Science for Communities

NOTIFIABLE DISEASES IN NEW ZEALAND ANNUAL REPORT 2018

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Disclaimer

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SUMMARY

This report provides a summary of the key trends in notifiable diseases for 2018.

In 2018, a total of 19,335 notifications were reported through New Zealand's notifiable disease database, EpiSurv, compared with 19,914 in 2017.

From 2017 to 2018, notifications of the following diseases increased significantly: campylobacter, cryptosporidiosis, dengue fever, measles, pertussis, shiga toxin-producing *Escherichia coli* (STEC) infection and yersiniosis (Table 1). Notifications of acute gastroenteritis, legionellosis, leptospirosis, mumps and paratyphoid fever decreased significantly.

ENTERIC DISEASES

The introduction of enteric PCR tests from 2015 has had an impact of the number of cases of enteric disease reported in recent years. There were significant increases in campylobacteriosis, cryptosporidiosis, STEC infection and yersiniosis notifications from 2017 to 2018.

In 2018, 6957 cases (142.4 per 100,000) of campylobacteriosis were notified, compared with 6482 cases (135.2 per 100,000) in 2017. Campylobacteriosis remains the most commonly notified disease in New Zealand (36% of all notifications in 2018). Most cases were sporadic with only 92 notified cases being associated with outbreaks.

There were 1611 cases (33.0 per 100,000) of cryptosporidiosis notified in 2018, compared with 1192 in 2017 (24.9 per 100,000). Contact with farm animals and faecal matter were the most common risk factor associated with cryptosporidiosis notification.

A total of 925 cases (18.9 per 100,000) of STEC infection was notified in 2018, compared with 547 cases (11.4 per 100,000) in 2017. Notifications of STEC infection have increased markedly since 2014 (187 cases, 4.1 per 100,000), driven by the introduction of tests which are more sensitive to detecting non-O157 serotypes than traditional methods.

There were 1202 cases (24.6 per 100,000) of yersiniosis notified in 2018, compared with 917 cases (19.1 per 100,000) in 2017. The increase in yersiniosis began in 2014, before the introduction of enteric PCR tests, and therefore cannot be fully attributed to changes in testing.

There was a significant decrease in paratyphoid fever cases in 2018, when 19 cases (0.4 per 100,000) were notified compared with 37 cases (0.8 per 100,000) in 2017. The decrease was largely due to a change to the case definition for paratyphoid fever at the end of 2017 to exclude cases due to *S*. Paratyphi B var. Java. These cases are now classified as salmonellosis.

VACCINE-PREVENTABLE DISEASES

There was a significant increase in pertussis notifications in 2018 (2592 cases, 60.4 per 100,000), compared with 2017 (2142 cases, 44.7 per 100,000). A national pertussis outbreak was declared in November 2017, and continued through 2018. The highest notification rate was for infants aged less than 1 year (305.5 per 100,000, 184 cases) and approximately 51% (95/184) of cases in this age group were hospitalised.

There was a significant increase in measles notifications in 2018 (30 cases, 0.6 per 100,000), compared with 2017 (15 cases, 0.3 per 100,000). Vaccination status was known for 26 (87%) cases, of which 18 (69%) were not immunised. In October 2017, New Zealand was verified by the World Health Organization (WHO) as having eliminated endemic measles (and rubella).

There was a significant decrease in mumps cases in 2018, when 442 cases (9.0 per 100,000) were notified compared with 1338 cases (27.9 per 100,000) in 2017. The outbreak that started in 2016 and was mainly in the Auckland region, was largely over by the end of 2018.

EXOTIC DISEASES

There was a significant increase in dengue fever notifications in 2018 (292 cases, 6.0 per 100,000), compared with 2017 (161 cases, 3.4 per 100,000). All cases had travelled overseas during the incubation period; Samoa (122 cases), Tonga (58 cases) and Fiji (37 cases) were the most commonly visited countries.

There were 12 cases (0.2 per 100,000) of chikungunya fever notified in 2018, compared with eight cases (0.2 per 100,000) in 2017. This increase was not statistically significant.

Table 1. Number of cases and rates per 100,000 population for selected notifiable diseases in New Zealand, 2017 and 2018

Disease	Number of notifications		Rate per 100,000		Change[d,e]
	2018	2017	2018	2017	
AIDS[a]	15	12	0.3	0.3	↑
Campylobacteriosis	6957	6482	142.4	135.2	↑
Chikungunya fever	12	8	0.2	0.2	↑
Cryptosporidiosis	1611	1192	33.0	24.9	↑
Dengue fever	294	161	6.0	3.4	↑
Gastroenteritis (acute)[b]	234	324	4.8	6.8	↓
Giardiasis	1585	1648	32.4	34.4	↓
Hepatitis A	68	58	1.4	1.2	↑
Hepatitis B[c]	34	27	0.7	0.6	↑
Hepatitis C[c]	34	21	0.7	0.4	↑
Invasive pneumococcal disease	557	522	11.4	10.9	↑
Legionellosis	174	221	3.6	4.6	↓
Leptospirosis	110	139	2.3	2.9	↓
Listeriosis	30	21	0.6	0.4	↑
Malaria	36	42	0.7	0.9	↓
Measles	30	15	0.6	0.3	↑
Meningococcal disease	120	112	2.5	2.3	↑
Mumps	442	1338	9.0	27.9	↓
Paratyphoid fever	19	37	0.4	0.8	↓
Pertussis	2952	2142	60.4	44.7	↑
Rheumatic fever[f]	188	155	3.8	3.2	↑
Salmonellosis	1100	1127	22.5	23.5	↓
Shigellosis	219	244	4.5	5.1	↓
STEC infection	925	547	18.9	11.4	↑
Tuberculosis disease[g]	317	308	6.5	6.4	↑
Typhoid fever	53	59	1.1	1.2	↓
Yersiniosis	1202	917	24.6	19.1	↑

[a] Data source: AIDS Epidemiology Group.

[b] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication.

[c] Only acute cases of this disease are notifiable.

[d] ↓↓= significant decrease, ↑↑ = significant increase, NC = no change, ↓ = non-significant decrease, ↑ = non-significant increase.

[e] Fisher's exact tests were used to determine statistical significance. Results are considered statistically significant when $P \leq 0.05$.

[f] Includes rheumatic fever initial episodes and recurrent cases.

[g] Includes new tuberculosis cases and reactivations.

INTRODUCTION

The *Notifiable Diseases in New Zealand: Annual Report 2018* gives an overview of the current state of notifiable diseases in New Zealand. The report includes diseases currently notifiable under the Health Act 1956.

The data presented has been derived from surveillance systems operated by the Institute of Environmental Science and Research Ltd (ESR) and from other organisations in New Zealand.

Surveillance is "the ongoing systematic collection, analysis and interpretation of outcome-specific data for use in the planning, implementation and evaluation of public health practice".[1] A surveillance system "includes the functional capacity for data collection and analysis, as well as the timely dissemination of information derived from these data to enable effective prevention and control activities".[2]

Surveillance provides *information for action*. Specific objectives for disease surveillance may include the following:[3]

- to identify cases of disease that require immediate public health control measures;
- to monitor disease incidence and distribution, and to alert health workers to changes in disease activity in their area;
- to identify outbreaks and support their effective management;
- to assess the impact of disease and help set priorities for prevention and control activities;
- to identify risk factors for diseases so as to support their effective management;
- to evaluate prevention and control activities;
- to identify and predict emerging hazards;
- to monitor changes in disease agents through laboratory testing;
- to generate and evaluate hypotheses about disease aetiology;
- to fulfil statutory and international reporting requirements.

Details about the individual surveillance systems are provided in the 'Surveillance Methods' section of this report.

The focus of this report is on diseases reported in 2018, with the aim of providing information for prevention and control measures. The report presents each notifiable disease, or disease grouping, in alphabetical order.

National data and trends over time are shown in summary tables in the Appendix. Data is also presented for specific population groups including by district health board (DHB), sex, age group and ethnic group.

Information on influenza-like illness and sexually transmitted infections can be found in separate annual reports at www.surv.esr.cri.nz

SURVEILLANCE METHODS

INTERPRETING DATA

Data in this report is presented by the date the case was reported to a public health unit (PHU) and not by the date of the onset of illness. In general, cases are allocated to geographic location based on where a medical practitioner first diagnosed them.

Notifiable disease data in this report may differ from that published in other reports depending on:

- the date of data extraction from EpiSurv;
- the date used to aggregate data (e.g., the date reported or date of onset of illness);
- whether laboratory-reported cases, notified cases or self-reported cases are used;
- whether the case has been confirmed by laboratory tests.

The information in this report shows disease trends by age group, sex, ethnic group and DHB region.

It should be noted that various factors influence disease notification and therefore the calculation of incidence rates. Where the illness is not severe, cases are less likely to consult a medical practitioner and, even if diagnosed, are less likely to be notified without laboratory confirmation.[4] Issues associated with the cost of and access to healthcare may also determine whether people visit healthcare providers for diagnosis.[5]

The extent to which the data reflects the true incidence of a disease is affected by public awareness of the disease, access to health services, use of diagnostic facilities, case definitions and the interest, resources and priorities of local healthcare services.

This report presents the number of cases and population rates for different ethnic groups. However, caution should be exercised in the interpretation of these numbers as ethnicity information is not always provided, different ethnic groups have different patterns of access to healthcare and the numbers may not accurately reflect the true burden of disease in the population.

For different ethnic groups, numbers and disease rates are based on a prioritised classification of ethnicity, with the Māori ethnic group at the top of the hierarchy, followed by Pacific peoples, Asian, Middle Eastern/Latin American/African (MELAA) and European or Other (including New Zealander) ethnic groups.

The small New Zealand population and the low number of cases for some diseases mean that the disease rates calculated in this report may be highly variable from year to year. As such, it is necessary to interpret trends with caution. The ‘Analytical Methods’ section contains more information about the calculation of population rates for diseases.

DATA SOURCES

The key sources of data used in this report are described below.

EpiSurv – the national notifiable disease surveillance system

Under the Health Act 1956, health professionals are required to inform their local medical officer of health of any notifiable disease that they suspect or diagnose. Since December 2007, laboratories have also been required to report notifiable diseases to medical officers of health. These notifications provide the basis for surveillance, and therefore control, of these diseases in New Zealand.

Notification data is entered at each PHU via a secure web-based portal into a database (EpiSurv). ESR collates and analyses the near real-time data on behalf of the Ministry of Health. The data collected depends on the specific disease, but usually includes demography, outcome, basis of diagnosis, risk factors and some clinical management information. The current schedule of notifiable diseases is available at www.health.govt.nz/our-work/diseases-and-conditions/notifiable-deseases.

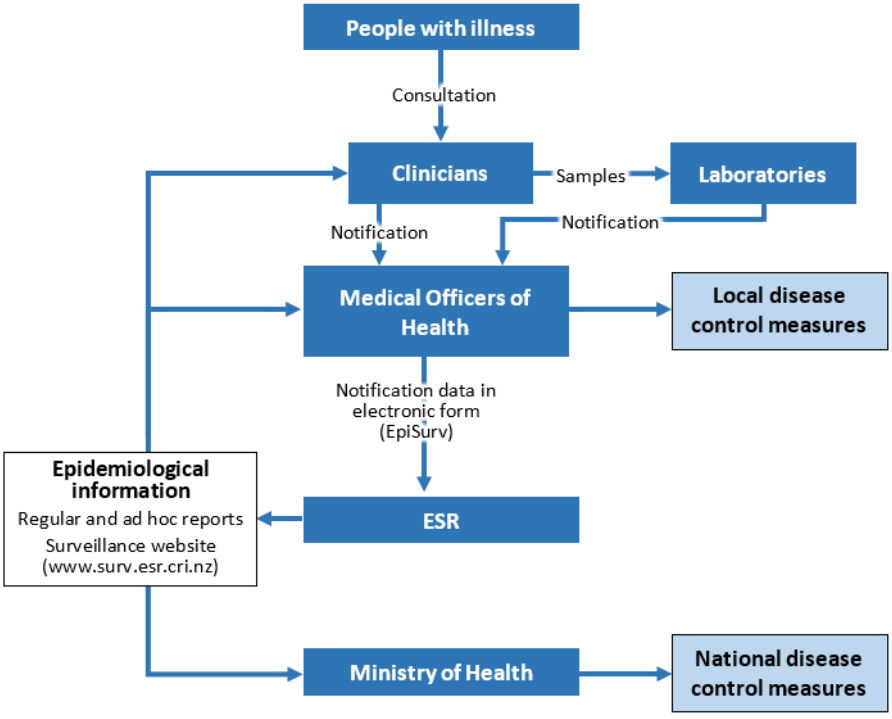
This report includes sections on diseases that are currently notifiable in New Zealand under the Health Act 1956, excluding gonorrhoea, HIV, syphilis, lead absorption and poisoning arising from chemical contamination of the environment. Sexually transmitted infections are reported elsewhere, while Massey University's Centre for Public Health Research is responsible for the collection and reporting of surveillance data on lead absorption and poisoning arising from chemical contamination of the environment.

