Surveillance of Notifiable Infectious Diseases in Victoria 1999

Human Services

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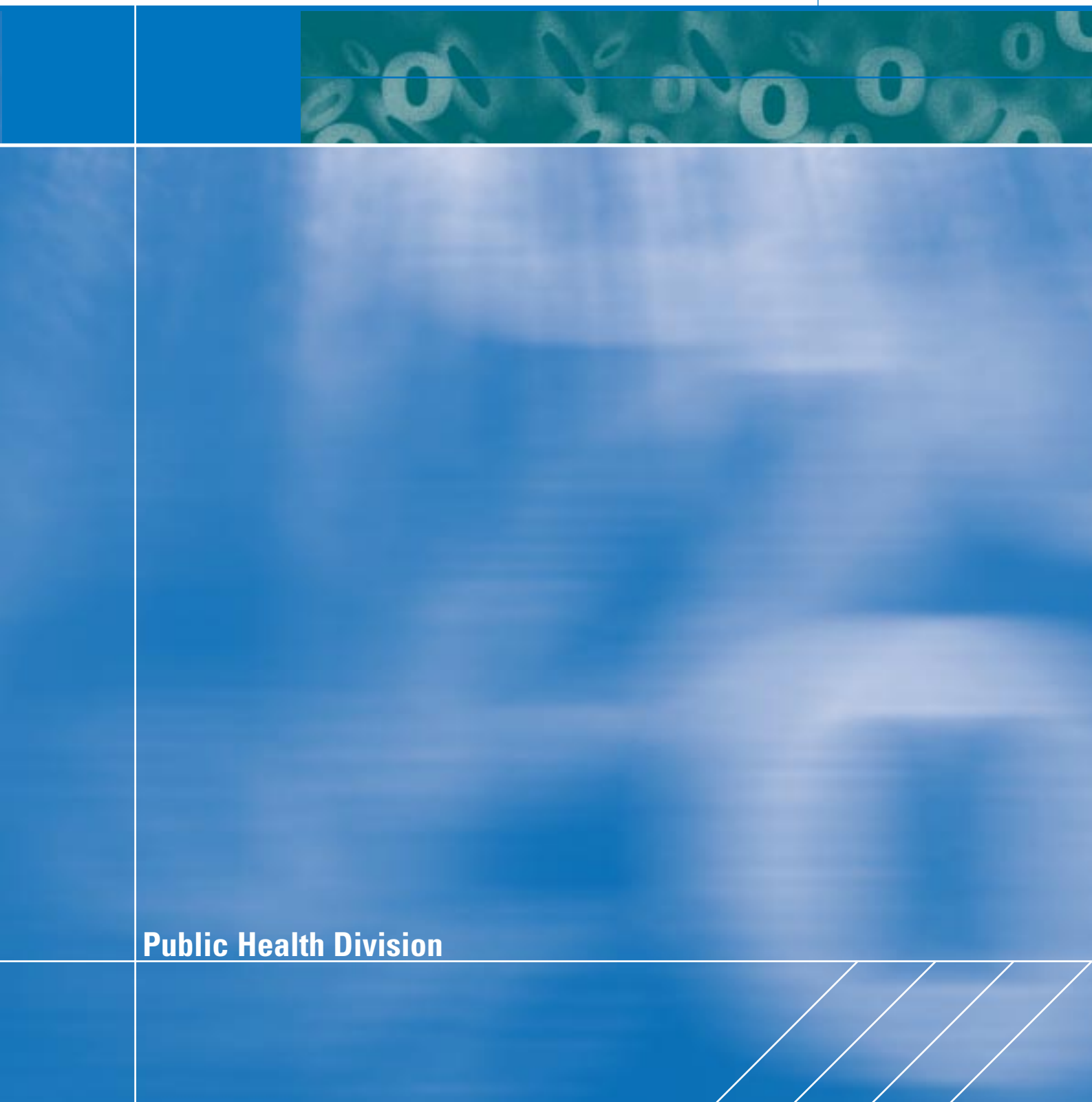

Public Health Division

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December 2000

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- The Director and staff of the Victorian Infectious Diseases Reference Laboratory, Melbourne Health, for providing information and advice, and helping investigate sporadic cases and outbreaks of infection.

Notes
- Data presented in this report relate to notifications received by the Department of Human Services and do not necessarily reflect the true incidence of the disease.
- 1999 data relating to sexually transmissible infections (HIV/AIDS, gonorrhoea, syphilis and chlamydia) will also be published in a separate report, *Surveillance of Sexually Transmissible Infections in Victoria, 1999.*

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Executive Summary

Dr John Carnie, Manager, Communicable Diseases Section

The most notable feature of 1999 was the large increase in cases of invasive meningococcal disease—up from 61 in 1998 to 137 in 1999. The notification rate in the 15–19 year old age group rose to 10 per 100,000 in 1999, from just over 5 per 100,000 in the previous year. The increase in the number of cases was accompanied by a change in the ratio of group B to group C cases, which shifted from 3.6:1 in 1998 to 1.1:1 in 1999. It has been shown overseas that specific clones of group C entering communities can cause such changes in epidemiology. Clinicians need to be alert to cases of meningococcal infection. The early institution of antibiotic therapy and transfer to hospital can be life saving.

Both hepatitis C and *Campylobacter* infections continued to rise in 1999, but there are difficulties in determining the reasons for the increases. In the case of hepatitis C, the lack of laboratory tests that can distinguish acute from past infection means only serial testing (to determine seroconversion) or the clinical features of acute infection (which are present in only a minority of cases) enable us to classify cases with any confidence. For *Campylobacter* infection, the lack of a good typing scheme hampers the determination of epidemiological links between cases.

Hepatitis A cases rose in 1999, with a continued outbreak among injecting drug users—one that has also been documented in other States and Territories in Australia. An outbreak related to a child care centre highlighted the importance of immunising child care workers against this condition.

A large outbreak of measles in 1999 was related to a returned traveller from Bali. A total of 75 cases were identified in this outbreak, with the majority being in the young adult age groups. This led to a decision to provide free measles/mumps/rubella (MMR) vaccine to all those aged 18–30 years, and this program has been taken up at a national level. The outbreak also highlighted the importance of providing advice on pre-travel immunisation to young adults travelling to countries where measles is endemic.

There were 64 cases of Legionnaires' disease in both 1999 and 1998. This number of notifications represents a marked increase on notifications in the three years 1995-97, and this rise is believed to reflect easier detection following the increased use of the urinary antigen test.

Rubella continued to show a decline in numbers over the past five years—down from 1,165 in 1995 to 123 in 1999. This may relate to the use of MMR vaccine in both male and female adolescents rather than the use of only rubella vaccine in females.

The number of listeriosis cases continued to show a slow decline in 1999, which may relate to better education of pregnant females about dietary factors.

Lastly, the number of reported cases of tuberculosis increased in 1999. This increase was partly due to the cases detected among refugees in Australian safe havens during the Kosovar and East Timorese crises. Further, more cases are being detected among overseas students who present for renewal of visas and have to undergo chest x-rays as part of the assessment process. Early detection and adequate treatment continue to be the most important aspects of preventing further transmission of tuberculosis.

1. Introduction

Surveillance for infectious diseases is a vital part of maintaining and improving public health in Victoria. The Communicable Diseases Section conducts surveillance for infectious diseases under the Health (Infectious Diseases) Regulations 1990, on behalf of the Department of Human Services. The Regulations require that medical practitioners and pathology laboratories notify the Department when they diagnose certain communicable diseases. The Communicable Diseases Section employs approximately 40 staff, including doctors, nurses, environmental health officers, scientists, epidemiologists, and administrative staff. These officers carry out the important work of conducting surveillance, investigating cases and outbreaks, and treating patients and contacts.

This report details the results of the investigations and surveillance conducted in 1999. Surveillance for infectious diseases is quite complex, requiring the notification data to be collected, entered in a database, cleaned, referred to investigators, summarised and reported. For each notification, the Communicable Diseases Section may receive reports from doctors, laboratories and reference laboratories. A surveillance coordinator refers each report to investigating staff, with varying degrees of urgency. For some diseases, investigation is initiated on the basis of clinical suspicion in the absence of laboratory confirmation. The data are regularly updated with information from investigations, making the notification system a dynamic process. The Communicable Diseases Section produces routine summary reports that allow assessment of the data by time, person and place.

In 1999 there were 19,078 notifications, representing a 6.8 per cent increase on notifications in 1998 (Table 1). These notifications would have generated over 50,000 paper reports from notifying practitioners and laboratories during the year. The greatest increase in notifications from 1998 was for measles, for which the number of notifications increased by 192 per cent due to an outbreak in people aged 18–30 years. No notifications of anthrax, Australian arbo encephalitis, botulism, diphtheria, plague, poliomyelitis, rabies, primary amoebic meningo-encephalitis, rickettsial infection, tetanus, viral haemorrhagic fevers or yellow fever were made in 1999.

In this report, we present summary data for sexually transmissible infections. More detailed information on these infections in Victoria in 1999 is contained in a separate report, *Surveillance of Sexually Transmissible Infections in Victoria, 1999.*

Prompt notification of infectious diseases is an integral component of responsive public health action. It is important that health professionals do not delay. Doctors and laboratories can notify infectious disease by telephone on **1300 65 1160** or facsimile on **1300 65 1170**.

General information on infectious diseases appears on the Department of Human Services web site http://www.dhs.vic.gov.au/phd/hprof/inf_dis/bluebook/index.htm, which also includes specific details about the notification and control of infectious diseases, and quarterly and annual reports. See: http://www. dhs.vic.gov.au/phd/vidb/index.htm.

Table 1: Summary of Notifications Received, Victoria, 1995-99

Disease	1995	1996	1997	1998	1999
Amoebiasis	72	75	76	84	113
Anthrax	0	0	1	0	0
Arbovirus Infection	55	187	1109	174	332
Brucellosis	2	3	2	2	3
Campylobacter Infection	3007	3452	3678	4064	4798
Cholera	0	0	1	1	1
Food - or Water-Borne Illness—*Cryptosporidium*	41	17	15	266	104
Food - or Water-Borne Illness—not elsewhere specified	34	54	185	181	321
Giardiasis	1031	1085	1063	1009	933
Haemolytic Uraemic Syndrome	Not notifiable	Not notifiable	0	2	8
Haemophilus influenzae type b (epiglottitis)	7	9	1	2	0
Haemophilus influenzae type b (meningitis)	7	2	5	3	2
Hepatitis A	231	461	364	169	260
Hepatitis B—acute	97	94	118	92	94
Hepatitis B—chronic/unknown	1893	2089	1713	2111	2293
Hepatitis C—acute (incident)	5	2	11	54	74
Hepatitis C—unspecified	4349	4656	4989	6315	6316
Hepatitis (viral, not elsewhere specified)	16	10	5	2	1
Hydatid Disease	14	16	29	26	17
Invasive Meningococcal Disease	75	93	98	61	137
Legionellosis	23	37	29	64	64
Leprosy	0	0	2	0	1
Leptospirosis	58	74	23	22	29
Listeriosis	23	19	15	15	12
Malaria	110	110	90	88	81
Measles	155	95	86	38	111
Mumps	78	50	65	56	73
Paratyphoid	15	9	6	7	5
Pertussis	391	1201	1666	1141	998
Psittacosis	147	62	39	47	69
Q Fever	67	62	19	32	26
Rickettsial Infections	6	9	1	3	0
Rubella	1165	804	371	189	123
Salmonellosis	984	909	1679	1133	1198
Shigellosis	85	71	79	119	107
Taeniasis	13	7	5	5	12
Tetanus	4	1	1	1	0
Tuberculosis	301	299	286	238	324
Typhoid	13	15	15	11	16
Verotoxin-producing *E. coli*	Not notifiable	Not notifiable	2	10	5
Yersiniosis	27	15	15	25	17
Total	**14601**	**16154**	**17957**	**17862**	**19078**

2.Blood-Borne Viruses

Hepatitis B

For surveillance purposes, the Department of Human Services classifies notified cases of hepatitis B as either acute or chronic infections. Acute hepatitis B is defined as the presence of hepatitis B surface antigen (HBsAg) together with either:

- The presence of IgM antibodies to hepatitis B core antigen (anti-HBc IgM); or
- The demonstration of a clinical illness consistent with acute viral hepatitis (that is, jaundice and elevated serum transaminase).

Chronic hepatitis B infection is defined as the presence of hepatitis B surface antigen (HBsAg) together with:

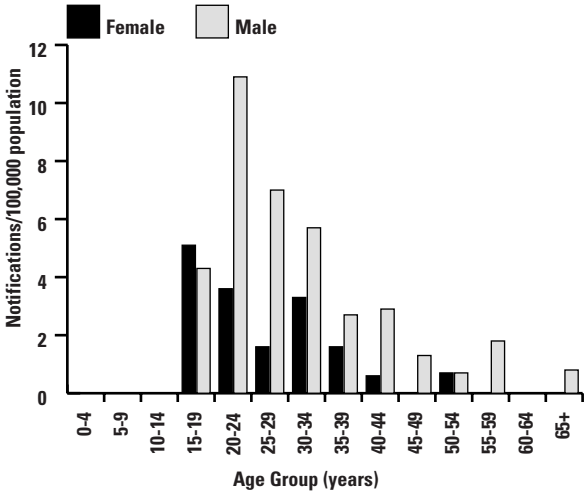
- The presence of IgG antibodies to hepatitis B core antigen (anti-HBc IgG) but no anti-HBc IgM; and
- No clinical illness consistent with acute viral hepatitis.

Lack of information means we cannot classify some notified cases of hepatitis B as acute or chronic. In this report, these cases of unknown status are included with the cases of chronic hepatitis B infection.

Acute Hepatitis B

There were 94 persons notified with acute hepatitis B in 1999, similar to the number of notifications in the previous year (Table 1). As in previous years, the majority of notified cases were male (70 per cent). The overall notification rate was 2.0 per 100,000 population. The highest rate (10.9 per 100,000 population) occurred in males aged 20–24 years (Figure 1).

Figure 1: Acute Hepatitis B Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Source of Infection

For cases of acute hepatitis B, exposure information is usually obtained from the reporting doctor and not directly from the patient. Injecting drug use and sexual contact were the most common risk factors for infection in 1999 (Table 2), accounting for 77 per cent of infections. Three cases were attributed to household contact, because the only risk factor identified in these cases was household contact with a person reported to be a chronic carrier. One death (a 20 year old male) was due to acute fulminant hepatitis B.

Table 2: Acute Hepatitis B Notifications, by Exposure Category, Victoria, 1999

Exposure Category	Female	Male	Total
Injecting drug use	10	34	44
Injecting drug use and heterosexual	4	2	6
Heterosexual	7	7	14
Homosexual	0	8	8
Household contact	1	2	3
No risk factor identified	2	12	14
Information unavailable	3	2	5
Total	**27**	**67**	**94**

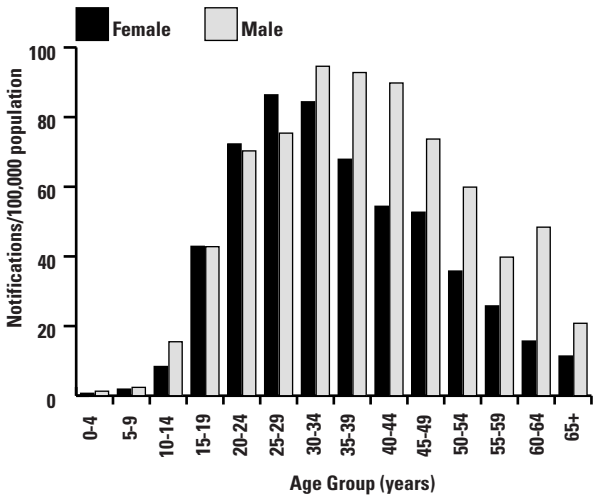
Table 3: Acute Hepatitis B Notifications, by Country of Birth, Victoria, 1999

Country of Birth	Notifications
Australia	26
Asia	6
USA	2
Former Yugoslav Republic of Macedonia	1
Ireland	1
Nigeria	1
Southern Europe	1
Not known	56
Total	**94**

Chronic Hepatitis B

There were 2293 persons notified with chronic hepatitis B infection in 1999, of whom 966 (42 per cent) were female, 1200 (52 per cent) were male, and 127 (6 per cent) were of unknown gender.

Figure 2: Prevalent Hepatitis B Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Hepatitis C

For surveillance purposes, the Department of Human Services classifies cases of hepatitis C infection as either acute (incident) hepatitis C or hepatitis C unspecified. Acute hepatitis C is defined as:

- The demonstration of seroconversion to hepatitis C virus (HCV) when the most recent negative specimen was within the last 12 months; or
- The demonstration of a positive HCV antibody test or a positive polymerase chain reaction (PCR) test for HCV, and a clinical illness consistent with acute hepatitis within the past 12 months where other possible causes of acute hepatitis are excluded.

Hepatitis C unspecified is defined as:

- The demonstration of a positive HCV antibody test or a positive PCR test for HCV, but without fulfilling the above criteria for acute disease.

The Department of Human Services received 6390 notifications of hepatitis C in 1999. There were more males than females in the notifications for almost every age group (Figures 3 and 4).

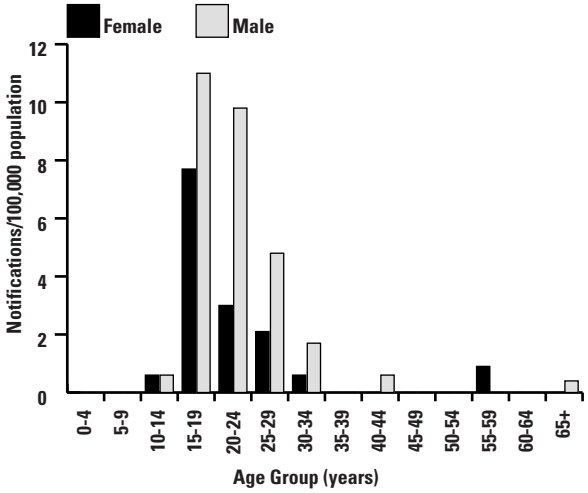
Acute Hepatitis C

The majority of acute (incident) hepatitis C infections are asymptomatic and, without serological assays that distinguish between acute and chronic cases, identification of incident infections is difficult. All notifications from doctors that indicated possible acute hepatitis C were followed up to ascertain if they met the case definition. This follow-up identified 74 cases of acute hepatitis C.

Of the 74 acute cases of HCV infection notified in 1999:

- Three (4 per cent) had documented seroconversion and a clinical illness consistent with acute hepatitis.
- Fifty-three (72 per cent) had documented seroconversion only.
- Seventeen (23 per cent) had acute hepatitis where other possible causes were excluded.
- One (1 per cent) was detected during an epidemiological investigation.
- Fifty-one cases were males (69 per cent) and 23 cases were females (31 per cent). The majority were in the 15–29 year age group (88 per cent of cases). Figure 3 indicates the age and sex distribution of cases of acute hepatitis C.

Figure 3: Acute Hepatitis C Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Source of Infection

For cases of acute hepatitis C, exposure information is obtained from the reporting doctor and not directly from the patient. Injecting drug use was the major risk factor for transmission in 1999, and was identified in 66 of the 74 cases (89 per cent). Twenty-seven of these 66 cases (41 per cent) were aged under 18 years, with the youngest aged 14 years.

An epidemiological investigation identified iatrogenic transmission as the only possible risk factor for two cases. Heterosexual contact was identified in one case; the individual had requested the test as a result of a known risk behavior and recent travel overseas. (The doctor was unable to identify sexual orientation.) Organ transplant was identified for one case, who received a transplant from a relative who was known to have hepatitis C and who was PCR negative. A risk factor could not be identified for the remaining four cases.

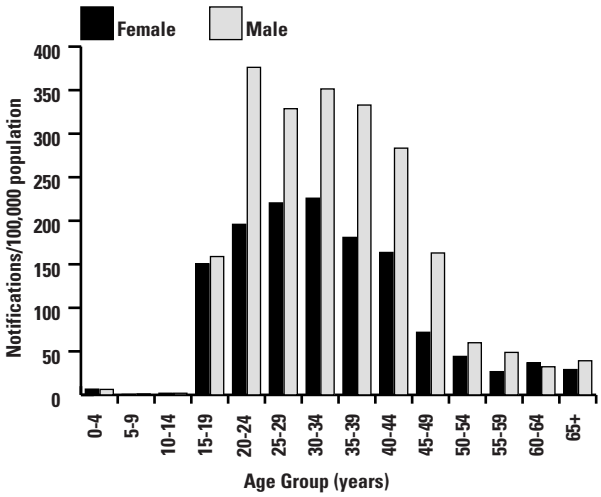
The small number of incident cases identified is likely to be an underestimate of the true incidence.

Hepatitis C Unspecified

There were 6316 notifications of hepatitis C unspecified in 1999. The majority were prevalent cases, having been infected at some indeterminate time in the past. The notifications for which gender was known comprise 3807 males and 2372 females. The highest rates of notification occurred in males aged 20–44 years (Figure 4).

The descriptive epidemiology for cases of unspecified hepatitis C probably reflects doctors' testing patterns, as well as the prevalence of the disease.

Figure 4: Hepatitis C Unspecified Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



3. Enteric Diseases

Amoebiasis

There were 113 cases of amoebiasis notified in 1999, which were all sporadic. The highest notification rates occurred among males aged 25–44 years (Figure 6). Twenty-two cases (19 per cent) reported having acquired their infection overseas, most commonly in Africa and the Pacific region. A much higher proportion of the cases were likely to have acquired the infection overseas, but the majority of notifications were from laboratories so they did not include travel history.

