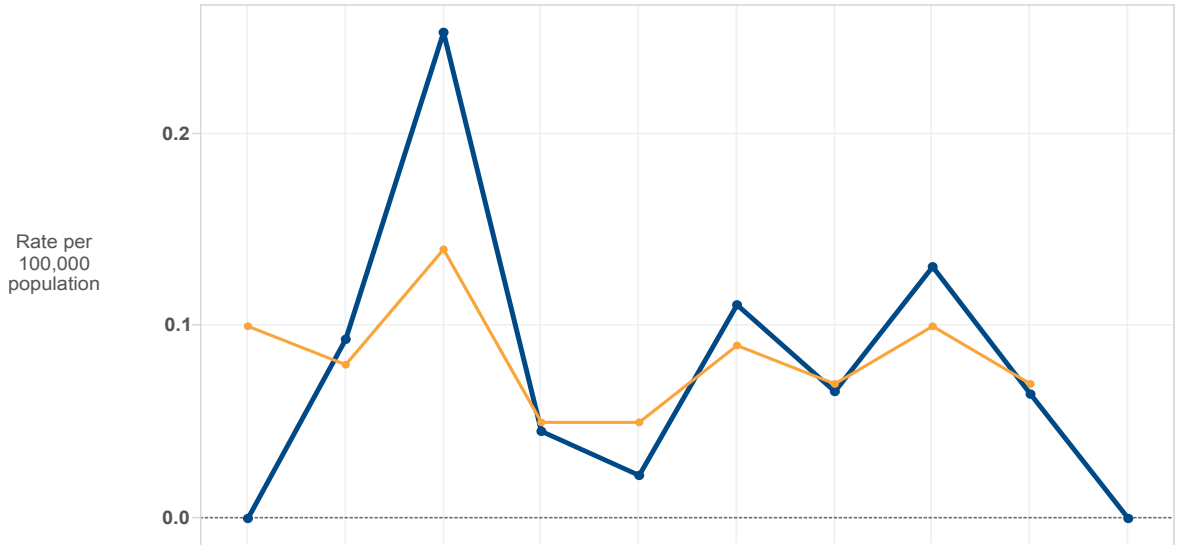
Haemophilus influenzae type b (Hib), invasive
Influenza
Measles
Meningococcal Disease (invasive)
Mumps
Pertussis
Pneumococcal Disease (invasive)
Rubella and Congenital Rubella Syndrome
Tetanus

Haemophilus influenzae type b (Hib), invasive

No cases of invasive *Haemophilus influenzae* type b (Hib) disease were reported in 2015. Hib vaccine is routinely given in infancy with a booster dose in the second year of life. Its use in adults is limited to those with select high risk medical conditions. Hib disease has declined dramatically since the introduction of Hib vaccines in the early 1990s, with a small residual burden of illness almost exclusively in adults.

interactive dashboard

23.1 Haemophilus influenzae type b (Hib), invasive Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	0	4	11	2	1	5	3	6	3	0
BC Rate	0.00	0.09	0.25	0.05	0.02	0.11	0.07	0.13	0.06	0.00
Canadian Rate	0.10	0.08	0.14	0.05	0.05	0.09	0.07	0.10	0.07	

Influenza

Influenza surveillance is conducted year-round in BC, with renewed annual monitoring typically commencing the first week of October (week 40) and ongoing through the end of September (week 39). This report summarizes surveillance data for the 2015-16 influenza season, spanning week 40 (starting October 4, 2015) through week 17 (ending April 30, 2016).

Influenza surveillance in BC consists of monitoring major trends in influenza activity and circulating viruses to inform prevention and control programs, including vaccine effectiveness. Community indicators for influenza-like illness (ILI) surveillance include: (1) sentinel practitioner ILI reporting; (2) Medical Service Plan (MSP) visits with a clinical diagnosis of influenza illness; (3) facility and school outbreak notifications; (4) provincial influenza laboratory diagnosis by the BCCDC Public Health Laboratory (PHL) and BC Children's and Women's Health Centre Laboratory; and (5) strain characterization and antiviral resistance testing by the National Microbiology Laboratory (NML), Public Health Agency of Canada.

Since 2004, the BCCDC has led a national surveillance initiative to monitor annual vaccine effectiveness (VE) against medically-attended, lab-confirmed influenza, using a test-negative case-control design overlaid upon the national Sentinel Practitioner Surveillance Network (SPSN), with additional phenotypic and genetic characterization of circulating viruses to inform VE analysis and interpretation.

Detailed surveillance bulletins are issued throughout the season, distributed weekly during the influenza season and periodically during inter-seasonal months, and are available from:

http://www.bccdc.ca/health-professionals/data-reports/influenza-surveillance-reports.

SUMMARY

The 2015-16 influenza season in BC was characterized by overall mild activity and mixed circulation of influenza A and B viruses, with a later than typical seasonality. Compared to prior recent seasons, most ILI surveillance indicators were lower than historical averages throughout the season. Notable influenza activity did not start until late December (weeks 51-52), peaking over a prolonged period in February (weeks 5-8) and then gradually declining thereafter. A more pronounced peak around week 2 (early/mid-January) is typical. At the BCCDC Public Health Laboratory (PHL), influenza B viruses predominated earlier in the season starting in late December, while influenza A(H1N1)pdm09 viruses circulated later in the season from early January to mid-April. Although A(H3N2) viruses were detected earlier than usual in the autumn of 2015, they remained at low level throughout the rest of the season. Non-elderly, working-aged adults 20-64 years comprised the majority of influenza detections during the 2015-16 season (just over 50%), likely driven by co-circulation of A(H1N1)pdm09 and B viruses, with children <20 years old and elderly adults ≥65 years old each comprising about one-quarter of influenza detections overall. Despite prominent influenza A(H1N1)pdm09 activity this season in BC, A(H1N1)pdm09 viruses were a lesser contributor to long-term care facility influenza outbreaks, comprising only 6 (21%) of the 29 lab-confirmed influenza outbreaks with subtype information most involved A(H3N2) (15/29; 52%) or influenza B (13/29; 45%), inclusive of outbreaks with multiple influenza type/subtype detection. In mid-season analysis from the BCCDC-led national Sentinel Practitioner Surveillance Network (SPSN), interim estimates of vaccine effectiveness (VE) showed significant protection of about 60% overall against medically attended, lab-confirmed A(H1N1)pdm09 illness, despite some genetic evolution in circulating viruses. End-of-season VE estimates are pending.

1. Sentinel physician reporting of ILI

During the 2015-16 season (week 40 to week 17), each week 70-95% of the 34 active sentinel sites (with one or more contributing practitioners at each site) representing all regional health authorities in BC contributed to sentinel ILI surveillance. The proportion of patient visits due to ILI seen by these sentinel sites was generally consistent with expected historical ranges throughout the influenza season (Figure 24.2). Sentinel ILI rates peaked around late January and early February (weeks 4-5), suggesting a later than typical seasonality.

2. MSP visits with an influenza diagnosis

BC MSP general practitioner service claims with a clinical diagnosis of influenza illness (ICD-9 code 487), as a proportion of all submitted MSP claims, increased gradually beginning in late December (week 51) and peaked in mid-February (weeks 7-8) (Figure 24.3), with some expected regional variation observed across health authorities. Overall, provincial rates were above 10-year 75th percentiles during this peak period due to the late start to the 2015-16 season, but were considerably lower than historical peak levels observed in previous seasons, which typically occur

earlier in the season.

3. Facility outbreak notifications

Residential facilities, such as long-term care facilities (LTCFs), are asked to notify their local health unit when 2 or more cases of ILI occur within their setting within a 7-day period. Schools are asked to report when absenteeism, mostly likely due to ILI, is greater than 10% on any one day. Provincial reporting of ILI outbreaks to BCCDC is at the discretion of the local health authority and varies regionally, with less consistent reporting for school outbreaks.

During the 2015-16 season (week 40 to week 17), 33 lab-confirmed influenza outbreaks in facilities were reported to BCCDC, including 30 from LTCFs, 1 from an acute care facility, and 2 from rehabilitation facilities (Figure 24.4). Of these, 17 had influenza A detected [13 A(H3N2), 3 A(H1N1)pdm09, and 1 with insufficient sample for subtyping] and 11 had influenza B detected; 5 outbreaks had co-detection of 2 different influenza strains [2 A(H3N2) and A(H1N1)pdm09, 2 A(H3N2) and B, and 1 A(H1N1)pdm09 and B]. Four LTCF outbreaks, all with influenza A(H3N2) detected, were additionally reported with onset in weeks 32-39 (i.e. prior to the start of the influenza surveillance period, not shown on Figure 24.4, suggesting atypical inter-seasonal influenza activity. Lab-confirmed influenza outbreaks (predominantly influenza B) continue to be reported beyond week 17, the end of the influenza surveillance period (also not shown on Figure 24.4), consistent with the late start to the 2015-16 influenza season.

Overall, fewer lab-confirmed influenza outbreaks in LTCFs were reported during the 2015-16 season (n=30) compared to the prior A(H3N2)-dominant 2014-15 season (n=165), during which a record number of facility outbreaks were reported; however, a higher number of influenza outbreaks were reported in 2015-16 compared to the last A(H1N1)pdm09-dominant season in 2013-14 (n=13). Of note, despite prominent A(H1N1)pdm09 contribution to influenza detections overall this season in BC (43% of all influenza virus detections with known type/subtype at the BCCDC PHL; Figure 24.5), A(H1N1)pdm09 viruses were a lesser contributor to facility influenza outbreaks. Of the 29 lab-confirmed outbreaks in LTCFs reported cumulatively since week 40 and with type/subtype information available, only 6 (21%) had A(H1N1)pdm09 detected whereas most involved A(H3N2) (15; 52%) or influenza B (13; 45%), inclusive of outbreaks with multiple influenza type/subtype detection. Prior serological studies have demonstrated that elderly adults possess some degree of pre-existing protective immunity to A(H1N1)pdm09 due to childhood exposures to antigenically related viruses but are more susceptible to infection with A(H3N2) viruses, which likely contributed to A(H1N1)pdm09 detections among facility outbreaks during this and other seasons.

In addition to facility outbreak reports, 38 ILI outbreaks were reported from schools during the 2015-16 influenza season.

4. Laboratory diagnosis

a. BCCDC Public Health Laboratory

The BCCDC Public Health Laboratory (PHL) routinely conducts influenza and other respiratory virus testing on specimens collected from pediatric and acute care hospital inpatients, or patients of residential facilities, and community sentinel sites and otherwise where clinically indicated or specifically requested. This includes specimens diagnosed with influenza elsewhere for which subtype information is sought. All submitted specimens are routinely tested for influenza A/B and respiratory syncytial virus (RSV), while testing for other respiratory viruses is conducted less systematically and only on a subset of influenza and RSV negative specimens during peak influenza season.

During the 2015-16 season (week 40 through week 17), the BCCDC PHL tested 8,351 patients for respiratory viruses. Of these, 2,250 (27%) were positive for influenza, including 1,269 (56%) patients with influenza A [963 A(H1N1)pdm09, 296 A(H3N2), and 10 influenza A unsubtyped], 976 (43%) with influenza B, and 5 (<1%) adult patients with influenza A and B co-infections [4 with A(H1N1)pdm09 and B and 1 with A(H3N2) and B].

Overall, the 2015-16 season was characterized by mixed circulation of influenza A and B viruses, with A(H1N1)pdm09 subtype viruses predominating over A(H3N2) subtype viruses since early January (week 2) and B/Victoria lineage viruses predominating over B/Yamagata lineage viruses throughout the season (Figure 24.5). Overall influenza positivity at the BCCDC PHL increased dramatically from less than 10% in mid-December (week 50) to over 30% in early January (week 2).

Just over one-half (53%) of influenza detections during the 2015-16 season were in non-elderly, working-aged adults 20-64 years, with a smaller proportion of detections in children <20 years (24%) and elderly adults ≥65 years (23%). However, this age distribution differed by influenza type/subtype: adults 20-64 years, and to a lesser extent children <20 years, comprised a larger proportion of A(H1N1)pdm09 and influenza B cases, while elderly adults ≥65 years comprised a larger proportion of A(H3N2) cases (Figure 24.6 and 24.7).

Among other respiratory viruses, RSV co-circulated with influenza viruses, peaking around 10% positivity in late February and early March (week 8-9), while entero/rhinoviruses were detected throughout the season, most notably at the beginning of the season (week 40-50) before influenza activity began to increase.

b. BC Children's and Women's Health Centre Laboratory

During the 2014-15 influenza season (week 40 to week 17), the BC Children's and Women's Health Centre Laboratory conducted 3,560 tests for influenza A and 2,785 tests for influenza B. Of these, 120 (3%) tests were positive for influenza A and 24 (1%) tests were positive for influenza B. As with laboratory surveillance at the BC PHMRL, influenza A was the predominant influenza virus detected, followed by a smaller late-season wave of influenza B (Figure 24.8). RSV was the mostly commonly detected virus among the non-influenza respiratory viruses.

c. Strain characterization by the National Microbiology Laboratory

Select influenza isolates are routinely sent by the BCCDC PHL to the NML for strain characterization by haemagglutination inhibition (HI) assay. From September 1, 2015 to April 30, 2016, 66 BC isolates were sent to the NML for strain characterization, including 4 A(H1N1)pdm09, 10 influenza A(H3N2) and 52 influenza B.

Of the 4 A(H1N1)pdm09 viruses, all were antigenically similar to A/California/7/2009 based on HI assay, the WHO-recommended A(H1N1) component for the 2015-16 northern hemisphere influenza vaccine.

Of the 10 influenza A(H3N2) viruses, none had sufficient haemagglutination titre for antigenic characterization by HI assay. Genetic characterization was performed to infer antigenic properties on the A(H3N2) viruses that did not grow to sufficient haemagglutination titre for HI assay. All 10 of the A(H3N2) viruses genetically characterized were reported to belong to a genetic group in which most viruses were antigenically related to A/Switzerland/9715293/2013, the WHO-recommended A(H3N2) component for the 2015-16 northern hemisphere influenza vaccine.

Of the 52 influenza B viruses, 11 (21%) were antigenically similar to B/Phuket/3073/2013 (Yamagata lineage), the recommended influenza B component for the 2015-16 northern hemisphere trivalent influenza vaccine (TIV), while 41 (79%) were characterized as B/Brisbane/60/2008 (Victoria lineage), the recommended influenza B component for the 2015-16 northern hemisphere quadrivalent influenza vaccine (QIV) containing two influenza B components.

For context, the WHO-recommended components for the 2015-16 and upcoming 2016-17 northern hemisphere TIV are listed below:

2015-16	2016-17 §
A/California/07/2009(H1N1) pdm09-like virus*	A/California/07/2009(H1N1) pdm09-like virus*
A/Switzerland/9715293/ 2013(H3N2)-like virus†	A/Hong Kong/4801/2014(H3N2)-like virus**
B/Phuket/3073/2013-like virus (Yamagata lineage)‡	B/Brisbane/60/2008-like virus (Victoria lineage)††

The 2015-16 northern hemisphere QIV contained two influenza B viruses including the above three viruses and a B/Brisbane/60/2008-like virus (Victoria lineage), the same influenza B strain recommended for the 2016-17 northern hemisphere TIV.

* Recommended strain has been retained as the A(H1N1) component since the 2009 pandemic and has been included in the northern hemisphere vaccine since 2010-11.

† Recommended strain is considered antigenically distinct from the A/Texas/50/2012-like virus recom-

mended for the 2014-15 northern hemisphere vaccine and clusters within the phylogenetic clade 3C.3a.

‡ Recommended strain is the same Yamagata lineage as the B/Massachusetts/2/2012-like virus recommended for the 2014-15 northern hemisphere vaccine but represents a phylogenetic clade-level change from clade 2 to clade 3.

§ Recommended strains represent a change for two of the three components used for the 2015-16 northern hemisphere TIV.

** Recommended strain for the A(H3N2) component represents a phylogenetic clade-level change from a clade 3C.3a virus to a clade 3C.2a virus.

†† Recommended strain for the influenza B component represents a lineage-level change from a Yamagata to a Victoria lineage virus.

d. Antiviral resistance assessment by the National Microbiology Laboratory

The The NML routinely tests for susceptibility of selected influenza isolates to antiviral drugs recommended for treatment of influenza. From September 1, 2015 to April 30, 2016, 14 influenza A viruses from BC [4 A(H1N1)pdm09 and 10 A(H3N2)] were tested against amantadine and all were resistant; 67 influenza viruses from BC [4 A(H1N1)pdm09, 11 A(H3N2) and 52 influenza B] were tested against oseltamivir and all were sensitive; and 67 influenza viruses from BC [4 A(H1N1)pdm09, 11 A(H3N2) and 52 influenza B] were tested against zanamivir and all were sensitive.

Nationally, 1 A(H1N1)pdm09 virus from Newfoundland and Labrador and 1 A(H3N2) virus from Alberta, out of 1,147 A(H1N1)pdm09 and 200 A(H3N2) tested viruses, respectively, were found to be sensitive to amantadine. Eight A(H1N1)pdm09 viruses with a H275Y mutation (4 from Ontario and 4 from Quebec), out of 786 A(H1N1)pdm09 tested viruses, were found to be resistant to oseltamivir.

5. Sentinel influenza vaccine effectiveness (VE) monitoring

Interim estimates of 2015-16 vaccine effectiveness (VE) against influenza A(H1N1)pdm09 illness were derived in February 2016 using respiratory specimens and epidemiological information collected from patients presenting with ILI to sentinel sites participating in the BCCDC-led Canadian Sentinel Practitioner Surveillance Network (SPSN) in BC, Alberta, Ontario and Quebec.

VE against medically attended, lab-confirmed A(H1N1)pdm09 illness was 64% (95%CI=44-77%) overall and 56% (95%CI=26-73%) among adults 20-64 years old. Since their first emergence in 2009, A(H1N1)pdm09 viruses have evolved slightly, with an increasing proportion of viruses since October 2015 belonging to the newly emerging subclade 6B.1 (defined by S162N and I216T mutations in the haemagglutinin protein). However, in mid-season analysis these mutations did not appear to have dramatically affected the protection given by the A(H1N1)pdm09 vaccine component, which has been retained in the seasonal influenza vaccine since the 2009 pandemic. These findings were comparable to previous VE estimates of 70% measured by the Canadian SPSN during the last substantial A(H1N1)pdm09 epidemic in 2013-14. However, due to considerations such as the late start of the 2015-16 influenza season and smaller number of accrued cases in mid-season analysis, and the potential for further evolution in circulating viruses and/or waning immunity, estimates may differ in end-of-season analyses.

Mid-season findings were published in EuroSurveillance, an open-access peer-reviewed journal, in March 2016: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=21415.