Case definitions (including laboratory and clinical criteria) for notification of diseases and/or conditions are in the latest version of the Communicable Disease Control Manual.[6]

Information on trigger points for notification of a laboratory test result is in the 'Direct Laboratory Notification of Communicable Diseases: National Guidelines'.[7]

Figure 1 illustrates the major components and information flow of the notifiable disease surveillance system.

Figure 1. Notifiable disease surveillance system



Laboratory-based surveillance

Laboratory results for all organisms that meet the laboratory criteria for notification are reported directly to medical officers of health. After further testing at a reference laboratory, some reported cases may not meet the laboratory criteria of the surveillance case definition. Laboratory-reported cases may also not meet the clinical criteria of the case definition. For this reason, the number of laboratory-reported cases may not match the number of notified cases for some diseases.

Laboratory-based surveillance may be conducted to enhance data gathered by notifiable disease surveillance. Organisms under laboratory-based surveillance include *Legionella* spp., *Leptospira*, *Neisseria meningitidis*, *Salmonella* spp. and invasive *Streptococcus pneumoniae*. For these organisms, isolates are referred to a reference laboratory for confirmation and typing.

Statistics New Zealand

Statistics New Zealand provides the denominator data used to calculate the population rates of disease. Further details are provided in the 'Analytical Methods' section.

Ministry of Health

The Ministry of Health collates national data on patients discharged from publicly funded hospitals. This data is stored as part of the National Minimum Dataset (NMDS) (see www.health.govt.nz for more information). Upon discharge, patients are assigned disease codes using the 10th revision of the International Classification of Diseases (ICD10) coding system.[8] Information provided in this report uses the principal or primary diagnosis, which is the condition that was chiefly responsible for the hospital admission. This may be different from the diagnoses for the patient on admission, while in hospital, or from the final diagnosis after discharge.

Anonymised data for selected diseases was extracted from the NMDS and sent to ESR for analysis and comparison with data from other surveillance systems.

Hospital discharge data presented in this report includes multiple records for patients with chronic notifiable diseases (e.g., tuberculosis), for diseases that have long-term health impacts (e.g., meningococcal disease) and may include re-admissions for acute diseases (e.g., pertussis). For some diseases, the criteria for notification (clinical and laboratory or epidemiological evidence) do not match those required for diagnostic coding. For these reasons, hospitalisation and notification numbers may differ.

Surveillance of AIDS in New Zealand

Since 1989, the AIDS Epidemiology Group (AEG) at the University of Otago has been contracted to collect information about people diagnosed with AIDS through notification to medical officers of health. The use of an AIDS-specific identifier ensures that the identity of the patient is known only to the reporting doctor, but is sufficiently specific to allow detection of duplicate reports.

New Zealand Creutzfeldt-Jakob Disease Registry

The New Zealand Creutzfeldt-Jakob disease (CJD) Registry (the Registry), at the University of Otago was established in 1996 to monitor sporadic, familial, iatrogenic and variant CJD. A medical practitioner must immediately report any suspected cases of CJD directly to the Registry as well as inform the local Medical Officer of Health and the Director of Public Health at the Ministry of Health.[6]

New Zealand Paediatric Surveillance Unit

The New Zealand Paediatric Surveillance Unit (NZPSU) [9] was established in 1997 to provide active surveillance of acute flaccid paralysis (AFP) to fulfil World Health Organization (WHO) requirements for the certification of polio eradication. Since then, other conditions have been added for surveillance by the NZPSU. Conditions currently under surveillance include haemolytic uraemic syndrome (HUS), congenital

rubella syndrome (CRS) and perinatal exposure to human immunodeficiency virus (HIV) (see http://www.otago.ac.nz/nzpsu for a complete list).

Every month, participating paediatricians and other specialists in paediatric practice send either a reply-paid card or an email to the NZPSU to report whether they have seen any cases of the conditions under surveillance in the previous month. The average response rate to the monthly card/email is generally above 90%. The NZPSU then collates and analyses the data. Information from the NZPSU is used in this report to enhance notification data on polio (AFP data), STEC infection (HUS data) and rubella (CRS data).

ANALYTICAL METHODS

Key analytical methods are provided below.

Dates

The notification data contained in this report is based on information recorded on EpiSurv as at 23 February 2019. Changes made to EpiSurv data by PHU staff after this date are largely not reflected in this report. Consequently, future analyses of data may produce revised results. Notification data published in previous annual reports has been updated to reflect cases in EpiSurv as at 23 February 2019.

Disease numbers are reported according to the date of notification. Laboratory results are reported according to the date the specimen was received.

Geographic breakdown

This report provides rates for current DHB regions. The DHB populations used are shown in Table 2. These are from the Statistics New Zealand 2018 mid-year population estimates.

Table 2. District Health Board populations, 2018

DHB	Population
Northland	179,100
Waitemata	620,300
Auckland	536,800
Counties Manukau	558,200
Waikato	416,400
Lakes	109,700
Bay of Plenty	237,000
Tairawhiti	49,100
Taranaki	119,800
Hawke's Bay	165,800
Whanganui	64,900
MidCentral	179,300
Hutt Valley	149,500
Capital & Coast	317,500
Wairarapa	45,500
Nelson Marlborough	150,600
West Coast	32,600
Canterbury	563,200
South Canterbury	59,900
Southern	330,100
Total	**4,885,300**

Map classification scheme

On the maps provided in this report, the darkest colour represents the highest disease notification rates and the lightest colour represents the lowest rates. The dark grey colour shows where there was insufficient data (fewer than five cases) to calculate a rate.

Case status for notifications

All notifications recorded in EpiSurv that meet the case definitions [6], apart from cases classified as ‘not a case’, are included for analysis in this report. In some instances, the investigation of a case may not be complete and the status may be set to ‘under investigation’. These cases are included in this report. Any changes will be reflected in future surveillance reports.

Population rate calculations for diseases

The denominator data used to determine disease rates (except the data used to determine disease rates for ethnic groups) has been derived from the 2018 mid-year population estimates published by Statistics New Zealand. Denominator data used to determine disease rates for ethnic groups is based on the proportion of people in each ethnic group from the 2013 Census ‘usually resident population’ applied to the 2018 mid-year population estimates from Statistics New Zealand. Ethnicity is prioritised in the following order: Māori, Pacific peoples, Asian, MELAA, European or Other (including New Zealander) ethnic groups.

Rates are not calculated where a category has fewer than five notified cases. Calculating population rates from fewer than five cases produces unstable rates.

Percentages

Percentages are calculated using the total number of cases for which the information was known as the denominator, unless specified otherwise. Cases with ‘unknown’ information are excluded from the denominator. These percentages are usually presented with numbers in brackets that show the numerator and denominator used, e.g., 49.3% (523/1061).

Risk factors and sources of infection

For many diseases, an analysis of exposure to risk factors for the cases is reported. These risk factors are those included in the current EpiSurv case report forms. More than one risk factor is often reported for each case. The reporting of exposure to a risk factor does not mean that this was the source of the infection.

Vaccination data

Data on vaccinations is reported for a number of vaccine-preventable diseases. This represents the vaccination status of the case as reported in EpiSurv and has not been routinely validated against the National Immunisation Register.

Statistical tests

Fisher's exact tests were used to determine statistical significance. Results are considered to be statistically significant where $P \leq 0.05$.

LIMITATIONS OF SURVEILLANCE DATA

Quality

Quality assurance in the collection and reporting of notifiable disease data in EpiSurv is supported by validation at the time of data entry (e.g., automated fields), regular (weekly, monthly, quarterly, annually) data quality reports run by ESR on key reporting fields, liaison with PHUs, and the epidemiological skills development programme.

Sensitivity

Sensitivity is a measure of our ability to identify the true burden of disease. More common and less severe diseases such as acute gastroenteritis are significantly less likely to be notified than diseases such as meningococcal disease.[10, 11]

The introduction of new diagnostic methods can alter our ability to detect notifiable diseases over time. For example, diagnostic tests for enteric disease can now screen for multiple disease agents at the same time and increase their detection. Changes in test sensitivity should be considered when interpreting disease trends.

Completeness

The completeness of data recorded in EpiSurv varies among diseases. Table 3 shows the percentage of notifications for which complete data was provided for selected demographic variables from 2009 to 2018.

The completeness of date of birth, age, sex and NHI data remains very high (99%), with little variation over the last five years. The completeness of ethnicity data in 2018 (93.2%) was slightly lower than 2017 (96.0%).

Table 3. Complete data for selected EpiSurv variables, 2009–2018

Report year	Completeness of data (%)				
	Date of birth	Age	Sex	Ethnicity	NHI
2009	99.2	99.3	98.8	92.1	91.0
2010	99.7	99.8	99.5	91.5	94.9
2011	99.6	99.7	99.0	95.7	94.6
2012	99.7	99.8	100.0	95.9	96.8
2013	99.7	99.8	100.0	95.3	97.5
2014	99.8	99.9	100.0	94.6	97.0
2015	99.8	99.8	100.0	94.9	97.7
2016	99.9	100.0	100.0	96.2	98.4
2017	99.9	99.9	100.0	96.0	98.7
2018	99.9	99.9	99.9	93.2	99.0

Accuracy

A limitation to accuracy is the identification of cases on the basis of serology, which may not be as specific as isolating the implicated organism or detecting it using polymerase chain reaction (PCR).

Timeliness

Timely receipt of information is essential for appropriate public health investigation and action.

Table 4 shows a summary of the timeliness of notifications by disease for 2018.

In 2018, 70.4% of disease notifications had an onset date recorded (compared with 69.8% in 2017). Of these, 47.8% were reported to a public health service (PHS) within one week of the onset of symptoms and 75.3% were reported within two weeks of the onset of symptoms.

For some diseases, reporting delays are related to the nature of the symptoms, leading to late presentation e.g., giardiasis, pertussis, rheumatic fever, tuberculosis disease. For other diseases there may be delays in confirmation of the diagnosis due to the particular laboratory test required e.g., leptospirosis.

In 2018, 82.9% (83.6% in 2017) of the notifications were entered into EpiSurv within a day of being reported to a PHS and over 99% were entered within one week.

Table 4. Timeliness of disease reporting and data entry for selected notifiable diseases, 2018

Disease	Onset date recorded (%)	Reporting delay (%)[a]		Entry delay (%)[b]		
		≤1 week	≤2 weeks	≤1 day	≤1 week	≤2 weeks
Campylobacteriosis	62.2	63.5	91.0	80.2	99.7	100.0
Chikungunya fever	100.0	25.0	58.3	91.7	100.0	100.0
Cryptosporidiosis	55.8	43.0	82.2	80.9	99.9	99.9
Dengue fever	97.3	53.8	88.1	91.5	100.0	100.0
Gastroenteritis (acute)[c]	90.9	79.1	92.9	72.8	92.7	94.8
Giardiasis	50.7	25.4	51.1	81.0	99.8	100.0
Hepatitis A	86.8	52.5	84.7	97.1	100.0	100.0
Invasive pneumococcal disease	76.3	71.5	91.5	84.7	99.6	99.6
Legionellosis	92.0	35.6	72.5	87.4	100.0	100.0
Leptospirosis	88.2	28.9	67.0	73.6	100.0	100.0
Measles	100.0	93.3	100.0	90.0	100.0	100.0
Meningococcal disease	99.2	95.0	97.5	88.3	100.0	100.0
Pertussis	93.6	24.1	51.5	88.9	99.7	99.9
Rheumatic fever - initial episode	97.9	29.9	60.3	92.0	96.8	99.5
Salmonellosis	85.6	60.0	85.7	82.7	99.8	100.0
Shigellosis	95.4	34.4	80.4	86.8	100.0	100.0
STEC infection	87.6	49.4	74.6	76.2	99.9	100.0
Tuberculosis disease	65.3	4.3	8.2	89.3	99.4	99.7
Typhoid fever	96.2	41.2	66.7	92.5	100.	100.0
Yersiniosis	53.2	27.4	64.9	82.8	99.7	100.0
Other	62.6	71.2	88.3	89.0	97.2	97.5
Total	**70.4**	**47.8**	**75.3**	**82.9**	**99.5**	**99.8**

[a] Percentage of notifications reported (with onset date recorded) to a public health service within 1 week and 2 weeks of the onset of symptoms.

[b] Percentage of notifications entered into EpiSurv within 1 day, 1 week and 2 weeks of being reported to a PHS.

[c] Cases of acute gastroenteritis from a common source or foodborne intoxication, e.g., staphylococcal intoxication.