Figure 5: Amoebiasis Notifications, by Month of Onset, Victoria, 1995-99

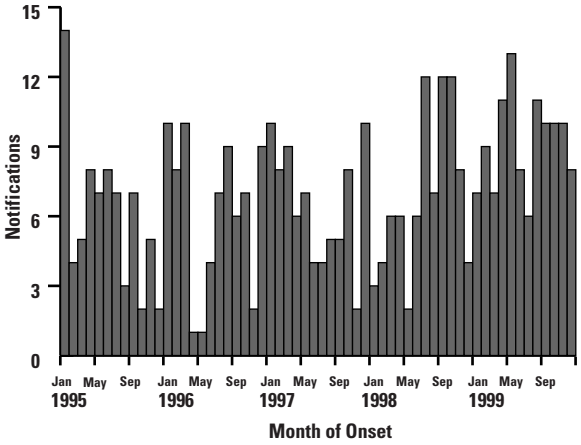
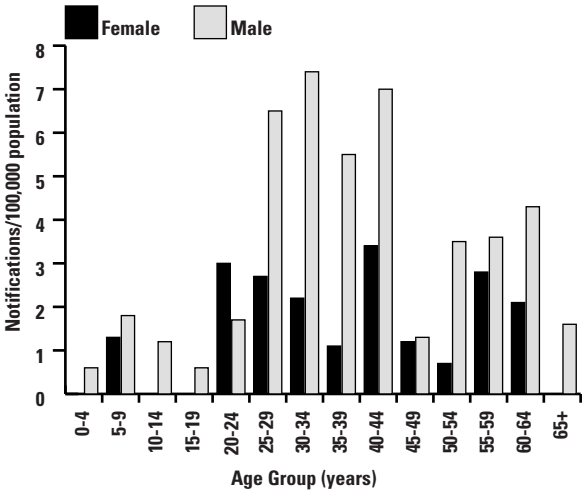


Figure 6: Amoebiasis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Campylobacter Infection

There were 4798 notifications of *Campylobacter* infection in 1999—up 18 per cent on the number received in 1998. Campylobacteriosis is most common in spring and summer, and there were 566 notifications with onset of illness in November 1999 (Figure 7). The highest age-specific rates were among children aged under 5 years (Figure 8).

Figure 7:* Campylobacter *Infection Notifications, by Month of Onset, Victoria, 1995-99

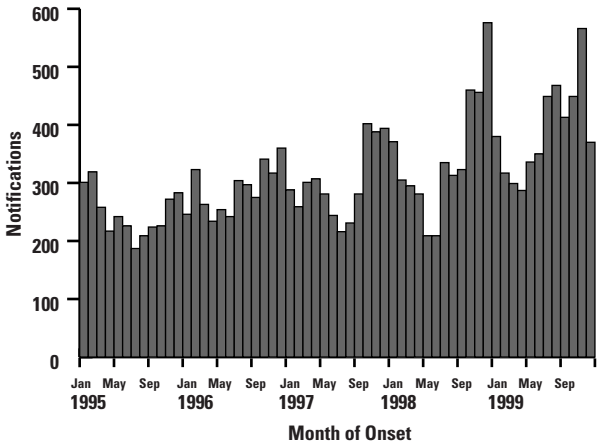
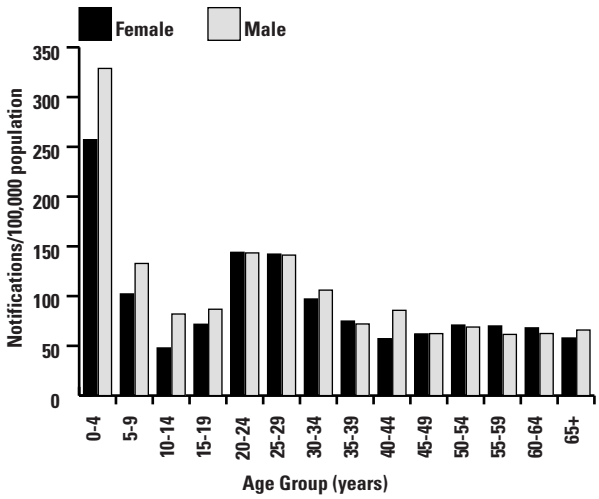


Figure 8:* Campylobacter *Infection Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Cholera

Notifications of cholera in Victoria are rare and have been limited to imported cases among travellers returning from overseas. In 1999, there was one notification of cholera—a 66 year old male. An overseas resident, he had been travelling through South-east Asia for 10 days prior to the onset of illness. Taking into account an incubation period of up to five days, the case would have acquired his infection in either Indonesia (Jakarta) or Singapore. The case reported eating numerous meals in restaurants and also eating meals provided by the companies for whom he was working. He also reported drinking tap water in Singapore. He was hospitalised for 12 days and treated with antibiotics and fluid replacement therapy. A faecal specimen confirmed that his illness was due to *Vibrio cholerae* serogroup O1 Ogawa v El Tor.

A travelling companion (work associate) who ate all meals with the case also became unwell with diarrhoea on the same day as the case. This man did not travel to Australia and was later diagnosed with cholera on his return to Japan.

Food- or Water-Borne Illness

The Health (Infectious Diseases) Regulations 1990 require medical practitioners to notify the Department of Human Services of suspected cases or outbreaks of food- or water-borne illness, regardless of the aetiology. This allows for the early investigation of possible sources of illness where food or water is suspected, which is important for preventing further cases in people who may be at risk. These notifications are classified as 'group A' notifications and must be notified within 24 hours.

Notifications of food- or water-borne illness were originally intended for situations of two or more related cases, but single notifications are often received when a medical practitioner suspects that a particular food or water source is associated with the illness. Council environmental health officers follow up these sporadic cases. Pathogens that are not notifiable under the regulations (for example, Cryptosporidium and rare gastrointestinal diseases) are also recorded under the food- or water-borne illness category.

There were 425 notifications of food- or water-borne illness in 1999, of which 104 (24 per cent) were cases of cryptosporidiosis (Table 4).

Table 4: Food- or Water-Borne Illness Notifications, by Causative Organism/Agent, Victoria, 1999

Organism/Agent	Notifications
Adenovirus	1
Astrovirus	2
Bacillus cereus	2
Blastocystis hominis	3
Ciguatera fish poisoning	2
Clostridium perfringens	7
Cryptosporidium species	104
Dientamoeba fragilis	1
Cases epidemiologically linked to an outbreak	144
Norwalk-like virus	76
Rotavirus	34
Staphylococcus aureus	7
Vibrio parahaemolyticus	3
No organism identified	39
Total	**425**

Cryptosporidiosis

Pathology laboratories in Victoria notify cases of cryptosporidiosis to the Department of Human Services on a voluntary basis. The Department intends to make cryptosporidiosis a notifiable condition when the Health (Infectious Diseases) Regulations 1990 are revised in 2001. For surveillance purposes, the Department of Human Services defines *Cryptosporidium* infection as the identification of *Cryptosporidium* oocysts in a faecal specimen or intestinal biopsy.

There were 104 notifications of cryptosporidiosis in 1999—down 61 per cent from notifications received in 1998. The median age of cases was 9 years (range 0–69 years), and 51 per cent of notifications were males (Figure 9). The highest numbers of notifications were received in February and October (Figure 10). The Gippsland region had the highest number of notifications for the year (Appendix 1A). No common source outbreaks were detected during the year.

The Department of Human Services is working with the Cooperative Research Centre for Water Quality and Treatment on a case control study to examine the

risk factors for *Cryptosporidium* infection. The investigators seek information from all cases who live in the Melbourne metropolitan area, asking about possible exposures in the incubation period. They interviewed 36 cases in 1999. Analytical results from the case control study are not yet available.

Figure 9: Cryptosporidiosis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

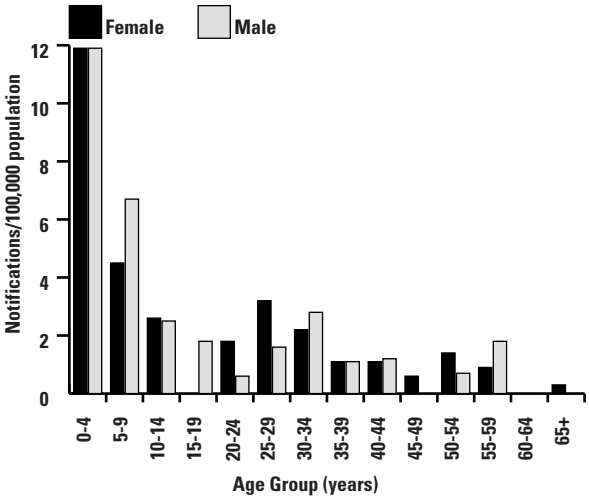
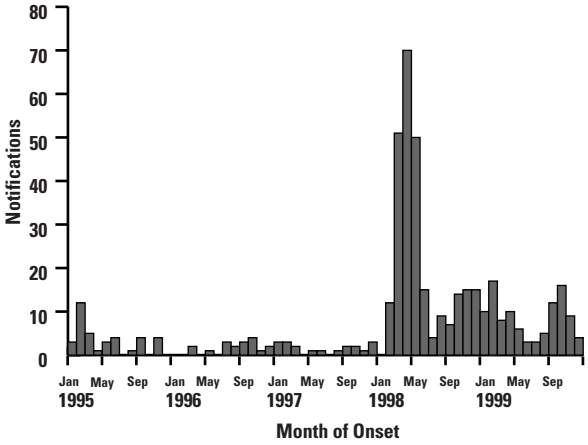


Figure 10: Cryptosporidiosis Notifications, by Month of Onset, Victoria, 1995-99



Outbreaks Investigated

The Department of Human Services investigated 116 outbreaks of gastrointestinal illness in 1999—a 97 per cent increase on the number of outbreaks reported in 1998 (Table 5). As in previous years, a large number of the outbreaks investigated (53 per cent) were identified as viral (predominantly Norwalk-like virus) or of suspected viral origin. (*Salmonella* outbreaks are discussed further in the relevant section of this report.)

Table 5: Food- and Water-Borne Illness Outbreaks, by Setting and Causative Agent, Victoria, 1999

Outbreak Setting	Causative Agent	Total
Food premises/catered function	*Salmonella* infection (4); *Clostridium perfringens* (4); suspected scombroid poisoning (1); butterfish diarrhoea (2); Norwalk-like virus (7); suspected viral (14); no organism identified (18)	50
Nursing homes/hostels/health care facilities	Norwalk-like virus (4); suspected viral (21)	25
Family/social gatherings	*Staphylococcus aureus* (1); *Salmonella* infection (1); ciguatera fish poisoning (1); Norwalk-like virus (2); suspected viral (1); no organism identified (7)	13
Children's services	*Salmonella* infection (1); hepatitis A (2); rotavirus (6); Norwalk-like virus (1); suspected viral (2); no organism identified (1)	13
Recreation/sport	No organism identified (1)	1
Community	No organism identified (1)	1
Fundraising	*Salmonella* infection (1); no organism identified (1)	2
Holiday/resort/camping ground	Giardia/viral (1); typhoid (1); Norwalk-like virus (1); suspected viral (3); no organism identified (4)	10
Workplace	No organism identified (1)	1
Total	Viral/suspected viral (62); *Salmonella* infection (7); suspected scombroid poisoning (1); ciguatera fish poisoning (1); *Clostridium perfringens* (4); hepatitis A (2); butterfish diarrhoea (2); *Staphylococcus aureus* (1); Giardia/viral (1); typhoid (1); no organism identified (34)	**116**

Viral and Suspected Viral Outbreaks

Of the 62 viral and suspected viral gastroenteritis outbreaks investigated in 1999, 25 (40 per cent) were reported in nursing homes, hostels or other health care settings. The transmission of viral pathogens in these settings appears to be due to person-to-person spread, highlighting the importance of monitoring and instituting early control strategies.

There were six confirmed outbreaks of rotavirus notified in children's services in August and September. In each instance, council environmental health officers visited the child care centre to ensure that good infection control procedures were being implemented and that the centres were excluding sick children and staff. Secondary cases in household contacts were also reported.

In October and December, there were two outbreaks of gastroenteritis among school groups at camps. One outbreak was confirmed to be a Norwalk-like virus and the other was suspected to be a viral pathogen. The mode of transmission was most likely to have been person-to-person, although one campsite provided drinking water that was heavily contaminated with *E. coli*. This camp has subsequently closed.

The majority of the remainder of the viral or suspected viral outbreaks involved people sharing food from common platters or eating buffet-style meals.

Outbreak Due to *Staphylococcus aureus*

In January 1999, the Department of Human Services was notified of an outbreak of gastrointestinal illness among a number of people who had attended a Christening. The illness was characterised by a rapid onset of vomiting and diarrhoea approximately 2–4 hours after consumption of the meal served at the function. The catering consisted of food prepared by some of the guests and brought to a community hall where it was served. Thirty-five of the 54 people who were interviewed (65 per cent) were ill; of those ill, 24 (69 per cent) were taken to hospital. *Staphylococcus aureus* and enterotoxin were isolated from faecal specimens. Illness was associated with eating a chicken and rice dish (chicken biriyani) prepared by a guest. High levels of *Staphylococcus aureus* were found in the leftover chicken biriyani and *Bacillus cereus* was also found in the leftover food.

Outbreaks Due to *Clostridium perfringens*

Reception Centre Outbreak

A medical practitioner reported an outbreak of gastroenteritis to the Department of Human Services in July 1999. A patient had become ill two days after attending a ball. The doctor also reported that other attendees at the function were ill. A list of guests was obtained, from which 75 people were randomly selected and interviewed. Thirty-four of the interviewees reported gastrointestinal illness. One hundred per cent of cases had diarrhoea, 82 per cent had abdominal cramps and 17 per cent reported vomiting. The incubation period ranged between five and 17 hours. Those people who ate the chicken vol au vent were nine times more likely to have been ill than those who did not eat this meal. Five faecal specimens were collected, and *Clostridium perfringens* enterotoxin was detected in two specimens that had high levels of *Clostridium perfringens* bacteria. Investigations of the preparation of the suspect food revealed that the cooling and reheating the vol au vents might have been the problem.

Privately Catered Birthday Party

An outbreak of *Clostridium perfringens* food poisoning was reported in a group of people who attended a privately catered birthday party. Sixteen of the 31 people who attended the party became ill with diarrhoea and stomach cramps. Some of the food served at the party was purchased from a local Chinese take-away. The restaurant delivered two large dishes of food to the party just before lunchtime, and it was initially thought that the temperature of the food might have been conducive to bacterial growth during preparation and delivery.

Further investigation revealed that the party was an open house arrangement whereby guests arrived at different times throughout the day and food was left at room temperature for up to eight hours. At least 13 of the 16 people who were ill had eaten at dinnertime

or later, suggesting that high levels of bacteria could have been present in the food by dinnertime.

A cohort study revealed that people who ate the sweet and sour pork were three times more likely to have been ill and that those who ate the chicken and vegetables were six times more likely to have been ill. *Clostridium perfringens* bacteria and enterotoxin were detected in three faecal specimens. All people affected ate the two suspect dishes. An investigation of the take-away shop revealed that procedures for cooking, hot holding and delivery were satisfactory.

Butterfish

Two outbreaks reported during November 1999 concerned restaurant patrons who had become ill with gastrointestinal symptoms, mainly consisting of watery diarrhoea. In the first reported outbreak, 50 guests were interviewed, of whom 14 reported becoming ill within a few hours of consuming butterfish. Those who ate the butterfish were 11 times more likely to have become ill than those who did not eat it.

Many different fish species are marketed under the name 'butterfish'. Two particular species, escolar (*Lepidocybium flavobrunneum* and *Ruvettus pretiosis*) and rudderfish (*Centrolophus sp*.), are commonly sold as butterfish. Both have a high oil content (as high as 23 per cent by weight). Humans do not easily digest the type of oil contained in these species, and the oil is documented to cause diarrhoea (especially if eaten in large quantities).

Usually people complain of diarrhoea soon after consumption; the diarrhoea is sometimes described as oily, may be orange in colour, and often can be severe enough to cause faecal incontinence. The cause of the illness appears to be the high oil content rather than a toxin or bacterial contamination. The fish supplied in both outbreaks was believed to be rudderfish.

Giardiasis

There were 933 notifications of giardiasis in 1999. The peak period for illness onset was the first quarter of 1999 (Figure 11). Notification rates were highest among children aged under 5 years—72.7 per 100,000 population for females in this age group and 85.6 per 100,000 population for males (Figure 12). As in previous years, there was a secondary peak among adults aged 30–39 years. This may indicate the occurrence of household transmission from infants to parents and other carers. Many cases also reported a history of recent travel.

Figure 11: Giardiasis Notifications, by Month of Onset, Victoria, 1995-99

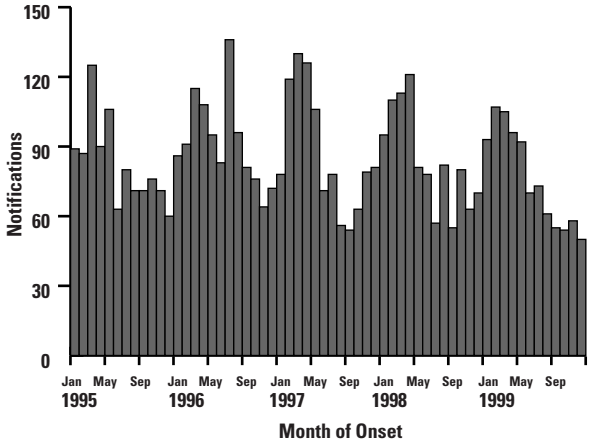
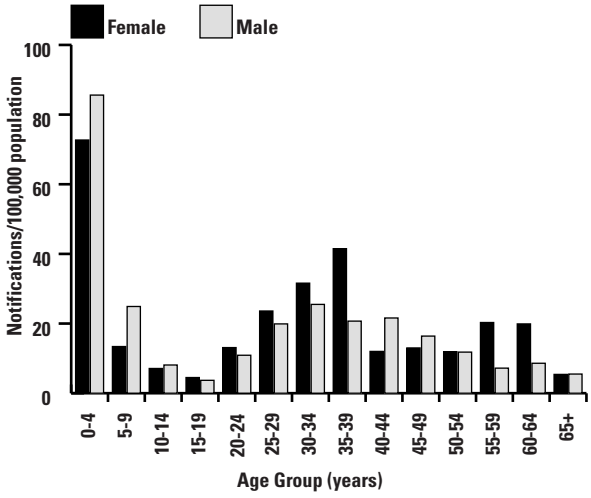


Figure 12: Giardiasis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Haemolytic Uraemic Syndrome and Verotoxin-producing *E. coli*

E. coli are common bacteria normally found in the gut of warm-blooded animals. There are many types of *E. coli*, of which most are harmless. However, some types can produce toxins that are pathogenic in humans. One type is known as verotoxin-producing *E. coli*. The most common symptom is diarrhoea, which can range from mild to severe, and may be bloody and accompanied by stomach cramps. Symptoms can be severe in children and people with reduced immunity.

Haemolytic uraemic syndrome is a rare condition affecting the kidneys and the bloodstream, which can be caused by verotoxin-producing *E. coli*. The condition leads to kidney failure and anaemia. Children aged under 5 years are at the greatest risk of developing haemolytic uraemic syndrome. Abdominal pains and bloody diarrhoea mark the onset of a prodromal illness. Typically, the diarrhoea lasts about a week, after which time the child becomes lethargic and passes decreased amounts of urine, as a result of kidney damage. Outbreaks of haemolytic uraemic syndrome have been associated with the consumption of food contaminated with verotoxin-producing *E. coli*.

Since October 1998, haemolytic uraemic syndrome and verotoxin-producing *E. coli* infection have been included on the notifiable infectious diseases schedule.

Haemolytic Uraemic Syndrome (HUS)

Eight cases of haemolytic uraemic syndrome (including two deaths) were reported to the Department of Human Services. Although verotoxin-producing *E. coli* could not be cultured from faecal samples obtained from five of these cases (Table 6), toxin-producing genes were found in one case by PCR.

Five of the haemolytic uraemic syndrome cases in 1999 occurred between October and December. Three cases were in formula-fed infants aged under 2 years, and these were reported in a two week period. Faecal specimens from cases and household contacts were collected, but no verotoxin-producing *E. coli* were detected in any of the specimens. Numerous food samples, including formula, rice cereals and other baby foods, were sampled from the homes of cases as well as from retail premises. No verotoxin-producing *E. coli* were detected in any of the food samples. Also, no common links were found between any of the cases.

After the third reported case, the Department of Human Services undertook active surveillance for cases of haemolytic uraemic syndrome and bloody diarrhoea through pathology laboratories and the major paediatric hospitals (Royal Children's Hospital and Monash Medical Centre). No other cases were reported.

Verotoxin-producing *E. coli* (VTEC)

Five cases of verotoxin-producing *E. coli* were reported in 1999. One of these, which was a case of *E. coli* O157:H7, occurred in a laboratory worker. The laboratory used *E. coli* O157:H7 as a control strain but the worker concerned had not handled the organism. This incident highlighted a number of safety issues for laboratory managers. A brief case report and a check list for risk assessment in microbiology laboratories were published in the Victorian Infectious Diseases Bulletin (see http://www.dhs.vic.gov.au/phd/vidb/vidbv2i3.pdf, page 52).