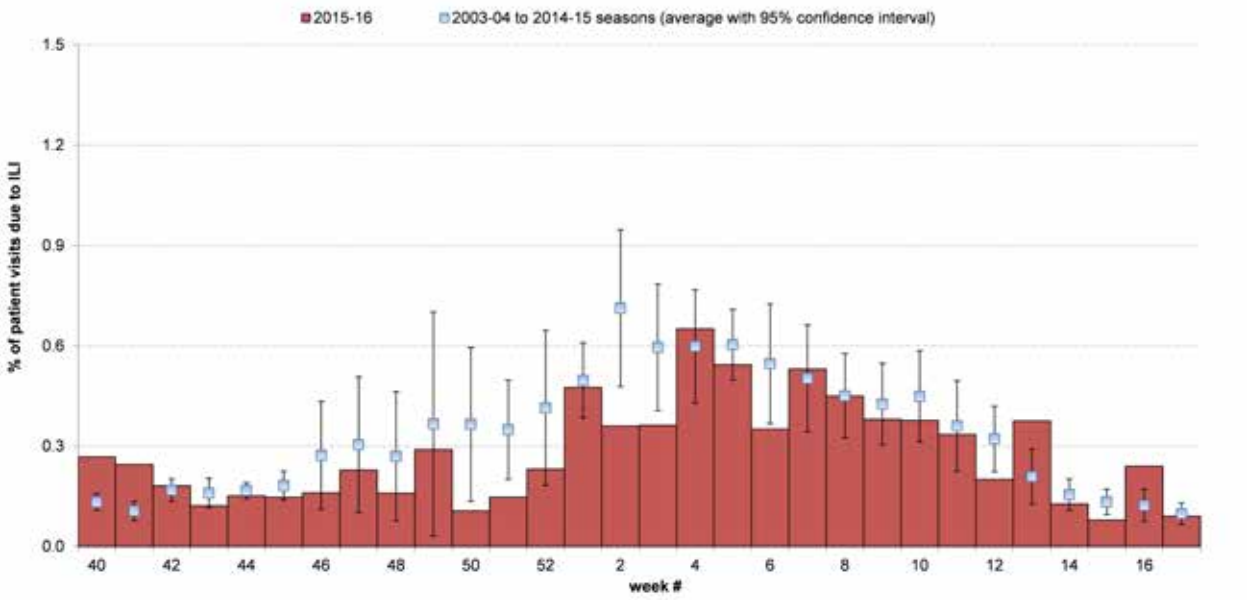
24.1 Number of Reported Lab-Confirmed Influenza Outbreaks in Long-Term Care Facilities (LTCF) British Columbia, Week 40 to Week 17, 2003-04 to 2015-16 Seasons

Season	LTCF outbreaks*
2003-04	46
2004-05	68
2005-06	28
2006-07	25
2007-08	53
2008-09	41
2009-10	12
2010-11	13
2011-12	30
2012-13	91
2013-14	13
2014-15†	165
2015-16	30

† Includes one lab-confirmed influenza outbreak reported in an assisted living facility.

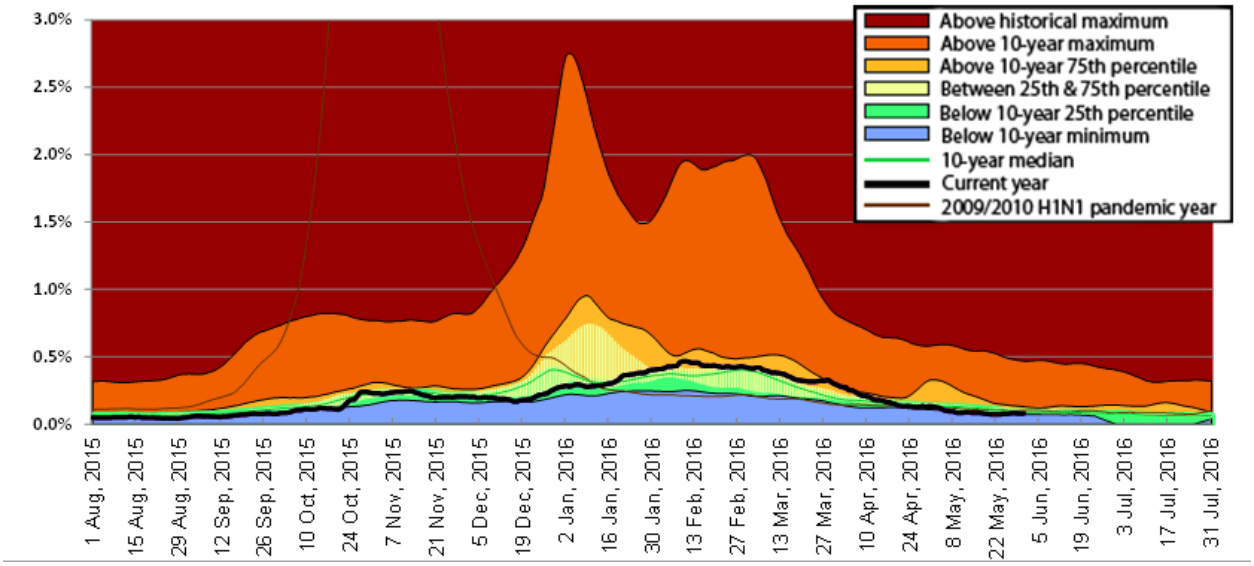
Historical numbers may differ from previous annual reports due to restriction of data to lab-confirmed influenza outbreaks and retrospective reconciliation of data entry or reporting anomalies (e.g. duplicate reporting).

24.2 Percent of Patient Visits to Sentinel Practitioners Due to Influenza-Like Illness (ILI) per Week Compared to Historical 10-Season Average, British Columbia, 2015-16 Season



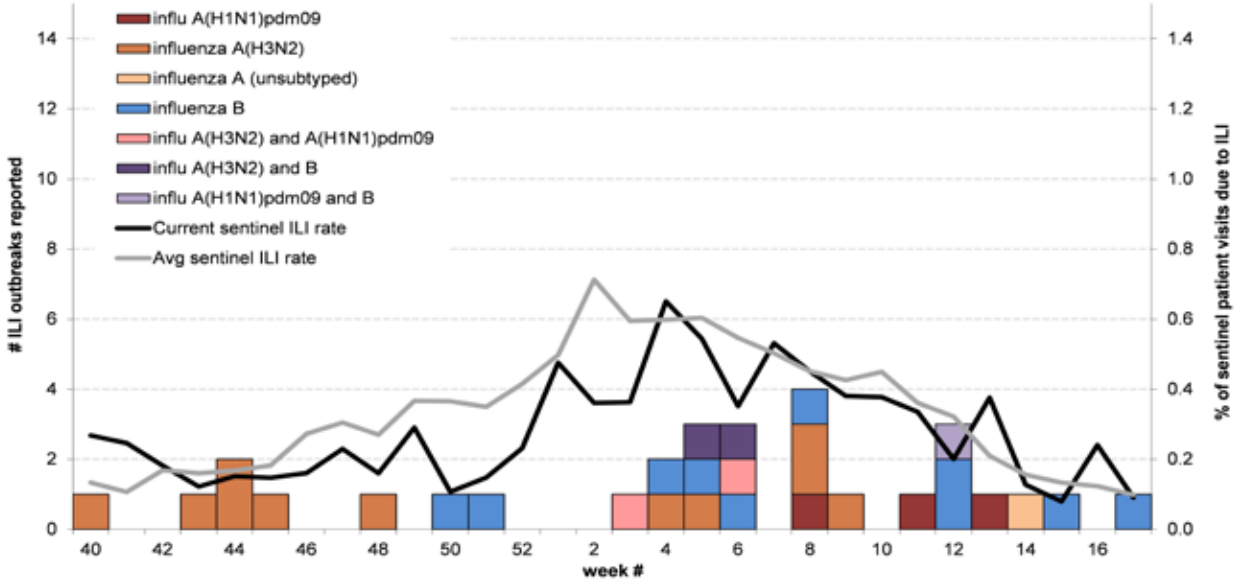
Surveillance period includes week 40 (starting October 4, 2015) to week 17 (ending April 30, 2016), inclusive. Ten-year historical average includes 2003-04 to 2014-15 seasons, excluding 2008-09 and 2009-10 seasons due to atypical seasonality. One hospital ER site that reported ILI rates of ≥4% during weeks 7-9 was excluded from graph.

24.3 BC MSP General Practitioner Service Claims for Influenza Illness (Il) as a Proportion of All Submitted Service Claims (7-day Moving Average), British Columbia, 2015-16 Season*



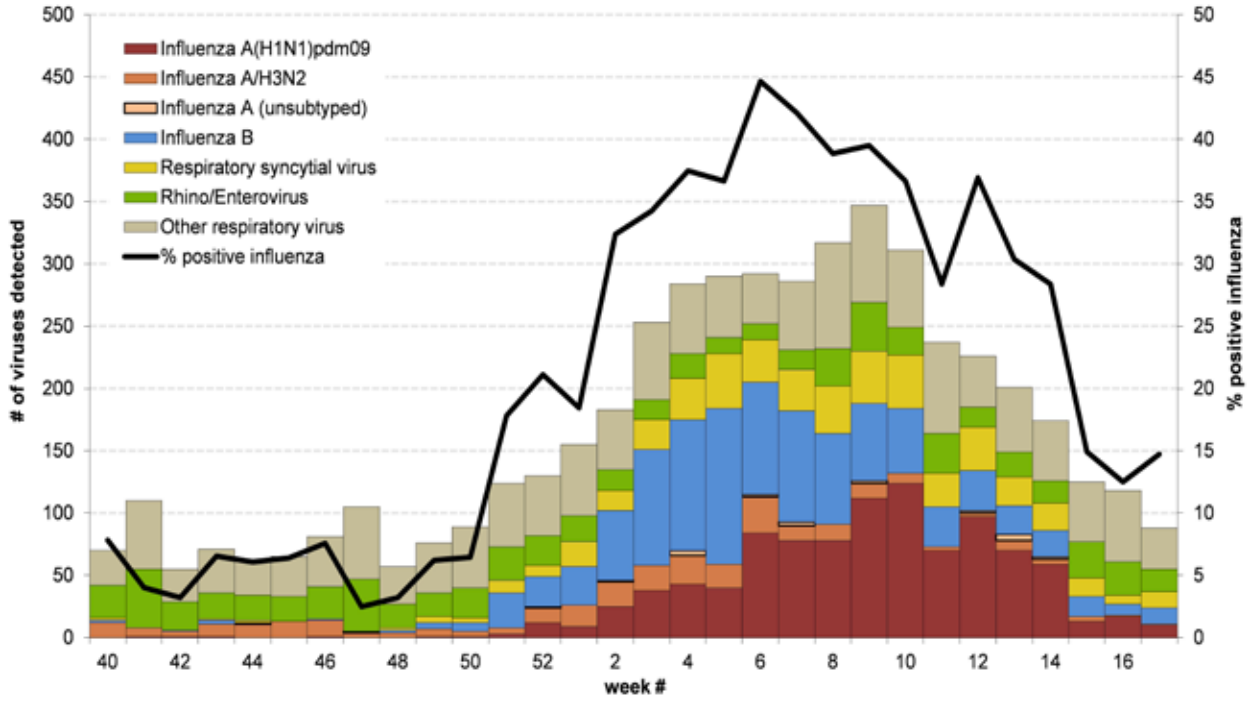
Influenza illness is tracked as the percent of all submitted MSP service claims for selected general practitioner services with a diagnosis of influenza (ICD-9 code 487). Data are provided by Population Health Surveillance and Epidemiology, BC Ministry of Health Services. Data for the period August 1, 2009 to July 31, 2010 have been excluded from the 10-year median calculation due to atypical seasonality during the 2009-10 H1N1 pandemic year. MSP week beginning August 1, 2015 corresponds to sentinel ILI week 30; data are current to May 31, 2016.

24.4 Number of Lab-Confirmed Influenza Outbreaks in Long-term Care Facilities (LTCF) Reported to BCCDC per Week Compared to Current Sentinel Influenza-Like Illness (ILI) Rate and Historical 10-Seasons, British Columbia, 2015-16 Season

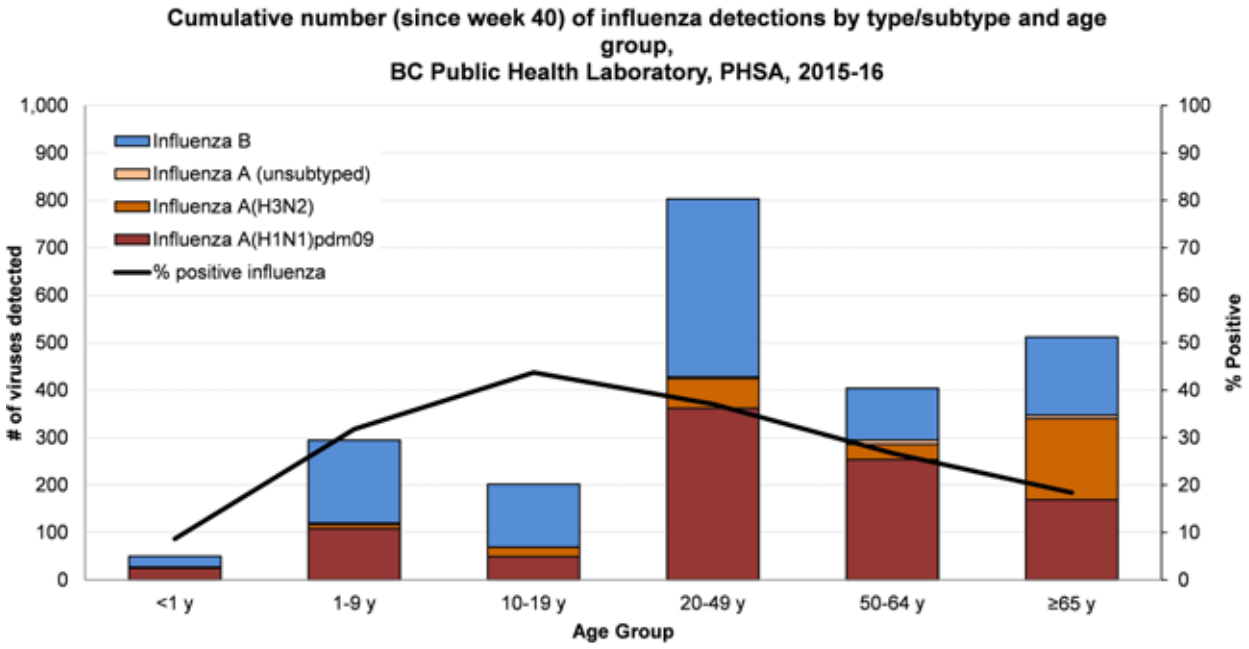


Lab-confirmed influenza outbreak in a LTCF is defined as 2 or more cases of ILI within 7-day period, with at least one specimen lab-confirmed as influenza.Ten-year historical average includes 2003-04 to 2014-15 seasons, excluding 2008-09 and 2009-10 seasons due to atypical seasonality. One hospital ER sites that reported ILI rates of ≥4% during weeks 7-9 was excluded from graph.

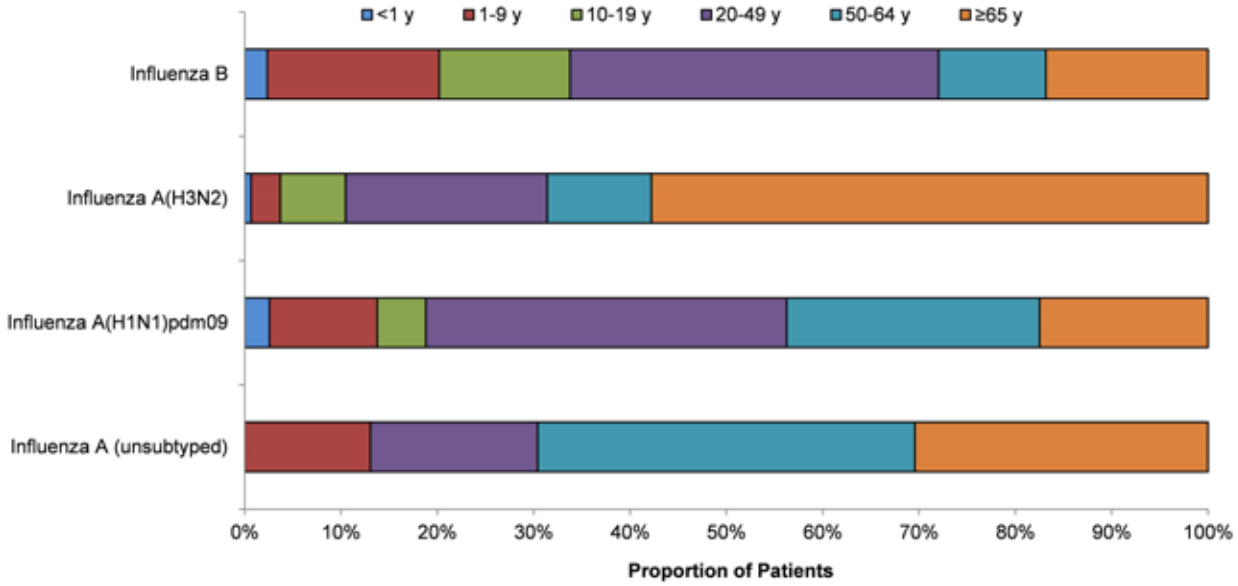
24.5 Influenza and Other Virus Detections Among Respiratory Specimens, BC Public Health Laboratory, British Columbia, 2015-16 Season



24.6 Cumulative Number (since Week 40) of Influenza Detections by Type/Subtype and Age Group, BCCDC Public Health Laboratory, 2015-16

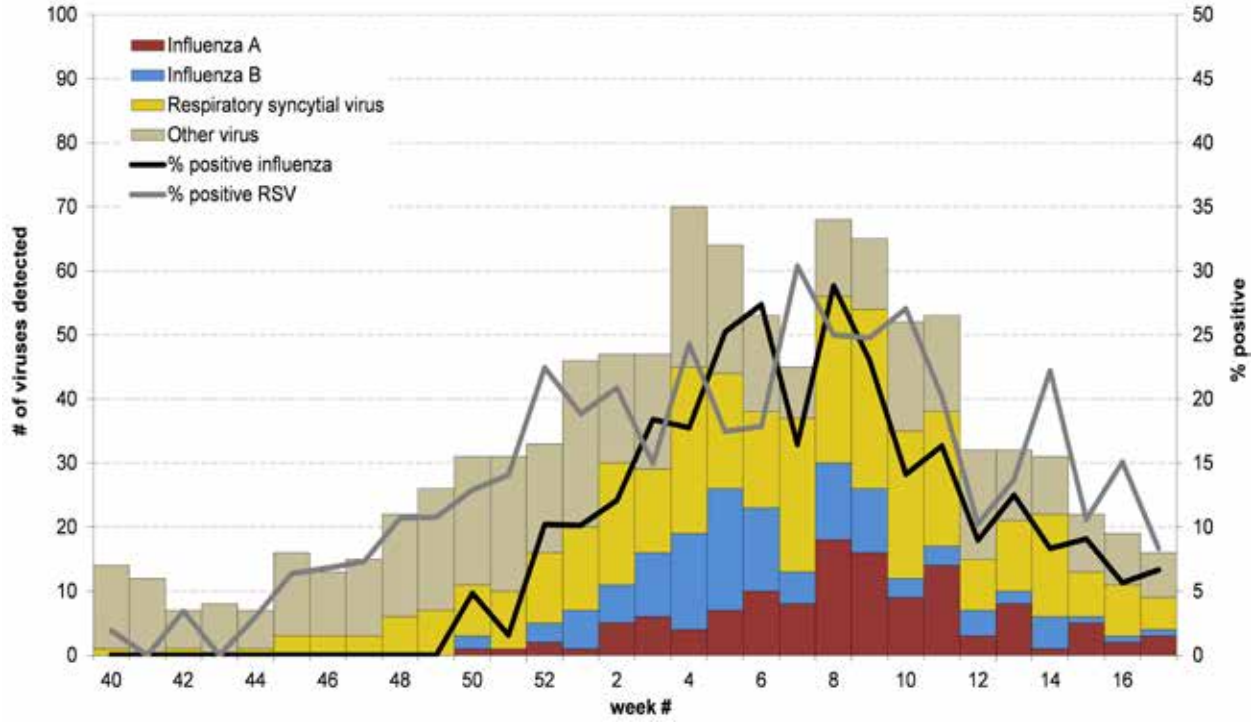


24.7 Age Distribution of Influenza Detections (Cumulative since Week 40) by Type/Subtype, BCCDC Public Laboratory, 2015-16



Data are current to May 17, 2016; figure includes cumulative influenza detections for specimens collected from weeks 40-17.