NOTIFIABLE DISEASES

Acquired immunodeficiency syndrome

Acquired immunodeficiency syndrome (AIDS) is a notifiable disease in New Zealand. The AIDS Epidemiology Group (AEG) within the University of Otago carries out national AIDS/HIV surveillance. More detailed information is available from the AEG website: https://www.otago.ac.nz/aidsepigroup/newsletters/.

In 2018, 15 cases of AIDS were reported to the AEG compared with 12 cases in 2017.

The 2018 AIDS notification rate was the same as the 2017 rate (0.3 per 100,000 population).

The cases ranged from ages 30 to 62 years, with a mean age of 44.0 years.

Fourteen cases were male and one was female.

Eight cases were of European ethnicity, four Māori, two Asian and one was Pacific.

Seven cases (46.7%) were infected heterosexually, six cases (40.0%) were men who had sex with other men (MSM), one case (6.7%) was infected by either sex with another man or injecting drug use and one case (6.7%) was infected through 'other' means of transmission.

Anthrax

No cases of anthrax were notified in 2018. The last case was notified in 1940. New Zealand has been considered free of anthrax since the last recorded outbreak among domestic livestock in 1954.[12]

Arboviral diseases

This section includes arboviral diseases with cases notified since 1997. Dengue fever and yellow fever are reported in separate sections later in the report.

Barmah Forest virus infection

No cases of Barmah Forest virus infection were notified in 2018. Six cases have been notified since 1997, most recently two cases in 2009, all with a history of travel to Australia.

Chikungunya fever

Twelve cases of Chikungunya fever were notified in 2018, compared with eight cases in 2017. The 2018 notification rate was the same as the 2017 rate (0.2 per 100,000). Eleven cases were laboratory confirmed.

The cases were aged 40–49 (3 cases), 20–29 years and 70 years and over (2 cases each), and 1–4, 15–19, 30–39, 50–59 and 60–69 (1 case each) years. Six cases were male and six were female. Six cases were of European or Other ethnicity, three were Asian, two were Pacific and one was MELAA.

Hospitalisation status was recorded for 11 cases, of which three (27.3%) were hospitalised.

All 12 cases had travelled overseas during the incubation period for the disease or had a prior travel history that could account for their infection. The countries visited or lived in were Cambodia and Thailand (3 cases each), Fiji and India (2 cases each), Brazil, Laos, Malaysia, Samoa and Vietnam (1 case each). Some cases reported travel to more than one country.

Japanese encephalitis

No cases of Japanese encephalitis were notified in 2018. Since 1997, only one case of Japanese encephalitis has been notified (in 2004).

Ross River virus infection

One case of Ross River virus infection was notified in 2018, compared with seven cases in 2017. The case was a female, of European or Other ethnicity, aged 40–49 years, who had been in Australia during the incubation period. The case was laboratory confirmed.

Zika virus infection

In 2018, two cases of Zika virus infection were notified, compared with eleven cases in 2017. Both cases were laboratory confirmed.

The cases were aged 40–49 and 50–59 years. Both cases were female (neither of whom were pregnant) and were of European or Other ethnicity.

One case was hospitalised.

Both cases had travelled to Fiji during the incubation period for the disease.

Botulism

No cases of botulism were notified in 2018. The most recent case of botulism was notified in 2014. Prior to that, two cases were reported in 1985.[13]

Brucellosis

Three laboratory-confirmed cases of brucellosis were notified in 2018. A male aged 30–39 years and a female aged 60–69 years old had both recently arrived from Tonga, and a male aged 40–49 years had recently arrived from Saudi Arabia. Since 1997, 19 cases of brucellosis have been notified. There has been no evidence of locally acquired brucellosis in humans since New Zealand's declaration of freedom from bovine brucellosis in 1996.[14]

Campylobacteriosis

In 2018, 6957 cases of campylobacteriosis were notified, compared with 6482 cases in 2017. The 2018 rate of 142.4 per 100,000 was a significant increase from the 2017 rate of 135.2 per 100,000. Campylobacteriosis is the most commonly notified disease, accounting for 36.0% of all notifications in 2018. Since 2008, the annual number of campylobacteriosis cases reported has been much lower than in the preceding decade (Figure 2).

Figure 2. Campylobacteriosis notifications by year, 1999–2018

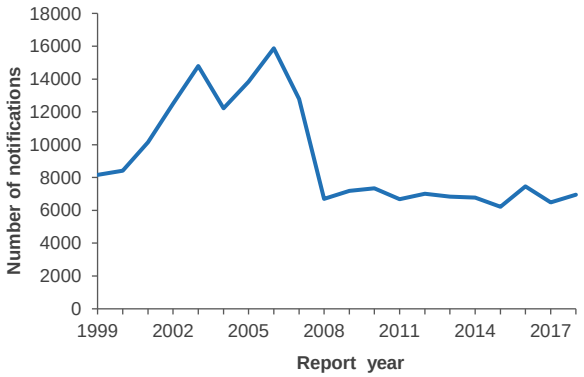
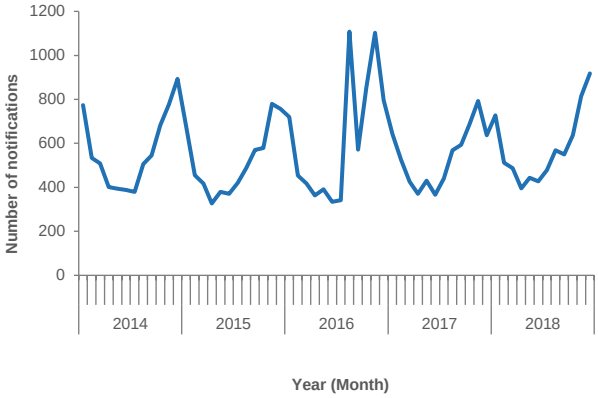


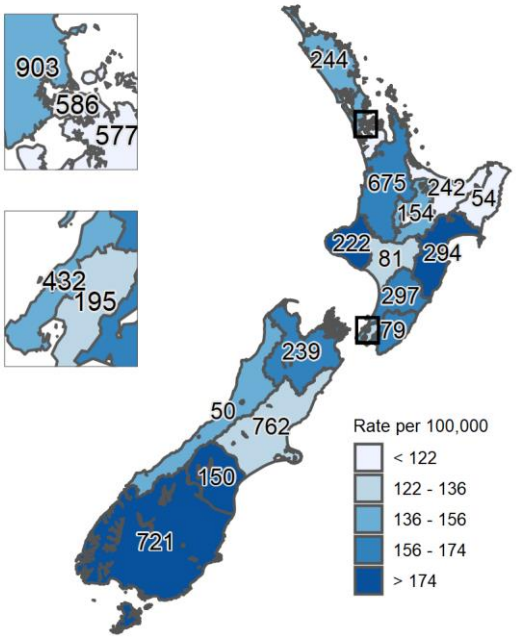
Figure 3 shows campylobacteriosis notifications by month since 2014. There is a distinct seasonal pattern, with an early summer peak and a winter trough. However, this trend was disrupted in 2016, due to a large outbreak in Hawke's Bay in August (964 cases were linked to the outbreak). The second peak in October 2016 is due to some cases with an onset date in August/September being reported late.

Figure 3. Campylobacteriosis notifications by month, January 2014–December 2018



The highest notification rates for campylobacteriosis were reported from South Canterbury, Southern, Taranaki and Hawke's Bay DHBs (250.4, 218.4, 185.3 and 177.3 per 100,000 respectively) (Figure 4).

Figure 4. Campylobacteriosis notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Children aged 1–4 years (302.9 per 100,000) and infants aged less than 1 year (229.2 per 100,000) had the highest notification rates.

Sex was recorded for 6956 cases. Males (160.7 per 100,000) had a higher rate than females (124.6 per 100,000).

Ethnicity was recorded for 6107 (87.8%) cases. The ethnic group with the highest notification rate for campylobacteriosis was European or Other (153.3 per 100,000), followed by MELAA (80.5 per 100,000) and Māori (79.9 per 100,000).

Table 5. Exposure to risk factors associated with campylobacteriosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	1166	1186	4605	49.6
Contact with farm animals	1411	1709	3837	45.2
Consumed untreated water	608	2132	4217	22.2
Contact with faecal matter	650	2292	4015	22.1
Recreational water contact	600	2388	3969	20.1
Travelled overseas during the incubation period	494	3084	3379	13.8
Contact with other symptomatic people	374	2445	4138	13.3
Contact with sick animals	159	2637	4161	5.7

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 4730 (68.0%) cases, of which 689 (14.6%) cases were hospitalised.

Consumption of food from retail premises and contact with farm animals were the most common risk factors for campylobacteriosis (Table 5). Multiple risk factors are often reported for each case.

In 2018, 16 outbreaks of campylobacteriosis were reported, involving 92 cases.

Cholera

One case of cholera was notified in 2018, in a 40–49 year old male of Asian ethnicity, with recent travel to Pakistan. Since 1997, a total of 13 laboratory-confirmed cases of cholera have been notified, with the last two cases reported in 2010. All 13 cases were overseas during the incubation period for the disease.

Creutzfeldt-Jakob disease

The New Zealand Creutzfeldt-Jakob Disease (CJD) Surveillance Registry is responsible for receiving notifications of suspected cases of CJD, undertaking a review of each notified case, and providing advice and reporting on CJD in New Zealand. This section is based on the 22nd annual report of the CJD Registry (1 January 2018 to 31 December 2018).[15]

In 2018, seven cases of suspected sporadic CJD (sCJD) were referred to the CJD Registry for evaluation. These cases were subsequently classified as two definite cases, two probable cases, and three cases that did not met surveillance criteria for possible CJD.

The four definite and probable cases were aged 50–59, 60–69 years, and 70 years and over (2 cases).

Two cases were male and two were female.

Since 1997, the Registry has documented 107 cases of sCJD, consisting of 50 definite and 57 probable cases.

No cases of variant CJD, the form linked with bovine spongiform encephalopathy, have been identified in New Zealand to date.

Cronobacter species invasive disease

In December 2017, the case definition of *Cronobacter* species invasive disease (previously known as *Enterobacter sakazakii*) was restricted to infants less than 1 year old. No cases of *Cronobacter* species invasive disease were notified in 2018, and there have been no cases in infants or neonates since it became notifiable in mid-2005.

Cryptosporidiosis

In 2018, 1611 cases of cryptosporidiosis were notified, compared with 1192 in 2017 (Figure 5). The 2018 notification rate (33.0 per 100,000) was a significant increase from the 2017 rate (24.9 per 100,000).

Figure 5. Cryptosporidiosis notifications by year, 1999–2018

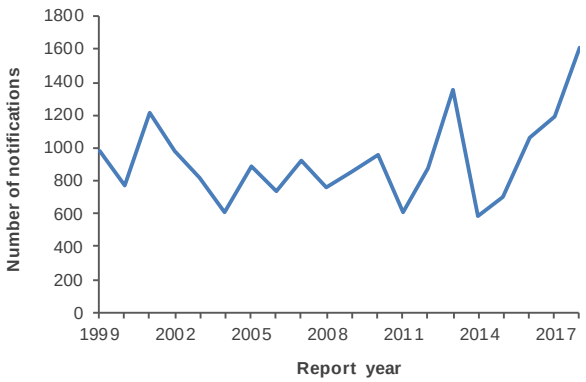
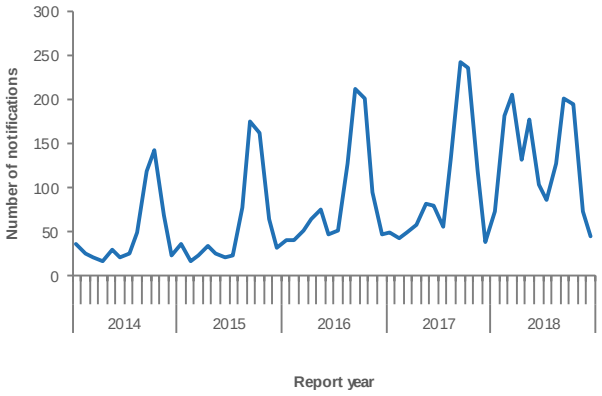


Figure 6 shows cryptosporidiosis cases by month since 2014. There is a distinct seasonal pattern, with the highest number of notifications generally reported during spring each year. In 2018, there was also a peak in late summer/autumn, largely driven by increases in the Auckland and Wellington regions. Recent trends are also affected by changes in diagnostic testing methods introduced since 2015.