Table 6: HUS/VTEC Notifications, by* E. coli *Phage Type, Victoria, 1999

***E. coli* Type**	**HUS**	**VTEC**
E. coli O113:H21	1	0
E. coli O111:H	1	0
E. coli O1:H7	1	0
E. coli O157:H	0	1
E. coli O157:H7	0	1
E. coli O157:H phage type 14	0	2
E. coli O157:H phage type 21	0	1
No *E. coli* isolated	5	0
Total	**8**	**5**

Hepatitis A

There were 260 notifications of hepatitis A in 1999—up 54 per cent from the number in the previous year. There were 103 females (40 per cent) and 157 males (60 per cent). The highest notification rate occurred among males aged 15–29 years (Figure 14).

Figure 13: Hepatitis A Notifications, by Month of Onset, Victoria, 1995-99

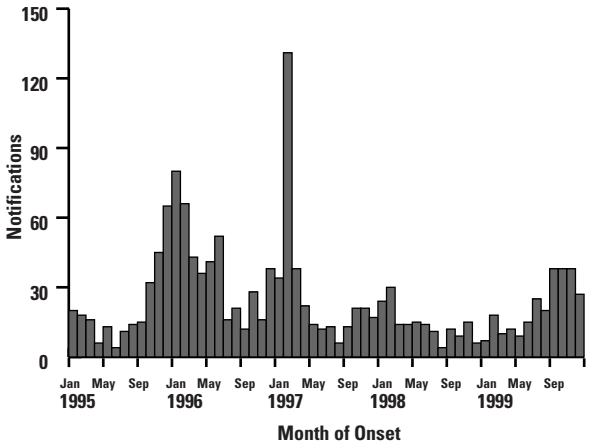
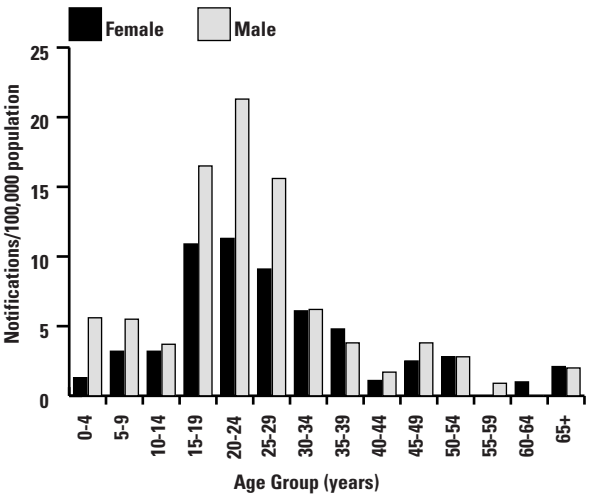


Figure 14: Hepatitis A Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

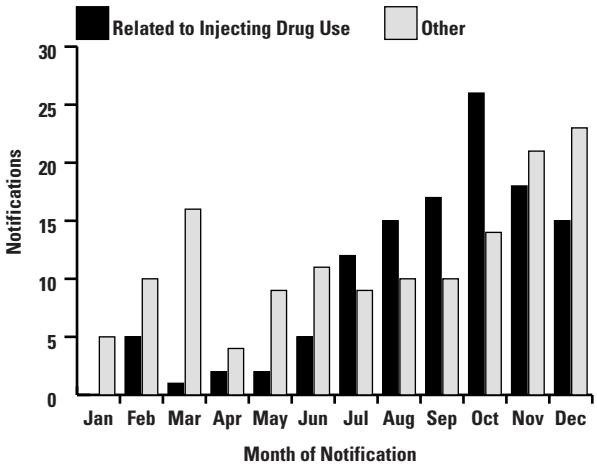


Outbreaks

Injecting Drug Users

From late 1998, the Department of Human Services observed a large increase in notifications of Hepatitis A among injecting drug users in parts of Melbourne, particularly in the south-eastern suburbs. Injecting drug users or close contacts of injecting drug users represented approximately 45 per cent of the total number of cases of hepatitis A in 1999 (Figure 15). The high incidence of hepatitis A among injecting drug users had also recently been documented in other States in Australia.

Figure 15: Hepatitis A Notifications, by Month of Notification and Injecting Drug Use, Victoria, 1999



Child Care Centre Outbreak

An outbreak of hepatitis A at a child care centre in 1999 was recognised when two child care workers were notified. The Department of Human Services recommended that all staff and children be given immunoglobulin, which the centre medical officer administered. Subsequent investigations revealed that both parents of one child at the centre had been diagnosed with hepatitis A. Although asymptomatic, their child was subsequently tested and found to have been infected.

Another child care worker and parent were diagnosed in the following weeks. This outbreak highlights the importance of the recommendation that child care workers be immunised against hepatitis A. Often when child care workers become infected, an outbreak may already be well established among the children. Children aged under 5 years are usually asymptomatic, so they often attend child care centres during their infectious period.

Table 7: Listeriosis Notifications and Deaths, by Category, Victoria, 1998-99

Year	1998 Notifications	Percentage	1999 Notifications	Percentage
Materno-foetal notifications	5	-	5	-
Stillbirths, neonatal deaths and miscarriages	4	80	3	60
General notifications	10	-	7	-
Case fatalities-general notifications	3	30	1	14
Total notifications	15	-	12	-
Case fatalities-total notifications	7	47	4	33

Listeriosis

For surveillance purposes, the Department of Human Services defines a case of listeriosis as a patient who has had *Listeria monocytogenes* isolated from a site that is normally sterile, including foetal gastrointestinal contents. There were 12 notifications of listeriosis in 1999, consisting of five materno-foetal cases and seven notifications in other at-risk persons. A materno-foetal case is one in which *L. monocytogenes* is isolated from a pregnant woman, her foetus or her neonate. A pair consisting of a mother and her neonate is counted as one case.

No clusters were identified in 1999, and notifications were received throughout the year.

Materno-Foetal Cases

The five materno-foetal cases in 1999 resulted in only two live births, but there were no maternal deaths (Table 8). Three of the materno-foetal cases lived in the metropolitan area and two were from country Victoria. All cases were sporadic and unrelated.

Table 8: Materno-Foetal Listeriosis, by Age, Gestation, Outcome and Maternal Country of Birth, Victoria, 1999

Maternal Age (Years)	Gestational Age (Weeks)	Outcome	Maternal Country of Birth
33	28	Survived	Australia
30	21	Miscarriage	Australia
34	22	Miscarriage	Australia
36	36	Survived	Australia
38	21	Miscarriage	Vietnam

Materno-Foetal Cases of Interest

A woman at 36 weeks gestation presented with contractions, foetal distress and a history of fever of four hours. An emergency caesarean was performed, resulting in a live birth. The baby had mild respiratory illness for 24 hours, but responded to antibiotic treatment and made a full recovery. *L. monocytogenes* was isolated from the placenta and the baby's blood culture.

A woman at 28 weeks gestation presented with a history of feeling mildly unwell for 48 hours, and reported rapid foetal movement for 24 hours followed by the absence of foetal movement. An emergency caesarean was performed, resulting in a live birth. The baby had severe sepsis and respiratory distress, and required ventilation. Following antibiotic treatment, the baby improved and made a full recovery. *L. monocytogenes* was isolated from the baby's blood culture and surface swabs.

Other Cases

The seven remaining listeriosis cases occurred in three females and four males. All were adults, ranging in age from 62 years to 81 years (median 75 years). Six were immunocompromised and had varying risk factors for listeriosis, including recent heart surgery, chronic myeloid leukaemia, prostate cancer, stomach cancer, breast cancer, treatment by chemotherapy, and rheumatoid arthritis with steroid administration. One case presented with Listeria meningitis; a male (aged 62 years) of European origin with a history of hypertension, this case's only noted risk factor was a high consumption of delicatessen products (known high risk foods for *L. monoctyogenes*). One of the seven cases (a female aged 81 years) died.

Subtyping

As part of epidemiological investigations, the Microbiological Diagnostic Unit, University of Melbourne, routinely conducts molecular typing using pulsed-field gel electrophoresis (PFGE) on all isolates from notified cases. Twelve different patterns were found in the 12 listeriosis cases, consistent with the finding that there was no epidemiological link among them.

L. monocytogenes was detected in seven food samples investigated as possible sources of infection. A sample of coriander tested for one case was found to have an identical PFGE to that of the patient isolate. However, the other six positive food samples had different patterns on PFGE to that found in the associated patient, indicating that the occurrence of the organism in the food was probably coincidental.

Salmonellosis

There were 1198 notifications of salmonellosis in 1999. As in previous years, notifications peaked over the summer months (Figure 16). The highest age-specific notification rates occurred in children aged under 5 years—105.6 per 100,000 males in this age group and 98.5 per 100,000 females (Figure 17).

Figure 16: Salmonellosis Notifications, by Month of Onset, Victoria, 1995-99

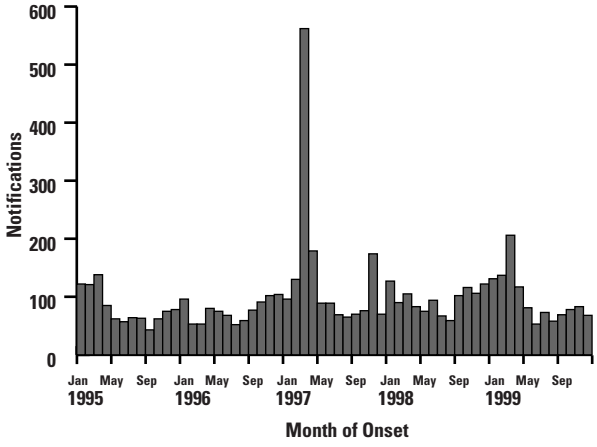
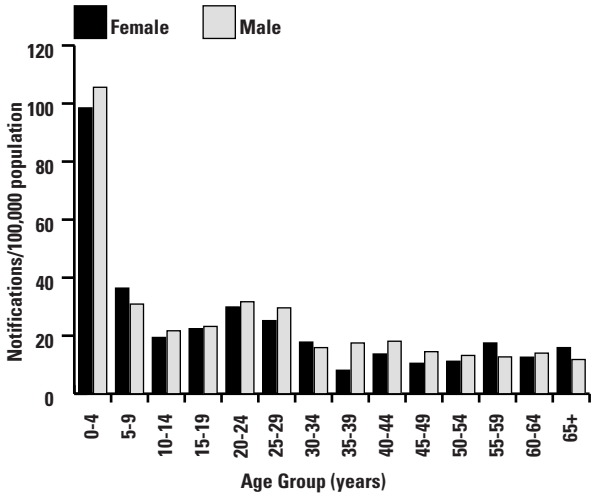


Figure 17: Salmonellosis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Salmonella Outbreaks

Salmonella Virchow 34

A local government environmental health officer detected a point source outbreak of *Salmonella* Virchow 34 through routine follow-up of a *Salmonella* notification in 1999. The outbreak occurred after a commercially catered work function, at which 15 of 52 people became ill. People who ate chicken satay and/or beef satay were at a higher risk of illness. The risk was slightly higher for chicken satay than for beef satay, but both satays were served on the same plate and cross-contamination could have occurred. *Salmonella* Virchow 34 was subsequently isolated from a raw chicken sample obtained from the caterer's supplier.

In April 1999, a case control study was undertaken to investigate an increase in notifications of *Salmonella* Virchow 34. The investigators detected a separate outbreak of the same serovar among patrons at a restaurant. Three confirmed cases had dined at the restaurant on the same weekend. Department of Human Services staff contacted people on the restaurant booking list for that weekend. Fifty-four people were interviewed, of whom 17 had become ill with gastrointestinal symptoms after dining at the restaurant. Faecal samples were collected for 12 cases, of which 10 had positive faecal culture for *Salmonella* Virchow 34 and one had *Salmonella* Virchow 19 isolated. One case was hospitalised.

Salmonella Virchow 34 was isolated from a sample of raw chicken obtained from the restaurant and a sample of raw beef from the restaurant's suppliers

(which also supplied raw chicken). Consumption of any beef dish was epidemiologically associated with illness, although it appears that raw chicken was the initial contaminant. Inspection of the restaurant revealed many opportunities for cross-contamination between raw and cooked foods. Clean-up and control measures were instituted at the premises.

Salmonella Typhimurium 9

Fifty-four cases of *Salmonella* Typhimurium 9 were notified with the same antibiotic resistance pattern and illness onset ranging over the period November 1998 to April 1999. Follow-up of all cases identified a link, with 27 of the cases having eaten continental custard cakes during their incubation period. The custard contained in the cake was thought to be the most likely vehicle for the *Salmonella*. Other cases in this cluster that were not associated with the cake shop were investigated as part of a case control study. Two point source outbreaks of the same type of *Salmonella* were also identified during this period. Both outbreaks were associated with parties at which guests were served a continental custard cake purchased from the implicated manufacturer.

Salmonella Hessarek

In April 1999, the Department of Human Services investigated an outbreak of *Salmonella* associated with a food fair organised by a charitable fundraising club. Preliminary interviews conducted with some people known to have been ill implicated pan rolls as the likely source of the outbreak. A pan roll is a pancake with a curried mince filling, which is rolled, coated with egg and breadcrumbs, and then deep-fried. Club members were randomly selected and contacted by telephone. People who had eaten food purchased at the fair were interviewed using a standard questionnaire.

Preliminary investigation showed that the type of food sold at the fair was likely to have been taken home and frozen for later consumption. This raised the concern that people might still have contaminated food in the freezer. It was not possible to contact everyone who attended the fair, so the Department of Human Services released a media statement warning people against eating any food purchased at the fair.

It also set up a telephone hotline. This process elicited further cases and enabled leftover foods to be sampled from people's homes.

A case control study revealed that those who were ill were 12 times more likely to have eaten pan rolls than were those who were not ill. *Salmonella* Hessarek was

Table 9: **Salmonella *Enteritidis* Notifications, by Country of Source of Infection and Phage Types, Victoria, 1999**

Region	Notifications	Phage Types (Number of Notifications)
Cambodia	1	1 (1)
Indonesia	35	4 (30); 1 (1); 21 (1); 26 (1); RDNC (1); untypable (1)
Malaysia	1	4 (1)
Thailand	1	1 (1)
Singapore	1	9A (1)
India	1	RDNC (1)
Philippines	2	1 (2)
Hong Kong	5	1 (1); 21 (1); 4 (3)
Sri Lanka	2	4 (2)
China	2	1 (1); RDNC (1)
North America	1	4 (1)
Europe	3	1 (1); 6b (1); 8 (1)
Middle East	2	4 (2)
InterState	2	RDNC (1); 26 (1)
No overseas source identified	1	26 (1)
Total	**60**	

isolated from faecal specimens taken from 11 cases and also from a sample of pan rolls obtained from one of the cases. Factors that may have contributed to this outbreak include cross-contamination and the inadequate storage/transportation temperatures of the pan rolls. Initial cooking of the raw mince also may have been inadequate. Volunteers are often unaccustomed to preparing food in large quantities and do not have suitable facilities or equipment. Volunteers need to take special care to ensure food reaches the required cooking temperature.

Other Investigations of Interest

Salmonella Enteritidis

Salmonella Enteritidis is not endemic in Australia, with the exception of phage type 26, which occurs in Queensland. Enteritidis is a significant *Salmonella* serovar in that the organism vertically transmits from chickens to eggs. It is common overseas and has been responsible for large outbreaks of disease associated with undercooked eggs and products containing eggs. In Victoria, all cases of *Salmonella* Enteritidis are followed up to ascertain whether the infection was acquired overseas (Table 9).

There were 60 notifications of *Salmonella* Enteriditis in 1999. All cases except three (5 per cent) had travelled overseas in their incubation period. The most common phage type was *Salmonella* Enteriditis 4, of which most cases were isolated from travellers returning from Indonesia.

Typhoid and Paratyphoid

For surveillance purposes, the Department of Human Services defines a case of typhoid or paratyphoid infection as:

- Someone who has had *Salmonella typhi* isolated from any clinical specimen; or
- Someone who has had *Salmonella paratyphi* serotype A, B or C isolated from any clinical specimen.

There were 16 notifications of typhoid and five of paratyphoid in 1999. Eleven of the 21 notifications were male and 10 were female (Table 3). The age of cases ranged from a 2 year old female with paratyphoid to a 57 year old male with typhoid (Appendix 2).

Source of Infection

Most notifications occur in the early months of the year as people return from overseas holidays. There were 11 notifications in the first quarter (January to March) of 1999, and an unusual cluster of four cases of typhoid in June related to the outbreak on the cruise ship visiting the Kokoda Trail (see below).

The majority of cases reported were associated with a recent history of overseas travel and occurred in overseas born residents (Table 10). Twelve cases were overseas-born Australian residents who had become ill following recent travel to their county of origin. Six cases were Australian-born returned travellers, although one case was infected by his mother, who was probably a carrier. Three cases were recently arrived immigrants to Australia who were infected in their countries of origin (India, Indonesia and Lebanon).

Table 11: Typhoid and Paratyphoid Notifications, by Country of Acquisition and Phage Type, Victoria, 1999

Country	Typhoid	Phage type	Paratyphoid	Phage type
Australia	1	A	-	-
Bangladesh	-	-	1	A4
India	2	Untypable, E1a	1	A RDNC (AUS 1)
Indonesia	3	Untypable, D2, D2	1	A11
Kenya	1	Var 43	-	-
Lebanon	2	38, Untypable	-	-
Mauritius	1	A	-	-
Pakistan	2	E1a, Degraded	2	A13, A4
Papua New Guinea	4	D2, D2, D2, D2	-	-
Total	**16**		**5**	

None of the 16 typhoid cases had received typhoid immunisation. Medical practitioners should advise intending travellers of the importance of exercising care in what they eat and drink irrespective of whether they have been immunised.

Table 10: Typhoid and Paratyphoid Notifications, by Category and Residential Status, Victoria, 1999

Category/Residential Status	Notifications
Australian born, returned traveller	6
New migrant	3
Returning migrant	12

Outbreak of Typhoid Fever Among Travellers on a Cruise

In May 1999, a cruise ship on a 14–day Pacific Island cruise with passengers from Australia and New Zealand docked for a short stopover at Port Moresby, Papua New Guinea. Several passengers and crew disembarked for an eight-hour Kokoda Trail bus tour. The tour group had a scheduled lunch stop at a restaurant en route, at which they consumed a variety of foods including coleslaw.

An outbreak of gastroenteritis affected approximately 128 of the 159 persons (81 per cent) on this tour. The onset of symptoms (watery diarrhoea and abdominal pain) occurred within two to five days of the Kokoda Trail tour. Duration of symptoms varied from a few hours to a few days. The cruise ship returned to Australia on 25 May 1999.

Two cases of typhoid were notified to the Department of Human Services on 8 June 1999. The first case was a male (aged 38 years) who presented with a history of an acute diarrhoeal illness of four days duration following the Kokoda Trail tour, with ongoing minor symptoms of headache and a generally unwell feeling for the remainder of the cruise. On 31 May he developed fevers, sweats and headache, followed by profuse diarrhoea. The clinical presentation was consistent with a diagnosis of typhoid. He was admitted to hospital, and cultures subsequently tested positive for *S. typhi*. The case responded to antibiotic treatment and made a full recovery.

The second case was a female (aged 51 years) who presented with a history of an acute diarrhoeal illness of two days duration following the Kokoda Trail tour. She continued to feel unwell for the remainder of the cruise. On 1 June she developed progressive symptoms of fever, headache, myalgia, arthralgia, abdominal pain, constipation and nausea. She was admitted to hospital on 4 June 1999. Blood cultures showed the presence of *S. typhi*.

Following notification of these two cases, Department of Human Services staff made contact with other State Health Departments. This check revealed a typhoid case in New South Wales who also had been on the cruise and the Kokoda Trail tour.

The Communicable Diseases Network of Australia New Zealand coordinated the investigation of this multi-State outbreak of typhoid. A national media release was issued to alert the public of the outbreak. Health departments made case finding a high priority, to identify other people on the tour who may have contracted typhoid. In Victoria, health alerts were sent to all hospitals and doctors, advising them of possible cases presenting and their appropriate management.

Public health staff in each State interviewed people who went on the Kokoda Trail tour and arranged for screening (by stool testing) for typhoid infection. The investigation revealed 12 microbiologically confirmed cases of typhoid among people who had been on the tour. This included four cases from Victoria, one case from Western Australia, six cases from New South Wales, and one case from New Zealand. (No cases were found in cruise ship passengers who had not been on the day tour.) All cases were unimmunised and were identified as *S. typhi* phage type D2, which is a type common in Papua New Guinea.

This outbreak demonstrated the value of prompt reporting by hospitals and laboratories of suspected typhoid cases. The two linked cases allowed early identification of the outbreak, and contributed to early detection and treatment of other cases within Australia and New Zealand. This early response to the outbreak may have prevented secondary transmission.

Shigellosis

For surveillance purposes, the Department of Human Services defines a case of shigellosis as someone who has had *Shigella* species isolated from any clinical specimen. The Department received 107 notifications of *Shigella* in 1999. The highest age-specific notification rates were among males aged 30–34 years and females aged 45–49 years. Thirty-seven cases (34 per cent) were identified as having acquired their infection overseas.