24.8 Influenza and Other Virus Detections Among Respiratory Specimens, BC Children's and Women's Health Centre Laboratory, British Columbia, 2015-16 Season" on page 20 Influenza and Other Virus



Measles

A single importation of measles in mid-March led to 11 confirmed measles cases in BC in 2015; 8 were in Vancouver Coastal and 3 in Fraser. Ten were among BC residents (0.21 per 100,000 population) and 1 was a visitor to BC.

This outbreak was associated with a high school trip to China. Two returning students developed onset of illness compatible with acquisition at the same time while in China, and were infectious on their return flight from Beijing to Vancouver. Of the remaining cases, 7 were exposed while abroad or during the flight, 1 was exposed at Vancouver airport (YVR) upon flight arrival, and 1 was a household contact of a case.

Of the 10 cases among BC residents, 8 cases were 10 to 19 years old and 2 were aged 30 to 39. Five were male.

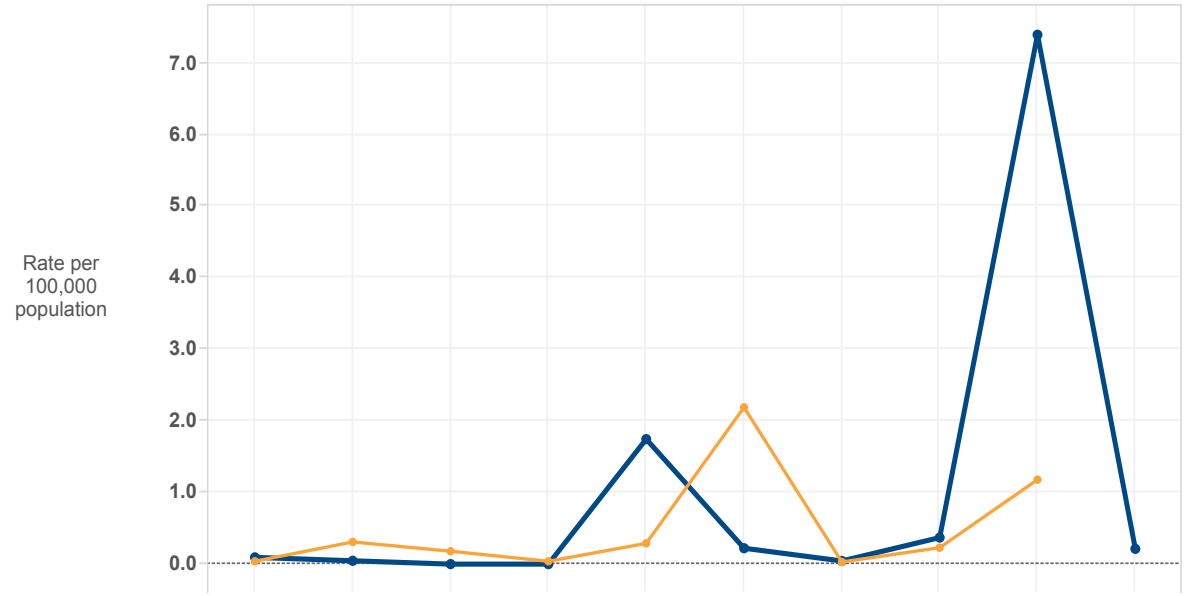
Three cases had documented receipt of 2 doses and one case had 1 dose of measles containing vaccine, two cases gave a verbal history of childhood vaccinations, one case had unknown measles vaccination status and three cases were unvaccinated against measles. Half of the cases visited emergency rooms; none were hospitalized. All recovered fully.

All 11 cases were PCR confirmed genotype H1, which is endemic in China. The virus was the MVs/Hong Kong.CHN/49.12 reference sequence variant. Nine of 11 cases were identical to the reference sequence variant and the other 2 cases had a 1 nucleotide difference.

Global distribution of measles genotypes is available at http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/index1.html

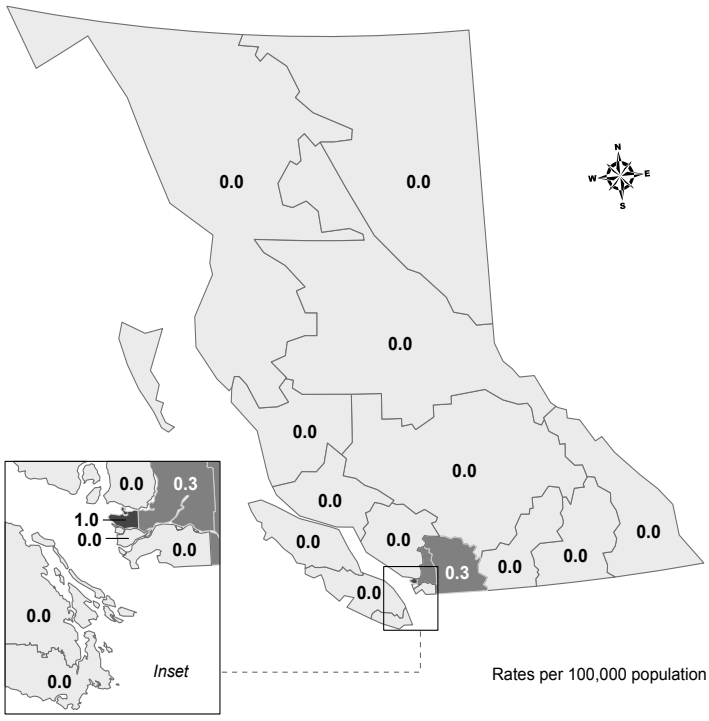
Measles elimination status was achieved in Canada in 1998, however, importations and subsequent transmission arise periodically, largely driven by measles activity globally and travel patterns of British Columbians. BC guidelines recommend 2 doses of measles containing vaccine for health care workers born in 1957 and later and for other residents born in 1970 or later.

25.1 Measles Rates by Year, 2006-2015

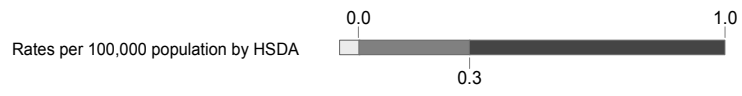


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	4	2	0	0	78	10	2	17	343	10
BC Rate	0.09	0.05	0.00	0.00	1.75	0.22	0.04	0.37	7.40	0.21
Canadian Rate	0.04	0.31	0.18	0.04	0.29	2.19	0.03	0.23	1.18	

25.2 Measles Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	0	0.0
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	1	0.3
22	Fraser North	2	0.3
23	Fraser South	0	0.0
31	Richmond	0	0.0
32	Vancouver	7	1.0
33	North Shore/Coast Garibaldi	0	0.0
41	South Vancouver Island	0	0.0
42	Central Vancouver Island	0	0.0
43	North Vancouver Island	0	0.0
51	Northwest	0	0.0
52	Northern Interior	0	0.0
53	Northeast	0	0.0



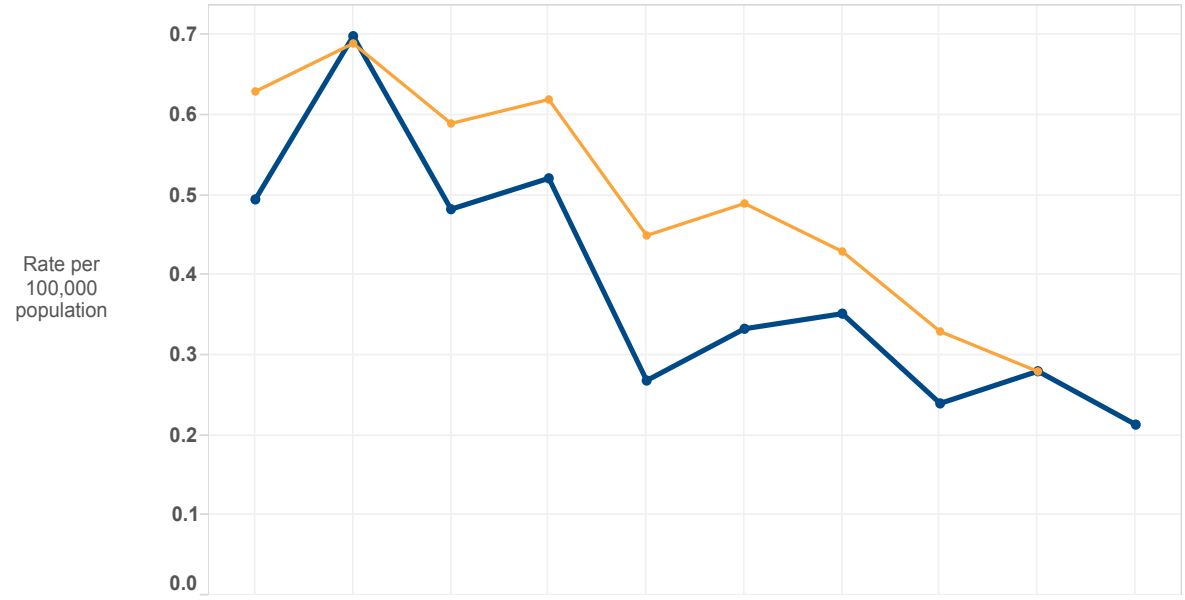
Meningococcal Disease (invasive)

Ten sporadic cases of invasive meningococcal disease (IMD) were reported in 2015, none with fatal outcomes. There were 6 cases of serogroup B, and 2 cases each of serogroup Y and W-135 disease. No cases had reported being immunized against the serogroup-specific disease. The median age of cases was 44 years, with four cases under 25 years of age (3 serogroup B and 1 serogroup W-135).

The incidence of IMD has decreased from 0.5 cases per 100,000 population in 2006 to 0.2 cases per 100,000 population in 2015. This is partly due to a decline in serogroup C from 0.1 to 0 cases per 100,000 population from 2006 to 2015, reflecting the impact of the infant and school-age meningococcal C conjugate immunization program beginning in September 2003. The remaining portion of the decline was due to lower incidence of serogroups A (2 travel-associated cases in 2006 only), B, Y and non-typeable cases.

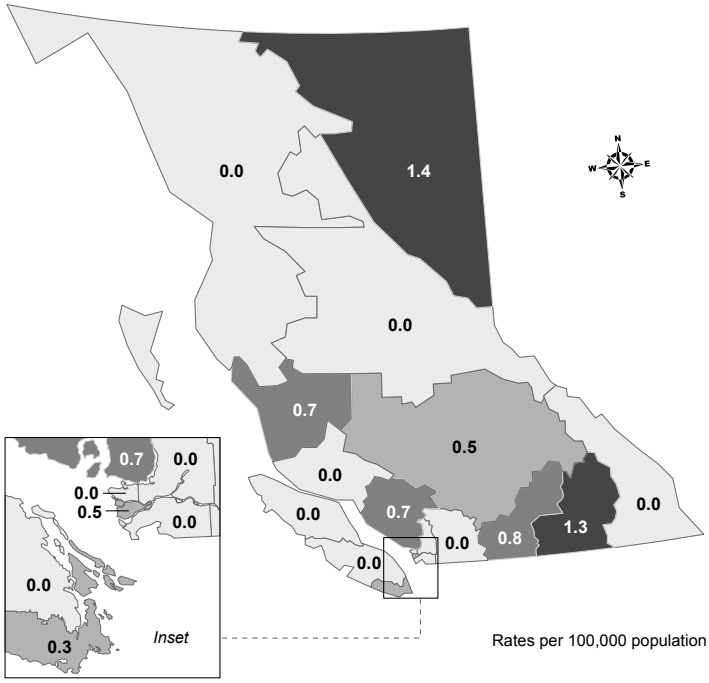
With declining incidence of serogroup C, serogroup B has become the most commonly reported serogroup with an incidence that ranged from 0.09 to 0.4 cases per 100,000 population per year between 2006 and 2015.

26.1 Meningococcal Disease (invasive) Rates by Year, 2006-2015

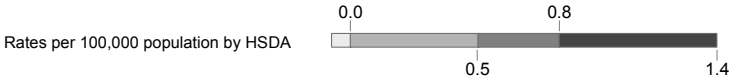


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	21	30	21	23	12	15	16	11	13	10
BC Rate	0.50	0.70	0.48	0.52	0.27	0.33	0.35	0.24	0.28	0.21
Canadian Rate	0.63	0.69	0.59	0.62	0.45	0.49	0.43	0.33	0.28	

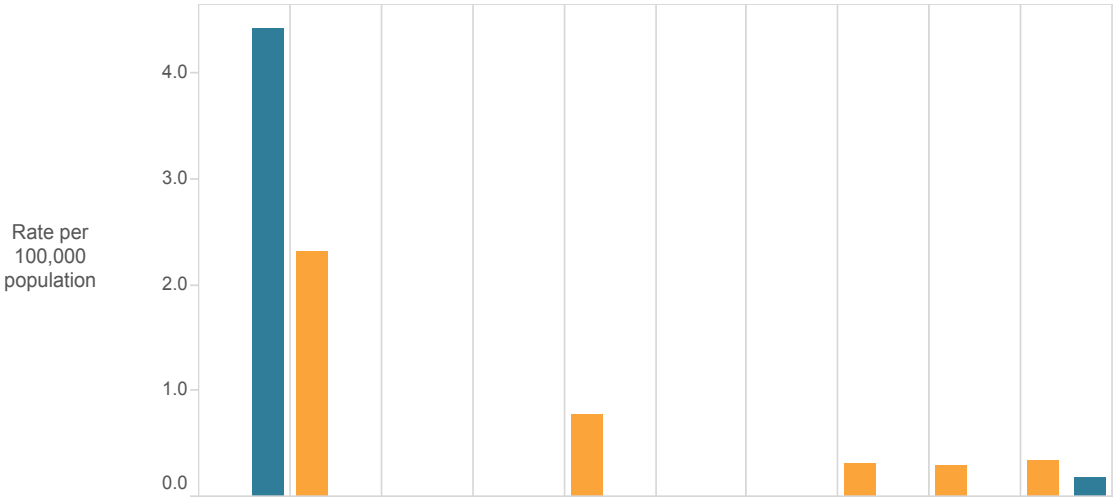
26.2 Meningococcal Disease (invasive) Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	1	1.3
13	Okanagan	3	0.8
14	Thompson Cariboo Shuswap	1	0.5
21	Fraser East	0	0.0
22	Fraser North	0	0.0
23	Fraser South	0	0.0
31	Richmond	1	0.5
32	Vancouver	0	0.0
33	North Shore/Coast Garibaldi	2	0.7
41	South Vancouver Island	1	0.3
42	Central Vancouver Island	0	0.0
43	North Vancouver Island	0	0.0
51	Northwest	0	0.0
52	Northern Interior	0	0.0
53	Northeast	1	1.4

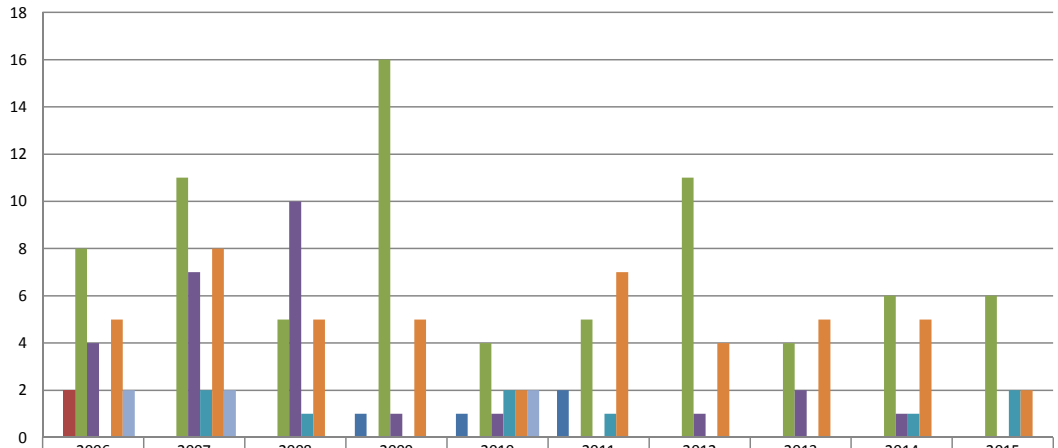


26.3 Meningococcal Disease (invasive) Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	2	0	0	1	0	0	1	2	2
	Male	1	0	0	0	0	0	0	0	0	1
	Total	1	2	0	0	1	0	0	1	2	3
BC Rate	Female	0.00	2.32	0.00	0.00	0.77	0.00	0.00	0.32	0.29	0.34
	Male	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
	Total	2.27	1.13	0.00	0.00	0.37	0.00	0.00	0.16	0.15	0.27

26.4 Meningococcal Disease (invasive) Cases by Serotype and Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
29E	0	0	0	1	1	2	0	0	0	0
A	2	0	0	0	0	0	0	0	0	0
B	8	11	5	16	4	5	11	4	6	6
C	4	7	10	1	1	0	1	2	1	0
W-135	0	2	1	0	2	1	0	0	1	2
Y	5	8	5	5	2	7	4	5	5	2
Nontypable/Unknown	2	2	0	0	2	0	0	0	0	0

Mumps

Fourteen confirmed mumps cases were reported in 2015 (0.30 per 100,000 population), fewer than the 23 mumps cases in 2014. Cases were reported from 3 of the 5 regional Health Authorities. More cases were male (n=9, 64%) than female (n=5, 36%). All cases were adults, and the median age of cases was 26. This age distribution is compatible with mumps epidemiology in Canada in the past decade and reflects susceptibility in adults too old to have received two doses of mumps containing vaccine in childhood and too young to be protected by prior mumps infection.

Half of the cases had travel histories compatible with acquisition outside of Canada, one case was related to household transmission, and the source for the remaining 6 cases was unknown.

Five cases had a history of prior receipt of one dose of mumps containing vaccine, one case of two doses, one case gave a history of childhood vaccination but without documentation, and 7 cases had unknown immunization history. No cases were hospitalized and no serious complications were reported.