Figure 6. Cryptosporidiosis notifications by month, January 2014–December 2018



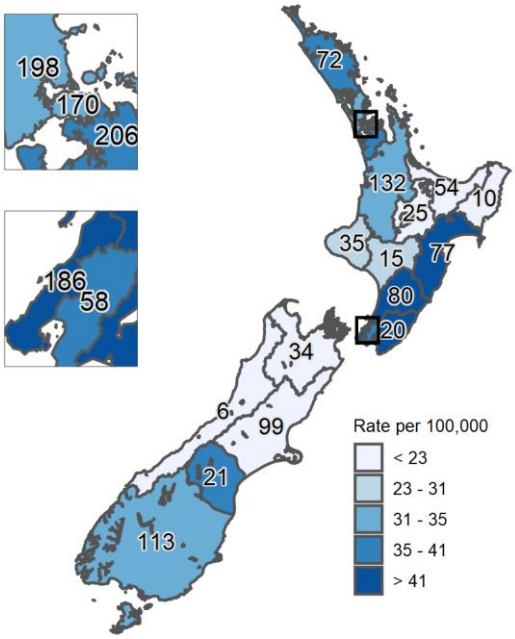
In 2018, the highest notification rates for cryptosporidiosis were reported from Capital & Coast, Hawke's Bay, MidCentral and Wairarapa DHBs (58.6, 46.4, 44.6 and 44.0 per 100,000 respectively) (Figure 7).

Children aged 1–4 years (155.9 per 100,000) and infants aged less than 1 year (63.1 per 100,000) had the highest notification rates. Over forty percent (43.8%) of all cases were in children aged less than 15 years.

Females (36.0 per 100,000) had a slightly higher notification rate than males (29.8 per 100,000).

Ethnicity was recorded for 1454 (90.3%) cases. The ethnic group with the highest notification rate for cryptosporidiosis was European or Other (33.2 per 100,000), followed by Māori (28.4 per 100,000).

Figure 7. Cryptosporidiosis notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 1078 cases (66.9%), of which 95 (8.8%) cases were hospitalised.

Contact with farm animals and faecal matter were the most common risk factors associated with cryptosporidiosis cases in 2018 (Table 6).

In 2018, 19 outbreaks of cryptosporidiosis were reported, involving 209 cases.

Table 6. Exposure to risk factors associated with cryptosporidiosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with farm animals	403	405	803	49.9
Contact with faecal matter	263	490	858	34.9
Recreational water contact	267	520	824	33.9
Contact with other symptomatic people	240	494	877	32.7
Consumed untreated water	192	513	906	27.2
Consumed food from retail premises	174	518	919	25.1
Contact with sick animals	104	593	914	14.9
Travelled overseas during the incubation period	62	773	776	7.4

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases have more than one risk factor recorded.

Cysticercosis

One case of cysticercosis was notified in 2018. The case was a male, aged 40-49 years who had lived in China. Since 1997, nine cases have been notified.

Decompression sickness

One case of decompression sickness was notified in 2018. The case was a male aged 20–29 years.

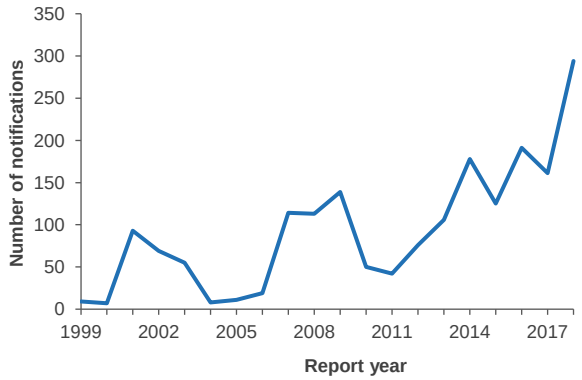
Ministry of Health hospital discharge data for 2018 included 16 cases where decompression sickness was the principal diagnosis.

Over the last five years, the number of hospitalisations with decompression sickness as the principal diagnosis has ranged from 16 to 25 annually, compared with only one notification in EpiSurv during this time, indicating consistent under-notification of this condition.

Dengue fever

In 2018, 294 cases of dengue fever were notified, compared with 161 cases in 2017 (Figure 8). The 2018 notification rate (6.0 per 100,000) was a significant increase from the 2017 rate (3.4 per 100,000). Of the 294 cases, 280 (95.2%) were laboratory confirmed.

Figure 8. Dengue fever notifications by year, 1999–2018



Adults aged 30–39 years (9.7 per 100,000) had the highest notification rate followed by those aged 40–49 years (8.8 per 100,000) and young adults aged 15–19 years (8.6 per 100,000).

Males and females had the same rate (6.0 per 100,000).

Ethnicity was recorded for 288 (98.0%) cases. The ethnic group with the highest notification rate was Pacific peoples (58.2 per 100,000), followed by Asian (6.6 per 100,000) and European or Other (2.1 per 100,000).

Hospitalisation status was recorded for 289 (98.3%) cases, of which 173 (59.9%) were hospitalised.

All of the cases had travelled overseas during the incubation period for the disease. The countries most commonly visited or lived in were Samoa (122 cases), Tonga (58 cases), Fiji (37 cases) and Thailand (19 cases). Some cases reported travel to more than one country.

Diphtheria

No cases of toxigenic diphtheria were notified in 2018.

The last case of cutaneous toxigenic diphtheria was notified in 2017. The last case of toxigenic respiratory diphtheria was notified in 1998.[16]

In 2018, the Special Bacteriology Laboratory at ESR received 53 isolates of *Corynebacterium diphtheriae* for toxin testing. The majority (46 isolates, 86.8%) were from cutaneous sources, six were from the throat and one from the blood. No isolates were found to be toxigenic.

Gastroenteritis (acute)

Not all cases of acute gastroenteritis are notifiable. Cases thought to be related to a common source, as well as those occurring in a person in a high-risk category (e.g., food handler or early childhood service worker) are notifiable. Single cases of chemical, bacterial or toxic food poisoning are also notifiable under this category. Toxic shellfish poisoning is reported separately at the end of this section. Diseases and conditions that are notifiable separately (e.g., campylobacteriosis, giardiasis, STEC infection and salmonellosis) are reported in their own sections.

In 2018, 231 cases of acute gastroenteritis (other than toxic shellfish poisoning) were notified. The 2018 notification rate of 4.7 per 100,000 was a significant decrease from the 2017 rate of 6.7 (319 cases). A causal agent was reported for 44 (19.0%) cases. Of these, the most common pathogen recorded was Enterotoxigenic *Escherichia coli* (31.8%, 14 cases).

The distribution of cases by causal agent is shown in Table 7.

Table 7. Acute gastroenteritis cases by agent type, 2018

Agent type[a]	Cases	Percentage (%)
Agent identified	**44**	**19.0**
Enterotoxigenic *Escherichia coli* (ETEC) infection	14	6.1
Norovirus infection	12	5.2
Histamine (scombroid) poisoning	9	3.9
Rotavirus infection	3	1.3
Vibrio parahaemolyticus infection	3	1.3
Sapovirus	2	0.9
Bacillus cereus food intoxication	1	0.4
Agent not identified	**187**	**81.0**

[a] Does not include diseases that are notifiable separately.

Note: there may be more cases associated with specific disease agents through outbreak reporting, see Appendix.

The highest notification rates for acute gastroenteritis were reported from Northland, Capital & Coast, Hutt Valley and Lakes DHBs (22.9, 12.9, 11.4 and 9.1 per 100,000 respectively).

Infants aged less than 1 year (10.0 per 100,000) had the highest notification rate, followed by children aged 1–4 years (8.5 per 100,000)

Females (5.2 per 100,000) had a higher rate than males (4.1 per 100,000).

The ethnic group with the highest notification rate was European or Other (5.1 per 100,000), followed by Pacific peoples (3.3 per 100,000) and Māori (2.8 per 100,000).

Hospitalisation status was recorded for 220 (95.2%) cases, of which 28 cases (12.7%) were hospitalised.

The most common risk factor associated with acute gastroenteritis was consumption of food from retail premises (Table 8).

In 2018, 175 outbreaks of acute gastroenteritis were reported, involving 2267 cases, of which 37 cases were notified individually.

Toxic shellfish poisoning

In 2018, three cases of toxic shellfish poisoning were notified, compared with five cases in 2017. The toxin type was not specified for any of the cases.

Cases were reported from Waikato, Bay of Plenty and Nelson Marlborough DHBs.

The cases were adults aged 20–29, 30–39 and 40–49 years. Two cases were male and one was female. Two cases were of Māori ethnicity and one was European or Other.

Two cases (66.7%) were hospitalised.

All three cases were classified as suspected based on symptoms. All had eaten recreationally collected seafood. Leftover shellfish were tested in one case and results were negative for biotoxins.

Table 8. Exposure to risk factors associated with acute gastroenteritis, 2018

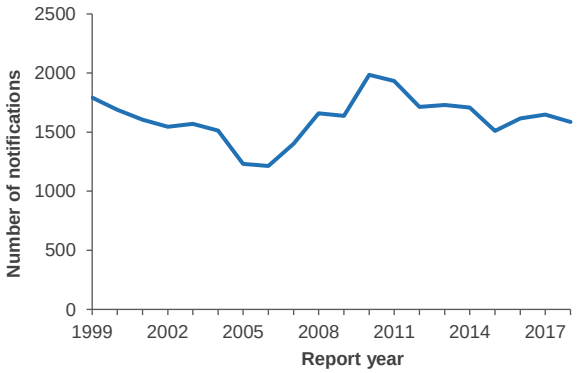
Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed food from retail premises	136	51	44	72.7
Contact with other symptomatic people	47	132	52	26.3
Contact with farm animals	29	146	56	16.6
Contact with human faecal matter	24	146	61	14.1
Consumed untreated water	20	148	63	11.9
Recreational water contact	13	155	63	7.7
Travelled overseas during the incubation period	12	179	40	6.3

[a] Percentage refers to the number of cases that answered “yes” out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Giardiasis

In 2018, 1585 cases of giardiasis were notified, compared with 1648 in 2017. The 2018 notification rate (32.4 per 100,000) was slightly lower than the 2017 rate (34.4 per 100,000). Figure 9 shows giardiasis notifications by year from 1999 to 2018.

Figure 9. Giardiasis notifications by year, 1999–2018



The highest notification rates for giardiasis were reported from Tairawhiti, Wairarapa, Auckland, South Canterbury and Hawke's Bay DHBs (69.2, 48.4, 43.4, 41.7, and 41.0 per 100,000 respectively) (Figure 10).

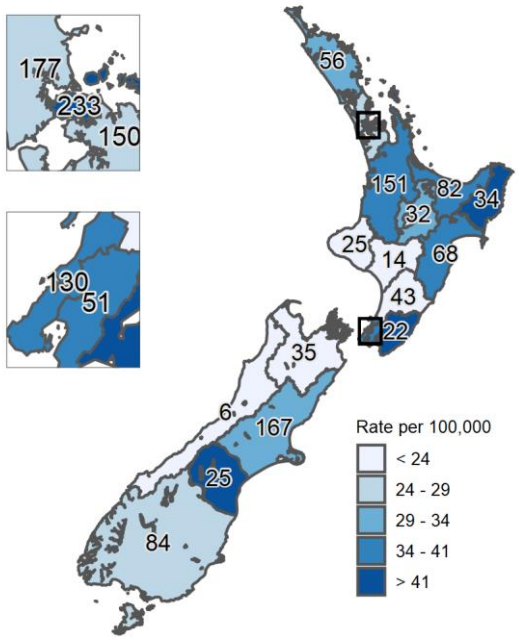
Children aged 1–4 years (106.0 per 100,000) and adults aged 30–39 years (51.7 per 100,000) had the highest notification rates.

Males (35.2 per 100,000) had a higher rate than females (29.8 per 100,000).

Ethnicity was recorded for 1424 (89.8%) cases. The ethnic group with the highest notification rate for giardiasis was MELAA (49.4 per 100,000), followed by European or Other (34.9 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Figure 10. Giardiasis notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Hospitalisation status was recorded for 1038 (65.5%) cases, of which 51 (4.9%) were hospitalised.

The most commonly reported risk factors for giardiasis were contact with faecal matter and recreational water (Table 9).

In 2018, 16 giardiasis outbreaks were reported, involving 106 cases.

Haemophilus influenzae serotype b disease

In 2018, three cases of *Haemophilus influenzae* serotype b (Hib) disease were notified, compared with four in 2017. All three cases were laboratory confirmed.

The cases were aged 1–4 years, 50–59 years and 70 years and over. Two cases were female and one was male.

Table 9. Exposure to risk factors associated with giardiasis, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with faecal matter	291	433	861	40.2
Recreational water contact	285	456	844	38.5
Consumed untreated water	233	427	925	35.3
Contact with other symptomatic people	250	468	867	34.8
Contact with farm animals	256	491	838	34.3
Consumed food from retail premises	209	433	943	32.6
Travelled overseas during the incubation period	195	628	762	23.7
Contact with sick animals	29	641	915	4.3

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

One case was of Māori ethnicity, one was Asian and one was European or Other.