Figure 18: Shigellosis Notifications, by Month of Onset, Victoria, 1995-99

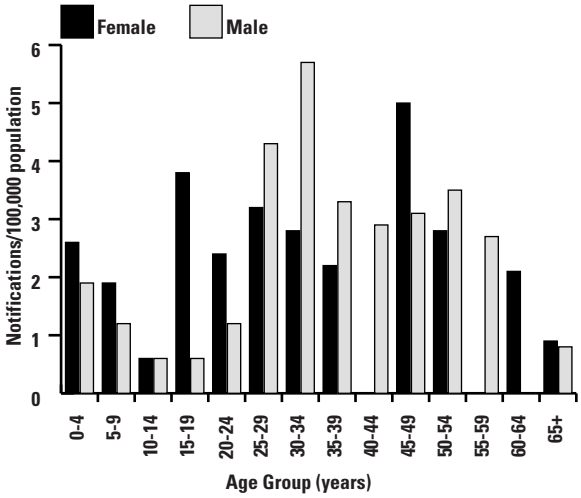


Figure 19: Shigellosis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

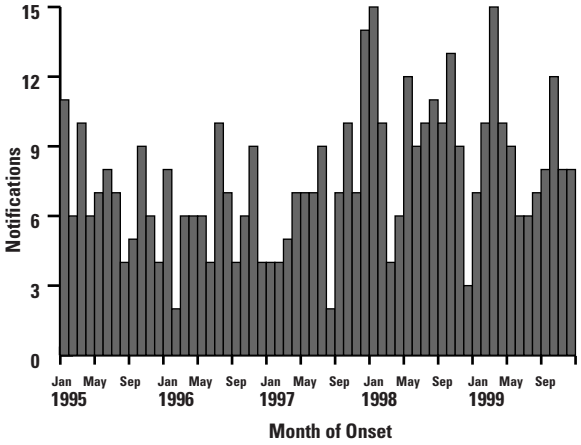


Table 12: Shigellosis Notifications, by Country of Source of Infection, Victoria, 1999

Region	Notifications
Indonesia (excluding Bali and East Timor)	1
Bali	4
East Timor	2
Papua New Guinea	1
Malaysia	1
Vietnam	5
India	6
Nepal	1
Sri Lanka	1
Asia-not further specified	1
Pacific Islands	2
Africa	4
Europe	2
Turkey	1
Overseas travel-country not specified	5
Northern Territory	2
New South Wales	2
Lab worker	2
No history of travel	5
Not known	59
Total	**107**

Table 13: Shigellosis Notifications, by Species and Type, Victoria, 1999

Species	Notifications
S. boydii 18	1
S. boydii 4	3
S. dysenteriae 2	1
S. dysenteriae 4	1
S. flexneri 1b	2
S. flexneri 2a	22
S. flexneri 2b	2
S. flexneri 3a	5
S. flexneri 3a/*S. sonnei* biotype g	1
S. flexneri 3b	2
S. flexneri 4	3
S. flexneri 4a	4
S. flexneri 5a	1
S. flexneri 6	5
S. sonnei biotype a	12
S. sonnei biotype f	2
S. sonnei biotype g	36
Shigella-not further specified	4
Total	**107**

Yersiniosis

For surveillance purposes, the Department of Human Services defines a case of yersiniosis as someone who has *Yersinia enterocolitica* isolated from faeces or blood. There were 17 notifications in 1999. Cases were most commonly reported in children aged under 5 years (Appendix 2).

4. Legionellosis

For surveillance purposes, the Department of Human Services defines a case of legionellosis as someone who has a clinically compatible illness (fever, cough or pneumonia) together with:

- The isolation of *Legionella* species from lung tissue, respiratory secretions, pleural fluid, blood or other tissues; or
- The demonstration of *Legionella* species antigen in lung tissue, respiratory secretions, pleural fluid or urine; or
- A four-fold or greater rise in titre against *Legionella* species (to at least 128) between acute and convalescent phase sera; or
- A stable high titre *Legionella* (at least 512) in convalescent phase serum.

The Department of Human Services received 64 notifications of legionellosis in 1999, of which 44 were male and 20 were female (a male-to-female ratio of 2:1). The age of cases ranged from 26 years to 92 years (median 55 years). The highest notification rate (9.0 per 100,000) occurred among males aged 55–59 years (Figure 20).

Five deaths were reported, giving a case fatality rate of 7.8 per cent. Of the 57 cases for whom country of birth was known, 31 (54 per cent) were Australian born and 10 (18 per cent) were born in the Balkans (four in the former Yugoslavia and six in Greece). Thirty-five cases (55 per cent) were employed, while 26 cases (41 per cent) were retired or pensioners.

There were 56 cases of *L. pneumophila* serogroup 1, making it the most common species and serogroup reported (88 per cent of notifications) (Table 14). One case of *L. longbeachae* infection was confirmed by culture, while the other two were confirmed by serology. The *L. micdadei* infections were all confirmed by serology. Of the 56 cases of disease due to *L. pneumophila* serogroup 1, 37 (66 per cent) were notified on the basis of a positive urinary antigen test alone (Table 15). The urinary antigen test has provided clinicians with a rapid diagnostic tool, which is especially useful in outbreak settings. However, the test is limited to diagnosing infections due to *L. pneumophila* serogroup 1.

Figure 20: Legionellosis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

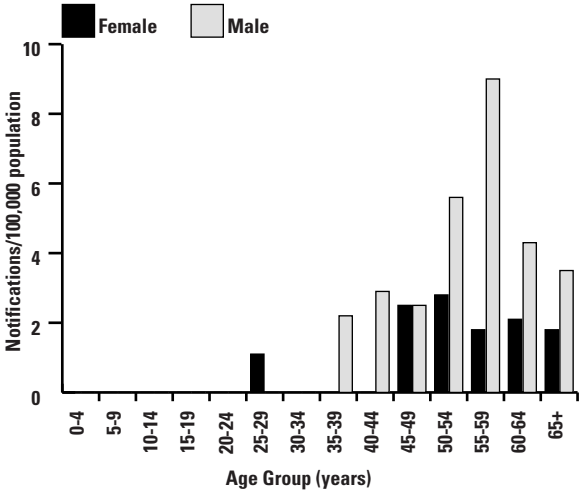


Table 14: Legionellosis Notifications, by Species/ Serogroup, Victoria, 1999

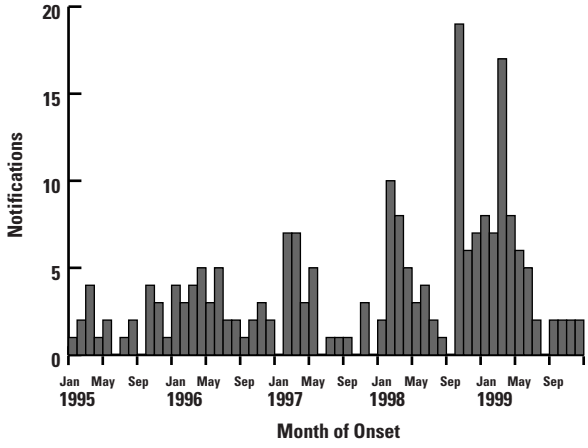
Species/Serogroup	Number of Cases
L. pneumophila serogroup 1	56
L. pneumophila serogroup 4	1
L. pneumophila serogroup 6	1
L. longbeachae	3
L. micdadei	3
Total	**64**

Table 15:* L. pneumophila *Serogroup 1 Notifications, by Diagnostic Test, Victoria, 1999

Method of Diagnosis	Number of Cases of Serogroup 1
Antigen alone	37
Culture plus antigen	9
Culture alone	6
Antigen plus serology	1
Serology alone	2
Other*	1
Total	**56**

*Direct immunofluorescence antibodies on post mortem lung tissue

Figure 21: Legionellosis Notifications, by Month of Onset, Victoria, 1995-99



Source of Infection

Fifty-nine of the 64 cases (92 per cent) were sporadic in nature. Two small outbreaks occurred, involving five cases.

Two Cases Linked to a Private Spa

The Department of Human Services was notified of a case of Legionnaires' disease in a 48 year old male who had been admitted to hospital on 18 June 1999, having fallen ill with cough and dyspnoea five days earlier. Diagnosis was based on a positive urinary antigen for *L. pneumophila* serogroup 1. This organism was subsequently cultured from a sputum sample.

It was established that during the incubation period he had visited a social club in the northern metropolitan region. He had used the swimming pool at the social club but not the adjacent spa pool. Samples were taken from both pools. The spa pool was disinfected via slug dosing with chlorine at the time of inspection. *L. pneumophila* serogroup 1 (1800 colony forming units/mL) was found in the spa pool water.

The Department of Human Services required the club to post a surveillance letter to all club members advising them of the result and recommending they seek treatment if they had symptoms. A second case was subsequently diagnosed with Legionnaires' disease by a positive urinary antigen test. This case (69 year old male) was admitted to hospital, having fallen ill with fever on 12 June. His incubation period was almost the same as the index case, who had become ill on 13 June. It was established that this man had worked voluntarily in the garden of the social club during his incubation period. While he had not used the spa pool, he had worked only three to four metres away. He subsequently deteriorated and died despite intensive treatment.

Small Outbreak in the Northern Metropolitan Region

The Department investigated a cluster of three cases of Legionnaires' disease notified in residents or workers in a suburb in the northern metropolitan region. The first case (59 year old female) was admitted to hospital on 1 January, having fallen ill with cough and dyspnoea. Diagnosis was based on a positive urinary antigen for *L. pneumophila* serogroup 1. This organism was subsequently cultured from a sputum sample.

The patient was largely housebound and the environmental investigation focused on the home and its vicinity. Environmental health officers identified premises with cooling towers in the streets surrounding her home. Officers collected water samples for testing, and advised building owners to slug dose the towers with biocide as a precaution.

One premises had several cooling towers that tested positive for *L. pneumophila* serogroup 1. The Department of Human Services undertook workplace surveillance at these premises, identifying one employee (53 year old male) with recent pneumonia. He was advised to attend his general practitioner for review, and the subsequent urinary antigen testing was positive.

With two cases now linked to the area, the Department issued a media release to alert the general public of the possibility of an outbreak. Further sampling of cooling towers in the neighbourhood revealed a second premises with cooling towers that tested positive for *L. pneumophila* serogroup 1.

On 1 March 1999, the Department was notified of a third case in the neighbourhood. This case (73 year old male) was admitted to hospital, having fallen ill with fever and rigors on 18 February. Diagnosis was based on a positive urinary antigen for *L. pneumophila* serogroup 1. A standard interview revealed that he had been to several premises around Melbourne. He had not been to any of the places with positive cooling towers, but lived several hundred metres away.

5. Invasive Meningococcal Disease

There were 137 notifications of invasive meningococcal disease in 1999, which was a large increase from numbers in previous years (Table 1). This was the highest number of notifications since 1956, when there were 142 cases. The male-to-female ratio of notifications in 1999 was 1.1: 1—similar proportions to those in previous years. The highest notification rates occurred in children aged under 5 years and teenagers aged 15–19 years (Figure 22).

In 1999, for the first time there were more cases in the teenage and young adult age groups than in those aged under 5 years. Eighteen of the 36 cases in the latter age group (50 per cent) were aged under 1 year. Serogroup B disease dominated the under-5 years old age group, while serogroup C was more common among young adults and teenagers (Figure 23). The median age was 9.5 years for serogroup B disease and 20 years for serogroup C.

Figure 22: Invasive Meningococcal Disease Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

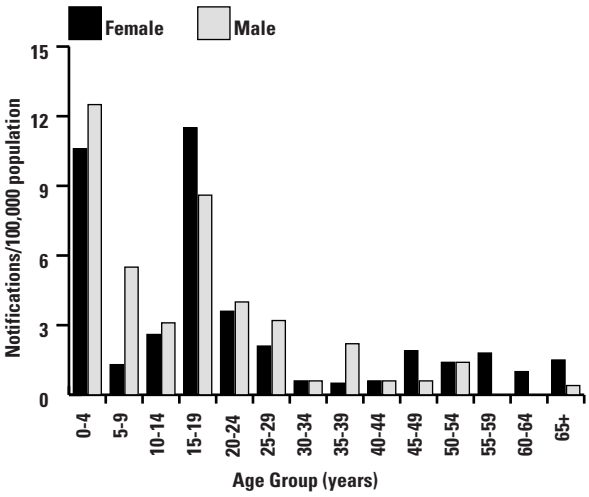


Figure 23: Invasive Meningococcal Disease Notifications of Serogroups B and C per 100,000 population, by Age Group, Victoria, 1999

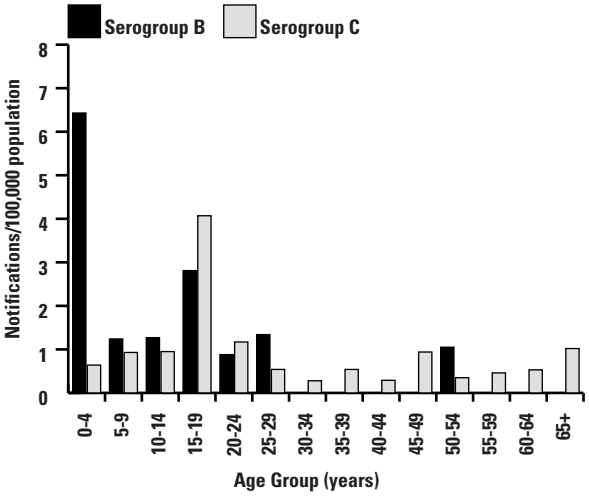
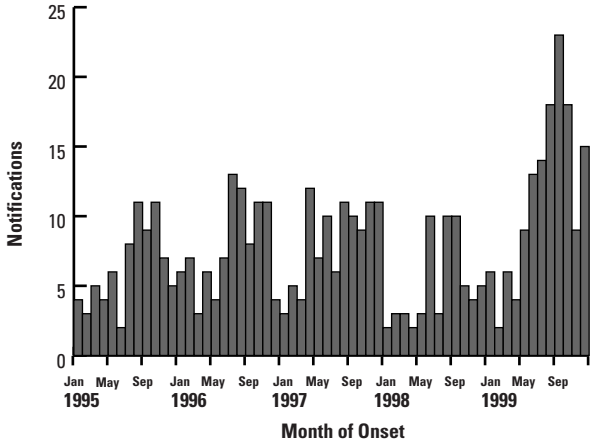


Figure 24: Invasive Meningococcal Disease Notifications, by Month of Onset, Victoria, 1995-99



Microbiological Classification

Most of the increase in notifications comprised serogroup C cases (Table 16).

Table 16: Invasive Meningococcal Disease Notifications, by Serogroup, Victoria, 1999

Serogroup	1995	1996	1997	1998	1999
B	38	51	48	29	48
C	17	11	9	8	43
W135	0	0	0	0	1
Y	0	0	0	0	1
29E	1	0	0	0	0
No serogroup available *	0	3	0	5	13
Clinical†	19	28	41	19	31
Total	**75**	**93**	**98**	**61**	**137**

* Culture negative, PCR positive for *Neisseria meningitidis*.

† Culture and PCR negative (usually as a result of prior antibiotic treatment). Two cases were positive for ACY antigen and one was positive for B antigen on CSF.

Apart from serogroup, further characterisation of the bacteria is possible by identifying serotype and serosubtype. There are six common serotypes and 13 common serosubtypes. Complete classification of individual strains involves identification of serogroup, serotype and serosubtype. A summary of the strains or clones found in Victoria in 1999 is presented in Table 17.

Table 17: Invasive Meningococcal Disease, by Serotype and Serosubtype, Victoria, 1999

Serogroup	Serotype and serosubtype	Number of cases
C	2a:P1.5	2
	2a:P1.2	13
	2a:P1.5, 2	2
	2a:P1.4	9
	2a:P1 nst	11
	Sub- total (ET37/15-related strains)	37
	Other serogroup C strains	6
	Total serogroup C strains	**43**
B	15:nst	3
	15:P1.4	5
	15:P1.7	2
	Sub-total (ET5 complex)	10
	4:nst	1
	4:P1.4	3
	4:P1.4	1
	nt:P1.4	15
	Sub-total (lineage III)	20
	2b:nst	1
	2b:P1.10	1
	Sub-total (A4 cluster)	2
	Other serogroup B strains	16
	Total serogroup B strains	**48**
W135	nt:P1.6	1
Y	14:nst	1
Not grouped		13
Clinical		31
	Total	**137**

nt = not typable; nst = not subtypable.

A new clone of serogroup C emerged during 1999, unique to Victoria. It is classified as C:2a:P1.4, related to the ET37/15 complex. The ET37/15 complex has caused major outbreaks of infection overseas. This clone also appears to cause more severe disease than caused by other meningococcal strains in Victoria.

Ten deaths were reported in 1999 (Table 18). Two deaths were due to serogroup B organisms, and the remainder were due to serogroup C.

Table 18: Deaths due to Invasive Meningococcal Disease by Gender, Age and Strain, Victoria 1999

Case number	Gender	Age	strain
1	Female	14	B:15:P1.7
2	Male	28	B:15:nst
3	Male	18	C:2a:P1.4
4	Male	42	C:2a P1.5
5	Female	30	C:2a:nst
6	Female	85	C:2a:P1.2
7	Male	52	C:2a:P1.2
8	Female	20	C:2a:nst
9	Female	48	C:2a:P1.4
10	Male	19	C:2a:P1.5,2

nst: not subtypable

Fatal Cases

1. A 14 year old female developed a temperature, followed by generalised aching and severe headache, which persisted for two days. Her conscious state deteriorated and she collapsed. A CT scan revealed sub-arachnoid bleeding, but a craniotomy the following day showed that she also had meningitis, with gram-negative cocci being found in the cerebrospinal fluid (CSF). Despite intensive antibiotic and resuscitative treatment, her condition deteriorated and she died eight days after the onset of symptoms.

2. A male aged 28 years was missing from work, so his employer phoned the police who entered his apartment and found him deceased, covered with a purpuric rash. It transpired that he had two days previously cancelled a meeting because he was unwell, and the following day he had purchased painkillers at a pharmacy. He had also telephoned a relative, but the message was incoherent and the voice was unrecognisable, indicating that he was too confused to seek medical help.

3. A male aged 18 years became unwell and complained of a headache and backache. He began to vomit and was taken to hospital. He developed a petechial rash the next morning, after which his condition worsened dramatically, with widespread purpura, falling blood pressure, disseminated intra-vascular coagulation and adult respiratory distress syndrome. He died that evening.

4. A 42 year old male with a mild intellectual disability awoke at 2 a.m. and vomited. A doctor saw him at 9 a.m. when a macular rash was noted on his face. A carer found him deceased at 1 p.m.

5. A 30 year old female was 36 weeks pregnant. She developed fever, aching muscles and vomiting, and arranged to attend her obstetrician. While waiting in the hospital foyer, she suddenly developed respiratory distress. She did not have a rash and was thought to have had a pulmonary embolus. Her condition deteriorated and she was moved to the Intensive Care Unit but suffered a cardiac arrest and died. An urgent caesarean section was done but the foetus could not be saved. Blood culture later confirmed *Neisseria meningitidis.*

6. An 85 year old female was admitted to hospital because she was febrile and unwell. She became hypotensive and had impaired renal function. There was no rash. She was treated with intravenous antibiotics but died the following day. Blood cultures grew *Neisseria meningitidis*.

7. A 52 year old male complained of a headache for 24 hours, then developed rigors, vomiting, severe hand and foot pain, and a purpuric rash on his back. He was taken to hospital, where he became drowsy and developed acute renal failure, shock and coagulopathy. Despite treatment with antibiotics, his condition worsened, his fingers and toes became ischaemic, and he died five days after the onset of illness.

8. A 20 year old female became unwell with myalgia and rigors. She developed a petechial rash later that day, which became purpuric two hours later. At the hospital she was conscious, although her blood pressure was unrecordable and the rash was extensive. She remained critical then suffered a cardiac arrest and died 12 hours after her initial symptoms.

9. A 48 year old female developed severe back and stomach pains and vomiting. A purpuric rash

appeared, spreading rapidly. She was hospitalised and treated but died at 6.30 a.m. next morning.

10. A 19 year old male developed a headache and chills and vomited. Next morning he had an extensive purpuric rash. At the hospital he was conscious but in shock, with no urine output. Despite treatment, he died at 11 a.m. from a fulminant illness.

Cluster of Cases

In the last week of August 1999, the Department of Human Services was notified of three students from the same school with meningococcal septicaemia. Detailed interviews were undertaken with the cases' families to identify close contacts, common links and the population at risk. Close contacts require antibiotic prophylaxis, to eliminate nasopharyngeal carriage of meningococci and to prevent further transmission from asymptomatic carriers to other individuals. Prophylaxis may not prevent contacts from acquiring disease, and there is no evidence that it can abort disease in those already incubating the infection.

Discussion with the parents of the cases and staff at the school identified several important links:

- The first two cases were close friends.
- The three pupils had recently been involved in different school camp activities: one went to Canberra; one went to Darwin; and the third child went on a beach retreat day.
- The third case was unknown to the other two, and attended a separate school campus.
- The school camps in Canberra and Darwin had effectively involved the entire year 9 group from one campus. The retreat had involved year 10 students from both campuses.

Generally, school contacts of sporadic cases do not require prophylaxis. However, given the recent timing of the camps and the closeness of the living quarters of the students while away, the Department decided to treat the entire year 9 group on one campus and the year 10 group who had attended the retreat. These children, along with the usual family and close contacts, were given prophylaxis to interrupt the carriage of virulent strains. The rationale was that it was possible for a pool of asymptomatic carriers in these two school groups to be at high risk of transmitting the infection to other students.

Only a single blood culture sample from one of the cases was positive, but the isolate was identified as a group C meningococcus. The use of new molecular techniques subsequently confirmed the other two cases were identical. Thus, the Department of Human Services decided to use immunisation to protect the entire population of the school and the family contacts of cases. Given the delay in providing protection, immunisation enhances rather than supplants chemoprophylaxis in the management of serogroup C disease. Department staff vaccinated 1530 of the 1600 children and staff of the school on a single day. There were no major problems associated with immunisation, except for one child fainting. Absentees were vaccinated in a mop-up campaign two days later.