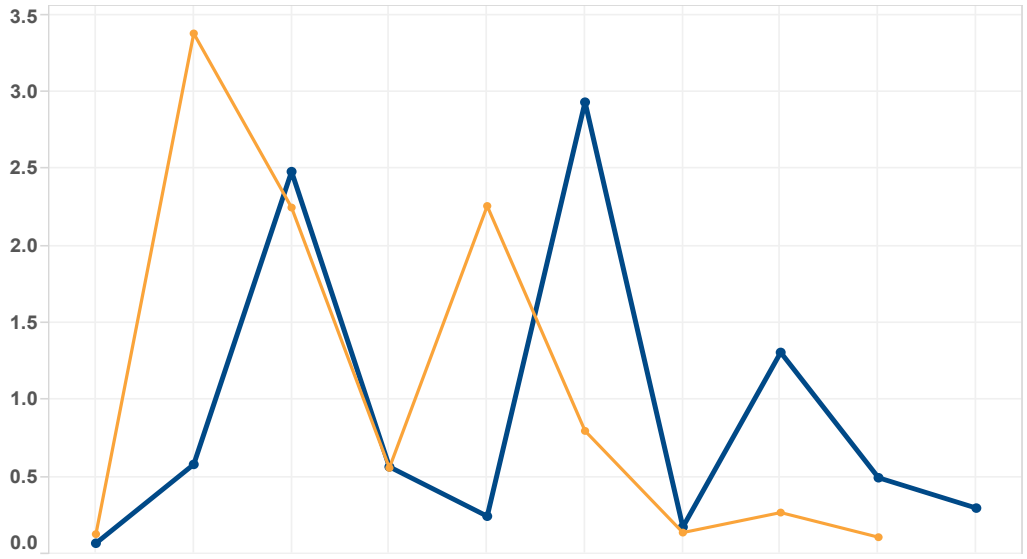
Eight cases (57%) were PCR confirmed, four cases (29%) were IgM confirmed with history of travel, one case (6%) was confirmed by IgG seroconversion and one case (6%) was epidemiologically linked to a laboratory confirmed case. Genotype was determined for 7 cases: 3 K, 2 G, 1 F, and 1 C. Genotype G was the predominant genotype in Europe and North America from 2005 to 2011 and is endemic in BC. Cases with other genotypes are attributed to importation.

Global distribution of mumps genotypes is available at

http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/passive/mumps/en/

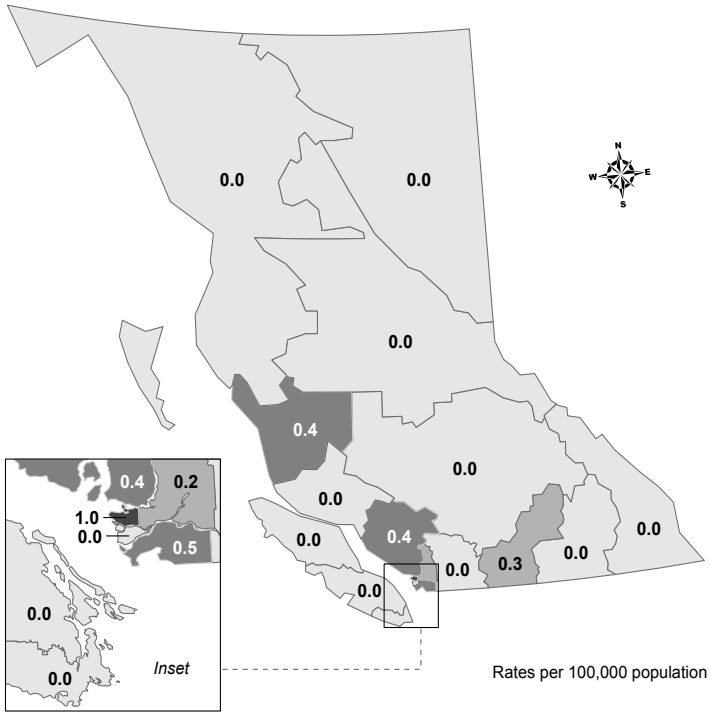
interactive dashboard

27.1 Mumps Rates by Year 2006-2015



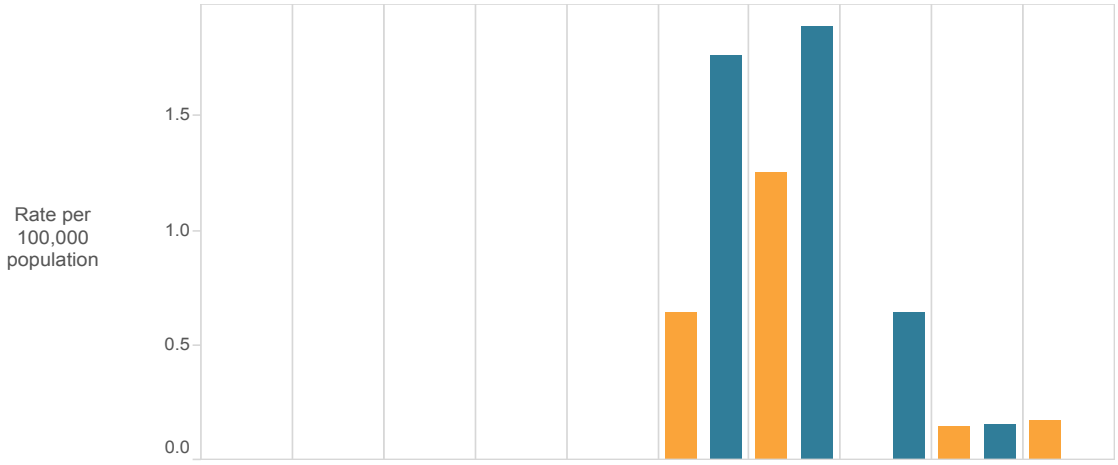
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	3	25	108	25	11	132	8	60	23	14
BC Rate	0.07	0.58	2.48	0.57	0.25	2.93	0.18	1.31	0.50	0.30
Canadian Rate	0.13	3.38	2.25	0.56	2.26	0.80	0.14	0.27	0.11	

27.2 Mumps Rates by HSDA 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	1	0.3
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	0	0.0
22	Fraser North	1	0.2
23	Fraser South	4	0.5
31	Richmond	0	0.0
32	Vancouver	7	1.0
33	North Shore/Coast Garibaldi	1	0.4
41	South Vancouver Island	0	0.0
42	Central Vancouver Island	0	0.0
43	North Vancouver Island	0	0.0
51	Northwest	0	0.0
52	Northern Interior	0	0.0
53	Northeast	0	0.0

27.3 Mumps Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	0	0	0	1	2	0	1	1
	Male	0	0	0	0	0	3	3	2	1	0
	Total	0	0	0	0	0	4	5	2	2	1
BC Rate	Female	0.00	0.00	0.00	0.00	0.00	0.65	1.26	0.00	0.15	0.17
	Male	0.00	0.00	0.00	0.00	0.00	1.77	1.89	0.64	0.15	0.00
	Total	0.00	0.00	0.00	0.00	0.00	1.23	1.57	0.32	0.15	0.09

Pertussis

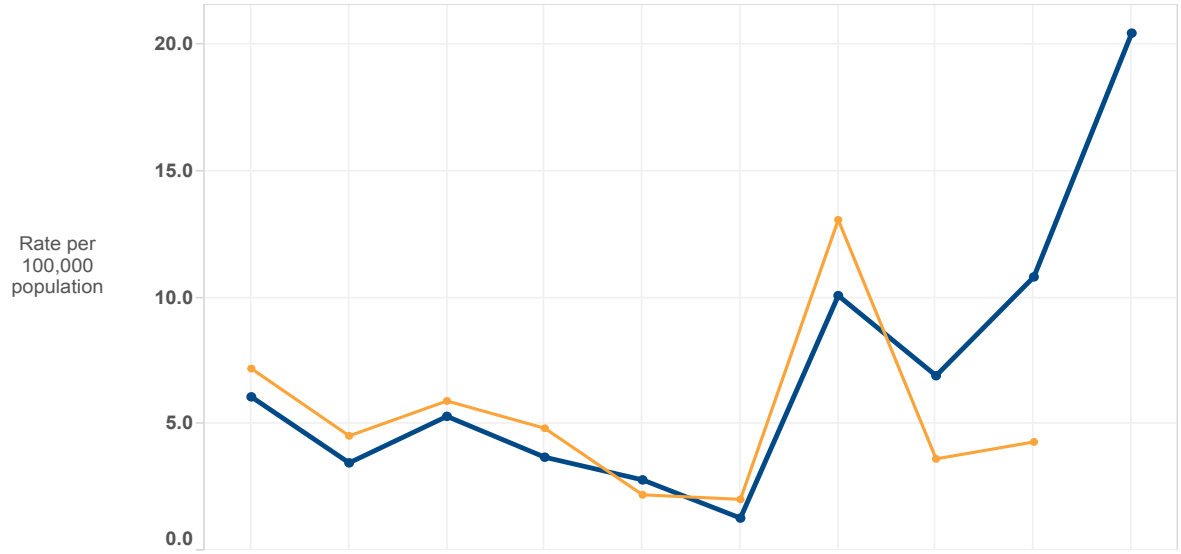
As elsewhere, pertussis remains an endemic disease in BC, with cyclical peaks occurring every 3-5 years. In 2015, BC experienced a cyclical peak in pertussis activity, with overall provincial rates of confirmed pertussis exceeding 20 cases per 100,000 (Figure 28.1). After substantial epidemics in the late 1990s and early 2000s, with incidence rates ranging from 20 to 40 per 100,000 overall, BC experienced trough levels of pertussis activity from 2004 to 2011. However, since 2012, pertussis incidence in BC has continued an increasing trend, driven primarily by asynchronous regional peaks in Vancouver Coastal and Fraser Health Authorities (2012), Vancouver Island Health Authority (2013), and Northern Health Authority (2014). This increasing trend in pertussis activity may reflect changes in population-level immunity due in part to recent periods of low-level activity in some regions of BC as well as waning of immunity from acellular vaccine.

In 2015, pertussis incidence rates were highest in Northern Health Authority, following a large-scale outbreak affecting the Haida Gwaii and Prince Rupert regions in the Northwest HSDA during the spring/summer of 2014, with elevated activity elsewhere in that region continuing into 2015. Incidence rates in Northwest HSDA in 2015 were 119 per 100,000 (Figure 28.2), but were lower by about 25% compared with the outbreak in 2014 when rates in that region reached 164 per 100,000. Elevated rates were also observed in Northeast HSDA (75 per 100,000) and Northern Interior HSDA (67 per 100,000) in 2015. These HSDA-level rates should be interpreted in the context of the small population of the area affected.

A cyclical peak in pertussis activity in 2015 was also observed in all regions of the Vancouver Island Health Authority, but in particular in the South Vancouver Island HSDA where rates were 56 per 100,000 (Figure 28.2), almost three times higher than rates observed during the last cyclical peak in that region in 2013. Heightened pertussis activity was also observed in the Kootenay Boundary HSDA (48 per 100,000), as in 2014, as well as the Okanagan HSDA (29 per 100,000) in 2015.

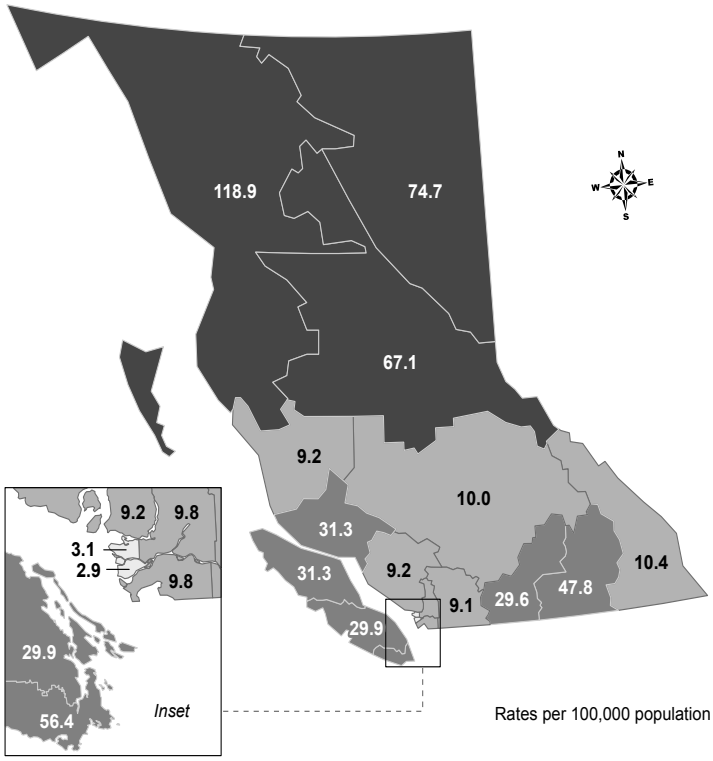
The highest age-specific incidence rates in 2015 were in infants <1 year old and pre-teens/teens (10-14 years old), both at 102 per 100,000 (Figure 28.3). Lower incidence was observed in pre-school-aged children (1-4 years old) and younger school-aged children (5-9 years old), with incidence around 50 to 60 per 100,000 in these non-infant age groups. Lower age-specific incidence was observed in older teens (15-19 years old) at 38 per 100,000 following the Grade 9 booster dose and in adults ≥20 years old at <15 per 100,000. This age distribution is consistent with prior cyclical peaks emphasizing risk in young infants and pre-teens/teens.

28.1 Pertussis Rates by Year, 2006-2015



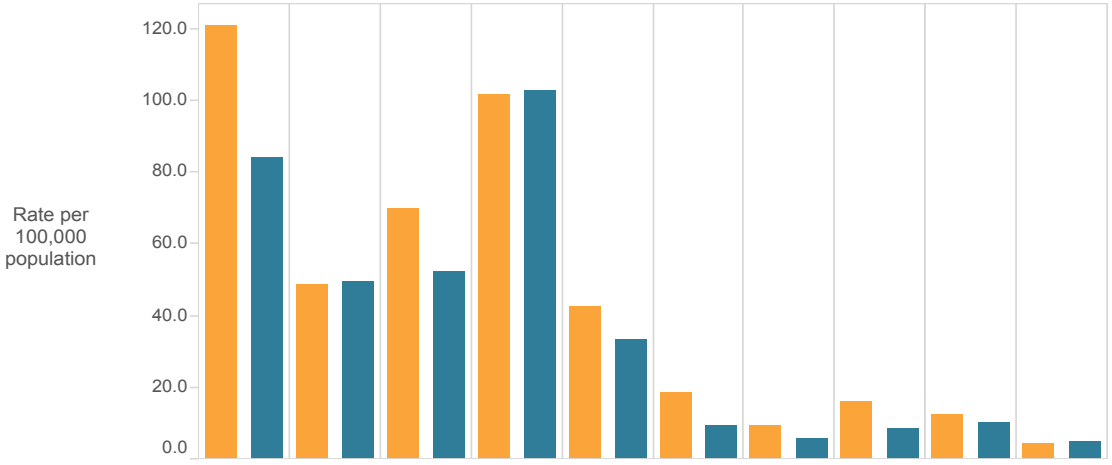
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	258	149	231	163	125	58	458	317	502	958
BC Rate	6.08	3.47	5.31	3.70	2.80	1.29	10.08	6.92	10.83	20.46
Canadian Rate	7.20	4.54	5.92	4.84	2.21	2.03	13.08	3.63	4.30	

28.2 Pertussis Rates by HSDA 2014



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	8	10.4
12	Kootenay Boundary	37	47.8
13	Okanagan	107	29.6
14	Thompson Cariboo Shuswap	22	10.0
21	Fraser East	27	9.1
22	Fraser North	64	9.8
23	Fraser South	78	9.8
31	Richmond	6	2.9
32	Vancouver	21	3.1
33	North Shore/Coast Garibaldi	26	9.2
41	South Vancouver Island	213	56.4
42	Central Vancouver Island	80	29.9
43	North Vancouver Island	38	31.3
51	Northwest	86	118.9
52	Northern Interior	93	67.1
53	Northeast	52	74.7

28.3 Pertussis Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	26	42	77	113	55	29	15	51	85	27
	Male	19	45	62	121	46	16	9	26	68	26
	Total	45	87	139	234	101	45	24	77	153	53
BC Rate	Female	120.82	48.66	69.82	101.63	42.58	18.76	9.42	16.09	12.51	4.59
	Male	84.17	49.47	52.12	102.36	33.33	9.43	5.68	8.37	10.30	4.84
	Total	102.06	49.07	60.63	102.01	37.80	13.88	7.55	12.27	11.42	4.71

Pneumococcal Disease (invasive)

Three hundred and eighty two cases of invasive pneumococcal disease (IPD) were reported in 2015 for a rate of 8.2 per 100,000 population, which has been stable since 2012. Serotyping results were available for 85% (327/382) of cases. Among cases ≥65 years old, serotype was available for 87% (122/141) of cases, and 47% (66/141) were due to serotypes covered by pneumococcal polysaccharide 23-valent (PPV-23) vaccine.

The highest rates of IPD were reported among infants (15.9 per 100,000 population) and those ≥60 years old (16.43 per 100,000 population).

Health Service Delivery Areas with the highest rates of IPD were East Kootenay (15.6 cases per 100,000 population) and Thompson Cariboo Shuswap (11.3 per 100,000).

Based on data from enhanced surveillance for pediatric cases ≤16 years old, a total of 40 cases were reported, including 22 cases aged ≤5 years. None had a fatal outcome. Among cases with clinical presentation reported, 50% presented as 'bacteremia without focus', 35% as bacteremic pneumonia, and 20% as meningitis; clinical presentation was not reported for 3%. Cases ≤5 years presented as 'bacteremia without focus' more frequently than children 6-16 years of age.

Among cases ≤5 years old, serotype results were available for 21 (95%) of the 22 cases. Sixteen (76%) were due to serotypes not covered by conjugate vaccines, and the remaining five (24%) were due to the serotypes unique to the 13-valent vaccine (PCV-13) and not covered by the 7-valent vaccine (PCV-7).

The 21 cases with serotype results were reviewed for preventability based on their age and immunization status at the time of onset of illness, taking into account recommendations for use of conjugate and polysaccharide vaccines with introduction in BC of PCV-7 in 2003, PCV-13 in June 2010 with a catch-up program only for high risk children, and recommendations for polysaccharide 23-valent vaccine (PPV-23) for high risk children, with results as follows:

Only 1 case was preventable: an 18 month old child who developed disease due to serotype 19A but had received only one dose of PCV-13 (which covers 19A) at 2 months of age.