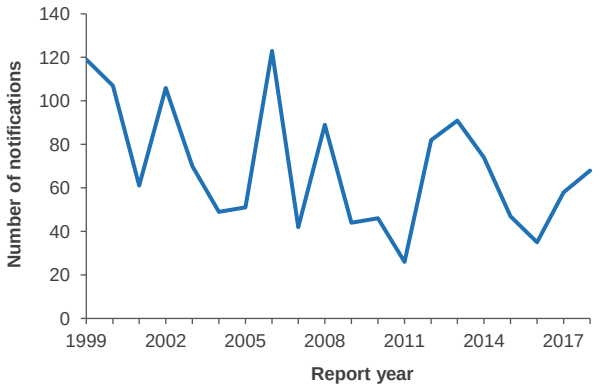
The vaccination status of the 1–4 year old was known, and the child had received four doses of Hib vaccine prior to onset.

A Hib vaccine was introduced in January 1994. The current vaccination schedule consists of a primary course of three doses of DTaP-IPV-HepB/Hib vaccine for infants when aged 6 weeks, 3 months and 5 months, and a booster of Hib vaccine when aged 15 months.[17]

Hepatitis A

In 2018, 68 cases of hepatitis A were notified, compared with 58 cases in 2017. The 2018 notification rate (1.4 per 100,000) was similar to the 2017 rate (1.2 per 100,000). Since 2001, numbers have fluctuated, primarily due to outbreaks in 2002, 2006, 2008, 2012, 2013 and 2017 (Figure 11).

Figure 11. Hepatitis A notifications by year, 1999–2018



Auckland, Southern (both 3.0 per 100,000) and Waitemata (1.8 per 100,000) DHBs had the highest notification rates.

Children aged 5–9 years (4.0 per 100,000), adults aged 20–29 years (2.8 per 100,000) and young adults aged 15–19 years (2.2 per 100,000) had the highest notification rates.

Males (1.5 per 100,000) had a similar rate to females (1.3 per 100,000).

Ethnicity was recorded for 66 cases (97.1%). The ethnic group with the highest notification rate for hepatitis A was MELAA (9.2 per 100,000), followed by Pacific peoples (7.0 per 100,000) and Asian (3.2 per 100,000).

Hospitalisation status was recorded for all cases, of which 32 (47.1%) were hospitalised.

Travel information was recorded for 67 (98.5%) cases, with 43 cases (64.2%) having travelled overseas during the incubation period for the disease. The countries most commonly visited were Tonga (11 cases), India (10 cases), Fiji (5 cases), Argentina and Pakistan (3 cases each). Nine cases reported travel to more than one country.

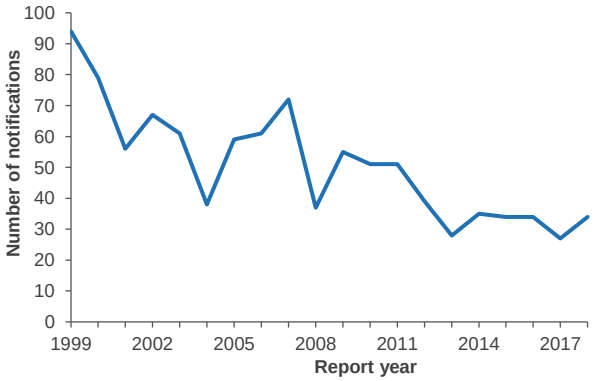
In 2018, four outbreaks of hepatitis A were reported, involving 17 cases.

Hepatitis B

Only acute hepatitis B is notifiable, so notification rates do not give an indication of the burden of chronic hepatitis B infection.

In 2018, 34 cases of hepatitis B were notified, compared with 27 cases in 2017. The 2018 notification rate (0.7 per 100,000) was similar to the 2017 rate (0.6 per 100,000). The annual number of hepatitis B cases has ranged from 27 to 35 in the last five years (Figure 12).

Figure 12. Acute hepatitis B notifications by year, 1999–2018



There has been a decrease in the number of hepatitis B cases since 1984 when over 600 cases were notified. This decrease is primarily due to the introduction of hepatitis B vaccine to the national immunisation schedule in 1988.[17]

Auckland, Counties Manukau and Waitemata were the only DHBs that reported more than five cases of hepatitis B and the corresponding notification rates were 1.3, 1.1, and 0.8 per 100,000 respectively.

Adults aged 40–49 years (1.5 per 100,000) and 20–29 years (1.2 per 100,000) had the highest notification rates.

Males (1.0 per 100,000) had a higher rate than females (0.4 per 100,000).

Table 10. Exposure to risk factors associated with acute hepatitis B, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Travelled overseas during the incubation period	10	19	5	34.5
Sexual contact with confirmed case or carrier	6	13	15	31.6
Household contact with confirmed case or carrier	6	17	11	26.1
Case child of seropositive mother	3	22	9	12.0
History of injecting drug use	2	26	6	7.1
Case is a blood product or tissue recipient	1	23	10	4.2
Occupational exposure to blood	1	26	7	3.7

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Ethnicity was recorded for 32 (94.1%) cases. The ethnic group with the highest notification rate for hepatitis B was Pacific peoples (4.0 per 100,000), followed by Asian (1.1 per 100,000).

Hospitalisation status was recorded for 31 (91.2%) cases, of which 19 (61.3%) were hospitalised.

The most commonly reported risk factors for hepatitis B were overseas travel and sexual or household contact with a confirmed case or carrier (Table 10).

Hepatitis C

Only acute hepatitis C is notifiable, so notification rates do not give an indication of the burden of chronic hepatitis C infection.

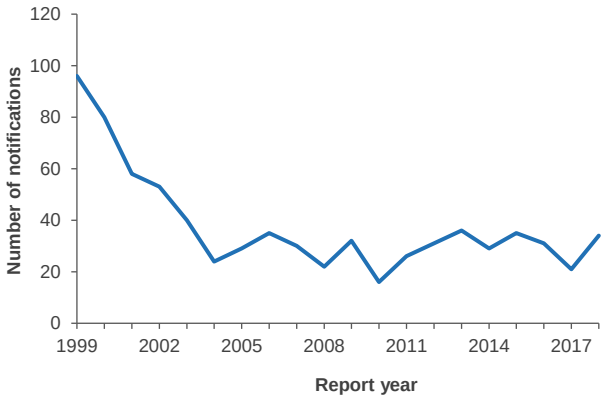
In 2018, 34 cases of hepatitis C were notified compared with 21 cases in 2017. The 2018 notification rate (0.7 per 100,000) was slightly higher than the 2017 rate (0.4 per 100,000).

After a peak of 102 cases in 1998, notifications steadily declined until 2004. The number of notifications has ranged from 21 to 35 in the last five years (Figure 13).

Canterbury DHB had the highest number of cases (10 cases), followed by Auckland, Nelson Marlborough and Southern DHBs (5 cases each).

Adults aged 30–39 years (1.6 per 100,000, 10 cases) had the highest notification rate, followed by those aged 20–29 (1.1 per 100,000, 8 cases), 40–49 (1.0 per 100,000, 6 cases) and 50–59 (0.8 per 100,000, 5 cases) years.

Figure 13. Acute hepatitis C notifications by year, 1999–2018



Males and females had the same rate (0.7 per 100,000).

Ethnicity was recorded for 33 (97.1%) cases. The ethnic group with the highest notification rate for hepatitis C was Māori (1.4 per 100,000, 10 cases), followed by European or Other (0.6 per 100,000).

Hospitalisation status was recorded for 33 (97.1%) cases, of which seven (21.2%) were hospitalised.

The most commonly reported risk factors for hepatitis C were a history of injecting drug use and body piercing/tattooing in the last 12 months (Table 11).

Table 11. Exposure to risk factors associated with acute hepatitis C, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
History of injecting drug use	25	8	1	75.8
Body piercing/tattooing in the last 12 months	7	18	9	28.0
Household contact with confirmed case or carrier	4	12	18	25.0
Sexual contact with confirmed case or carrier	3	14	17	17.6
Occupational exposure to blood	1	27	6	3.6

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Hepatitis (viral) not otherwise specified

In 2018, seven cases of hepatitis (viral) not otherwise specified (NOS) were notified, compared with 10 cases in 2017. Two cases were hepatitis D and five cases were hepatitis E.

Hepatitis D

The two hepatitis D cases were aged 30–39 years and 50–59 years. Both cases were male.

One case was of Pacific ethnicity and one European or Other.

Neither of the cases were hospitalised.

One case had not travelled overseas during the incubation period and the travel history for the other case was unknown.

Both cases had co-infection with hepatitis B.

Hepatitis E

The five hepatitis E cases were aged 20–29 years (2 cases), 40–49 years (2 cases) and 60–69 years (1 case). Four cases were male and one was female.

Four cases were of Asian ethnicity, and one was European or Other.

Three cases were hospitalised.

Overseas travel information was recorded for all five cases; four cases had travelled overseas during the incubation period.

Highly pathogenic avian influenza

Highly pathogenic avian influenza (HPAI) became a notifiable disease in New Zealand in February 2004. No human cases have been reported in New Zealand and no highly pathogenic avian influenza A(H5N1) has been reported in New Zealand animals.[18]

Hydatid disease

No cases of hydatid disease (*Echinococcus granulosus*) were notified in 2018 compared with one case in 2017. Since 1997, 71 cases of hydatid disease have been notified.

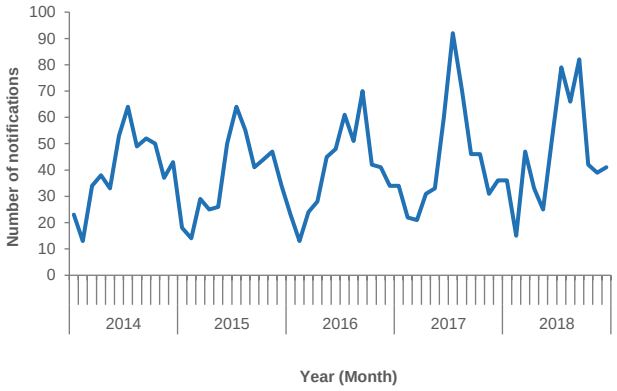
Echinococcus species are notifiable organisms under the Biosecurity Act 1993. All cases of hydatid disease are reported to the Ministry for Primary Industries for investigation of possible disease reservoirs in New Zealand animals. In September 2002, New Zealand was declared provisionally free of hydatids. Given the natural history of the disease, it is expected that cases may occur for some years.

Invasive pneumococcal disease

In 2018, 557 cases of IPD were notified, compared with 522 cases in 2017. The 2018 notification rate of 11.4 per 100,000 was slightly higher than the 2017 rate of 10.9 per 100,000.

There is a distinct seasonal pattern for IPD, with the highest number of notifications reported during winter, and particularly in July, each year (Figure 14).

Figure 14. Invasive pneumococcal disease notifications by month, January 2014–December 2018



In 2018, the highest notification rates for IPD were reported from Lakes, Wairarapa, Hawke's Bay and Whanganui DHBs (22.8, 22.0, 19.3 and 18.5 per 100,000 respectively) (Figure 15).

Adults aged 70 years and over (34.9 per 100,000), infants aged less than 1 year (28.2 per 100,000) and adults aged 60–69 years (20.2 per 100,000) had the highest rates of IPD.

Males (11.5 per 100,000) had a similar rate to females (11.3 per 100,000).

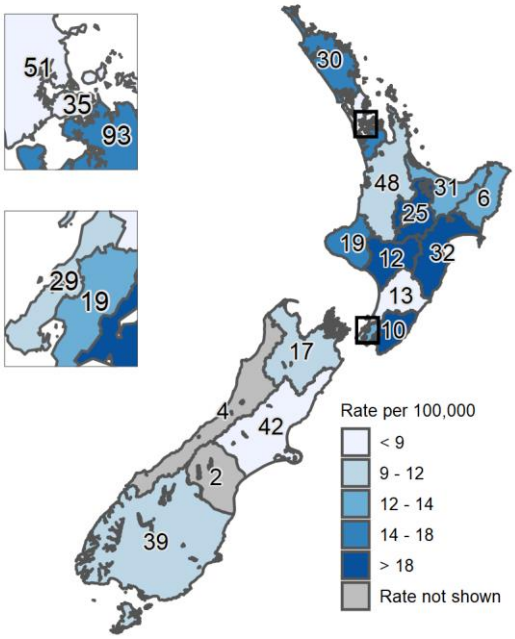
Ethnicity was recorded for 538 (96.6%) cases. The ethnic group with highest rate of IPD was Pacific peoples (31.1 per 100,000), followed by Māori (17.7 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 543 (97.5%) cases, of which 532 (98.0%) were hospitalised.

There were 20 deaths due to IPD reported in 2018. Two deaths were in children aged 1–4 years and 10–14 years, and the remaining 18 deaths were in adults aged over 50 years.