The three girls all recovered well and returned to school to continue their courses. No additional cases occurred at the school. A full description of this outbreak appeared in the Victorian Infectious Diseases Bulletin (see http://www.dhs.vic.gov.au/phd/vidb/vidbv2i4.pdf).

6. Sexually Transmissible Infections

This chapter contains summary data, more detailed information is contained in a separate report titled *Surveillance of Sexually Transmissible Infections in Victoria, 1999*.

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS)

There were 141 new notifications of human immunodeficiency virus (HIV) in Victoria—down 5 per cent from the 149 cases in 1998 (Figure 25). The median age of diagnosis in 1999 was 35 years for males and 33 years for females, and 128 cases (91 per cent) were male. Of the 128 notified infections in men, 61 per cent reported male-to-male sexual contact, 12 per cent reported heterosexual exposure, and 6 per cent were born in a high prevalence country. Injecting drug use and homosexual contact accounted for infections in 12 males (9 per cent) and injecting drug use alone accounted for six males (5 per cent). There were 12 females notified with HIV infection in Victoria in 1999, for which heterosexual contact was reported as the principal exposure in seven cases (58 per cent). None of the HIV cases notified in females was attributed to injecting drug use.

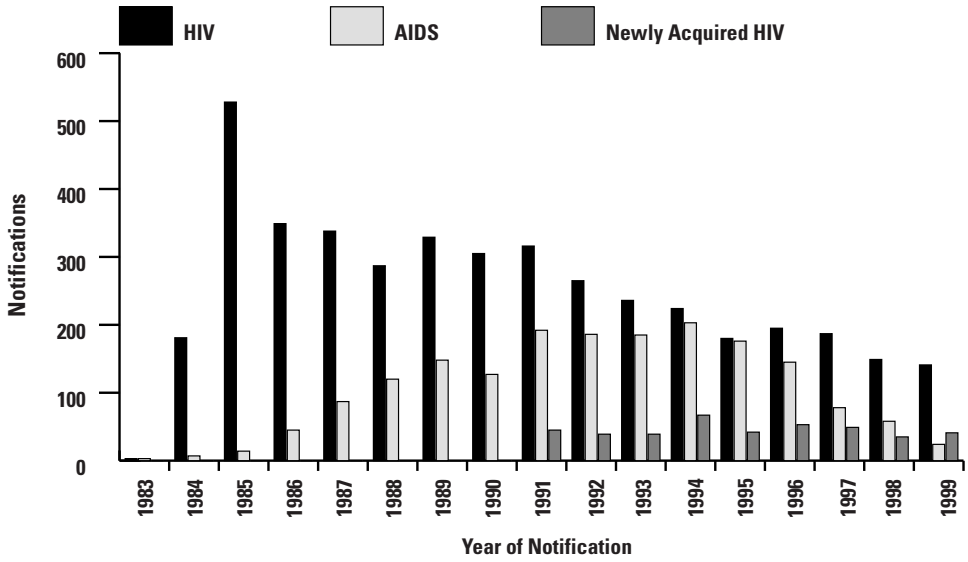
There were 41 notifications (40 males and one transgender person) of new cases of AIDS in 1999. Due to the chronic nature of AIDS, there is a delay between AIDS diagnosis and notification to the Victorian AIDS Registry. Only 24 of the 41 cases (59 per cent) notified in 1999 were actually diagnosed with AIDS in that year. Fifty-eight per cent of cases reported male-to-male sexual contact (homosexual and bisexual) as the primary exposure, while 21 per cent of cases were heterosexuals. The median age for males notified as having AIDS was 45 years in 1999, compared with 43 years in 1998. The proportion of cases presenting with AIDS within one year of their first positive HIV diagnosis fell for the first time in three years—down from 59 per cent in 1998 to 46 per cent in 1999.

Chlamydia Infections

Genital chlamydia, caused by the organism *Chlamydia trachomatis*, is the most commonly reported sexually transmissible infection in Victoria. This may be attributable to enhanced surveillance activities, the use of improved testing methods, increased awareness and/or increased testing. However, it may also be due to increased prevalence in the community.

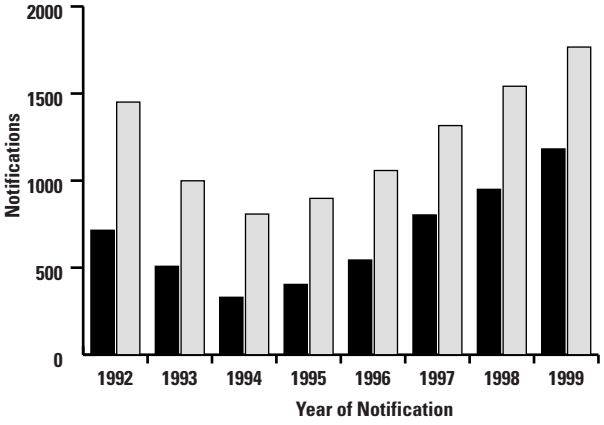
There were 2952 chlamydia notifications in 1999: 1767 females, 1182 males and three people for whom no

Figure 25: HIV, AIDS and Newly Acquired HIV Infections, Victoria, 1983-99



gender was recorded. This represents an 18 per cent increase on the number notified in 1998 (Figure 26). The majority of infections (59 per cent) were in males and females aged 20–29 years. The Department of Human Services obtained additional information for 1712 (58 per cent) of the notifications, of which 82 per cent of males and 99 per cent of females identified as heterosexual, and 16 per cent of males identified as homosexual. Males were more likely to present with symptoms (74 per cent, compared with 44 per cent of females), and females were more likely to be diagnosed as a result of a screen (26 per cent, compared with six per cent of males). Over 62 per cent of females believed they had been infected by their regular partner (compared with 36 per cent of males); males were more likely than females to report that they had acquired their infection from a casual partner.

Figure 26: Chlamydia Infections in Males and Females, Victoria, 1992-99



Gonorrhoea

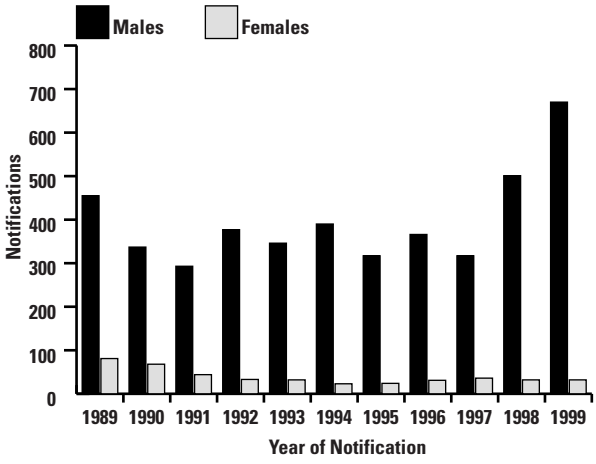
Gonorrhoea is a sexually transmissible infection caused by the bacterium *Neisseria gonorrhoeae*. Gonorrhoea typically causes a urethritis or cervicitis, but infection can also involve the rectum, pharynx or conjunctiva. There is an ongoing outbreak of gonorrhoea in Victoria that is mainly concentrated among men who have sex with men. There were 702 gonorrhoea notifications in 1999 (14.9 per 100,000 population)—the highest incidence since 1987 (Figure 27)—of which 670 cases (95 per cent) were male and 32 (5 per cent) were female. Sexual orientation was reported for 626 male cases: 64 per cent were homosexual, 4 per cent were bisexual, and 32 per cent were heterosexual. Thirty out of the 32 female cases were reported to be heterosexual. The mean age of female cases was 27 years, and the mean age of male cases was 32 years. Three-quarters of male cases were aged 20–39 years.

Cases of gonorrhoea were intensely concentrated in the inner southern, inner northern and inner western local government areas of metropolitan Melbourne. One third of all cases were from the cities of Port Phillip, Yarra and Stonnington.

Adequate data on the reported sources of infection were available for 82 per cent of cases. Local casual sexual partners were most often cited as the source of infection for both heterosexual men and men who had sex with men (homosexual and bisexual men). Among women, the most commonly reported source of infection was a regular sexual partner.

Isolates of *N. gonorrhoeae* fully sensitive to penicillin were uncommon, and 17 per cent of isolates were resistant to penicillin. Penicillinase-producing gonococci comprised 7 per cent of isolates and were frequently acquired overseas, particularly heterosexually.

Figure 27: Gonorrhoea Notifications, by Sex, Victoria, 1989-99



Syphilis

There 145 notifications of syphilis in Victoria in 1999, of which two were infectious, 77 were non-infectious and 66 were unspecified. No cases of congenital syphilis were notified in 1999.

7. Tuberculosis

Early detection and effective treatment are still the key strategies to control tuberculosis. Doctors should have a high index of suspicion for pulmonary tuberculosis when patients present with a history of persistent cough (particularly people born overseas, people who have spent a prolonged period in a country with endemic tuberculosis, or people who are immunosuppressed, such as those on immunosuppressive therapy or co-infected with HIV). In recent years there have been increasing numbers of patients from high-prevalence countries in Africa, such as Somalia and Ethiopia.

There were 324 notifications of tuberculosis in 1999—up 36 per cent from the 238 cases in 1998. This increase in notifications can be attributed to:

- Tuberculosis notifications in East Timor and Kosovo evacuees who were accommodated in Victorian safe havens; and
- Changes in November 1998 to visa processes for overseas students in 1999, requiring them to undergo a medical examination and a chest x-ray, which resulted in 12 overseas students being diagnosed with early pulmonary tuberculosis.

The notification rate of tuberculosis was highest in males aged 25–29 years (14.5 per 100,000), reflecting cases in overseas students and evacuees (Figure 28). There were 114 notifications in people born in South-east Asia (Table 19). A large proportion of cases from Asia, Africa, Europe and the Middle East arrived in Australia between 1991 and 1999. The western metropolitan region had the highest notification rate (15.6 cases per 100,000 population) in 1999 (Appendix 1).

Pulmonary tuberculosis continues to be the predominant site of infection (Figure 29), with 153 cases notified in 1999 (accounting for 48 per cent of all cases). The lymphatic system was the second most common site of infection (26 per cent of notifications). There were eight cases of peritoneal tuberculosis, which is less common in Australia. This form of extra-pulmonary tuberculosis predominately occurred in persons of African and Indian origin.

Contact tracing is a tool for active case finding. In 1999, 1610 individuals were screened as contacts of notified cases of tuberculosis, including some cases that were not *Mycobacterium tuberculosis*. Screening of these individuals detected 5 cases of primary tuberculoisis.

The Department of Human Services has issued Guidelines for Management, Control and Prevention of Tuberculosis, which is available from the Communicable Diseases Section (telephone (03) 9637 4110) and on the Department's web site at: http: //www.dhs.vic.gov.au/phd/hprof/tb/tbm/tbindex.html

Figure 28: Tuberculosis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

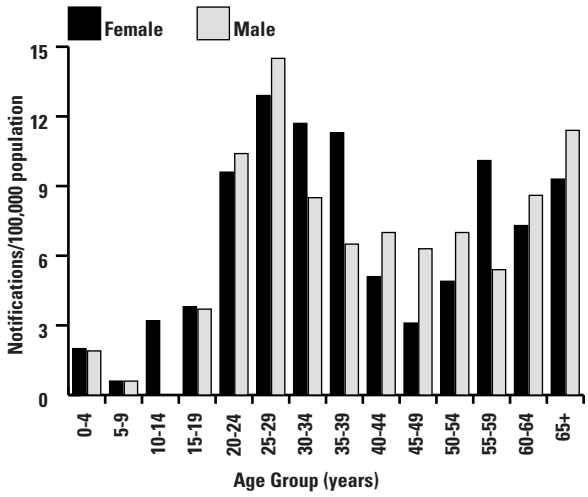
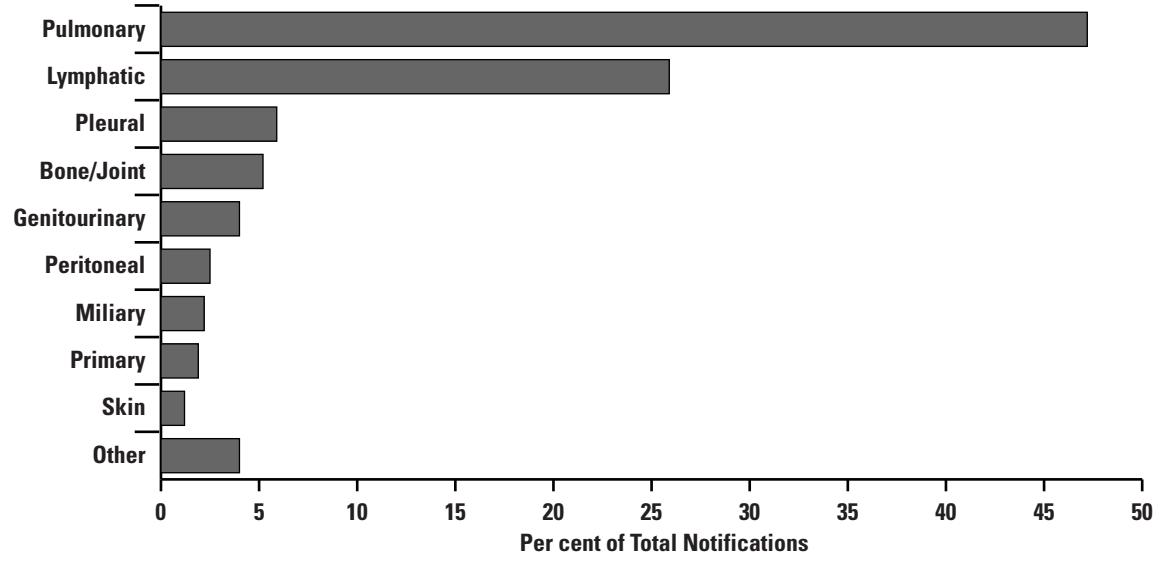


Table 19: Tuberculosis Notifications of Overseas-Born Cases, by Region of Birth and Year of Arrival in Australia, Victoria, 1999

Region	Arrived before 1991	Arrival 1991-95	Arrival 1996-99	Total
Micronesia	0	0	1	1
North Africa	1	1	0	2
North-east Asia	10	6	8	24
Polynesia (excluding Hawaii)	4	0	1	5
South-east Asia	38	43	33	114
Southern and East Africa	7	15	12	34
Southern Asia	8	13	14	35
Southern Europe	19	2	17	38
Middle East	4	2	4	10
United Kingdom and Ireland	4	0	0	4
Unknown	15	0	0	15
Western Europe	2	0	0	2

Figure 29: Tuberculosis Notifications, by Site of Infection, Victoria, 1999



8. Vaccine Preventable Diseases

Haemophilus influenzae Type b (Hib) Infection

For surveillance purposes, the Department of Human Services defines a case of *Haemophilus influenzae* type b (Hib) infection as:

- An invasive clinically compatible illness (meningitis, epiglottitis, cellulitis, septic arthritis, osteomyelitis, pneumonia, pericarditis or septicaemia) and:

  —The isolation of *Haemophilus influenzae* type b from blood, or

  —The detection of *Haemophilus influenzae* type b antigen, or

  —The detection of gram-negative bacteria where the organism fails to grow in a clinical case; or

- A confident diagnosis of epiglottitis by direct vision, laryngoscope or x-ray.

Only Hib meningitis and Hib epiglottitis are notifiable under the Health (Infectious Diseases) Regulations 1990, but the Department of Human Services accepts other reports of invasive infection due to the organism. The Department received two notifications of Hib meningitis and two other cases of Hib septicaemia in 1999; no epiglottitis notifications due to Hib were reported.

Table 20:* Haemophilus influenzae *Type b Notifications, by Year and Type, Victoria, 1995-1999

Year	1995	1996	1997	1998	1999
Epiglottitis	7	9	1	2	0
Meningitis	7	2	5	3	2
Septicaemia	12	3	2	3	2
Total	**26**	**14**	**8**	**8**	**4**

Of the cases received in 1999, three were male and one was female. The notification rates for Hib infections, meningitis and epiglottitis, in children aged under 5 years old have remained low (Table 21).

Table 21: Hib Meningitis and Epiglottitis Notifications and Incidence Rates for Children Aged Under 5 Years, Victoria, 1995-99

Age < 5 years	1995	1996	1997	1998	1999
Notifications	17	6	6	3	2
Age specific rate per 100,000	5.3	1.9	1.9	1.0	0.6

Hib Epiglottitis

No notifications of Hib epiglottitis were received in 1999. One notification concerned a 54 year old female with epiglottitis due to *Haemophilus influenzae* type e. The case presented with a severe painful sore throat and respiratory distress, and required intubation. Following antibiotic treatment, the patient made a full recovery.

Hib Meningitis

There were two notifications of Hib meningitis in 1999. One (9 day old female) was unimmunised. The other (6 month old male) had received two doses of HibTITER—one at 2 months and another at 4 months. Both cases recovered.

The 6 month old male presented with a clinical picture of meningitis, a 12 hour history of fever, irritability, increasing drowsiness and neck stiffness. Although he developed respiratory stridor immediately before hospital admission and had an inflamed larynx, there was no evidence of epiglottitis. He was admitted to the Intensive Care Unit for 24 hours but rapidly responded to antibiotic treatment. Cerebrospinal fluid and blood cultures were positive for Hib infection.

Other Invasive Hib Infections

Two other invasive Hib infections were reported in:

- A male aged 10 months, who was unimmunised and who developed osteomyelitis of his ankle and wrist, and septicaemia; and
- A male aged 22 months, who had been partly immunised with two doses of HibTITER given at 5 and 8 months of age, and who developed pneumonia and septicaemia.

Measles

The epidemiology of measles in Victoria in 1999 continued the previously observed pattern of clusters of infection following imported disease. The system of enhanced measles surveillance introduced at the beginning of 1997 operated during all of 1999. The system is a cooperative project between the Communicable Diseases Section and the Victorian Infectious Diseases Reference Laboratory. Detailed methods of this system have been described in earlier annual reports and other publications (see http:// www.health.gov.au/pubhlth/cdi/cdi2302 /cdi2302b. pdf). The primary focus of this system is to maximise the proportion of notified cases who have laboratory testing performed to confirm the diagnosis of measles.

The Department of Human Services received 317 notifications of suspected measles in 1999 (Table 22). The median age of cases was 6 years (range 3 months—61 years), and 53 per cent of cases were female. Clinical symptoms were obtained for 306 (97 per cent) of the notified cases, of whom only 138 (45 per cent) met the National Health and Medical Research Council's clinical case definition for suspected measles—that is, a morbilliform rash, a cough and a fever at rash onset.

Figure 30: Measles Notifications, by Month of Onset, Victoria, 1995-99

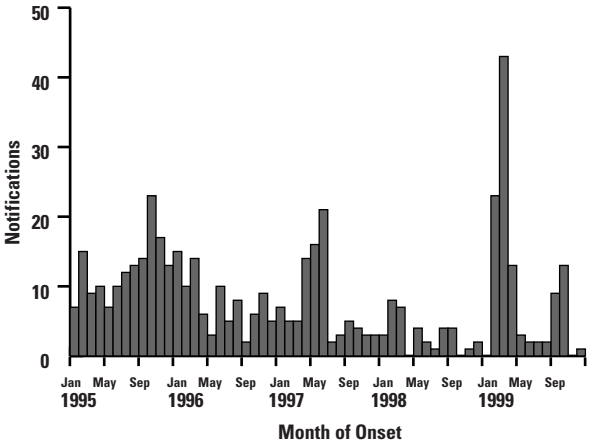
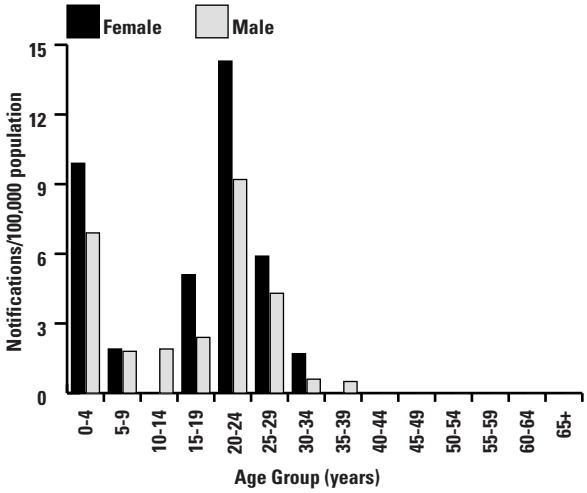


Figure 31: Measles Notifications per 100,000 Population, by Age Group and Sex, Victoria, 1999



The method of classifying notified measles cases in Victoria has been described elsewhere (see http:// www.health.gov.au/pubhlth/edi/edi2302/ edi2302b. pdf). Of the 317 notified cases, 111 remained in the notification data set because:

- They were laboratory confirmed; or
- They were epidemiologically linked to a laboratory confirmed case; or
- They were neither laboratory confirmed nor rejected, but they met the National Health and Medical Research Council's clinical case definition for suspected measles (clinically compatible); or
- There was insufficient symptomatology and laboratory information to accept or reject them as being measles (not classifiable) (Table 22).