The remainder were not preventable; serotype 3 is covered by both PCV-13 and PPV-23, but not PC-V7:

- 16 cases were due to serotypes not covered by PCV-13 and not preventable by the current program
- 2 cases of serotype 3 were in infants too young to have received their first dose
- 2 cases were vaccine failures, both serotype 3:
  - 1 case in a child immunized with 2 valid doses of PCV-13, with disease onset before the on-time receipt of the 12 month dose;
  - 1 case in a high risk 5 year old child who had received a 3+1 series of PCV-13 and no PPV-23

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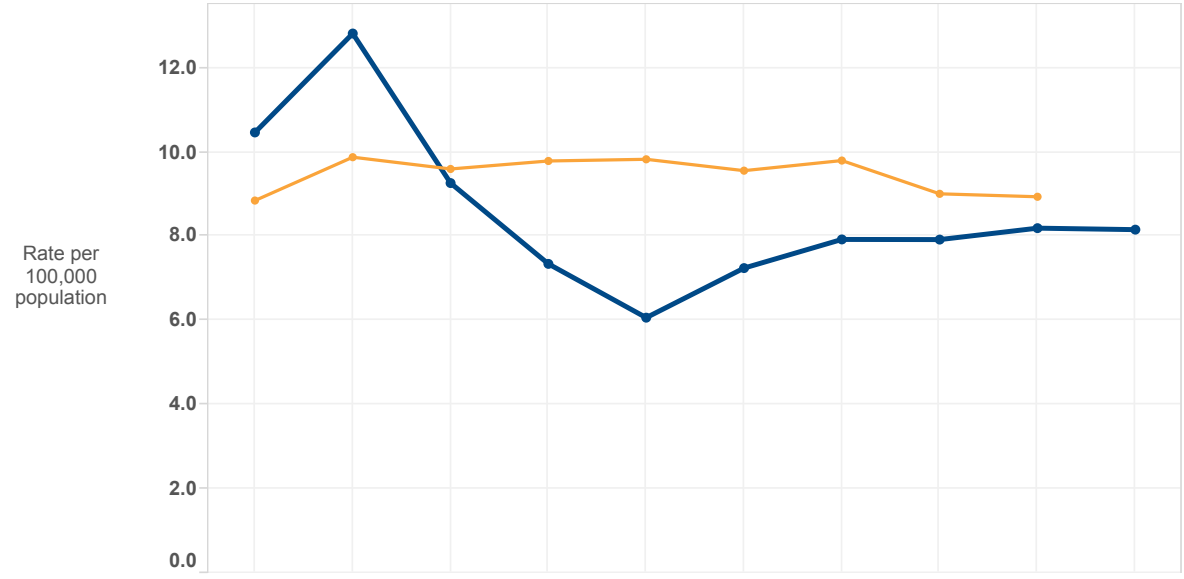
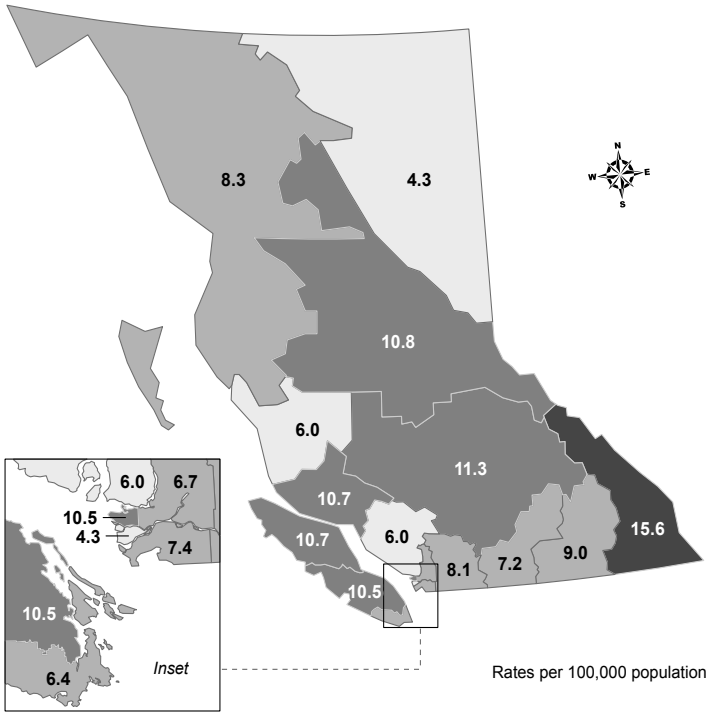
29.1 Pneumococcal Disease (invasive) Rates by Year, 2006-2015



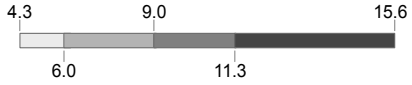
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	444	550	403	324	271	326	360	363	380	382
BC Rate	10.47	12.82	9.27	7.35	6.07	7.25	7.93	7.92	8.19	8.16
Canadian Rate	8.85	9.88	9.60	9.79	9.83	9.56	9.80	9.01	8.94	

29.2 Pneumococcal Disease (invasive) Rates by HSDA, 2015

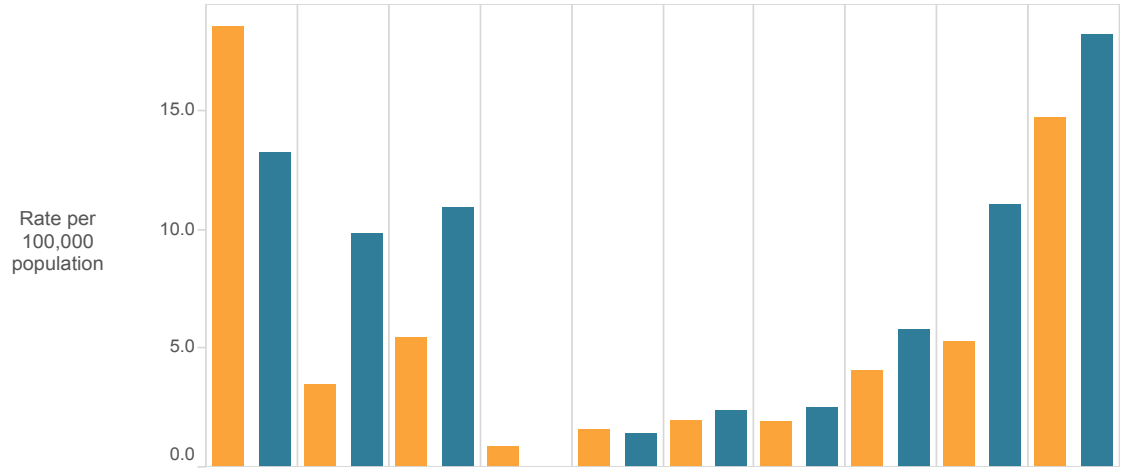


ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	12	15.6
12	Kootenay Boundary	7	9.0
13	Okanagan	26	7.2
14	Thompson Cariboo Shuswap	25	11.3
21	Fraser East	24	8.1
22	Fraser North	44	6.7
23	Fraser South	59	7.4
31	Richmond	9	4.3
32	Vancouver	70	10.5
33	North Shore/Coast Garibaldi	17	6.0
41	South Vancouver Island	24	6.4
42	Central Vancouver Island	28	10.5
43	North Vancouver Island	13	10.7
51	Northwest	6	8.3
52	Northern Interior	15	10.8
53	Northeast	3	4.3

Rates per 100,000 population by HSDA



29.3 Pneumococcal Disease (invasive) Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	4	3	6	1	2	3	3	13	36	87
	Male	3	9	13	0	2	4	4	18	73	98
	Total	7	12	19	1	4	7	7	31	109	185
BC Rate	Female	18.59	3.48	5.44	0.90	1.55	1.94	1.88	4.10	5.30	14.78
	Male	13.29	9.89	10.93	0.00	1.45	2.36	2.52	5.80	11.06	18.25
	Total	15.88	6.77	8.29	0.44	1.50	2.16	2.20	4.94	8.14	16.43

Rubella and Congenital Rubella Syndrome

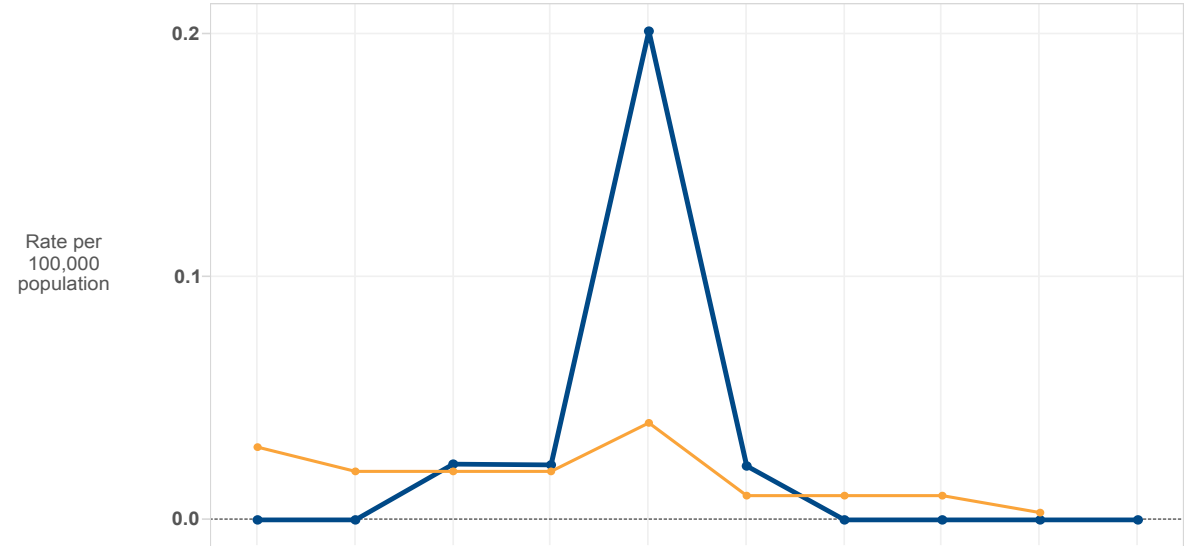
No rubella cases were reported in 2015 in BC. No cases of CRS have been reported in BC since case reports in each of 2002 and 2004.

Readers are referred to the relevant year's Annual Summary of Reportable Diseases for additional detail:

http://www.bccdc.ca/health-professionals/data-reports/annual-summaries-of-reportable-diseases.

interactive dashboard

30.1 Rubella Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	0	0	1	1	9	1	0	0	0	0
BC Rate	0.00	0.00	0.02	0.02	0.20	0.02	0.00	0.00	0.00	0.00
Canadian Rate	0.03	0.02	0.02	0.02	0.04	0.01	0.01	0.01	0.00	

Tetanus

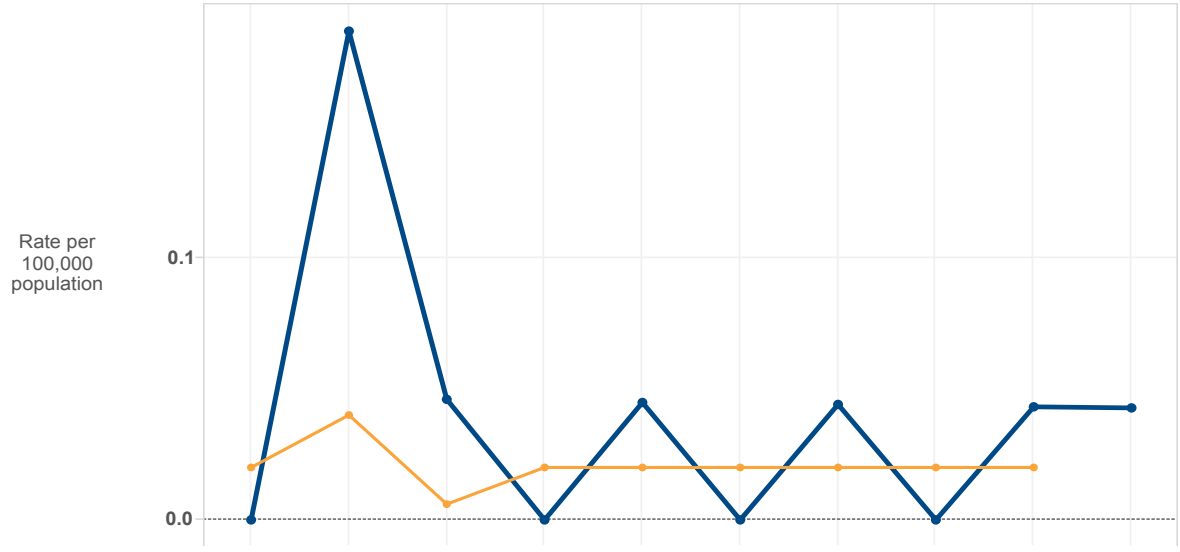
There was one confirmed case of tetanus reported in BC in 2015, based on clinical criteria and isolation of *Clostridium tetani*. The case was an elderly hiker who sustained an injury in a fall and received a Td booster the following day, but 11 days later presented with clinical signs and symptoms compatible with tetanus and was hospitalized for treatment. The case recovered without permanent disability.

From 2005 to 2014 there were 8 tetanus cases reported in BC. Readers are referred to Annual Summaries of Reportable Diseases for additional details: http://www.bccdc.ca/health-professionals/data-reports/annual-summaries-of-reportable-diseases.

In adults who have completed a primary series of tetanus toxoid in childhood, a booster dose of tetanus toxoid is recommended every 10 years to maintain protection against tetanus, which is ubiquitous in the environment.

interactive dashboard

31.1 Tetantus Rates by Year, 2006-2015



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reports	0	4	1	0	1	0	1	0	1	1
BC Rate	0.00	0.09	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.02
Canadian Rate	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	

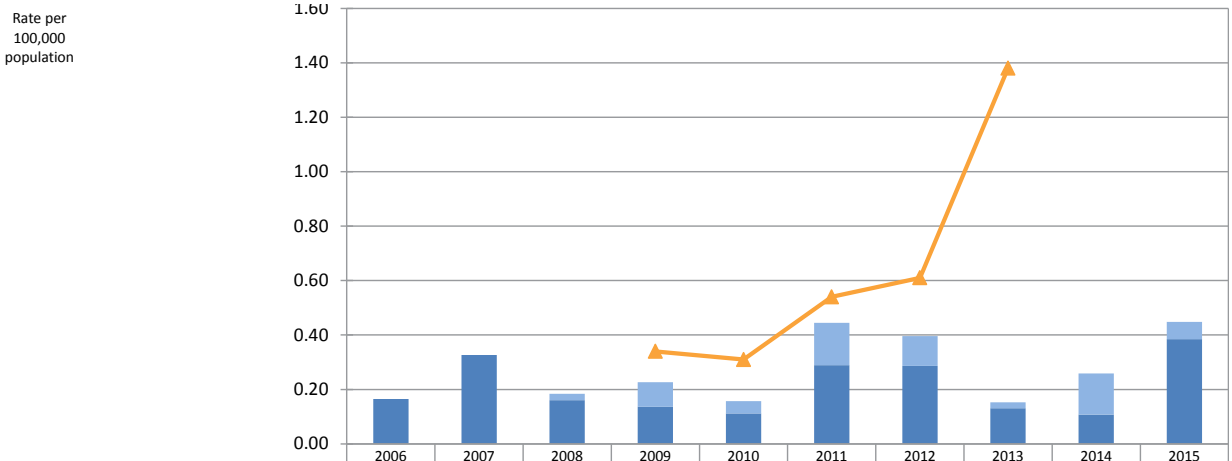
Vectorborne and Zoonotic Diseases

Lyme Disease
Rabies Exposure
Reportable Zoonoses in Animals

Lyme Disease

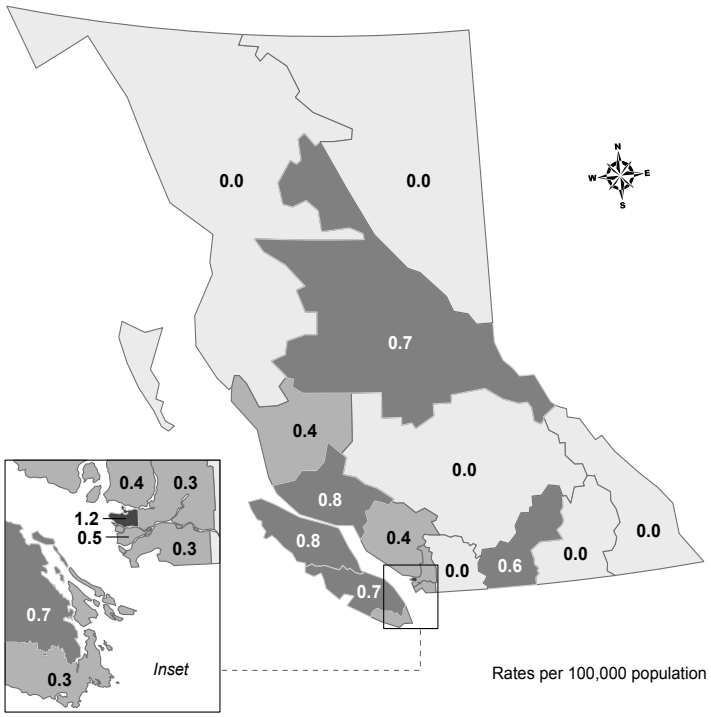
There was an increase in incidence of Lyme disease in 2015 with 21 cases reported. It is unclear if this change is due to a cyclical pattern or to small numbers. Ten (47.6%) cases reported travel and likely acquired their infection outside of BC; this is consistent with previous years. There were 3 clinical cases (physician-diagnosed erythema migrans) and 18 laboratory-confirmed (two-tiered serology) cases reported. Most cases are reported in the summer and fall months, consistent with the *Ixodes. pacificus* tick season. Incidence is highest among children and adults older than 60 years. The highest incidence was reported from Vancouver (8 cases). Lyme disease risk areas are found throughout southern BC: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Vector-bourne/Lyme_Disease_Risk_Areas_Map_BC_June_2013.pdf

32.1 Lyme Disease Rates by Year, 2006-2015

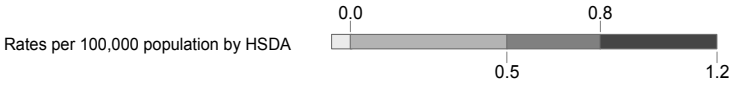


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
BC Clinical Rate	0.00	0.00	0.02	0.09	0.04	0.16	0.11	0.02	0.15	0.06
BC Confirmed Rate	0.17	0.33	0.16	0.14	0.11	0.29	0.29	0.13	0.11	0.38
BC Total Rate	0.17	0.33	0.18	0.23	0.16	0.44	0.40	0.15	0.26	0.45
Canadian Rate				0.34	0.31	0.54	0.61	1.38		
BC Reports	7	14	8	10	7	20	18	7	12	21

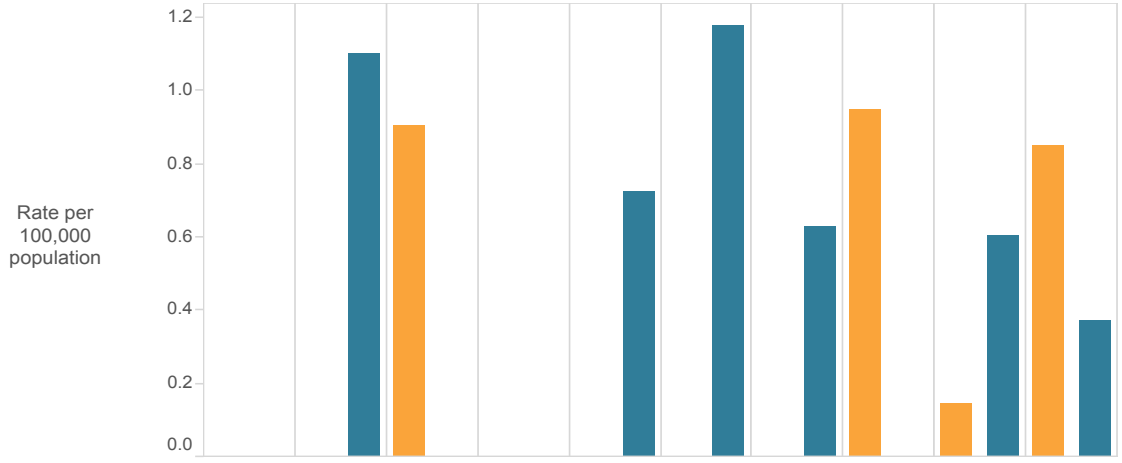
32.2 Lyme Disease Rates by HSDA, 2015



ID	Health Service Delivery Area	Cases	Rate
11	East Kootenay	0	0.0
12	Kootenay Boundary	0	0.0
13	Okanagan	2	0.6
14	Thompson Cariboo Shuswap	0	0.0
21	Fraser East	0	0.0
22	Fraser North	2	0.3
23	Fraser South	2	0.3
31	Richmond	1	0.5
32	Vancouver	8	1.2
33	North Shore/Coast Garibaldi	1	0.4
41	South Vancouver Island	1	0.3
42	Central Vancouver Island	2	0.7
43	North Vancouver Island	1	0.8
51	Northwest	0	0.0
52	Northern Interior	1	0.7
53	Northeast	0	0.0



32.3 Lyme Disease Rates by Age Group and Sex, 2015



		<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Reports	Female	0	0	1	0	0	0	0	3	1	5
	Male	0	1	0	0	1	2	1	0	4	2
	Total	0	1	1	0	1	2	1	3	5	7
BC Rate	Female	0.00	0.00	0.91	0.00	0.00	0.00	0.00	0.95	0.15	0.85
	Male	0.00	1.10	0.00	0.00	0.72	1.18	0.63	0.00	0.61	0.37
	Total	0.00	0.56	0.44	0.00	0.37	0.62	0.31	0.48	0.37	0.62

Rabies Exposures*

There were no human rabies cases in 2015. The last case reported in BC occurred in 2003. Only bats carry rabies in BC. When a person reports an encounter with a bat or other animal, public health authorities assess the rabies risk and may provide rabies post-exposure prophylaxis to prevent infection.