Figure 15. Invasive pneumococcal disease notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

The risk factors recorded for IPD are shown in Table 12 and Table 13. The most commonly reported risk factors for children aged less than 5 years were attending childcare and smoking in the household. Having a chronic illness was the most common risk factor for cases aged 5 years and older.

Pneumococcal conjugate vaccine (PCV) was added to the national immunisation schedule in June 2008. The 7-valent conjugate vaccine (PCV7) was used until July 2011 when the 10-valent conjugate vaccine (PCV10) was introduced. This was in turn replaced by the 13-valent conjugate vaccine (PCV13) in July 2014. The most recent schedule change was to revert to PCV10 in July 2017.

The recommended schedule for PCV is four doses given to infants at age 6 weeks, 3 months, 5 months and 15 months. For defined groups of high risk children and adults, the schedule also includes PCV13 and 23-valent pneumococcal polysaccharide vaccine (23PPV).[17]

Table 12. Exposure to risk factors associated with invasive pneumococcal disease for cases aged less than 5 years, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Attends childcare	4	14	28	22.2
Smoking in the household	5	18	23	21.7
Premature (<37 weeks gestation)[b]	3	11	3	21.4
Chronic illness	5	29	12	14.7
Immunocompromised	5	31	10	13.9
Congenital or chromosomal abnormality	2	34	10	5.6

[a] Percentage refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded. No cases reported asplenia, chronic lung disease or cochlear implants as risk factors.
[b] Only cases aged less than 1 year are included for reporting of this risk factor.

Table 13. Exposure to risk factors associated with invasive pneumococcal disease for cases aged 5 years and over, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Chronic illness	283	157	71	64.3
Current smoker[b]	97	291	94	25.0
Chronic lung disease or cystic fibrosis	89	352	70	20.2
Immunocompromised	80	339	92	19.1
Resident in long-term or other chronic-care facility	34	397	80	7.9
Congenital or chromosomal abnormality	10	391	110	2.5
Cochlear implants	4	406	101	1.0
Anatomical or functional asplenia	6	418	87	1.4

[a] Percentage refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.
[b] Only cases aged 15 years and over are included in the reporting of this risk factor

The Invasive Pathogens Laboratory at ESR received a viable *Streptococcus pneumoniae* isolate from a normally sterile site for serotyping for 523 (93.9%) notified cases in 2018. Table 14 shows the breakdown by serotype and age group. Although serotype 19A is not included in PCV10, studies have shown that PCV10 provides cross protection against serotype 19A.[19] Nearly 90% (34/39) of cases aged less than 5 years were due to serotypes not covered by PCV10, compared with 72.5% (190/262) and 77.0% (171/222) of cases aged 5–64 years and 65 years and over, respectively.

Table 14. Invasive pneumococcal disease notifications by serotype and age group, 2018

Serotype	<5 years	5–64 years	65+ years	Total
PCV7	**0**	**14**	**6**	**20**
4	0	3	1	4
6B	0	0	2	2
9V	0	2	1	3
14	0	2	0	2
18C	0	1	0	1
19F	0	5	1	6
23F	0	1	1	2
PCV10	**5**	**58**	**45**	**108**
1	1	3	1	5
5	0	0	0	0
7F	0	17	10	27
19A[a]	4	38	34	76
PCV13	**2**	**17**	**17**	**36**
3	2	16	15	33
6A	0	1	2	3
Other (non-PCV13)	32	173	154	359
Total[b]	**39**	**262**	**222**	**523**

[a] In 2016, Medsafe approved the indication that PCV10 provides cross-protection against serotype 19A

[b] Totals are for viable isolates of culture-positive cases referred to ESR for serotyping.

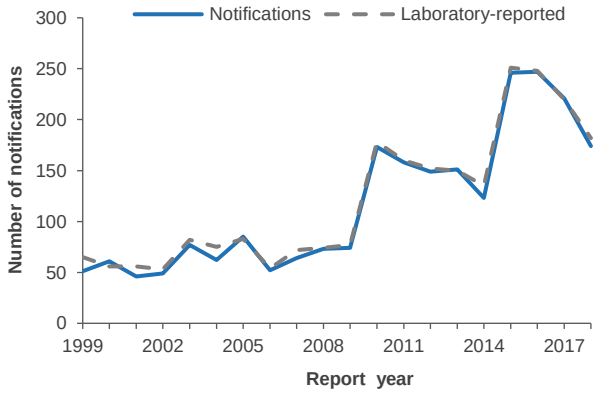
Serotype 19A was the most prevalent serotype (76 cases). In children aged less than 5 years, the most prevalent serotypes were two non-PCV serotypes, 12F and 15A (5 cases each). Serotype 19A was the most prevalent serotype for those aged 5–64 years, along with serotype 12F (38 cases). Serotype 19A was the also the most prevalent serotype (34 cases) for adults aged 65 years and over, followed by serotype 22F (29 cases).

Legionellosis

During 2018, 174 cases of legionellosis were notified, compared with 221 in 2017. The 2018 notification rate of 3.6 per 100,000 was a significant decrease from the 2017 rate of 4.6 per 100,000.

The annual number of cases was relatively stable between 1999 and 2009, but increased in 2010 and has remained high since (Figure 16). The increase in legionellosis cases in 2015 and 2016 is likely due to the LegiNZ study [20] which involved testing hospitalised patients with suspected pneumonia for *Legionella* spp. using PCR. The study ran from May 2015 to May 2016.

Figure 16. Legionellosis notifications and laboratory-reported cases by year, 1999–2018



In 2018, the highest notification rates for legionellosis were reported from Canterbury, Northland, Southern and Bay of Plenty DHBs (9.1, 6.1, 5.8, and 5.1 per 100,000 respectively).

Adults aged 70 years and over (11.6 per 100,000) and 60–69 years (8.4 per 100,000) had the highest notification rates for legionellosis.

Males (4.7 per 100,000) had a higher rate than females (2.5 per 100,000).

Ethnicity was recorded for 172 (98.9%) cases. The European or Other ethnic group (4.4 per 100,000) had the highest notification rate followed by Māori and Pacific peoples (1.9 and 1.7 per 100,000 respectively).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for all 174 cases, of which 140 (80.5%) were hospitalised.

Three deaths due to legionellosis were reported in 2018. All of the deaths were in cases aged 70 years and over.

Table 15. Exposure to risk factors associated with legionellosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Exposure to known environmental risk factor during the incubation period	130	22	22	85.5
Pre-existing immunosuppressive or debilitating condition	54	90	30	37.5
Smokes cigarettes	34	121	19	21.9

[a] Percentage refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Table 15 provides a summary of risk factors for which data was available. A total of 130 (85.5%) cases reported exposure to known environmental risk factors during the incubation period for the disease. Further details of the environmental exposures were recorded for 127 cases as follows: compost, potting mix or soil (96), shower or hot water system (26), spa or pool (11), water blasting (9), cooling towers (6), fountain, sprinkler or garden water feature (4), dialysis machine, humidifier, and a leisure park water ride (1 each). Some cases reported more than one exposure to known environmental risk factors.

One outbreak of legionellosis was reported, involving two cases.

The Legionella Reference Laboratory at ESR confirmed 181 cases of legionellosis in 2018. As in previous years, the most common *Legionella* species identified were *L. longbeachae* (49.2%, 89 cases) and *L. pneumophila* (33.1%, 60 cases) (Table 16).

Leprosy

Three cases of leprosy were notified in 2018, the same number as in 2017. All three cases were male. The cases were aged 40–49 years (2 cases) and 20–29 years (1 case). Two were of Pacific ethnicity and one was Asian.

One case had been in Tonga, one in Samoa and one in the Philippines during the incubation period for the disease.

Table 16. *Legionella* strains for laboratory-reported cases, 2018

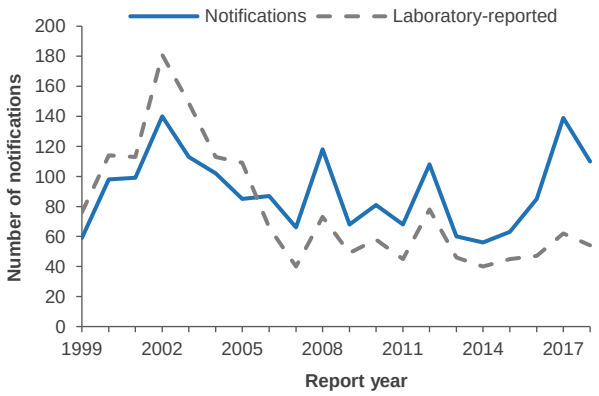
***Legionella* species and serogroup**	**Cases**	**Percentage (%)**
L. longbeachae	**89**	**49.2**
L. longbeachae sg 1	42	23.2
L. longbeachae sg 2	2	1.1
L. longbeachae/L. bozemanae sg 1	1	0.6
L. longbeachae/L. dumoffii	1	0.6
L. longbeachae sg not determined	43	23.8
L. pneumophila	**60**	**33.1**
L. pneumophila sg 1	47	26.0
L. pneumophila sg 2	2	1.1
L. pneumophila sg 4	1	0.6
L. pneumophila sg 7	1	0.6
L. pneumophila sg 12	1	0.6
L. pneumophila sg 13	1	0.6
L. pneumophila strain 97-2898	1	0.6
L. pneumophila sg not determined	6	3.3
Other *Legionella* species	**21**	**16.6**
L. micdadei	**5**	**2.8**
L. dumoffii	4	2.2
L. sainthelensi	4	2.2
L. bozemanae sg 1	2	1.1
L. harrisonii sp nov.	2	1.1
L. jordanis	2	1.1
L. feeleii sg 1	1	0.6
L. anisa/L. bozemanae sg 1	1	0.6
***Legionella* species unidentified**	**11**	**6.1**
Total	**181**	**100**

Leptospirosis

In 2018, a total of 110 cases of leptospirosis were notified, compared with 139 cases in 2017. The 2018 notification rate of 2.3 cases per 100,000 was a significant decrease from the 2017 rate of 2.9 per 100,000. Of the 110 notified cases, 106 were laboratory confirmed by microscopic agglutination titre (MAT) (51 cases), or nucleic acid testing (NAAT) (41 cases) or both MAT and NAAT (14 cases). Four cases were not laboratory confirmed.

Figure 17 shows the number of notified and laboratory-reported cases of leptospirosis each year since 1999.

Figure 17. Leptospirosis notifications by year, 1999–2018



The highest notification rates for leptospirosis were reported from Tairawhiti, Hawke's Bay, Waikato and Northland DHBs (12.2, 11.5, 5.5 and 4.5 per 100,000 respectively).

Adults aged 40–49 years (3.6 per 100,000), had the highest notification rates followed by those aged 60–69 (3.5 per 100,000), 50–59 (3.4 per 100,000) and 20–29 (3.3 per 100,000) years.

Males (4.0 per 100,000) had a much higher rate than females (0.6 per 100,000).

Ethnicity was recorded for all 110 cases. The ethnic group with the highest notification rate was European or Other (2.6 per 100,000), followed by Māori (2.5 per 100,000).

Hospitalisation status was recorded for 107 (97.3%) cases, of which more than two-thirds (68.2%, 73/107 cases) were hospitalised.

Occupation was recorded for 94 (85.5%) of the 110 cases. Of these, 65 (69.1%) were engaged in occupations considered high-risk for exposure to *Leptospira* spp. in New Zealand. [21] Of the 65 cases with a high-risk occupation, 48 (73.8%) were farmers, farm workers or livestock transporters and 17 (26.2%) worked in the meat processing industry (as freezing workers, meat process workers or butchers). An additional five (11.1%) cases worked in an occupation that involved contact with animals or their environment (fencer (2), forestry worker, landscaper and orchard worker).

Other risk factors reported included animal/outdoor exposure (24 cases), exposure to lakes, rivers or streams (16 cases), and overseas travel (4 cases)

No outbreaks of leptospirosis were reported in 2018.

The Leptospira Reference Laboratory at ESR confirmed 54 cases of infection with *Leptospira* in 2018. The most common *Leptospira* serovars reported were *L. borgpetersenii* sv Ballum, (25.9%, 14 cases), *L. borgpetersenii* sv Hardjo (24.1%, 13 cases), and *L. interrogans* sv Pomona (22.2%, 12 cases) (Table 17).