Table 22: Classification of Suspected Measles Notifications, 1999

Classification	Total
Laboratory confirmed as measles	88
Epidemiologically linked to a laboratory confirmed case	11
Clinically compatible	10
Not classifiable	2
Laboratory confirmed as rubella	7
Laboratory confirmed as parvovirus	28
Laboratory rejected	139
Not clinically compatible	32
Total	**317**

Results from serological testing were available for 90 per cent (285 of 317) of cases. For 87 cases, serum was positive for measles-specific IgM, and a further case who had a nose/throat swab was PCR positive for measles. Thirty-five cases notified as having measles (11 per cent of those tested) were positive for either rubella specific IgM (seven cases) or human parvovirus B19 IgM (28 cases).

Those aged under 1 year continued to be overrepresented in notified cases (65 out of 317). Serological testing was performed on 55 (85 per cent) of these infants, with two being positive for measles-specific IgM. A 10 month old child was also classified as being epidemiologically linked to her mother, who was a laboratory confirmed case.

Five episodes of measles imported into Victoria were detected during 1999. These and the cases linked to them accounted for 98 of the 99 cases that were either laboratory confirmed or epidemiologically linked to a laboratory confirmed case during the year (Table 23).

Table 23: Sources of Measles Infection and Cluster Size, Victoria, 1999

Origin (Month of Onset in First Case)	Laboratory Confirmed	Epidemio-logically Linked	Cluster Size
Bali (February)	74	1	75
East Java (May)	1	0	1
Gold Coast (June)	1	0	1
London via Malaysia (August)	6	0	6
East Timor (September)	5	10	15
Unknown (December)	1	0	1
Total	**88**	**11**	**99**

The first imported case in 1999 resulted in the largest identified outbreak of measles in Victoria since the re-introduction of notification in the early 1990s. A 21 year old female who had travelled to Bali became infected with measles. She worked at a large cinema complex in the western suburbs of Melbourne after developing symptoms. The case had no history of prior vaccination against measles. A total of 75 cases (74 laboratory confirmed and one epidemiologically linked to a laboratory confirmed case) were identified. Sixty-four cases (85 per cent) in this cluster were born between 1968 and 1981; 28 (37 per cent) were hospitalised for a total of 97 inpatient days; and five (7 per cent) were health care workers (see http://www.dhs.vic.gov.au/phd/vidb/vidbv2i2.pdf).

The case who imported measles from East Java was a 12 year old male who arrived in Melbourne seven days before developing prodromal symptoms. He had no history of prior vaccination, and no secondary cases were linked to him.

Another single case arrived from Queensland in May. A 24 year old man acquired the disease while visiting a theme park on the Gold Coast. A park ride attendant who was also infected on that day was notified in Queensland, but no source was identified for these two cases. The Victorian case did not report previous vaccination, and no secondary cases were related to this case.

A 16-year-old male, visiting his brothers (aged 22 years and 24 years) in Melbourne developed prodromal symptoms 15 days after arriving from London via Malaysia. Three days after he become unwell, his brothers held a party attended by 40 young adults. Active surveillance of the party attendees identified only one further case, but a further four cases were identified in people who had probable exposure to the first case while he was infectious. One of these cases, a 23 year old female, developed transverse myelitis as a complication of her infection (see http://www.dhs.vic.gov.au/phd/vidb/vidbv2i4.pdf).

Twelve cases of measles (three laboratory confirmed and nine epidemiologically linked) were identified among the East Timorese evacuees at the Puckapunyal Safe Haven in September and October 1999. A 26 year old Australian volunteer at the haven also developed laboratory confirmed measles after being given incorrect advice about the need for her to be vaccinated. Her 10 month old daughter also developed measles (epidemiologically linked). A 24 year old Australian female who had been in a hospital emergency department at the same time as a number of infectious East Timorese cases also developed laboratory confirmed measles.

In December, a 1 year old male had a measles-like illness and was IgM positive for measles. No source for his infection was identified, and he had received a mumps/measles/rubella vaccination five months earlier. No clinical specimens were measles PCR positive.

The enhanced surveillance system has facilitated the early identification and improved management of measles clusters in the Victorian community. The surveillance data show that the clusters of measles in Victoria were triggered by virus importation.

Mumps

For surveillance purposes, the Department of Human Services defines a case of mumps as someone who has had:

- The mumps virus isolated from a clinical specimen; or
- A significant rise in mumps antibody level by any standard serological assay, except following immunisation; or
- A clinically compatible illness (unilateral or bilateral swelling of the parotid or other salivary glands lasting two days or more without other apparent cause).

There were 73 notifications of mumps in 1999, of which 29 (40 per cent) were female and 44 (60 per cent) were male. Six cases (8 per cent) were confirmed by a laboratory, while a clinical diagnosis was the basis of the remainder of cases.

Fifty-one notifications were for residents of metropolitan regions (notification rate of 1.6 per 100,000 population), 18 were for residents of rural regions (notification rate of 1.3 per 100,000 population), and four were for cases from interstate, overseas or an unknown address (Appendix 1).

Notifications were received throughout the year, with a peak of 15 in May (Figure 32). Seventy-four per cent of notifications were for children and young adults aged under 20 years (Figure 33).

Figure 32: Mumps Notifications, by Month of Onset, Victoria, 1995-99

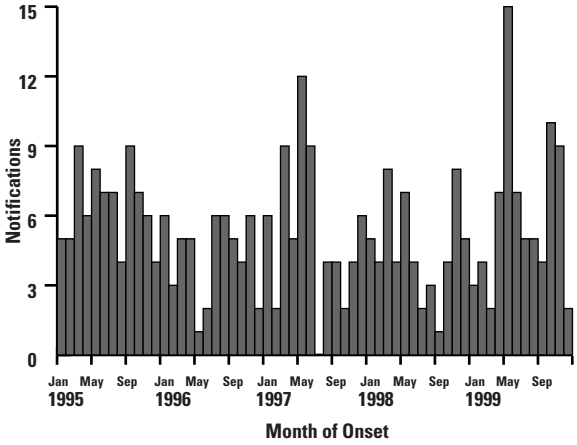
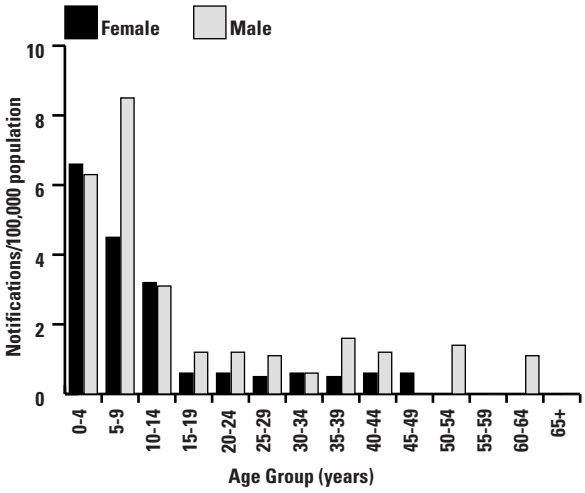


Figure 33: Mumps Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Pertussis

For surveillance purposes, the Department of Human Services defines a case of pertussis as a person who has had:

- *Bordetella pertussis* isolated from a clinical specimen; or
- Elevated *B. pertussis*-specific IgA in serum or *B. pertussis* antigen in a nasopharyngeal specimen using immunofluorescence with a history of clinically compatible illness; or
- An illness lasting two weeks or more with:
  - — Paroxysms of coughing, or
  - — Inspiratory 'whoop' without apparent cause, or
  - — Post-tussive vomiting; or
- An illness characterised by a cough lasting at least two weeks, and an epidemiological link to a laboratory confirmed case.

There were 998 notifications of pertussis in 1999, of which 54 per cent were female. Notification rates were much higher in country Victoria, with the lowest notification rate per 100,000 population being in the southern metropolitan region and the highest being in the Gippsland region (Appendix 1). Cases occurred throughout the year (Figure 34). The median age of cases was 20 years old (range 0–86 years). The age distribution varied according to gender, with female cases (median 25 years) being generally older than male cases (median 16 years). Only 112 notifications involved children aged over 2 months and under 8 years, which is the age range for pertussis vaccination (Figure 35).

Figure 34: Pertussis Notifications, by Month of Onset, Victoria, 1995-99

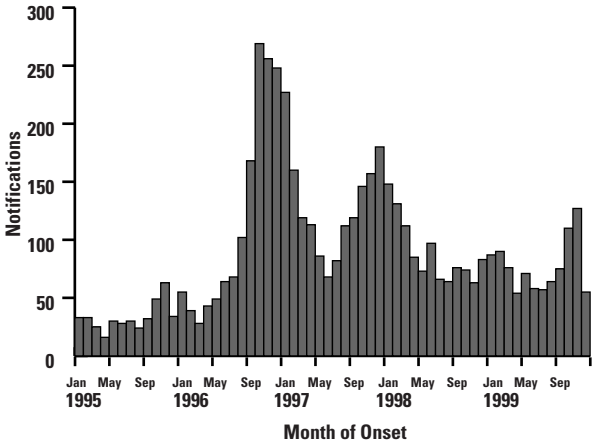
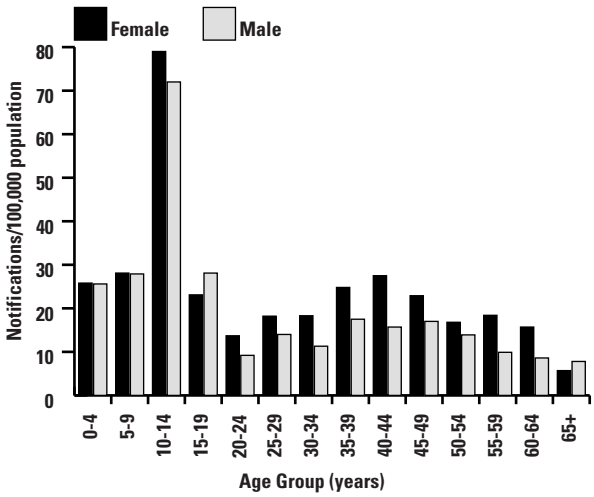


Figure 35: Pertussis Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Rubella

For surveillance purposes, the Department of Human Services considers a case of rubella infection as someone who has had:

- A generalised maculopapular rash and a fever, plus:
  - —One or more of arthralgia/arthritis, lymphadenopathy and conjunctivitis, plus
  - —An epidemiological link to a confirmed case; or
- A demonstrated rubella-specific IgM antibody, except following immunisation; or
- A fourfold or greater change in rubella antibody titre between acute and convalescent phase sera obtained at least two weeks apart; or
- Rubella virus isolated from a clinical specimen.

There were 123 notifications of rubella in 1999, of which 71 (58 per cent) were male and 52 (42 percent) were female. The notification rate was highest among males aged under 5 years (Figure 36). Males aged under 1 year accounted for 27 cases (38 per cent of notifications among males) compared with 13 females in the same age group (25 per cent of notifications among females). Fifteen notifications were for females aged 15–44 years, compared with 12 in males in this age group.

Of 119 cases who were residents in Victoria, 23 lived outside the metropolitan area, and 11 of these were from the Hume region. The greatest number of cases were from the southern metropolitan region (31 cases, which comprised 25 per cent), but the highest notification rate was in the Hume region (4.6 per 100,000 population).

The months with fewest notifications were April and December, while the greatest number of notifications occurred in August (Figure 37). There were no notifications of congenital rubella during 1999.

Figure 36: Rubella Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

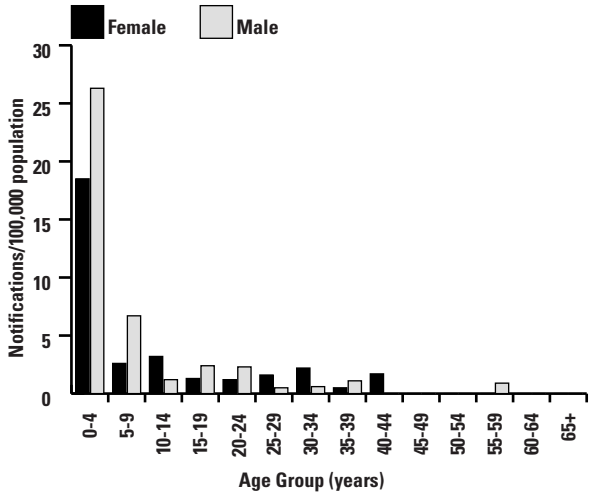
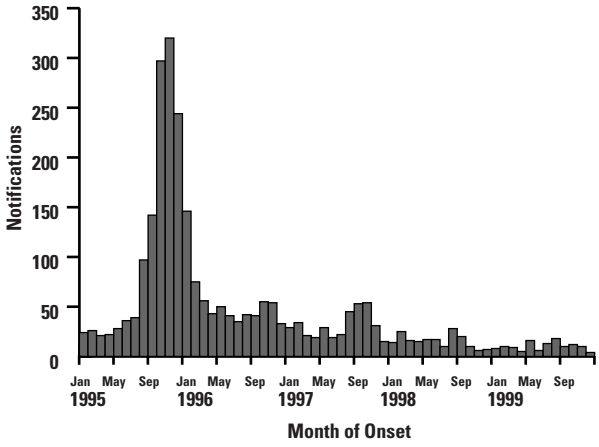


Figure 37: Rubella Notifications, by Month of Onset, Victoria, 1995-99



9. Vector-Borne Diseases

Arbovirus Infections

Arbovirus infections (mosquito-borne diseases) are transmitted by mosquitoes to humans. Victoria has two commonly reported arbovirus infections—Ross River virus disease (epidemic polyarthritis) and Barmah Forest virus disease. Australian arboencephalitis is a serious arbovirus disease that has not been reported in Victoria since 1974.

Ross River virus disease and Barmah Forest virus disease are endemic alphaviruses that occur throughout most parts of rural Victoria. Traditionally, the risk of infection is greater throughout the warmer months of the year when conditions are more conducive for mosquito breeding, and when outdoor activities place people at greater risk. However, the risks increase and decrease each year, depending on local conditions encountered.

There were 332 arbovirus infections notified in 1999, of which 267 (80 per cent) were Ross River virus disease, 15 (5 per cent) were Barmah Forest virus disease, one (0.3 per cent) was flavivirus infection and 48 were unspecified (14 per cent). The majority of notifications received in 1999 had an onset period between January and March.

The Department was notified of a single case of sindbis virus disease in 1999—a first for Victoria. This patient was a 44 year old female who had reported 'flu like symptoms' on and off for approximately two years. Tests for both Ross River virus disease and Barmah Forest virus disease were negative. The Institute of Clinical Pathology and Medical Research (New South Wales) confirmed the positive IgM for sindbis virus. Sindbis virus is in the alphavirus family and is antigenically related to the virus of Western equine encephalitis. A small number of human cases have been reported in Australia, although the virus is commonly detected by seroprevalence studies in host animal populations. The most common illness pattern appears to be fever with a rash (often vesicular), lassitude, headache, sore throat, enlarged glands, muscle, tendon and joint pains and swelling of fingers and feet which may persist for several weeks. The illness is usually of four to eight days duration although sometimes continuing for several weeks. Occasionally there are vesicles between the fingers and toes. The majority of sindbis virus infections in humans are subclinical.

Table 25: Arbovirus Notifications, by Year and Type, Victoria, 1995-99

Year	1995	1996	1997	1998	1999
Ross River	25	138	1061	113	267
Barmah Forest	7	41	42	17	15
Flavivirus	19	6	6	20	1
Unspecified	4	2	0	24	48
Sindbis	0	0	0	0	1
Total	**55**	**187**	**1109**	**174**	**332**

Ross River Virus Disease

Traditionally in Victoria, people acquire infection near major inland waterways such as the Murray Valley region and in eastern Victoria around the Gippsland Lakes system. Excess water levels caused by either river flooding or high tides, coupled with above-average rainfall, create ideal breeding sites for vector mosquitoes.

There was relatively low viral activity in 1999 (267 cases), although this was higher than experienced the previous year. It is likely that the majority of notifications of unspecified arboviral infection (48 cases) were also due to Ross River virus disease.

Rainfall throughout the summer period (December 1998 to March 1999) was average across the State. Above average rainfall was recorded in parts of the Murray Valley region during this period, which correlates with the onset of human infections (Figure 38). Local council officers identified that 52 per cent of the vector breeding sites were related to irrigation practices, compared with 61 per cent in 1998.

Figure 38: Ross River Virus Notifications, by Month of Onset, Victoria, 1995-99

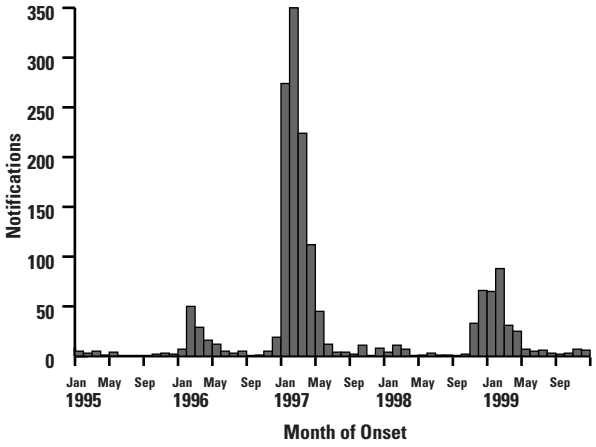
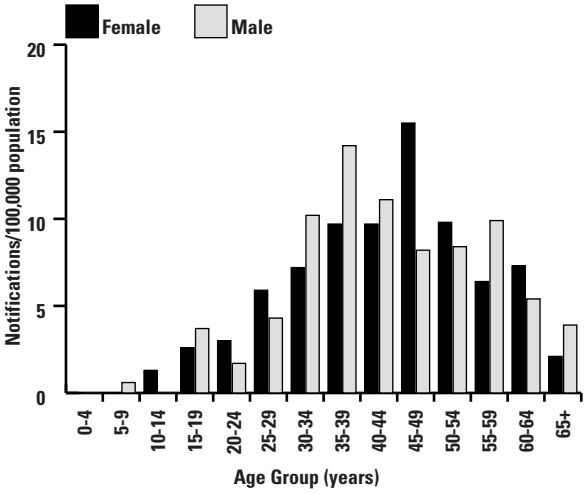


Figure 39: Ross River Virus Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999



Barmah Forest Virus Disease

Fifteen cases of Barmah Forest virus disease were notified in 1999. The Department of Human Services encourages medical practitioners to look for the disease in patients with classic arbovirus symptoms but negative serology for Ross River virus disease. A blood test is commercially available to confirm infection.

Flavivirus Infections

Only one flavivirus infection was notified in 1999, and this case was reported as being acquired overseas. Traditionally, Victoria receives flavivirus notifications (mainly dengue fever) from people returning from overseas destinations.

Malaria

The Department of Human Services received 81 notifications of malaria in 1999, continuing a slow downward trend since 1996. As in previous years, the majority of cases were male (78 per cent). Two males had recrudescent episodes of *Plasmodium vivax* malaria, despite treatment with primaquine.

Forty-four cases (54 per cent) were in persons aged 20–39 years. The youngest case was a male aged 8 months, who was a resident of Papua New Guinea visiting Australia for surgery. He had both vivax and falciparum malaria. The oldest case was a male aged 79 years who was treated for vivax malaria that was also acquired in Papua New Guinea.

Table 26: Malaria Notifications, by Species, Victoria, 1995-99

Malaria Species	1995	1996	1997	1998	1999
P. vivax	78	70	63	58	57
P. falciparum	24	29	16	17	14
P. ovale	6	8	7	9	6
P. falciparum / *P. vivax*	1	1	1	1	3
P. falciparum / *P. ovale*	0	1	0	2	1
Indeterminate	1	1	3	0	0
Total	**110**	**110**	**90**	**87**	**81**

Fifty-seven cases (70 per cent) were due to *P. vivax* (Table 26), of which 41 (72 per cent) were acquired in Papua New Guinea or Indonesia (including Bali and East Timor) (Table 27). Seven of the 14 cases of *P. falciparum* malaria were acquired in Papua New Guinea, and the other seven were acquired in Africa. All 6 cases of *P. ovale* malaria were acquired in Africa. As in previous years, no cases of *P. malariae* malaria were reported in 1999.