The rate of reported rabies exposures in BC has remained constant since 2012 with 178 exposures or 3.8/100,000 in 2015 (Figure 33.1). It dropped in 2009 following a change in the provincial recommendations whereby individuals finding a bat in their bedroom or nearby no longer receive post exposure prophylaxis. Overall, 98 (55.1%) of the reported exposures occurred in BC or Canada; this proportion increased in 2015, mostly driven by Interior Health.

The majority (75%) of exposures occurring in BC/Canada involved bats, the only rabies reservoir in BC (Figure 33.2). Dogs accounted for 58% of international exposures. As in recent years, the majority (62.9%) of exposures were due to bites (Figure 33.3). Fewer were due to handling of an animal, scratches and contact with saliva.

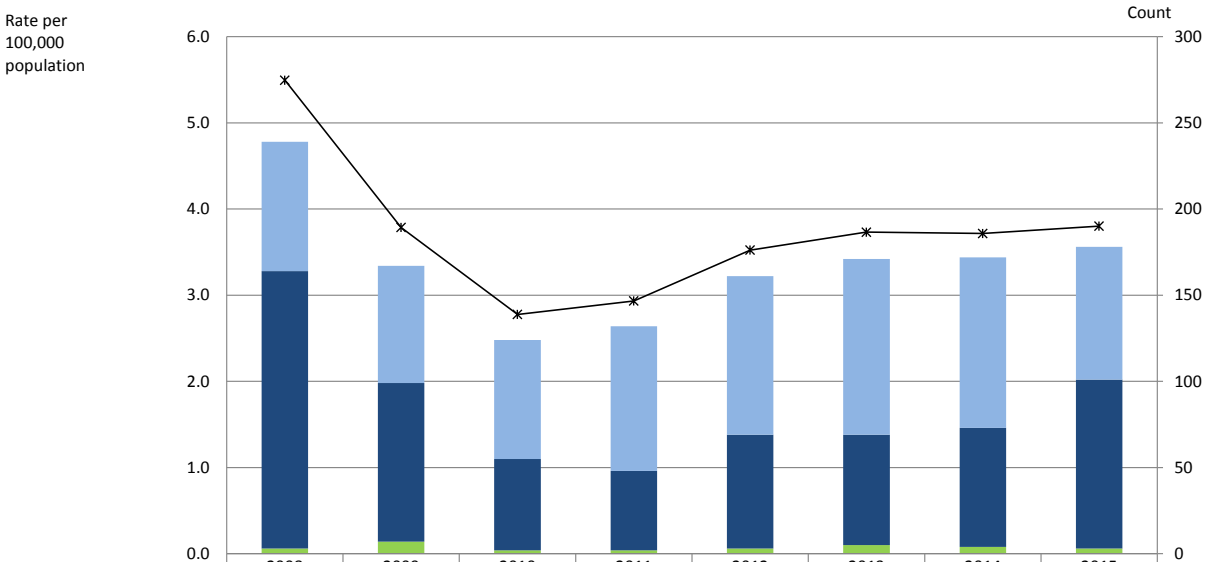
For the first time, Interior Health reported the highest number of rabies exposures, the majority (75.4%) of which occurred in BC/Canada (Figure 33.4). In fact, 50% of all BC/Canada exposures in 2015 occurred in IHA. Kootenay Boundary, Okanagan and Thompson Cariboo Shuswap all reported an increase in rates of human exposures in 2015 as compared to previous years.

As usual, the highest rates of exposure were reported in children and young adults (Figure 33.5).

Most BC/Canada exposures were reported between June and September when bats are active (Figure 33.6). This was an earlier start to the season which usually starts in July, perhaps due to the warm spring weather in 2015. In March, 6 individuals in TCS received RPEP after being exposed to a dog with neurological symptoms that was not tested for rabies. While there was seasonality to domestic rabies exposures, international exposures occurred throughout the year.

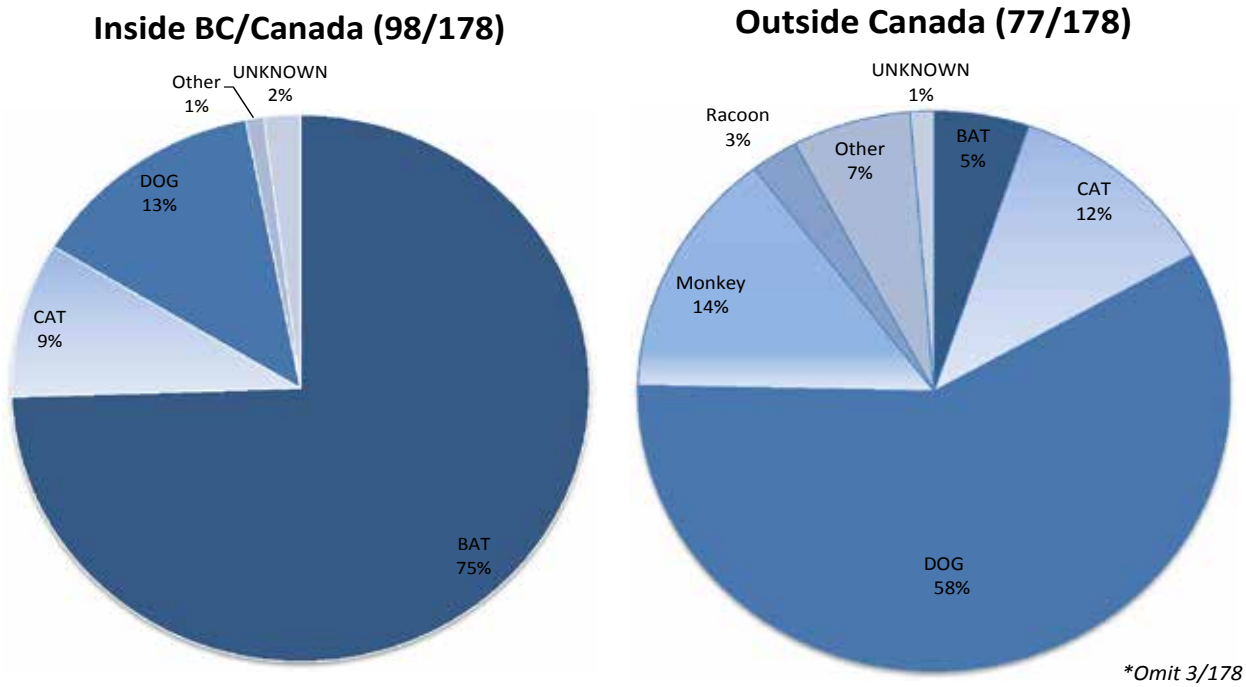
*The terms “exposure” denotes a report of an individual exposed to an animal which presents a risk of rabies infection. Rabies exposures were defined in Panorama as “confirmed exposure” AND “MHO recommends RPEP”.

33.1 Rabies Exposures Rates by Year, 2008-2015



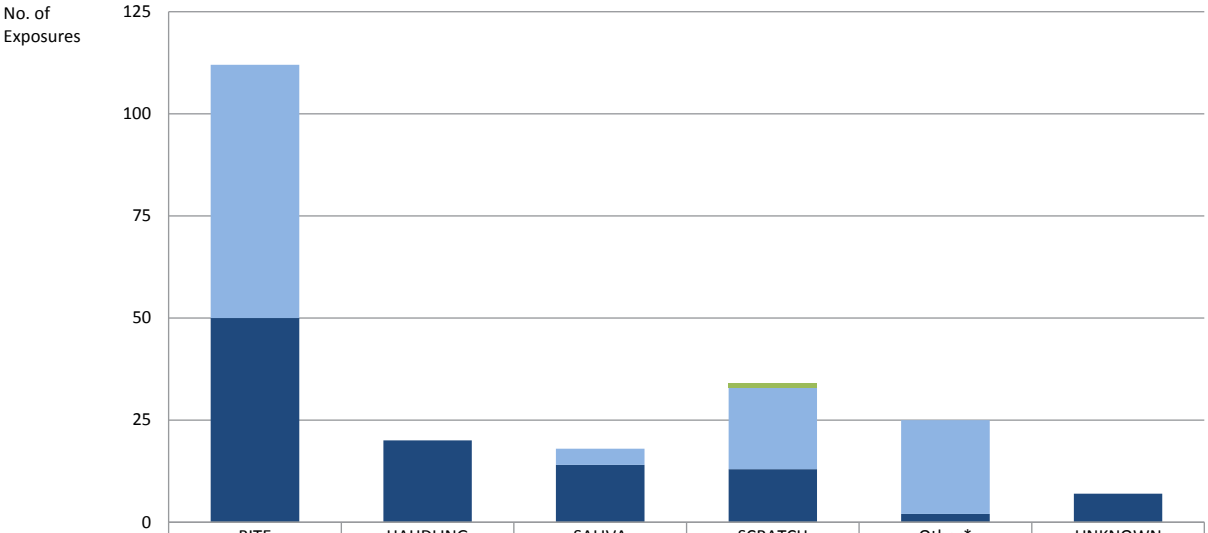
	2008	2009	2010	2011	2012	2013	2014	2015
Outside Canada	75	68	69	84	92	102	99	77
Inside BC/Canada	161	92	53	46	66	64	69	98
Unknown	3	7	2	2	3	5	4	3
Rates per 100,000	5.5	3.8	2.8	2.9	3.5	3.7	3.7	3.8
Total Exposures	239	167	124	132	160	171	172	178

33.2 Rabies Exposures by Percentage of Animal Species Involved, 2015



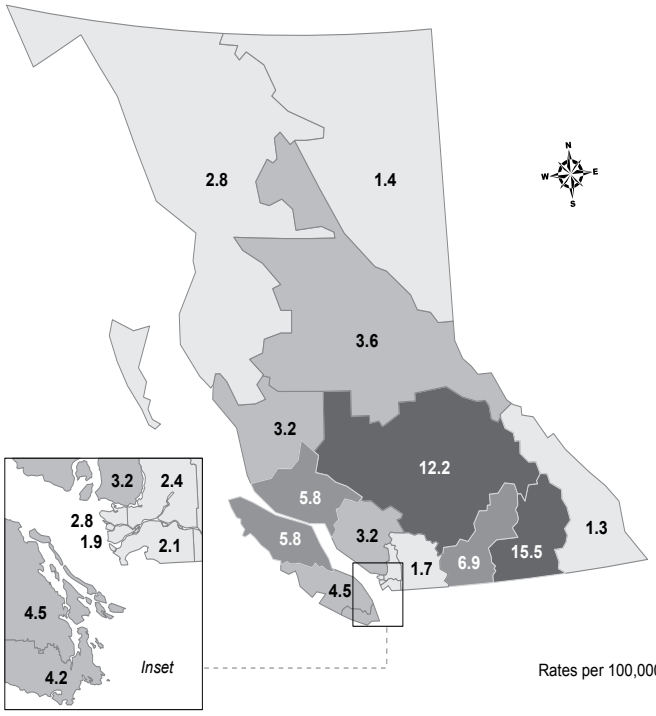
**Omit 3/178*

33.3 Rabies Exposures by Type of Exposure, 2015



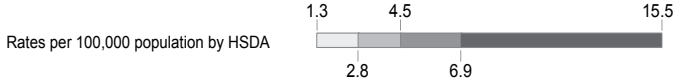
	BITE	HAHDLING	SALIVA	SCRATCH	Other*	UNKNOWN
Unknown				1		
Outside Canada	62		4	20	23	
Inside BC/Canada	50	20	14	13	2	7

33.4 Rabies Exposure Rates by HSDA, 2015

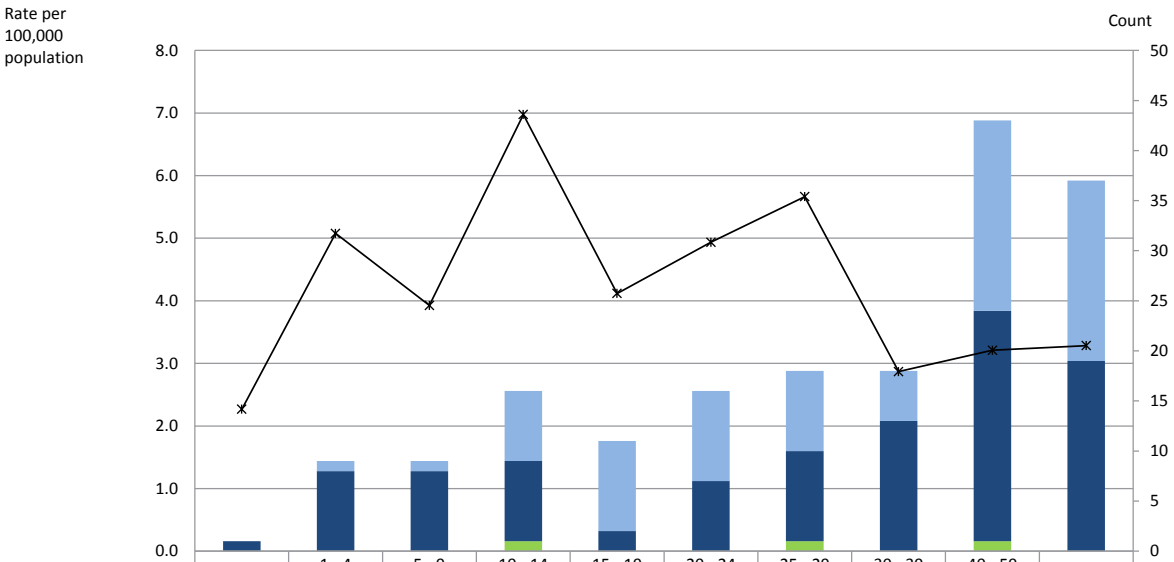


ID	Health Service Delivery Area	Exps.	Rate	BC/Can. Exps.	Int'l Exps.
11	East Kootenay	1	1.3	1	0
12	Kootenay Boundary	12	15.5	8	4
13	Okanagan	25	6.9	21	4
14	Thompson Cariboo Shuswap	*27	12.2	19	6
21	Fraser East	5	1.7	2	3
22	Fraser North	16	2.4	9	7
23	Fraser South	17	2.1	8	9
31	Richmond	4	1.9	0	4
32	Vancouver	*19	2.8	2	16
33	North Shore/Coast Garibaldi	9	3.2	4	5
41	South Vancouver Island	16	4.2	7	9
42	Central Vancouver Island	12	4.5	7	5
43	North Vancouver Island	7	5.8	4	3
51	Northwest	2	2.8	2	0
52	Northern Interior	5	3.6	4	1
53	Northeast	1	1.4	0	1

*Note: The location of 3 exposures (2 TCS; 1 Van) were not reported.

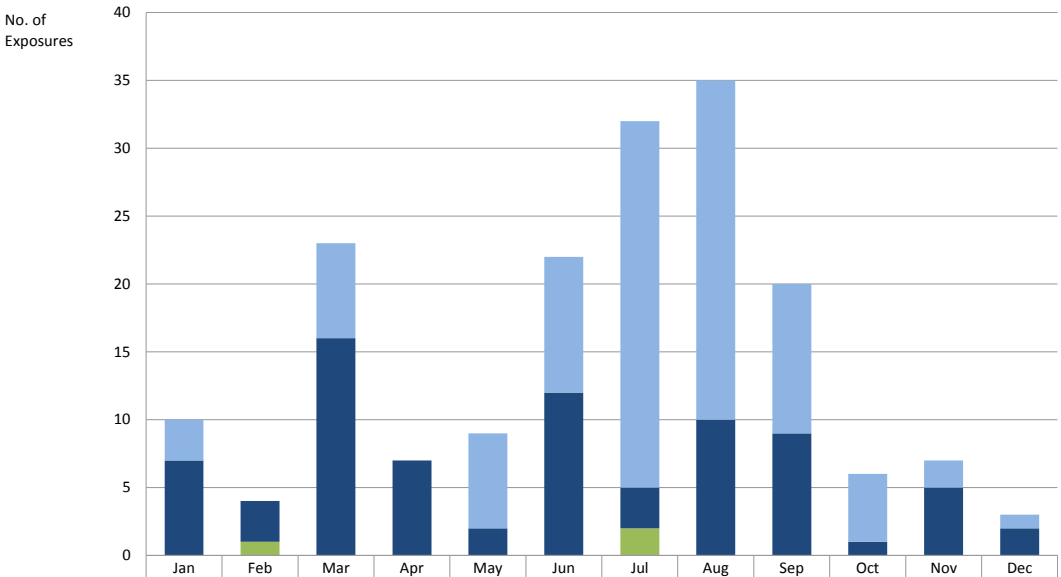


33.5 Rabies Exposures by Age Group, 2015



	<1 Year	1 - 4 Years	5 - 9 Years	10 - 14 Years	15 - 19 Years	20 - 24 Years	25 - 29 Years	30 - 39 Years	40 - 59 Years	60+ Years
Outside Canada		1	1	7	9	9	8	5	19	18
Inside BC/Canada	1	8	8	8	2	7	9	13	23	19
Unknown				1			1		1	
Rate per 100,000	2.3	5.1	3.9	7.0	4.1	4.9	5.7	2.9	3.2	3.3

33.6 Rabies Exposures by Month, 2015



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Outside Canada	3		7		7	10	27	25	11	5	2	1
Inside BC/Canada	7	3	16	7	2	12	3	10	9	1	5	2
Unknown		1					2					

Reportable Zoonoses in Animals

In 2015, an information sharing agreement took effect that enables the Chief Veterinary Officer (CVO) of British Columbia to share reports of certain zoonotic diseases in animals with the Provincial Health Officer (PHO) or delegate. Fourteen zoonotic diseases, plus new or unusual diseases or clusters with potential public health significance, were identified for which the occurrence in animals will be reported to the public health authorities to consider and possibly initiate a public health response. The 14 diseases are: anthrax, BSE, brucellosis, chlamydiosis (psittacosis in humans), swine influenza, avian influenza, plague, Q fever, rabies, trichinosis, tuberculosis, tularemia, West Nile virus and zoonotic viral hemorrhagic fever. The Reportable Zoonoses Guideline outlines the process for reporting and provides background information about each disease as well as an outline of the recommended public health response. Summary guidelines for veterinarians are also available. Separate guidelines dedicated to rabies for both public health professionals and veterinarians are also posted on the website.