Table 17. *Leptospira* species and serovars for laboratory-reported cases, 2018

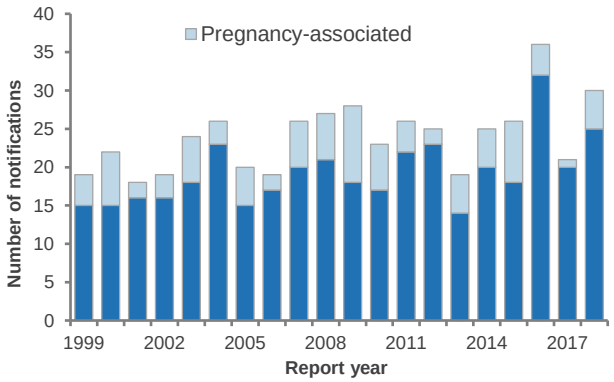
Leptospira species and serovar	Cases	Percentage (%)
L. borgpetersenii	**33**	**61.1**
L. borgpetersenii sv Ballum	14	25.9
L. borgpetersenii sv Hardjo	13	24.1
L. borgpetersenii sv Tarassovi	6	11.1
L. interrogans	**15**	**27.8**
L. interrogans sv Pomona	12	22.2
L. interrogans sv Australis	1	1.9
L. interrogans sv Canicola	1	1.9
L. interrogans sv Copenhageni	1	1.9
Serovar not identified	**6**	**11.1**
Total	**54**	**100.00**

Listeriosis

In 2018, 30 cases of listeriosis were notified (including five pregnancy-associated cases) compared with 21 cases (one pregnancy-associated case) in 2017. The 2018 rate of 0.6 cases per 100,000 was similar to the 2017 rate of 0.4 per 100,000.

Figure 18 shows listeriosis notifications for each year since 1999.

Figure 18. Listeriosis notifications by year, 1999–2018



No outbreaks of *Listeria* were reported during 2018.

The Special Bacteriology Laboratory at ESR serotyped 32 isolates of *Listeria monocytogenes* in 2018. The serotypes identified were O4 (19 isolates, 59.4%) and O1/2 (12 isolates, 37.5%). One isolate was non-serotypable. More than one isolate was received for two cases.

Listeriosis not associated with pregnancy

The 25 notified listeriosis cases that were not associated with pregnancy were from 13 DHBs, with the highest number of notifications reported from Capital & Coast (4 cases) DHB.

Most (88.0%, 22 cases) were aged 60 years and over. Fourteen cases were male and 11 were female.

Twenty-one cases were of European or Other ethnicity, two were Asian, one was Māori and one was Pacific.

All 25 cases were hospitalised for listeriosis and 10 were also hospitalised for the treatment of another illness.

Information on underlying illness was recorded for all 25 cases, of which 18 (72.0%) had an underlying illness such as cancer, renal failure, autoimmune disease, heart disease, diabetes or another chronic illness. Eleven cases were reported to be receiving immunosuppressive drugs.

Pregnancy-associated listeriosis

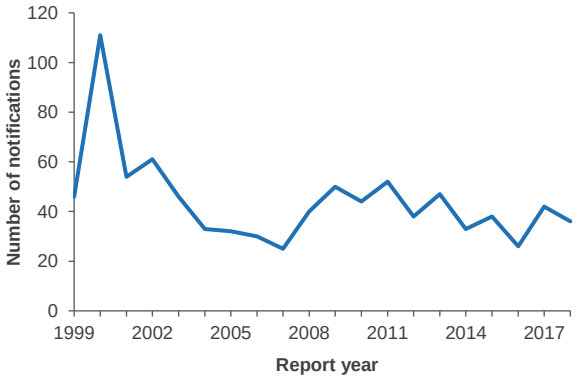
Five cases of pregnancy-associated listeriosis were notified in 2018. The length of gestation ranged from 23 to 39 weeks. The cases were aged 30–39 (3 cases), 20–29 (1 case) and 40–49 (1 case) years. Two cases were Pacific peoples, two were European or Other, and one was Asian.

No perinatal deaths from listeriosis occurred in 2018.

Malaria

In 2018, 36 cases of malaria were notified compared with 42 cases in 2017 (Figure 19). The 2018 notification rate of 0.7 per 100,000 was lower than the 2017 rate of 0.9 per 100,000.

Figure 19. Malaria notifications by year, 1999–2018



Adults aged 20–29 had the highest rate (1.8 per 100,000), followed by those aged 30–39 years (1.1 per 100,000).

Males (1.0 per 100,000) had a higher rate than females (0.5 per 100,000).

Ethnicity was recorded for 33 (91.7%) cases. The ethnic group with the highest rate was MELAA (12.8 per 100,000), followed by Asian (2.1 per 100,000).

Hospitalisation status was recorded for all 36 cases, of which 22 (61.1%) were hospitalised.

Table 18 shows the region and country of overseas travel and *Plasmodium* species identified for the 35 cases where a travel history was recorded. The region most commonly reported for *P. vivax* was Southern and Central Asia (9 cases), followed by South-East Asia (5 cases). For cases identified with *P. falciparum*, the region most commonly reported was Sub-Saharan Africa (11 cases).

The country most commonly reported by malaria cases as having lived in or travelled to during the incubation period was India (9 cases), of which eight cases were identified with *P. vivax*. Some cases reported travel to more than one country.

Table 18. Region and country of overseas travel and *Plasmodium* species for malaria notifications, 2018

Region	Country resided in or visited	*Plasmodium* species				
		P. falciparum	*P. malariae*	*P. ovale*	*P. vivax*	Indeterminate
North Africa and the Middle East	South Sudan	1				
Sub-Saharan Africa	Cameroon	2				
	DRC[a]	1				
	Ethiopia	1			1	
	Ghana	1				
	Malawi	1				
	Mali	1				
	Mozambique	2				
	Rwanda					1
	Sierra Leone	1				
	Tanzania	1				
	Zambia					1
Southern and Central Asia	Afghanistan				1	
	India	1			8	
	Sri Lanka	1				
South-East Asia	Cambodia				1	
	Indonesia	1			2	
	Thailand				2	
Oceania	Papua New Guinea	2			1	
	Solomon Islands				1	

[a] Democratic Republic of the Congo

Note: Some cases reported travel to more than one country during the incubation period for the disease.

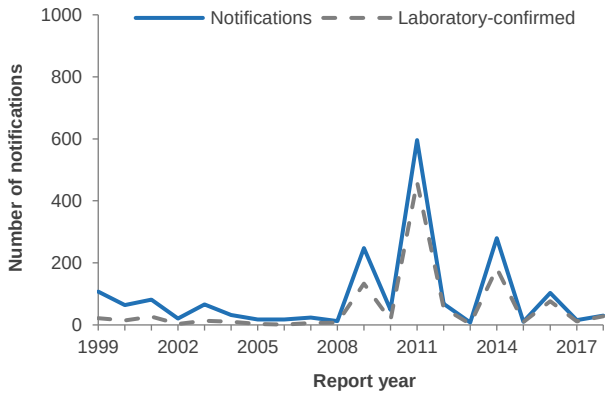
Measles

Measles vaccination was introduced in 1969 [17] and measles has been a notifiable disease since June 1996.[3] The recommended measles, mumps and rubella (MMR) vaccination schedule is two doses, given at age 15 months and 4 years. During measles outbreaks, the first dose may be given at age 12 months, and MMR vaccine may be recommended for infants aged less than 12 months if cases are occurring in the very young.[17] In October 2017, New Zealand was verified by the WHO as having eliminated endemic measles.[22]

In 2018, 30 cases of measles (including 28 laboratory-confirmed cases) were notified, compared with 15 cases in 2017 (including 11 laboratory-confirmed cases) (Figure 20). The 2018 notification rate of 0.6 per 100,000 was a significant increase from the 2017 notification rate of 0.3 per 100,000.

Figure 20 shows notifications and laboratory-confirmed cases from 1999 to 2018.

Figure 20. Measles notifications and laboratory-confirmed cases by year, 1999–2018



Cases were reported from Canterbury (13 cases), Southern (8 cases), Auckland (3 cases), Waitemata and Nelson Marlborough (2 cases each), Waikato and Capital & Coast (1 case each) DHBs.

Cases ranged in age from 6 months to 52 years, with 80.0% of the cases aged 11 years and over.

Males (0.7 per 100,000) and females (0.5 per 100,000) had a similar rate.

Ethnicity was recorded for 29 (96.7%) cases. Twenty-three cases were of European or Other ethnicity (0.7 per 100,000), five were Asian (0.9 per 100,000), and one was Pacific.

Hospitalisation status was recorded for all cases, and eight (26.7%) cases were hospitalised.

Vaccination status was known for 26 (86.7%) cases, of which 18 (69.2%) were not vaccinated. Of the eight vaccinated cases, three had received one vaccine dose, one had received two doses, and dose information was unknown for the remaining four cases.

The source of the virus was recorded for 27 cases; five were imported and 22 were import-related. The countries of importation were India, the Philippines (2 cases each) and Thailand (1 case).

Four measles outbreaks were reported in 2018, involving 25 cases.

The Ministry of Health hospital discharge data for 2018 included nine hospitalisations where measles was the principal diagnosis.

Meningococcal disease

In 2018, 120 cases of meningococcal disease were notified, compared with 112 cases in 2017. The notification rate (2.5 per 100,000) was higher than the 2017 rate (2.3 per 100,000). The 2018 rate was a significant decrease from the peak rate (16.7 per 100,000 in 2001) experienced during the meningococcal disease epidemic driven by the B:P1.7-2,4 strain.

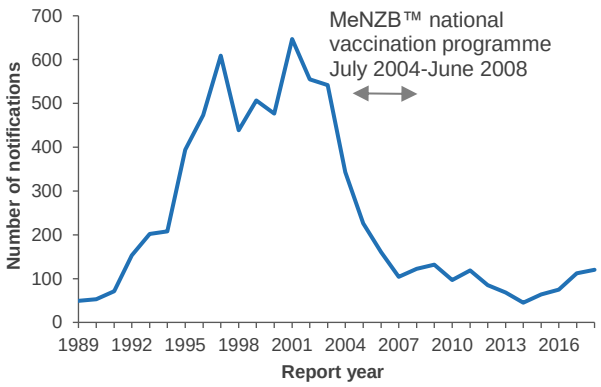
Figure 21 shows the number of meningococcal disease notifications from 1989 to 2018.

Of the nine DHBs that reported five or more cases in 2018, the highest rate was for Northland (7.3 per 100,000), followed by Bay of Plenty (4.2 per 100,000) and Southern (3.6 per 100,000) DHBs.

The highest rate was for infants aged less than 1 year (28.2 per 100,000), followed by children aged 1–4 years (6.1 per 100,000) and young adults aged 15–19 years (6.0 per 100,000).

Females and males had similar notification rates (2.5.and 2.4 per 100,000 respectively).

Figure 21. Meningococcal disease notifications by year, 1989–2018



Ethnicity was recorded for all cases. The ethnic group with the highest notification rate for meningococcal disease was Pacific peoples (5.0 per 100,000), followed by Māori (4.6 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Of the 120 cases, 113 cases were hospitalised (94.2%). For the hospitalised cases, pre-hospital management information was recorded for 104 (92.0%) cases. Of these, 41 (39.4%) cases were seen by a doctor prior to hospital admission, of whom, only 15 (36.6%) were given intravenous or intramuscular antibiotics before admission. Two cases did not report seeing a doctor but were given intramuscular antibiotics prior to admission.

Ten deaths were reported during 2018, giving a case fatality rate of 8.3%. Five of these cases had been admitted to hospital, one had been seen by a doctor prior to admission and had been given antibiotics by paramedics.

Of the 120 cases, 117 (97.5%) were laboratory confirmed and the strain type was determined for 113: 51 were group B strains, 33 group W, 16 group Y, 10 group C, one group X, and two were non-groupable strains (Table 19). Twenty-nine of the 32 laboratory-confirmed cases in children aged less than 5 years had a strain type determined: 18 (62.1%) were group B strains (including two B:P1.7-2,4), seven (24.1%) were group W, two were group C, and two were group Y strains.

One *N. meningitidis* outbreak was reported in 2018 involving five cases of group B disease in Otago.

Table 19. Meningococcal disease strain group distribution by year, 2014–2018

	2014	2015	2016	2017	2018
Group B	**26**	**41**	**47**	**70**	**51**
B:P1.7-2,4	13	10	23	27	16
Other group B	13	31	24	43	35
Group C	**6**	**6**	**8**	**11**	**10**
C:P1.5-1,10-8	5	3	4	8	6
Other group C	1	3	4	3	4
Group W	**0**	**6**	**5**	**12**	**33**
W:P1.5,2	0	4	3	12	32
Other group W	0	2	2	0	1
Group X	**0**	**0**	**0**	**0**	**1**
Group Y	**3**	**6**	**7**	**11**	**16**
Group E	**1**	**0**	**0**	**0**	**0**
Non-groupable	**0**	**0**	**0**	**1**	**2**
Total*	**36**	**59**	**67**	**105**	**113**

*Includes total number of laboratory-confirmed cases where strain group was determined.

The criteria for a community outbreak of group W disease in Northland were met in late October and a targeted vaccination programme for those aged 9 months–4 years and 13−19 years began on 5 December 2018.