Figure 40: Malaria Notifications, by Month of Onset, Victoria, 1995-99

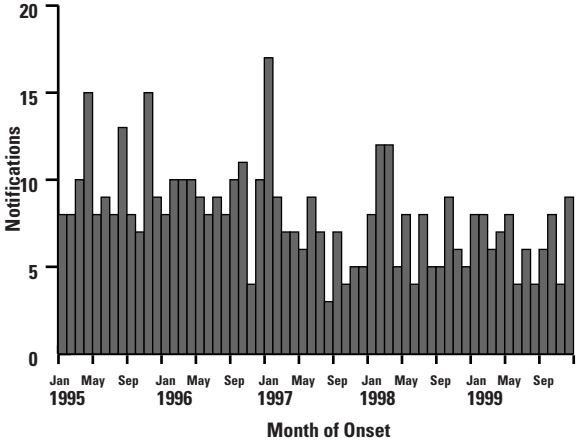


Figure 41: Malaria Notifications per 100,000 population, by Age Group and Sex, Victoria, 1999

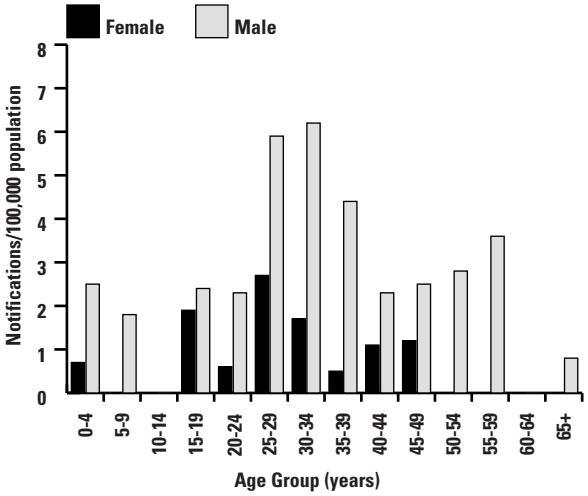


Table 27: Malaria Notifications, by Country Acquired, Victoria, 1999

	Countries visited	Notifications
P. vivax		
Oceania	Papua New Guinea	27
	Solomon Islands	1
	Vanuatu	1
Asia	Afghanistan	3
	India	3
	Indonesia (excluding Bali and East Timor)	11
	Bali	1
	Pakistan	2
	East Timor	2
	South-east Asia-not otherwise specified	1
Africa	Africa-not otherwise specified, multiple	1
	Sudan	2
	Uganda	1
Central America	Honduras	1
Sub-total		**57**
P. falciparum		
Oceania	Papua New Guinea	7
Africa	Africa-not otherwise specified, multiple	2
	Tanzania	1
	Ethiopia	1
	Uganda	1
	Kenya	1
	Malawi	1
Sub-total		**14**
P. ovale		
Africa	Africa-not otherwise specified, multiple	2
	Tanzania	1
	Kenya	1
	Zimbabwe,	1
	Ghana	1
Sub-total		**6**
P. vivax / P. falciparum		
Oceania	Papua New Guinea	2
Africa	Nigeria	1
Sub-total		**3**
P. ovale / P. falciparum		
Asia	India	1
Sub-total		**1**
Total		**81**

10. Zoonoses

Brucellosis

Three cases of brucellosis were notified in 1999. One man, a 32 year old abattoir worker, had an equivocal serological test result and was probably infected many years earlier. The second case was a 21 year old male who contracted *Brucella suis* from contact with Queensland feral pigs. He was treated with doxycyline and rifampicin. The other case was a 76 year old female who was visiting from Italy where she acquired *B. melitensis*. She too was treated with doxycyline and rifampicin.

Hydatid Disease

There were 17 cases of hydatid disease notified in 1999, with an age range of 18–74 years. Ten of these persons were born in Australia and acquired the disease in country Victoria. The other seven were from Italy, Greece, Indonesia and Romania. Many had histories of long standing hydatid disease, but one female (age 18 years) had already had a right lower lobectomy and removal of a liver cyst. She was notified as a result of a recurrent liver cyst, and was to be treated with albendazole.

Leptospirosis

Twenty-nine cases of leptospirosis were notified in 1999—27 males and two females. The notification rate was highest among males aged 55–59 years (Appendix 3). As in previous years, dairy farmers and other workers exposed to cattle appeared to be at greatest risk of acquiring leptospirosis (Table 28) and the most common serovar was *Leptospira borgpetersenii* var hardjo (Table 29). The *copenhagenii/canicola* infection was acquired by a 35 year old male in Thailand while on a jungle trek.

Table 28: Leptospirosis Notifications, by Occupation, Victoria, 1999

Occupation	Cases
Dairy farmer	19
Abattoir worker	5
Stock agent	3
Overseas visitor	1
Unknown source	1
Total	**29**

Figure 42: Leptospirosis Notifications, by Month of Onset, Victoria, 1995-99

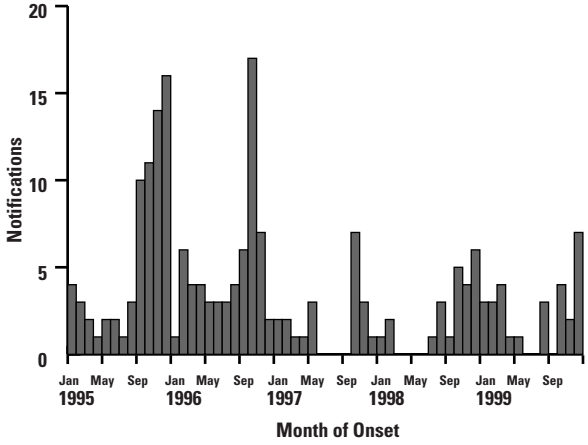


Table 29: Leptospirosis Notifications, by Serovar, Victoria, 1999

Serovar	Cases
L. hardjo	18
L. pomona/copenhageni	3
L. copenhagenii	2
L. copenhagenii/canicola	1
L. pomona	1
Not further specified	4
Total	**29**

Psittacosis

There were 69 notifications of psittacosis in 1999, of which 44 were male and 25 were female. This total was an increase of 22 notifications (47 per cent) from the total in 1998. The largest increase occurred in the eastern metropolitan region, where the number of cases rose from nine in 1998 to 20 in 1999. The majority of cases were sporadic. A family outbreak involving three people (one of whom died) occurred in the eastern metropolitan region in December. The outbreak was attributed to the purchase of a cockatoo, which had been recently trapped.

Figure 43: Psittacosis Notifications, by Month of Onset, Victoria, 1995-99

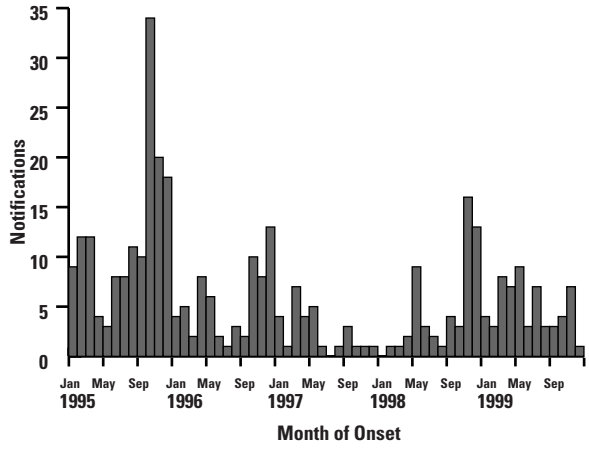
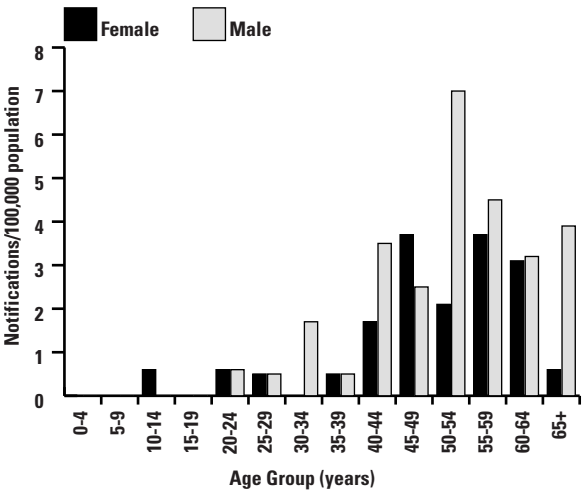


Figure 44: Psittacosis Notifications per 100,000 Population, by Age Group and Sex, Victoria, 1999



Q Fever

There were 26 cases of Q fever notified in 1999—24 males and two females. 15 cases (58 per cent) were males aged 30–49 years (Table 30).

Source of Infection

Most cases had a history of contact with livestock.

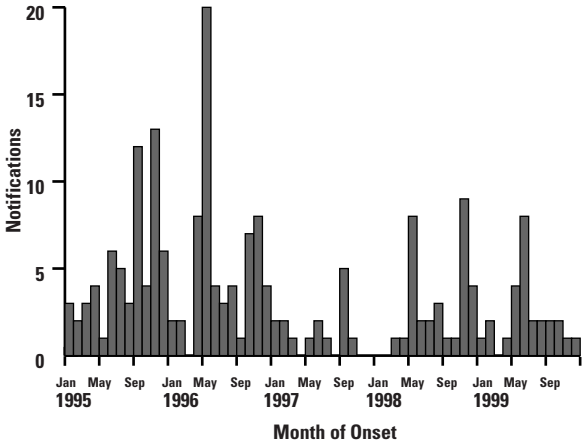
- Four infections in meat workers were acquired at one particular abattoir, while another infection occurred in a transport driver who had collected hides and skins from the same abattoir.
- Two other transport drivers collected offal from a different abattoir.
- Two people were employed at abattoirs—one as a gardener and one as a renovator of the abattoir.
- Two cases were from a New South Wales abattoir that processed kangaroos.
- One of the female cases was the wife of a transport driver who collected hides and skins from a tannery. She was tested by the Department of Human Services because she had symptoms of sweats, fever and weight loss.
- A 12 year old earned pocket money by hunting goats in the school holidays.
- The shearers acquired Q fever in New South Wales or Queensland, and an itinerant worker became infected in Queensland.
- One farmer became infected after buying cattle at a saleyard.

Feral goats are a certain source of Q fever. Abattoirs should ensure their meat workers, transport drivers and maintenance workers, and visitors to their plants receive vaccination for Q fever before they work at or visit the abattoir. Following vaccination, immunity from Q fever occurs two to three weeks later.

Table 30: Q Fever Notifications, by Occupation, Victoria, 1999

Occupation	Cases
Abattoir worker	12
Farmer	5
Shearer	2
Cattle truck driver	4
Other	3
Total	**26**

Figure 45: Q Fever Notifications, by Month of Onset, Victoria, 1995-99



Taeniasis

Twelve cases of taeniasis were notified in 1999. Five cases were due to *Taeniasis saginata* and one was a dwarf tapeworm *Hymenolepis nana*. The others were reported only as ova or eggs.

Table 31: Taeniasis Notifications, by Country of Source of Infection, Victoria, 1999

Region	Notifications
Lebanon	4
South Africa	1
Nigeria	1
Vietnam	1
Not known	5
Total	**12**

11. Other Notifiable Diseases

Hepatitis E

One case of hepatitis E was notified in 1999. The male (aged 19 years), whose country of birth was Afghanistan, visited Australia in May 1999. He had been jaundiced six days before being seen by a doctor. He had acquired the infection in India.

Leprosy

One case of leprosy was notified in 1999. The female (aged 29 years) had been previously diagnosed as having tuberculoid leprosy in 1996 in India, where she was treated with dapsone, rifampicin and clofazimine. The patient's leprosy reactivated in Australia during pregnancy, and she was treated with dapsone and rifampicin.

Appendixes

Appendix 1A: Summary of Notifications per 100,000 Population, by Non-Metropolitan Region, Victoria, 1999

	Barwon South Western		Gippsland		Grampians		Hume		Loddon Mallee	
	Cases	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
Blood-borne diseases										
Hepatitis B—acute	1	0.3	5	2.1	1	0.5	4	1.7	4	1.4
Hepatitis B—chronic/unknown	22	6.7	22	9.4	11	5.4	16	6.7	21	7.4
Hepatitis C—acute (incident)	4	1.2	6	2.6	1	0.5	2	0.8	4	1.4
Hepatitis C—unspecified	312	95.2	233	99.5	126	62.4	245	102.0	216	76.3
Enteric diseases										
Amoebiasis	3	0.9	0	0.0	7	3.5	9	3.7	3	1.1
Campylobacter infection	258	78.7	302	128.9	143	70.8	252	105.0	161	56.9
Cholera	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Food- or Water-borne Illness—*Cryptosporidium*	3	0.9	21	9.0	4	2.0	16	6.7	11	3.9
Food- or Water-borne Illness—other	5	1.5	3	1.3	3	1.5	13	5.4	3	1.1
Giardiasis	71	21.7	39	16.7	34	16.8	63	26.2	49	17.3
Haemolytic Uraemic Syndrome	2	0.5	0	0.0	0	0.0	1	0.4	1	0.4
Hepatitis A	6	1.8	9	3.8	5	2.5	8	3.3	8	2.8
Listeriosis	1	0.3	0	0.0	1	0.5	1	0.4	0	0.0
Paratyphoid	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0
Salmonellosis	99	30.2	55	23.5	49	24.3	61	25.4	37	13.1
Shigellosis	3	0.9	4	1.7	1	0.5	4	1.7	4	1.4
Typhoid	0	0.0	0	0.0	0	0.0	2	0.8	0	0.0
Verotoxin-producing *E.coli*	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0
Yersiniosis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Invasive Meningococcal Disease	12	3.7	7	3.0	3	1.5	7	2.9	6	2.1
Legionellosis	2	0.6	2	0.9	0	0.0	0	0.0	1	0.4
Tuberculosis	8	2.4	4	1.7	4	2.0	19	7.9	5	1.8
Vaccine preventable diseases										
Haemophilus influenzae type b (meningitis)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Measles	1	0.3	1	0.4	2	1.0	12	5.0	4	1.4
Mumps	0	0.0	2	0.9	6	3.0	8	3.3	2	0.7
Pertussis	67	20.4	106	45.3	81	40.1	66	27.5	63	22.2
Rubella	4	1.2	0	0.0	4	2.0	11	4.6	4	1.4
Vector-borne diseases										
Arbovirus—Barmah Forest	0	0.0	5	2.1	0	0.0	3	1.2	4	1.4
Arbovirus—flavivirus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Arbovirus—Ross River	6	1.8	71	30.3	17	8.4	42	17.5	45	15.9
Arbovirus—sindbis	0	0.0	0	0.0	0	0.0	0	0.0	1	0.4
Arbovirus—not further specified	0	0.0	30	12.8	3	1.5	4	1.7	6	2.1
Malaria	5	1.5	3	1.3	3	1.5	5	2.1	4	1.4
Zoonoses										
Brucellosis	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0
Hydatid disease	4	1.2	1	0.4	0	0.0	1	0.4	0	0.0
Leptospirosis	7	2.1	6	2.6	0	0.0	7	2.9	4	1.4
Psittacosis	5	1.5	1	0.4	4	2.0	6	2.5	3	1.1
Q fever	3	0.9	3	1.3	0	0.0	6	2.5	4	1.4
Taeniasis	1	0.3	0	0.0	0	0.0	0	0.0	0	0.0
Other infectious notifiable diseases										
Hepatitis E	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Leprosy	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Region total	**915**	**279.1**	**943**	**402.6**	**513**	**254.2**	**895**	**372.8**	**678**	**239.4**

Appendix 1B: Summary of Notifications per 100,000 Population, by Metropolitan Region, Victoria, 1999

	Eastern Metropolitan		Northern Metropolitan		Southern Metropolitan		Western Metropolitan		Not Elsewhere Specified	Total	
	Cases	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Cases**	**Rate**
Blood-borne diseases											
Hepatitis B—acute	14	1.5	17	2.3	21	1.9	25	4.3	2	94	2.0
Hepatitis B—chronic/unknown	464	48.7	472	63.0	584	54.0	563	96.5	118	2293	49.3
Hepatitis C—acute (incident)	8	0.8	12	1.6	15	1.4	21	3.6	1	74	1.6
Hepatitis C—unspecified	908	95.2	1004	134.0	1412	130.6	764	130.9	1096	6316	135.7
Enteric diseases											
Amoebiasis	25	2.6	23	3.1	24	2.2	16	2.7	3	113	2.4
Campylobacter infection	1070	112.2	721	96.2	1170	108.2	589	100.9	132	4798	103.1
Cholera	0	0.0	0	0.0	0	0.0	0	0.0	1	1	0.0
Food- or Water-borne Illness—*Cryptosporidium*	14	1.5	14	1.9	16	1.5	4	0.7	1	104	2.2
Food- or Water-borne Illness—other	43	4.5	59	7.9	43	4.0	44	7.5	105	321	6.9
Giardiasis	202	21.2	133	17.8	235	21.7	90	15.4	17	933	20.0
Haemolytic Uraemic Syndrome	1	0.1	0	0.0	2	0.2	1	0.2	0	8	0.2
Hepatitis A	53	5.6	34	4.5	99	9.2	35	6.0	3	260	5.6
Listeriosis	2	0.2	0	0.0	5	0.5	2	0.3	0	12	0.3
Paratyphoid	1	0.1	0	0.0	1	0.1	2	0.3	0	5	0.1
Salmonellosis	224	23.5	195	26.0	274	25.3	164	28.1	40	1198	25.7
Shigellosis	26	2.7	19	2.5	30	2.8	13	2.2	3	107	2.3
Typhoid	2	0.2	3	0.4	4	0.4	5	0.9	0	16	0.3
Verotoxin-producing *E.coli*	1	0.1	1	0.1	1	0.1	1	0.2	0	5	0.1
Yersiniosis	3	0.3	5	0.7	3	0.3	6	1.0	0	17	0.4
Invasive Meningococcal Disease	22	2.3	21	2.8	42	3.9	15	2.6	2	137	2.9
Legionellosis	9	0.9	23	3.1	11	1.0	15	2.6	1	64	1.4
Tuberculosis	53	5.6	65	8.7	75	6.9	91	15.6	0	324	7.0
Vaccine preventable diseases											
Haemophilus influenzae type b (meningitis)	1	0.1	0	0.0	0	0.0	1	0.2	0	2	0.0
Measles	12	1.3	32	4.3	6	0.6	38	6.5	3	111	2.4
Mumps	8	0.8	13	1.7	11	1.0	19	3.3	4	73	1.6
Pertussis	203	21.3	125	16.7	120	11.1	145	24.9	22	998	21.4
Rubella	28	2.9	25	3.3	31	2.9	12	2.1	4	123	2.6
Vector-borne diseases											
Arbovirus—Barmah Forest	0	0.0	1	0.1	0	0.0	0	0.0	2	15	0.3
Arbovirus—flavivirus	0	0.0	1	0.1	0	0.0	0	0.0	0	1	0.0
Arbovirus—Ross River	20	2.1	16	2.1	24	2.2	7	1.2	19	267	5.7
Arbovirus—sindbis	0	0.0	0	0.0	0	0.0	0	0.0	0	1	0.0
Arbovirus—not further specified	0	0.0	1	0.2	1	0.1	0	0.0	3	48	1.0
Malaria	13	1.4	14	1.9	24	2.2	5	0.9	5	81	1.7
Zoonoses											
Brucellosis	0	0.0	1	0.1	0	0.0	1	0.2	0	3	0.1
Hydatid disease	2	0.2	2	0.3	3	0.3	3	0.5	1	17	0.4
Leptospirosis	1	0.1	1	0.1	1	0.1	0	0.0	2	29	0.6
Psittacosis	20	2.1	8	1.1	16	1.5	6	1.0	0	69	1.5
Q fever	1	0.1	0	0.0	2	0.2	1	0.2	6	26	0.6
Taeniasis	1	0.1	7	0.9	0	0.0	3	0.5	0	12	0.3
Other infectious notifiable diseases											
Hepatitis E	0	0.0	0	0.0	1	0.1	0	0.0	0	1	0.0
Leprosy	1	0.1	0	0.0	0	0.0	0	0.0	0	1	0.0
Region total	**3456**	**362.4**	**3068**	**409.5**	**4307**	**398.3**	**2707**	**463.9**	**1596**	**19078**	**409.8**

Appendix 2: Summary of Notifications, by Age Group and Sex, Victoria, 1999

Condition	Sex	Age Group (Years)														Total
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	
Blood-borne diseases																
Hepatitis B—acute	Female	0	0	0	8	6	3	6	3	1	0	1	0	0	0	28
	Male	0	0	0	7	19	13	10	5	5	2	1	2	0	2	66
	Total	0	0	0	15	25	16	16	8	6	2	2	2	0	2	94
Hepatitis B—chronic/ unknown	Female	1	3	13	67	121	161	152	126	95	85	51	28	15	38	966
	Male	2	4	25	70	122	140	167	170	154	117	86	44	45	53	1200
	Total	3	7	39	143	255	325	338	314	262	209	143	75	63	97	2293
Hepatitis C—acute (incident)	Female	0	0	1	12	5	4	1	0	0	0	0	1	0	0	24
	Male	0	0	1	18	17	9	3	0	1	0	0	0	0	1	50
	Total	0	0	2	30	22	13	4	0	1	0	0	1	0	1	74
Hepatitis C—unspecified	Female	10	1	3	235	328	411	407	336	286	116	63	29	37	97	2372
	Male	10	2	3	260	653	610	620	610	486	259	86	54	30	100	3807
	Total	24	3	7	512	1004	1044	1047	957	785	378	149	85	70	202	6316
Enteric diseases																
Amoebiasis	Female	0	2	0	0	5	5	4	2	6	2	1	3	2	0	33
	Male	1	3	2	1	3	12	13	10	12	2	5	4	4	4	76
	Total	3	6	3	1	8	17	17	12	18	4	6	7	6	4	113
Campylobacter infection	Female	389	160	74	111	241	265	175	139	100	100	101	76	65	193	2214
	Male	526	219	132	142	249	262	187	132	147	99	99	68	58	168	2524
	Total	938	383	207	255	495	529	364	273	248	201	202	146	125	364	4798
Cholera	Male	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Food- or Water-borne Illness—*Cryptosporidium*	Female	18	7	4	0	3	6	4	2	2	1	2	1	0	1	51
	Male	19	11	4	3	1	3	5	2	2	0	1	2	0	0	53
	Total	37	18	8	3	4	9	9	4	4	1	3	3	0	1	104
Food- or Water-borne Illness—other	Female	23	9	6	6	12	21	5	15	6	9	11	4	1	14	159
	Male	21	5	7	2	8	18	16	11	8	4	11	3	4	8	150
	Total	47	14	13	8	20	39	23	26	16	13	23	7	5	22	321
Giardiasis	Female	110	21	11	7	22	44	57	77	21	21	17	22	19	18	471
	Male	137	41	13	6	19	37	45	38	37	26	17	8	8	14	449
	Total	253	64	24	13	41	81	103	117	58	48	34	30	27	32	933
Haemolytic Uraemic Syndrome	Female	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	Male	2	1	0	0	1	0	0	0	0	0	0	0	0	0	4
	Total	6	1	0	0	1	0	0	0	0	0	0	0	0	0	8
Hepatitis A	Female	2	5	5	17	19	17	11	9	2	4	4	0	1	7	103
	Male	9	9	6	27	37	29	11	7	3	6	4	1	0	5	157
	Total	11	14	11	44	56	46	22	16	5	10	8	1	1	12	260
Listeriosis	Female	0	0	0	0	0	0	3	2	0	0	0	0	0	3	8
	Male	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4
	Total	0	0	0	0	0	0	3	2	0	0	0	0	1	6	12
Paratyphoid	Female	1	0	0	0	2	0	1	0	0	0	0	0	0	0	4
	Male	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Total	1	0	0	0	2	0	2	0	0	0	0	0	0	0	5
Salmonellosis	Female	149	57	30	35	50	47	32	15	24	17	16	19	12	53	560
	Male	169	51	35	38	55	55	28	32	31	23	19	14	13	30	595
	Total	332	112	66	73	107	107	62	48	56	41	35	36	26	88	1198
Shigellosis	Female	4	3	1	6	4	6	5	4	0	8	4	0	2	3	50
	Male	3	2	1	1	2	8	10	6	5	5	5	3	0	2	53
	Total	8	5	2	7	7	14	16	10	6	13	9	3	2	5	107
Typhoid	Female	0	2	0	1	0	1	1	0	0	0	1	0	0	0	6
	Male	1	0	0	1	2	2	1	2	0	0	0	1	0	0	10
	Total	1	2	0	2	2	3	2	2	0	0	1	1	0	0	16
Verotoxin-producing *E. coli*	Female	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2
	Male	0	2	0	0	0	0	0	0	0	0	0	0	0	1	3
	Total	0	2	0	0	1	0	0	0	0	0	0	1	0	1	5
Yersiniosis	Female	2	1	1	0	1	1	0	0	0	1	0	0	0	0	7
	Male	3	1	0	0	0	0	0	1	2	1	0	0	0	0	8
	Total	6	2	2	0	1	1	0	1	2	2	0	0	0	0	17