Excluding rabies, seven cases of reportable zoonoses in animals were reported to public health in 2015 (Table 34.0). The diseases detected included viral, bacterial and fungal diseases. Investigation of the blastomycosis cases revealed that the animals were most likely infected outside of British Columbia. All of the other cases were caused by pathogens known to be endemic to British Columbia. The animal species involved included livestock, pets and wildlife. All of the affected animals resided in Fraser Health Authority.

Rabies is a special case with many suspect animal cases identified each year. A total of 97 samples were submitted from BC to the Canadian Food Inspection Agency laboratory for rabies testing in 2015. Bats, of various species, accounted for the majority of the samples (70/97). Other species submitted included 16 cats, 6 dogs, 2 coyotes, 1 bovine and 1 raccoon. There was one sample submitted from a suspected human case. Ten samples (all bats) submitted were positive for rabies virus. At least one rabies positive bat was detected within the boundaries of all Health Authorities in BC.

1. http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/CompleteReportableZoonosesGuidelineFinalVers.pdf
2. http://www.bccdc.ca/health-info/disease-types/zoonotic-diseases/reportable-zoonoses
3. http://www.bccdc.ca/health-info/diseases-conditions/rabies

34.1 Reportable Zoonoses reported in BC in 2015.

Disease	Month	Species	Health Authority
Q-fever	January	Cow	Fraser Health
Blastomycosis	May	Dog	Fraser Health
Blastomycosis	August	Red panda	Fraser Health
Psittacosis	September	Pigeon (farmed)	Fraser Health
Low pathogenic avian influenza	November	Wild duck	Fraser Health
Swine influenza (pH1N1-09)	December	Swine	Fraser Health
Low pathogenic avian influenza	December	Wild duck	Fraser Health
Rabies (10 cases)	Various	Bat	All

Counts and Rates for All Reportable Diseases

BC Centre for Disease Control
An agency of the Provincial Health Services Authority

2015 BC Reportable Disease CASE REPORTS by Health Service Delivery Area

	BC TOTAL	INTERIOR					FRASER			
	Provincial Total	East Kootenay	Kootenay Boundary	Okanagan	Thompson Cariboo	**Interior Total**	Fraser East	Fraser North	Fraser South	**Fraser Total**
2015 Population Estimate	**4681960**	**76776**	**77371**	**361856**	**220709**	**736712**	**295842**	**653734**	**792355**	**1741931**
AIDS (2014)*	**70**	0	0	3	3	**6**	1	7	5	**13**
Amebiasis	**412**	1	0	6	3	**10**	19	48	89	**156**
Ascaris Infection	**2**	0	0	0	0	**0**	0	0	1	**1**
Botulism	**1**	0	0	0	0	**0**	0	0	0	**0**
Campylobacteriosis	**1614**	30	22	110	67	**229**	98	220	275	**593**
Chlamydia (genital)	**14178**	204	131	1017	684	**2036**	594	1635	1695	**3924**
Clostridium difficile Infection	**4**	0	0	0	0	**0**	0	0	1	**1**
Creutzfeldt-Jakob Disease	**6**	0	0	1	0	**1**	0	0	1	**1**
Cryptococcus gattii	**15**	0	0	0	0	**0**	0	1	2	**3**
Cryptosporidiosis	**66**	4	1	0	2	**7**	7	9	9	**25**
Cyclosporiasis	**39**	1	0	0	1	**2**	2	11	3	**16**
Dengue	**3**	0	0	0	0	**0**	0	0	0	**0**
Diphtheria: Carrier	**15**	0	0	0	0	**0**	0	0	0	**0**
Giardiasis	**524**	9	12	36	17	**74**	35	52	88	**175**
Gonorrhea (genital)	**3134**	12	23	98	110	**243**	197	416	495	**1108**
Haemophilus Influenzae, non-Type b,	**55**	0	1	3	2	**6**	3	9	8	**20**
Hantavirus Infection	**1**	0	0	0	0	**0**	0	0	0	**0**
Hepatitis A	**26**	0	0	1	0	**1**	3	3	4	**10**
Hepatitis B: Acute	**6**	0	0	0	0	**0**	0	1	0	**1**
Hepatitis B: Chronic & Unknown	**1139**	2	0	12	8	**22**	17	220	164	**401**
Hepatitis C	**2208**	49	42	188	109	**388**	218	249	289	**756**
Hepatitis E	**6**	0	0	0	0	**0**	0	0	3	**3**
HIV	**241**	1	1	7	7	**16**	5	30	29	**64**
Human Metapneumovirus	**1**	0	0	1	0	**1**	0	0	0	**0**
Legionellosis	**23**	0	1	3	1	**5**	0	4	9	**13**
Listeriosis	**14**	0	0	1	0	**1**	0	3	1	**4**
Lyme Disease	**21**	0	0	2	0	**2**	0	2	2	**4**
Malaria	**30**	1	0	2	0	**3**	3	3	8	**14**
Measles	**10**	0	0	0	0	**0**	1	2	0	**3**
Meningococcal Disease (invasive)	**10**	0	1	3	1	**5**	0	0	0	**0**
Mumps	**14**	0	0	1	0	**1**	0	1	4	**5**
Neonatal Group B Streptococcal	**2**	0	0	0	0	**0**	0	0	0	**0**
Parainfluenza	**3**	0	0	1	0	**1**	1	1	0	**2**
Paratyphoid Fever	**20**	0	0	0	0	**0**	2	0	15	**17**
Pertussis	**958**	8	37	107	22	**174**	27	64	78	**169**
Pneumococcal Disease (invasive)	**382**	12	7	26	25	**70**	24	44	59	**127**
Rabies Exposure	**203**	1	12	28	27	**68**	6	16	17	**39**
Rickettsial Disease: Other	**1**	0	0	0	0	**0**	0	1	0	**1**
Rocky Mountain Spotted Fever	**1**	0	0	0	0	**0**	1	0	0	**1**
Salmonellosis	**1242**	33	27	85	54	**199**	104	134	230	**468**
Shigatoxigenic *E.coli*	**111**	3	1	7	4	**15**	13	9	12	**34**
Shigellosis	**182**	1	0	3	1	**5**	9	22	48	**79**
Streptococcal Disease (invasive)	**234**	3	4	20	11	**38**	14	23	41	**78**
Syphilis (Infectious)	**759**	2	3	10	14	**29**	6	64	76	**146**
Tetanus	**1**	0	0	0	0	**0**	0	0	0	**0**
Toxoplasma Infection	**2**	0	0	0	0	**0**	0	0	1	**1**
Transfusion-Transmissible Infection:	**1**	0	0	0	0	**0**	0	0	0	**0**
Tuberculosis	**261**	2	1	5	1	**9**	16	39	59	**114**
Typhoid Fever	**18**	0	0	0	0	**0**	2	2	9	**13**
Vibrio Infection	**90**	0	2	2	2	**6**	1	7	10	**18**
Yellow Fever	**3**	0	0	0	0	**0**	0	2	0	**2**
Yersiniosis	**551**	2	11	26	11	**50**	9	52	48	**109**

*Reportable diseases with no cases are not included

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VANCOUVER COASTAL				VANCOUVER ISLAND				NORTHERN			
Richmond	Vancouver	North Shore Coast Garibaldi	**Vancouver Coastal Total**	South Vancouver Island	Central Vancouver Island	North Vancouver Island	**Vancouver Island Total**	Northwest	Northern Interior	Northeast	**Northern Total**
207734	**666821**	**281440**	**1155995**	**377668**	**267833**	**121416**	**766917**	**72301**	**138479**	**69625**	**280405**
1	14	2	**17**	2	1	2	**5**	3	6	0	**9**
6	165	31	**202**	27	11	2	**40**	0	4	0	**4**
0	0	0	**0**	0	0	0	**0**	1	0	0	**1**
0	1	0	**1**	0	0	0	**0**	0	0	0	**0**
76	254	158	**488**	136	94	29	**259**	16	18	11	**45**
553	3407	873	**4833**	1064	813	346	**2223**	355	550	257	**1162**
0	0	0	**0**	1	0	1	**2**	0	0	1	**1**
0	0	1	**1**	3	0	0	**3**	0	0	0	**0**
0	1	4	**5**	2	5	0	**7**	0	0	0	**0**
0	16	8	**24**	6	3	0	**9**	0	0	1	**1**
1	10	4	**15**	3	1	0	**4**	2	0	0	**2**
0	0	0	**0**	2	0	0	**2**	0	1	0	**1**
0	14	1	**15**	0	0	0	**0**	0	0	0	**0**
9	129	48	**186**	49	16	9	**74**	9	3	3	**15**
45	1125	147	**1317**	176	82	30	**288**	59	87	32	**178**
2	4	3	**9**	7	4	3	**14**	1	5	0	**6**
0	0	0	**0**	0	0	0	**0**	0	0	1	**1**
1	3	2	**6**	1	2	1	**4**	0	1	4	**5**
0	2	0	**2**	1	1	0	**2**	0	1	0	**1**
191	379	69	**639**	47	12	7	**66**	2	7	2	**11**
28	377	103	**508**	142	156	83	**381**	33	104	38	**175**
1	2	0	**3**	0	0	0	**0**	0	0	0	**0**
8	114	8	**130**	12	9	3	**24**	1	4	1	**6**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
1	1	0	**2**	0	1	1	**2**	0	1	0	**1**
1	3	0	**4**	1	2	1	**4**	0	1	0	**1**
1	8	1	**10**	1	2	1	**4**	0	1	0	**1**
1	8	1	**10**	1	0	0	**1**	0	0	2	**2**
0	7	0	**7**	0	0	0	**0**	0	0	0	**0**
1	0	2	**3**	1	0	0	**1**	0	0	1	**1**
0	7	1	**8**	0	0	0	**0**	0	0	0	**0**
0	1	0	**1**	0	1	0	**1**	0	0	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
0	1	0	**1**	2	0	0	**2**	0	0	0	**0**
6	21	26	**53**	213	80	38	**331**	86	93	52	**231**
9	70	17	**96**	24	28	13	**65**	6	15	3	**24**
5	23	13	**41**	18	14	8	**40**	2	7	6	**15**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**
60	160	79	**299**	88	74	36	**198**	27	36	15	**78**
3	19	5	**27**	13	8	7	**28**	4	1	2	**7**
2	66	9	**77**	16	3	0	**19**	1	1	0	**2**
7	50	6	**63**	20	18	6	**44**	0	11	0	**11**
13	478	22	**513**	46	4	10	**60**	2	4	5	**11**
0	0	0	**0**	1	0	0	**1**	0	0	0	**0**
0	0	0	**0**	1	0	0	**1**	0	0	0	**0**
0	0	0	**0**	1	0	0	**1**	0	0	0	**0**
22	83	4	**109**	5	7	4	**16**	6	6	1	**13**
0	2	0	**2**	1	1	0	**2**	0	1	0	**1**
1	26	16	**43**	10	4	6	**20**	3	0	0	**3**
0	0	0	**0**	0	0	0	**0**	0	1	0	**1**
33	154	74	**261**	75	30	9	**114**	6	11	0	**17**

BC Centre for Disease Control
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2015 BC Reportable Disease CASE RATES (per 100,000 population) by Health Service Delivery Area

	BC TOTAL	INTERIOR					FRASER			
	Provincial Total	East Kootenay	Kootenay Boundary	Okanagan	Thompson Cariboo	**Interior Total**	Fraser East	Fraser North	Fraser South	**Fraser Total**
2015 Population Estimate	**4681960**	**76776**	**77371**	**361856**	**220709**	**736712**	**295842**	**653734**	**792355**	**1741931**
AIDS (2014)*	**1.5**	0.0	0.0	0.8	1.3	**0.8**	0.3	1.1	0.6	**0.7**
Amebiasis	**8.8**	1.3	0.0	1.7	1.4	**1.4**	6.4	7.3	11.2	**9.0**
Ascaris Infection	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.1	**0.1**
Botulism	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Campylobacteriosis	**34.5**	39.1	28.4	30.4	30.4	**31.1**	33.1	33.7	34.7	**34.0**
Chlamydia (genital)	**302.8**	265.7	169.3	281.1	309.9	**276.4**	200.8	250.1	213.9	**225.3**
Clostridium difficile Infection	**0.1**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.1	**0.1**
Creutzfeldt-Jakob Disease	**0.1**	0.0	0.0	0.3	0.0	**0.1**	0.0	0.0	0.1	**0.1**
Cryptococcus gattii	**0.3**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.2	0.3	**0.2**
Cryptosporidiosis	**1.4**	5.2	1.3	0.0	0.9	**1.0**	2.4	1.4	1.1	**1.4**
Cyclosporiasis	**0.8**	1.3	0.0	0.0	0.5	**0.3**	0.7	1.7	0.4	**0.9**
Dengue	**0.1**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Diphtheria: Carrier	**0.3**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Giardiasis	**11.2**	11.7	15.5	9.9	7.7	**10.0**	11.8	8.0	11.1	**10.0**
Gonorrhea (genital)	**66.9**	15.6	29.7	27.1	49.8	**33.0**	66.6	63.6	62.5	**63.6**
Haemophilus Influenzae, non-Type b,	**1.2**	0.0	1.3	0.8	0.9	**0.8**	1.0	1.4	1.0	**1.1**
Hantavirus Infection	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Hepatitis A	**0.6**	0.0	0.0	0.3	0.0	**0.1**	1.0	0.5	0.5	**0.6**
Hepatitis B: Acute	**0.1**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.2	0.0	**0.1**
Hepatitis B: Chronic & Unknown	**24.3**	2.6	0.0	3.3	3.6	**3.0**	5.7	33.7	20.7	**23.0**
Hepatitis C	**47.2**	63.8	54.3	52.0	49.4	**52.7**	73.7	38.1	36.5	**43.4**
Hepatitis E	**0.1**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.4	**0.2**
HIV	**5.1**	1.3	1.3	1.9	3.2	**2.2**	1.7	4.6	3.7	**3.7**
Human Metapneumovirus	**0.0**	0.0	0.0	0.3	0.0	**0.1**	0.0	0.0	0.0	**0.0**
Legionellosis	**0.5**	0.0	1.3	0.8	0.5	**0.7**	0.0	0.6	1.1	**0.7**
Listeriosis	**0.3**	0.0	0.0	0.3	0.0	**0.1**	0.0	0.5	0.1	**0.2**
Lyme Disease	**0.4**	0.0	0.0	0.6	0.0	**0.3**	0.0	0.3	0.3	**0.2**
Malaria	**0.6**	1.3	0.0	0.6	0.0	**0.4**	1.0	0.5	1.0	**0.8**
Measles	**0.2**	0.0	0.0	0.0	0.0	**0.0**	0.3	0.3	0.0	**0.2**
Meningococcal Disease (invasive)	**0.2**	0.0	1.3	0.8	0.5	**0.7**	0.0	0.0	0.0	**0.0**
Mumps	**0.3**	0.0	0.0	0.3	0.0	**0.1**	0.0	0.2	0.5	**0.3**
Neonatal Group B Streptococcal	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Parainfluenza	**0.1**	0.0	0.0	0.3	0.0	**0.1**	0.3	0.2	0.0	**0.1**
Paratyphoid Fever	**0.4**	0.0	0.0	0.0	0.0	**0.0**	0.7	0.0	1.9	**1.0**
Pertussis	**20.5**	10.4	47.8	29.6	10.0	**23.6**	9.1	9.8	9.8	**9.7**
Pneumococcal Disease (invasive)	**8.2**	15.6	9.0	7.2	11.3	**9.5**	8.1	6.7	7.4	**7.3**
Rabies Exposure	**4.3**	1.3	15.5	7.7	12.2	**9.2**	2.0	2.4	2.1	**2.2**
Rickettsial Disease: Other	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.2	0.0	**0.1**
Rocky Mountain Spotted Fever	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.3	0.0	0.0	**0.1**
Salmonellosis	**26.5**	43.0	34.9	23.5	24.5	**27.0**	35.2	20.5	29.0	**26.9**
Shigatoxigenic *E.coli*	**2.4**	3.9	1.3	1.9	1.8	**2.0**	4.4	1.4	1.5	**2.0**
Shigellosis	**3.9**	1.3	0.0	0.8	0.5	**0.7**	3.0	3.4	6.1	**4.5**
Streptococcal Disease (invasive)	**5.0**	3.9	5.2	5.5	5.0	**5.2**	4.7	3.5	5.2	**4.5**
Syphilis (Infectious)	**16.2**	2.6	3.9	2.8	6.3	**3.9**	2.0	9.8	9.6	**8.4**
Tetanus	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Toxoplasma Infection	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.1	**0.1**
Transfusion-Transmissible Infection:	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
Tuberculosis	**5.6**	2.6	1.3	1.4	0.5	**1.2**	5.4	6.0	7.4	**6.5**
Typhoid Fever	**0.4**	0.0	0.0	0.0	0.0	**0.0**	0.7	0.3	1.1	**0.7**
Vibrio Infection	**1.9**	0.0	2.6	0.6	0.9	**0.8**	0.3	1.1	1.3	**1.0**
Yellow Fever	**0.1**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.3	0.0	**0.1**
Yersiniosis	**11.8**	2.6	14.2	7.2	5.0	**6.8**	3.0	8.0	6.1	**6.3**

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VANCOUVER COASTAL				VANCOUVER ISLAND				NORTHERN			
Richmond	Vancouver	North Shore Coast Garibaldi	**Vancouver Coastal Total**	South Vancouver Island	Central Vancouver Island	North Vancouver Island	**Vancouver Island Total**	Northwest	Northern Interior	Northeast	**Northern Total**
207734	**666821**	**281440**	**1155995**	**377668**	**267833**	**121416**	**766917**	**72301**	**138479**	**69625**	**280405**
0.5	2.1	0.7	**1.5**	0.5	0.4	1.6	**0.7**	4.0	4.2	0.0	**3.1**
2.9	24.7	11.0	**17.5**	7.1	4.1	1.6	**5.2**	0.0	2.9	0.0	**1.4**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	1.4	0.0	0.0	**0.4**
0.0	0.1	0.0	**0.1**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
36.6	38.1	56.1	**42.2**	36.0	35.1	23.9	**33.8**	22.1	13.0	15.8	**16.0**
266.2	510.9	310.2	**418.1**	281.7	303.5	285.0	**289.9**	491.0	397.2	369.1	**414.4**
0.0	0.0	0.0	**0.0**	0.3	0.0	0.8	**0.3**	0.0	0.0	1.4	**0.4**
0.0	0.0	0.4	**0.1**	0.8	0.0	0.0	**0.4**	0.0	0.0	0.0	**0.0**
0.0	0.1	1.4	**0.4**	0.5	1.9	0.0	**0.9**	0.0	0.0	0.0	**0.0**
0.0	2.4	2.8	**2.1**	1.6	1.1	0.0	**1.2**	0.0	0.0	1.4	**0.4**
0.5	1.5	1.4	**1.3**	0.8	0.4	0.0	**0.5**	2.8	0.0	0.0	**0.7**
0.0	0.0	0.0	**0.0**	0.5	0.0	0.0	**0.3**	0.0	0.7	0.0	**0.4**
0.0	2.1	0.4	**1.3**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
4.3	19.3	17.1	**16.1**	13.0	6.0	7.4	**9.6**	12.4	2.2	4.3	**5.3**
21.7	168.7	52.2	**113.9**	46.6	30.6	24.7	**37.6**	81.6	62.8	46.0	**63.5**
1.0	0.6	1.1	**0.8**	1.9	1.5	2.5	**1.8**	1.4	3.6	0.0	**2.1**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.0	1.4	**0.4**
0.5	0.4	0.7	**0.5**	0.3	0.7	0.8	**0.5**	0.0	0.7	5.7	**1.8**
0.0	0.3	0.0	**0.2**	0.3	0.4	0.0	**0.3**	0.0	0.7	0.0	**0.4**
91.9	56.8	24.5	**55.3**	12.4	4.5	5.8	**8.6**	2.8	5.1	2.9	**3.9**
13.5	56.5	36.6	**43.9**	37.6	58.2	68.4	**49.7**	45.6	75.1	54.6	**62.4**
0.5	0.3	0.0	**0.3**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
3.9	17.1	2.8	**11.2**	3.2	3.4	2.5	**3.1**	1.4	2.9	1.4	**2.1**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
0.5	0.1	0.0	**0.2**	0.0	0.4	0.8	**0.3**	0.0	0.7	0.0	**0.4**
0.5	0.4	0.0	**0.3**	0.3	0.7	0.8	**0.5**	0.0	0.7	0.0	**0.4**
0.5	1.2	0.4	**0.9**	0.3	0.7	0.8	**0.5**	0.0	0.7	0.0	**0.4**
0.5	1.2	0.4	**0.9**	0.3	0.0	0.0	**0.1**	0.0	0.0	2.9	**0.7**
0.0	1.0	0.0	**0.6**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
0.5	0.0	0.7	**0.3**	0.3	0.0	0.0	**0.1**	0.0	0.0	1.4	**0.4**
0.0	1.0	0.4	**0.7**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
0.0	0.1	0.0	**0.1**	0.0	0.4	0.0	**0.1**	0.0	0.0	0.0	**0.0**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
0.0	0.1	0.0	**0.1**	0.5	0.0	0.0	**0.3**	0.0	0.0	0.0	**0.0**
2.9	3.1	9.2	**4.6**	56.4	29.9	31.3	**43.2**	118.9	67.2	74.7	**82.4**
4.3	10.5	6.0	**8.3**	6.4	10.5	10.7	**8.5**	8.3	10.8	4.3	**8.6**
2.4	3.4	4.6	**3.5**	4.8	5.2	6.6	**5.2**	2.8	5.1	8.6	**5.3**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
28.9	24.0	28.1	**25.9**	23.3	27.6	29.7	**25.8**	37.3	26.0	21.5	**27.8**
1.4	2.8	1.8	**2.3**	3.4	3.0	5.8	**3.7**	5.5	0.7	2.9	**2.5**
1.0	9.9	3.2	**6.7**	4.2	1.1	0.0	**2.5**	1.4	0.7	0.0	**0.7**
3.4	7.5	2.1	**5.4**	5.3	6.7	4.9	**5.7**	0.0	7.9	0.0	**3.9**
6.3	71.7	7.8	**44.4**	12.2	1.5	8.2	**7.8**	2.8	2.9	7.2	**3.9**
0.0	0.0	0.0	**0.0**	0.3	0.0	0.0	**0.1**	0.0	0.0	0.0	**0.0**
0.0	0.0	0.0	**0.0**	0.3	0.0	0.0	**0.1**	0.0	0.0	0.0	**0.0**
0.0	0.0	0.0	**0.0**	0.3	0.0	0.0	**0.1**	0.0	0.0	0.0	**0.0**
10.6	12.4	1.4	**9.4**	1.3	2.6	3.3	**2.1**	8.3	4.3	1.4	**4.6**
0.0	0.3	0.0	**0.2**	0.3	0.4	0.0	**0.3**	0.0	0.7	0.0	**0.4**
0.5	3.9	5.7	**3.7**	2.6	1.5	4.9	**2.6**	4.1	0.0	0.0	**1.1**
0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	0.0	0.7	0.0	**0.4**
15.9	23.1	26.3	**22.6**	19.9	11.2	7.4	**14.9**	8.3	7.9	0.0	**6.1**

Sources and Explanatory Remarks

1. Clinical and confirmed case reports are collected from the health regions in British Columbia through Panorama. Starting in 2005, only confirmed cases are described in the main report, in keeping with BC reporting to the Public Health Agency of Canada. For the breakdown of cases by their confirmed or clinical case status for 2005 and previous years, see the 2005 BC Annual Summary of Reportable Diseases posted on www.bccdc.ca.The exceptions are Lyme Disease and tetanus for which clinical cases are included and amebiasis for which probable cases are included.

2. Numbers in this report were generated in June 2016 and are subject to change due to possible late reporting and/or data clean up in the regions. This may also explain changes in the number of reported cases in previous years for some diseases.

3. Summary reports contained herein for some diseases are based on enhanced surveillance data bases maintained at BCCDC which are sourced from reporting by BC Health Authorities using forms specifically designed for that disease, and reconciliation of laboratory data. These may not always correspond to Panorama reports, including by case classification (i.e., confirmed and clinical status).

4. All data for influenza, invasive meningococcal disease, invasive group A streptococcal disease, *Cryptococcus gattii* infection, MRSA and VRE, as well as 2011 through 2015 data for measles, mumps, and rubella, are collected through enhanced surveillance systems. Data for invasive pneumococcal disease are collected through both Panorama (all age groups) and through enhanced surveillance (pediatric cases ≤16 years of age). Invasive meningococcal disease and invasive group A streptococcal disease are reported using episode date. Measles, mumps, and rubella are reported using reported date for 2005 through 2010 and episode date for 2011 through 2015. *Cryptococcus gattii* infections are reported using the date the diagnosis is reported by the laboratory. Other diseases are classified by the reported date which is the date reported to the health authority.

5. Enteric disease outbreak data are reported through a national, secure web-enabled outbreak reporting tool using the Canadian Network for Public Health Intelligence (CNPHI). Data were extracted from CNPHI on May 19, 2016.

6. *Salmonella* Enteritidis phage type data were provided by the BCCDC PHL and are based on results provided by the National Microbiology Laboratory.

7. Data for HIV and AIDS are collected through HAISYS, the HIV/AIDS Information System. Data for other sexually transmitted infections (STIs) are collected through the STI Information System. AIDS case reports are for 2014. The 2015 AIDS statistics will be available in our next report due to a delay associated with AIDS data collection. The BC total numbers for AIDS, chlamydia (genital), gonorrhea (genital), HIV and syphilis (infectious) include cases of non-BC residents and cases of unknown residency and thus may exceed the sum of cases in the five health authorities. The BC total age group and sex numbers for AIDS, chlamydia (genital), gonorrhea (genital), HIV and syphilis (infectious) is the sum of the following genders: female, male, transgender and gender unknown.

8. All active TB case data is extracted from the Integrated Public Health Information System (iPHIS). Population estimates come from BC Stats (http://www.bcstats.gov.bc.ca/Home.aspx).

9. For information on Antimicrobial Resistant Organism (ARO) Surveillance in BC, please refer to:

Antimicrobial Resistance Trends in the Province of British Columbia - 2012. Epidemiology Services, British Columbia Centre for Disease Control. Available at www.bccdc.ca/prevention/AntibioticResistance

10. Amebiasis, cryptosporidiosis and listeriosis were removed from national surveillance in January 2000. Listeriosis was made reportable nationally again in 2007. Lyme disease became nationally notifiable in 2009; methicillin resistant *Staphylococcus aureus*, vancomycin resistant enterococci, *Vibrio* Infections and yersiniosis have not been nationally notifiable diseases in the period 2005 through 2015.

11. The Jenks Natural Breaks Classification method was used for defining different classifications of disease rates in the maps. This classification method identifies gaps or depressions within the data distribution and creates the categories based on the best fit of the data (i.e., groups based on similarities).

12. Health Service Delivery Area boundaries are taken from BC STATS; BC STATS is the central statistical agency of the Province of British Columbia.

13. National rates are provided by the Public Health Agency of Canada -Division of Surveillance and Risk Assessment. The 2014 national rates are preliminary. In 2011, New Brunswick and Prince Edward Island did not report cyclosporiasis hence the population of those provinces have been removed for rate calculation. The resulting national rates are therefore based only on the data and populations for the remaining participating jurisdictions, and the national rates may change once reporting is complete. 2015 national rates are unavailable currently until data updates are finalized.

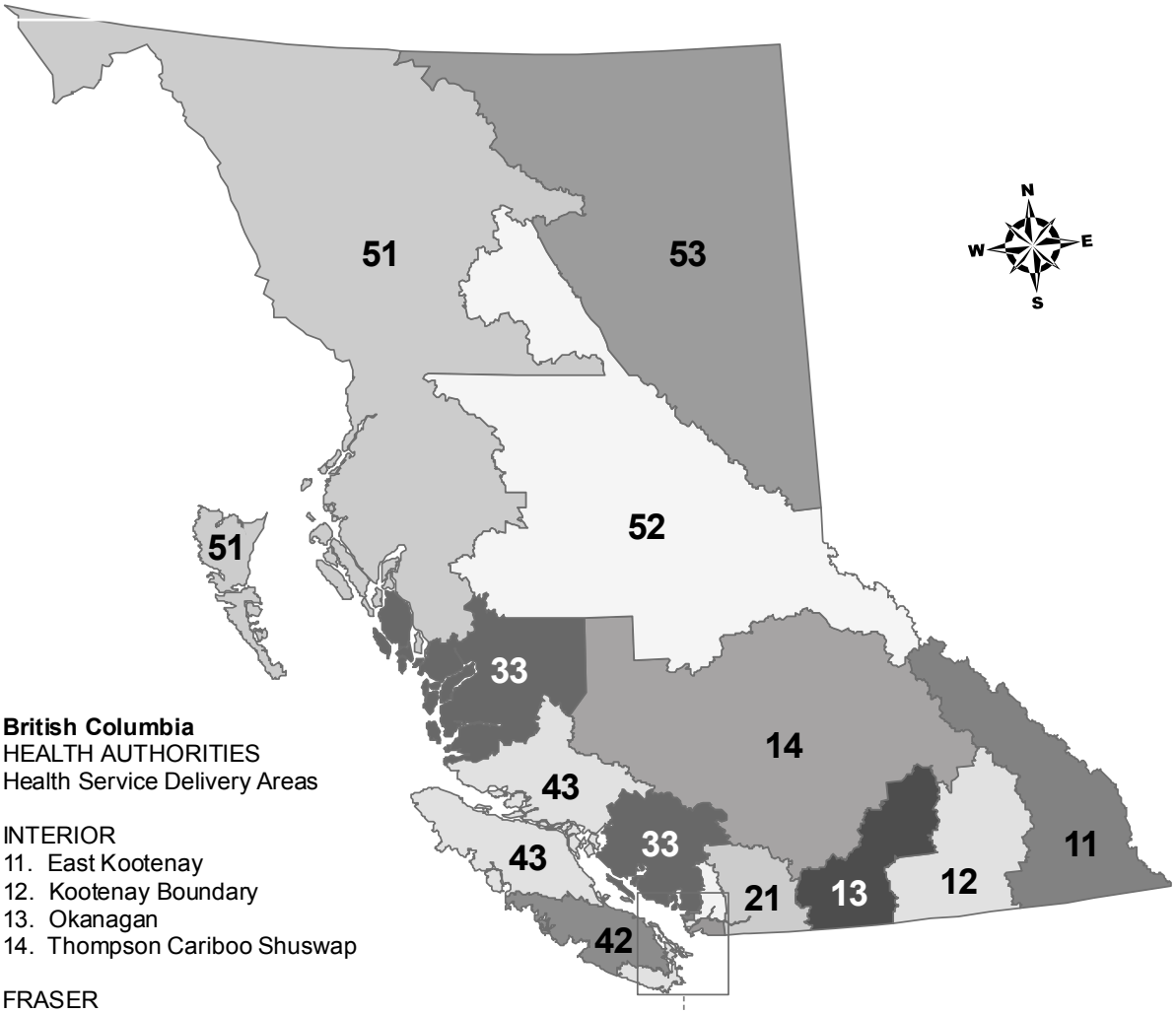
14. Population estimates come from BC Stats (http://www.bcstats.gov.bc.ca/Home.aspx). Please note for the 2010 BC Annual Summary of Reportable Diseases and previous years' reports, population estimates were taken from P.E.O.P.L.E. Projection (Population Extrapolation for Organizational Planning with Less Error) .

15. In 2015, there were no reported cases of Anthrax, Brucella infection, Cholera, invasive *Haemophilus Influenzae b*, Viral Hemorrhagic Fevers, Hepatitis D, Leprosy, Leptospira Infection, Methicillin Resistant Staphylococcal aureus (MRSA) Infection, Plague, Poliomyelitis,Q Fever, Rabies, Rubella, Severe Acute Respiratory Syndrome, Subacute Sclerosing Panencephalitis, Trichinosis, Tularaemia, Vancomycin Resistant Enterococcus (VRE) Infection, Vancomycin Resistant Staphylococcus aureus (VRSA) Infection or West Nile.

16. The rates for neonatal group B Streptococcal infection under 2015 BC Reportable Disease Case Rates by HSDA (pages 114-115) are calculated based on the population under 12 months of age, instead of the entire BC population.

17. While we endeavour to include data on the majority of reportable diseases in this publication, data on some are not included. For information on the incidence of these diseases in 2015 in British Columbia, please contact epidserv@bccdc.ca.

British Columbia Health Service Delivery Areas



British Columbia
HEALTH AUTHORITIES
Health Service Delivery Areas

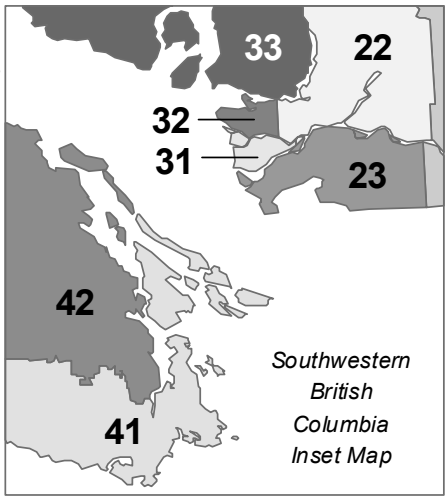
INTERIOR
11. East Kootenay
12. Kootenay Boundary
13. Okanagan
14. Thompson Cariboo Shuswap

FRASER
21. Fraser East
22. Fraser North
23. Fraser South

VANCOUVER COASTAL
31. Richmond
32. Vancouver
33. North Shore/Coast Garibaldi

VANCOUVER ISLAND
41. South Vancouver Island
42. Central Vancouver Island
43. North Vancouver Island

NORTHERN
51. Northwest
52. Northern Interior
53. Northeast



BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Reportable Communicable Diseases in BC, March 2013

Schedule A: Reportable by all sources, including Laboratories

Acquired Immune Deficiency Syndrome
Anthrax
Botulism
Brucellosis
Cholera
Congenital infections:
    Toxoplasmosis, Rubella,Cytomegalovirus, Herpes Simplex, Varicella-zoster, Hepatitis B Virus, Listeriosis and any other congenital infection
Creutzfeldt-Jacob Disease
Cryptococcus neoformans
Cryptosporidiosis
Cyclospora Infection
Diffuse Lamellar Keratitis (DLK)
Diphtheria:
    Cases
    Carriers
Encephalitis:
    Post-infectious
    Subacute sclerosing panencephalitis
    Vaccine-related
    Viral
Foodborne illness:
    All causes
Gastroenteritis epidemic:
    Bacterial
    Parasitic
    Viral
Genital Chlamydia Infection
Giardiasis
H5 and H7 strains of the Influenza virus
Haemophilus Influenzae Disease, All Invasive, by Type
Hantavirus Pulmonary Syndrome
Hemolytic Uremic Syndrome
Hemorrhagic Viral Fevers
Hepatitis Viral:
    Hepatitis A
    Hepatitis B
    Hepatitis C
    Hepatitis E
    Other Viral Hepatitis
Human Immunodeficiency Virus
Invasive Group A Streptococcal Disease
Invasive Streptococcus Pneumoniae Infection
Leprosy
Lyme Disease
Measles

Meningitis: All causes
    (i) Bacterial:
    Hemophilus
    Pneumococcal
    Other
    (ii) Viral
Meningococcal Disease:
    All Invasive
    Including Primary Meningococcal Pneumonia and Primary Meningococcal Conjunctivitis
Mumps
Neonatal Group B Streptococcus Infection
Paralytic Shellfish Poisoning (PSP)
Pertussis (Whooping Cough)
Plague
Poliomyelitis
Rabies
Reye's Syndrome
Rubella:
    Congenital Rubella Syndrome
Severe Acute Respiratory Syndrome
Smallpox
Tetanus
Transfusion Transmitted Infection
Tuberculosis
Tularemia
Typhoid Fever and Paratyphoid Fever
Venereal Disease:
    Chancroid
    Gonorrhea - all sites
    Syphilis
Waterborne Illness:
    All causes
West Nile Virus Infection
Yellow Fever

Schedule B: Reportable by Laboratories only

All specific bacterial and viral stool pathogens:
- (i) Bacterial:
  - Campylobacter
  - Salmonella
  - Shigella
  - Yersinia
- (ii) Viral

Amoebiasis
Borrelia burgdorferi Infection
Cerebrospinal Fluid Micro-organisms
Chlamydial Diseases, including Psittacosis
Creutzfeldt-Jacob Disease
Cryptococcus neoformans
Herpes Genitalis
Human Immunodeficiency Virus
Influenza virus, including the H5 and H7 strains
Legionellosis
Leptospirosis
Listeriosis
Malaria
Q Fever
Rickettsial Diseases
Severe Acute Respiratory Syndrome
Smallpox
Tularemia
West Nile Virus Infection

As per Health Act Communicable Disease Regulation includes amendments up to B.C. Reg. 380/2012, March 18, 2013
http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/12_4_83#section2

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