Condition	Sex	Age Group (Years)														Total
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	
Invasive Meningococcal Disease																
	Female	16	2	4	18	6	4	1	1	1	3	2	2	1	5	66
	Male	20	9	5	14	7	6	1	4	1	1	2	0	0	1	71
	Total	36	11	9	32	13	10	2	5	2	4	4	2	1	6	137
Legionellosis																
	Female	0	0	0	0	0	2	0	0	0	4	4	2	2	6	20
	Male	0	0	0	0	0	0	0	4	5	4	8	10	4	9	44
	Total	0	0	0	0	0	2	0	4	5	8	12	12	6	15	64
Tuberculosis																
	Female	3	1	5	6	16	24	21	21	9	5	7	11	7	31	167
	Male	3	1	0	6	18	27	15	12	12	10	10	6	8	29	157
	Total	6	2	5	12	34	51	36	33	21	15	17	17	15	60	324
Vaccine Preventable Diseases																
Haemophilus influenzae type b (meningitis)	Female	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Male	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Total	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Measles	Female	15	3	0	8	24	11	3	0	0	0	0	0	0	0	64
	Male	11	3	3	4	16	8	1	1	0	0	0	0	0	0	47
	Total	26	6	3	12	40	19	4	1	0	0	0	0	0	0	111
Mumps	Female	10	7	5	1	1	1	1	1	1	1	0	0	0	0	29
	Male	10	14	5	2	2	2	1	3	2	0	2	0	1	0	44
	Total	20	21	10	3	3	3	2	4	3	1	2	0	1	0	73
Pertussis	Female	39	44	122	36	23	34	33	46	48	37	24	20	15	19	541
	Male	41	46	116	46	16	26	20	32	27	27	20	11	8	20	456
	Total	80	90	238	82	39	60	53	78	75	64	44	32	23	39	998
Rubella	Female	28	4	5	2	2	3	4	1	3	0	0	0	0	0	52
	Male	42	11	2	4	4	1	1	2	0	0	0	1	0	0	71
	Total	70	15	7	6	6	4	5	3	3	0	0	1	0	0	123
Vector-borne diseases																
Arbovirus—Barmah Forest	Female	0	0	0	0	0	0	0	2	1	1	1	0	0	1	6
	Male	0	0	0	0	0	0	1	1	0	1	4	0	0	2	9
	Total	0	0	0	0	0	0	1	3	1	2	5	0	0	3	15
Arbovirus—flavivirus	Female	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Arbovirus—Ross River	Female	0	0	2	4	5	11	13	18	17	25	14	7	7	7	130
	Male	0	1	0	6	3	8	18	26	19	13	12	11	5	10	134
	Total	0	1	2	10	8	20	31	45	36	38	26	18	12	18	267
Arbovirus—sindbis	Female	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Total	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Arbovirus—not further specified	Female	0	0	1	2	0	0	1	0	4	5	4	4	4	1	27
	Male	0	0	0	0	3	0	3	0	4	3	2	2	1	3	21
	Total	0	0	1	2	3	0	4	0	8	8	6	6	5	4	48
Malaria	Female	1	0	0	3	1	5	3	1	2	2	0	0	0	0	18
	Male	4	3	0	4	4	11	11	8	4	4	4	4	0	2	63
	Total	5	3	0	7	5	16	14	9	6	6	4	4	0	2	81
Zoonoses																
Brucellosis	Female	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	Male	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
	Total	0	0	0	0	1	0	1	0	0	0	0	0	0	1	3
Hydatid disease	Female	0	0	0	1	0	0	1	1	0	1	1	0	3	1	9
	Male	0	0	0	0	0	1	1	0	2	0	1	1	0	0	6
	Total	0	0	0	1	0	1	2	1	2	1	2	2	3	2	17
Leptospirosis	Female	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2
	Male	0	0	0	0	4	2	2	4	2	3	3	5	2	0	27
	Total	0	0	0	0	4	2	3	4	2	3	3	6	2	0	29
Psittacosis	Female	0	0	1	0	1	1	0	1	3	6	3	4	3	2	25
	Male	0	0	0	0	1	1	3	1	6	4	10	5	3	10	44
	Total	0	0	1	0	2	2	3	2	9	10	13	9	6	12	69
Q fever	Female	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
	Male	0	0	1	0	0	3	4	2	5	4	0	2	1	1	24
	Total	0	0	1	0	0	3	4	3	5	4	0	3	1	1	26
Taeniasis	Female	0	0	0	0	0	1	1	0	1	0	0	0	1	0	5
	Male	1	0	0	0	3	2	0	0	1	0	0	0	0	0	7
	Total	1	0	0	0	3	3	1	0	2	0	0	0	1	0	12
Other infectious notifiable diseases																
Hepatitis E	Male	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	Total	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Leprosy	Female	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Total	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1

Totals include notifications for persons where age group or sex is unknown/not specified

Appendix 3: Summary of Notifications per 100,000 Population, by Age Group and Sex, Victoria, 1999

Condition	Sex	Age Group (Years)														Total
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	
Blood-borne diseases																
Hepatitis B—acute	Female	0.0	0.0	0.0	5.1	3.6	1.6	3.3	1.6	0.6	0.0	0.7	0.0	0.0	0.0	1.2
	Male	0.0	0.0	0.0	4.3	10.9	7.0	5.7	2.7	2.9	1.3	0.7	1.8	0.0	0.8	2.9
	Total	0.0	0.0	0.0	4.7	7.3	4.3	4.5	2.2	1.7	0.6	0.7	0.9	0.0	0.3	2.0
Hepatitis B—chronic/ unknown	Female	0.7	1.9	8.4	42.9	72.3	86.4	84.3	67.9	54.4	52.7	35.8	25.8	15.7	11.4	41.0
	Male	1.3	2.4	15.5	42.8	70.3	75.4	94.6	92.8	89.8	73.7	59.9	39.8	48.4	20.8	52.2
	Total	1.0	2.2	12.4	44.7	74.8	87.4	94.8	85.1	75.7	65.3	50.0	34.2	33.9	16.5	49.3
Hepatitis C—acute (incident)	Female	0.0	0.0	0.6	7.7	3.0	2.1	0.6	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.0
	Male	0.0	0.0	0.6	11.0	9.8	4.8	1.7	0.0	0.6	0.0	0.0	0.0	0.0	0.4	2.2
	Total	0.0	0.0	0.6	9.4	6.5	3.5	1.1	0.0	0.3	0.0	0.0	0.5	0.0	0.2	1.6
Hepatitis C—unspecified	Female	6.6	0.6	1.9	150.5	195.9	220.5	225.9	180.9	163.6	71.9	44.2	26.7	38.8	29.1	100.8
	Male	6.3	1.2	1.9	158.3	376.2	328.7	351.4	332.9	283.4	163.0	59.9	48.8	32.3	39.2	165.4
	Total	7.7	0.9	2.2	160.1	294.4	280.7	293.6	259.4	226.7	118.1	52.1	38.8	37.2	34.3	135.7
Enteric diseases																
Amoebiasis	Female	0.0	1.3	0.0	0.0	3.0	2.7	2.2	1.1	3.4	1.2	0.7	2.8	2.1	0.0	1.4
	Male	0.6	1.8	1.2	0.6	1.7	6.5	7.4	5.5	7.0	1.3	3.5	3.6	4.3	1.6	3.3
	Total	1.0	1.9	1.0	0.3	2.3	4.6	4.8	3.3	5.2	1.2	2.1	3.2	3.2	0.7	2.4
Campylobacter infection	Female	257.2	102.5	47.9	71.7	144.0	142.2	97.1	74.9	57.2	62.0	70.9	70.0	68.1	57.9	94.1
	Male	328.8	132.8	82.0	86.8	143.4	141.2	106.0	72.0	85.7	62.3	68.9	61.5	62.4	65.9	109.7
	Total	301.4	119.1	65.6	79.7	145.2	142.2	102.1	74.0	71.9	62.8	70.6	66.6	66.3	61.9	103.1
Cholera	Male	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	0.4	0.0
	Total	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	0.2	0.0
Food- or Water-borne Illness—*Cryptosporidium*	Female	11.9	4.5	2.6	0.0	1.8	3.2	2.2	1.1	1.1	0.6	1.4	0.9	0.0	0.3	2.2
	Male	11.9	6.7	2.5	1.8	0.6	1.6	2.8	1.1	1.2	0.0	0.7	1.8	0.0	0.0	2.3
	Total	11.9	5.6	2.5	0.9	1.2	2.4	2.5	1.1	1.2	0.3	1.0	1.4	0.0	0.2	2.2
Food- or Water-borne Illness—other	Female	15.2	5.7	3.9	3.8	7.2	11.3	2.8	8.1	3.4	5.6	7.7	3.7	1.0	4.2	6.8
	Male	13.1	3.0	4.3	1.2	4.6	9.7	9.1	6.0	4.7	2.5	7.7	2.7	4.3	3.1	6.5
	Total	15.1	4.4	4.1	2.5	5.9	10.5	6.4	7.0	4.6	4.1	8.0	3.2	2.7	3.7	6.9
Giardiasis	Female	72.7	13.4	7.1	4.5	13.1	23.6	31.6	41.5	12.0	13.0	11.9	20.3	19.9	5.4	20.0
	Male	85.6	24.9	8.1	3.7	10.9	19.9	25.5	20.7	21.6	16.4	11.8	7.2	8.6	5.5	19.5
	Total	81.3	19.9	7.6	4.1	12.0	21.8	28.9	31.7	16.7	15.0	11.9	13.7	14.3	5.4	20.0
Haemolytic Uraemic Syndrome	Female	2.0	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
	Male	1.3	0.6	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Total	1.9	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Hepatitis A	Female	1.3	3.2	3.2	10.9	11.3	9.1	6.1	4.8	1.1	2.5	2.8	0.0	1.0	2.1	4.4
	Male	5.6	5.5	3.7	16.5	21.3	15.6	6.2	3.8	1.7	3.8	2.8	0.9	0.0	2.0	6.8
	Total	3.5	4.4	3.5	13.8	16.4	12.4	6.2	4.3	1.4	3.1	2.8	0.5	0.5	2.0	5.6
Listeriosis	Female	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.1	0.0	0.0	0.0	0.0	0.0	0.9	0.3
	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.2	0.2
	Total	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.0	0.0	0.0	0.0	0.5	1.0	0.3
Paratyphoid	Female	0.7	0.0	0.0	0.0	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.3	0.0	0.0	0.0	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Salmonellosis	Female	98.5	36.4	19.4	22.4	29.9	25.2	17.8	8.1	13.7	10.5	11.2	17.5	12.6	15.9	23.8
	Male	105.6	30.9	21.7	23.2	31.7	29.6	15.9	17.5	18.1	14.5	13.2	12.7	14.0	11.8	25.9
	Total	106.7	34.8	20.9	22.8	31.4	28.8	17.4	13.0	16.2	12.8	12.2	16.4	13.8	15.0	25.7
Shigellosis	Female	2.6	1.9	0.6	3.8	2.4	3.2	2.8	2.2	0.0	5.0	2.8	0.0	2.1	0.9	2.1
	Male	1.9	1.2	0.6	0.6	1.2	4.3	5.7	3.3	2.9	3.1	3.5	2.7	0.0	0.8	2.3
	Total	2.6	1.6	0.6	2.2	2.1	3.8	4.5	2.7	1.7	4.1	3.1	1.4	1.1	0.9	2.3
Typhoid	Female	0.0	1.3	0.0	0.6	0.0	0.5	0.6	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3
	Male	0.6	0.0	0.0	0.6	1.2	1.1	0.6	1.1	0.0	0.0	0.0	0.9	0.0	0.0	0.4
	Total	0.3	0.6	0.0	0.6	0.6	0.8	0.6	0.5	0.0	0.0	0.3	0.5	0.0	0.0	0.3
Verotoxin-producing *E. coli*	Female	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.1
	Male	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
	Total	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.2	0.1
Yersiniosis	Female	1.3	0.6	0.6	0.0	0.6	0.5	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.3
	Male	1.9	0.6	0.0	0.0	0.0	0.0	0.0	0.5	1.2	0.6	0.0	0.0	0.0	0.0	0.3
	Total	1.9	0.6	0.6	0.0	0.3	0.3	0.0	0.3	0.6	0.6	0.0	0.0	0.0	0.0	0.4

Condition	Sex	Age Group (Years)														Total
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	
Invasive Meningococcal Disease	Female	10.6	1.3	2.6	11.5	3.6	2.1	0.6	0.5	0.6	1.9	1.4	1.8	1.0	1.5	2.8
	Male	12.5	5.5	3.1	8.6	4.0	3.2	0.6	2.2	0.6	0.6	1.4	0.0	0.0	0.4	3.1
	Total	11.6	3.4	2.9	10.0	3.8	2.7	0.6	1.4	0.6	1.2	1.4	0.9	0.5	1.0	2.9
Legionellosis	Female	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	2.5	2.8	1.8	2.1	1.8	0.8
	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.9	2.5	5.6	9.0	4.3	3.5	1.9
	Total	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1	1.4	2.5	4.2	5.5	3.2	2.6	1.4
Tuberculosis	Female	2.0	0.6	3.2	3.8	9.6	12.9	11.7	11.3	5.1	3.1	4.9	10.1	7.3	9.3	7.1
	Male	1.9	0.6	0.0	3.7	10.4	14.5	8.5	6.5	7.0	6.3	7.0	5.4	8.6	11.4	6.8
	Total	1.9	0.6	1.6	3.8	10.0	13.7	10.1	8.9	6.1	4.7	5.9	7.8	8.0	10.2	7.0
Vaccine preventable diseases																
Haemophilus influenzae type b (meningitis)	Female	0.7	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
	Male	0.6	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
	Total	0.6	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
Measles	Female	9.9	1.9	0.0	5.1	14.3	5.9	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7
	Male	6.9	1.8	1.9	2.4	9.2	4.3	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Total	8.4	1.9	1.0	3.8	11.7	5.1	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.4
Mumps	Female	6.6	4.5	3.2	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.0	0.0	0.0	0.0	1.2
	Male	6.3	8.5	3.1	1.2	1.2	1.1	0.6	1.6	1.2	0.0	1.4	0.0	1.1	0.0	1.9
	Total	6.4	6.5	3.2	0.9	0.9	0.8	0.6	1.1	0.9	0.3	0.7	0.0	0.5	0.0	1.6
Pertussis	Female	25.8	28.1	79.0	23.1	13.7	18.2	18.3	24.8	27.5	22.9	16.8	18.4	15.7	5.7	23.0
	Male	25.6	27.9	72.0	28.1	9.2	14.0	11.3	17.5	15.7	17.0	13.9	9.9	8.6	7.8	19.8
	Total	25.7	28.0	75.4	25.6	11.4	16.1	14.9	21.1	21.7	20.0	15.4	14.6	12.2	6.6	21.4
Rubella	Female	18.5	2.6	3.2	1.3	1.2	1.6	2.2	0.5	1.7	0.0	0.0	0.0	0.0	0.0	2.2
	Male	26.3	6.7	1.2	2.4	2.3	0.5	0.6	1.1	0.0	0.0	0.0	0.9	0.0	0.0	3.1
	Total	22.5	4.7	2.2	1.9	1.8	1.1	1.4	0.8	0.9	0.0	0.0	0.5	0.0	0.0	2.6
Vector-borne diseases																
Arbovirus—Barmah Forest	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.6	0.6	0.7	0.0	0.0	0.3	0.3
	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.0	0.6	2.8	0.0	0.0	0.8	0.4
	Total	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.3	0.6	1.7	0.0	0.0	0.5	0.3
Arbovirus—flavivirus	Female	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arbovirus—Ross River	Female	0.0	0.0	1.3	2.6	3.0	5.9	7.2	9.7	9.7	15.5	9.8	6.4	7.3	2.1	5.5
	Male	0.0	0.6	0.0	3.7	1.7	4.3	10.2	14.2	11.1	8.2	8.4	9.9	5.4	3.9	5.8
	Total	0.0	0.3	0.6	3.1	2.3	5.4	8.7	12.2	10.4	11.9	9.1	8.2	6.4	3.1	5.7
Arbovirus—sindbis	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Arbovirus—not further specified	Female	0.0	0.0	0.6	1.3	0.0	0.0	0.6	0.0	2.3	3.1	2.8	3.7	4.2	0.3	1.1
	Male	0.0	0.0	0.0	0.0	1.7	0.0	1.7	0.0	2.3	1.9	1.4	1.8	1.1	1.2	0.9
	Total	0.0	0.0	0.3	0.6	0.9	0.0	1.1	0.0	2.3	2.5	2.1	2.7	2.7	0.7	1.0
Malaria	Female	0.7	0.0	0.0	1.9	0.6	2.7	1.7	0.5	1.1	1.2	0.0	0.0	0.0	0.0	0.8
	Male	2.5	1.8	0.0	2.4	2.3	5.9	6.2	4.4	2.3	2.5	2.8	3.6	0.0	0.8	2.7
	Total	1.6	0.9	0.0	2.2	1.5	4.3	3.9	2.4	1.7	1.9	1.4	1.8	0.0	0.3	1.7
Zoonoses																
Brucellosis	Female	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	0.3	0.0
	Male	0.0	0.0	0.0	0.0	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Total	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Hydatid disease	Female	0.0	0.0	0.0	0.6	0.0	0.0	0.6	0.5	0.0	0.6	0.7	0.0	3.1	0.3	0.4
	Male	0.0	0.0	0.0	0.0	0.0	0.5	0.6	0.0	1.2	0.0	0.7	0.9	0.0	0.0	0.3
	Total	0.0	0.0	0.0	0.3	0.0	0.3	0.6	0.3	0.6	0.3	0.7	0.9	1.6	0.3	0.4
Leptospirosis	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.1
	Male	0.0	0.0	0.0	0.0	2.3	1.1	1.1	2.2	1.2	1.9	2.1	4.5	2.2	0.0	1.2
	Total	0.0	0.0	0.0	0.0	1.2	0.5	0.8	1.1	0.6	0.9	1.0	2.7	1.1	0.0	0.6
Psittacosis	Female	0.0	0.0	0.6	0.0	0.6	0.5	0.0	0.5	1.7	3.7	2.1	3.7	3.1	0.6	1.1
	Male	0.0	0.0	0.0	0.0	0.6	0.5	1.7	0.5	3.5	2.5	7.0	4.5	3.2	3.9	1.9
	Total	0.0	0.0	0.3	0.0	0.6	0.5	0.8	0.5	2.6	3.1	4.5	4.1	3.2	2.0	1.5
Q fever	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.9	0.0	0.0	0.1
	Male	0.0	0.0	0.6	0.0	0.0	1.6	2.3	1.1	2.9	2.5	0.0	1.8	1.1	0.4	1.0
	Total	0.0	0.0	0.3	0.0	0.0	0.8	1.1	0.8	1.4	1.2	0.0	1.4	0.5	0.2	0.6
Taeniasis	Female	0.0	0.0	0.0	0.0	0.0	0.5	0.6	0.0	0.6	0.0	0.0	0.0	1.0	0.0	0.2
	Male	0.6	0.0	0.0	0.0	1.7	1.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.3
	Total	0.3	0.0	0.0	0.0	0.9	0.8	0.3	0.0	0.6	0.0	0.0	0.0	0.5	0.0	0.3
Other infectious notifiable diseases																
Hepatitis E	Male	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leprosy	Female	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Totals include notifications for persons where age group or sex is unknown/not specified