The antimicrobial susceptibilities of 79 viable meningococcal isolates received by ESR from cases of invasive disease in 2018 were tested. All isolates were susceptible to ceftriaxone and rifampicin. Twenty-one isolates (26.6%) were penicillin resistant with minimum inhibitory concentrations (MICs) ≥0.5 mg/L. A further 27 (34.2%) isolates had intermediate resistance to penicillin (MICs 0.12–0.25 mg/L). One isolate (1.3%) was resistant to ciprofloxacin.

Middle East Respiratory Syndrome (MERS)

MERS became notifiable on 6 September 2013. Although no cases have been reported in New Zealand, worldwide 2279 laboratory-confirmed cases of human infection with MERS Coronavirus (MERS-CoV), including 806 related deaths, were reported to WHO from September 2012 to 31 December 2018.[23]

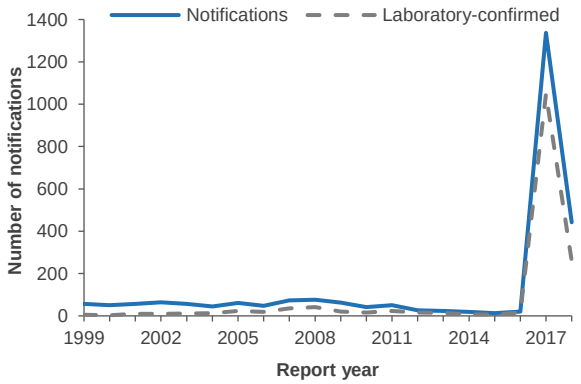
Mumps

Vaccination against mumps was introduced to the national immunisation schedule in 1990 as part of the MMR vaccine,[17] and mumps became notifiable in June 1996.[3] The recommended measles, mumps and rubella (MMR) vaccination schedule is two doses, given at age 15 months and 4 years.[17] Prior to 2017, the last mumps epidemic occurred in 1994.[17]

In 2018, 442 cases of mumps (including 259 laboratory-confirmed cases) were notified, compared with 1338 cases in 2017 (including 1049 laboratory-confirmed cases). The 2018 notification rate of 9.0 per 100,000 was a significant decrease from the 2017 rate of 27.9 per 100,000.

Figure 22 shows notifications and laboratory-confirmed cases from 1999 to 2018.

Figure 22. Mumps notifications and laboratory-confirmed cases by year, 1999–2018



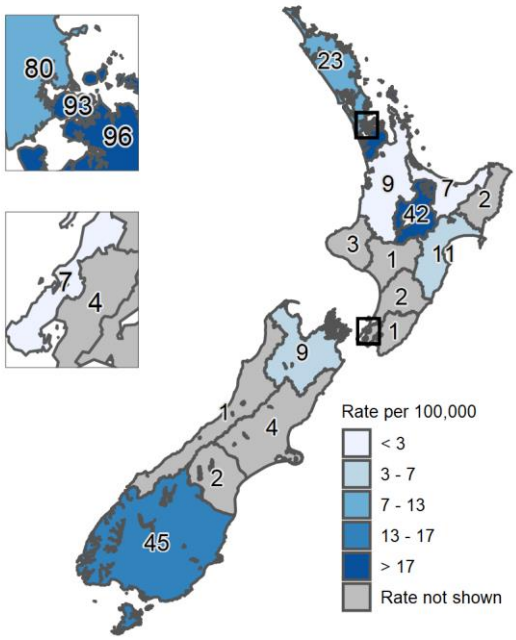
The highest notification rate for mumps was reported from Lakes DHB (38.3 per 100,000, 42 cases), followed by Auckland (17.3 per 100,000, 93 cases) and Counties Manukau (17.2 per 100,000, 96 cases) DHBs (Figure 23).

Adults aged 20–29 years (21.1 per 100,000) had the highest notification rate, followed by infants aged less than 1 year (16.6 per 100,000) and young adults aged 15–19 years (16.2 per 100,000).

Males (9.7 per 100,000) had a higher rate than females (8.4 per 100,000).

Ethnicity was recorded for 426 (96.4%) cases. The ethnic group with the highest notification rate was Pacific peoples (36.8 per 100,000), followed by MELAA (27.5 per 100,000), Asian (13.3 per 100,000) and Māori (9.4 per 100,000).

Figure 23. Mumps notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Hospitalisation status was recorded for 439 (99.3%) cases, of which 23 (5.2%) were hospitalised.

Vaccination status was unknown for two thirds of cases (283/442, 64.0%) (Table 20). Of the 159 cases with known vaccination status, 47 (29.6%) were not vaccinated, 25 (22.3%) cases had received one dose of vaccine, and 50 (44.6%) cases had received two doses. Dose information was unknown for the remaining 37 vaccinated cases.

Of the cases with risk factor information recorded, 10.1% (22/218) had travelled overseas during the incubation period for the disease.

Four mumps outbreaks were reported in 2018, involving 21 cases.

The Ministry of Health hospital discharge data for 2018 included 22 hospitalisations where mumps was the principal diagnosis.

Non-seasonal influenza

Non-seasonal influenza became a notifiable and quarantinable disease in New Zealand in April 2009, with confirmed cases requiring evidence of influenza A(H1N1)pdm09 infection (the pandemic strain). This strain was re-classified as seasonal on 1 January 2011.

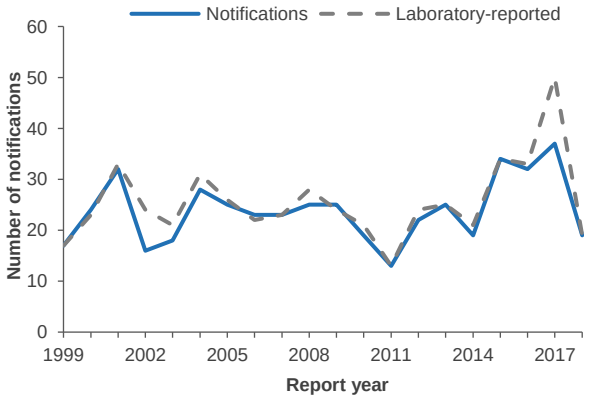
In August 2013, influenza A(H7N9) became notifiable as non-seasonal influenza. No cases have been notified to date.

Paratyphoid fever

In 2018, 19 cases of paratyphoid fever were notified compared with 37 cases in 2017. The 2018 notification rate of 0.4 per 100,000 was a significant decrease from the 2017 notification rate of 0.8 per 100,000. The case definition for paratyphoid was changed at the end of 2017 to exclude cases of *S.* Paratyphi B var. Java. [24]

Figure 24 shows the number of notifications and laboratory-reported cases of paratyphoid fever each year since 1999.

Figure 24. Paratyphoid fever notifications and laboratory-reported cases by year, 1999–2018



Note: Case definition changed in December 2017 to exclude cases due to *S.* Paratyphi B var. Java.

Adults aged 20–29 years accounted for almost half (9/19, 47.4%) of the cases.

Table 20. Age group and vaccination status of mumps notifications, 2018

Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 months[a]	11	0	0	0	6	5
15 months–3 years	31	10	1	0	3	17
4–9 years	51	4	20	0	5	22
10–19 years	88	4	17	4	11	52
20+ years	261	7	12	33	22	187
Total	**442**	**25**	**50**	**37**	**47**	**283**

Males (0.5 per 100,000) had a higher rate than females (0.3 per 100,000).

Ethnicity was recorded for 18 (94.7%) cases. Twelve cases were of Asian ethnicity, four were European or Other and two were Māori.

Hospitalisation status was known for 17 cases (89.5%), of which 11 (64.7%) were hospitalised.

Overseas travel information was recorded for 18 (94.7%) cases, of which 15 (83.3%) had travelled overseas during the incubation period for the disease. The country most commonly visited was India (9 cases), followed by China and Cambodia (2 cases each). Some cases reported travel to more than one country. Of the remaining three cases who had not travelled overseas, two were associated with an outbreak that was reported in 2017.

No outbreaks of paratyphoid fever were reported in 2018.

The Enteric Reference Laboratory at ESR confirmed 19 isolates as *Salmonella* Paratyphi during 2018. The serotypes identified were *S*. Paratyphi A (18 isolates) and *S*. Paratyphi B (1 isolate). *S*. Paratyphi A was identified in three cases with no history of overseas travel. There were 32 isolates of *S*. Paratyphi B var. Java identified in 2018 which have been reported as salmonellosis.

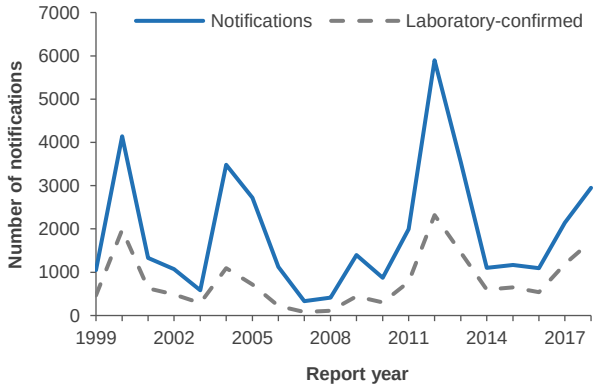
Pertussis

Pertussis is a vaccine-preventable disease caused by the bacterium *Bordetella pertussis*. Epidemics occur every 2–5 years, predominantly in young children, with a periodicity that is less affected by mass vaccination than other childhood vaccine-preventable diseases.[17] The most recent national outbreak of pertussis began in October 2017 and continued throughout 2018. Pertussis vaccination has been part of the national immunisation schedule in New Zealand since 1960. Pertussis has been notifiable since June 1996.[3]

The current vaccination schedule for pertussis is a primary course of DTaP-IPV-HepB/Hib at ages 6 weeks, 3 months and 5 months, followed by booster doses at ages 4 years (DTaP-IPV) and 11 years (Tdap). Vaccination with Tdap is also recommended for pregnant women from 28 to 38 weeks gestation.[17]

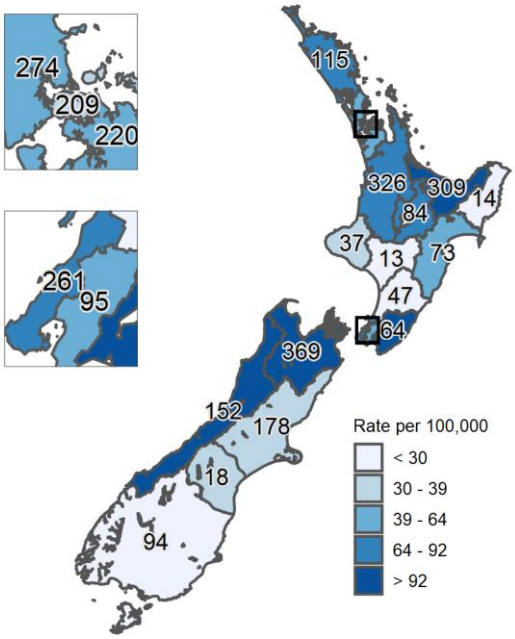
In 2018, 2952 pertussis cases were notified, of which 1702 (58.0%) were laboratory confirmed (35 by isolation only, 1642 by PCR only, and 35 by isolation and PCR). The 2018 notification rate (60.4 per 100,000) was a significant increase from the 2017 rate (44.7 per 100,000, 2142 cases) (Figure 25).

Figure 25. Pertussis notifications and laboratory-confirmed cases by year, 1999–2018



The highest rate of pertussis was reported from West Coast DHB (466.3 per 100,000), followed by Nelson Marlborough (245.0 per 100,000), Wairarapa (140.7 per 100,000), and Bay of Plenty (130.4 per 100,000) DHBs (Figure 26).

Figure 26. Pertussis notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

The highest notification rate was for infants aged less than 1 year (305.5 per 100,000) followed by children aged 1–4 (150.2 per 100,000), 5–9 (124.4 per 100,000) and 10–14 (98.4 per 100,000) years.

Females (66.4 per 100,000) had a higher notification rate than males (54.2 per 100,000).

The ethnic group with the highest notification rate for pertussis was Māori (76.6 per 100,000), followed by European or Other (64.4 per 100,000), Pacific peoples (51.5 per 100,000), and MELAA (34.8 per 100,000).

Hospitalisation status was recorded for 2872 (97.3%) cases, of which 227 (7.9%) were hospitalised. Approximately 51% (95/184) of cases aged less than 1 year were hospitalised.

The proportion of hospitalised cases (for all age groups) by ethnic group was: Pacific peoples (32.5%, 50/154), Māori (13.6%, 75/553), MELAA (10.5%, 2/19), Asian (8.7%, 8/92), and European or Other (4.2%, 88/2090).

Vaccination status was known for 1935 (65.6%) cases (Table 21). Of these, 721 (37.3%) cases were not vaccinated, including 19 infants aged less than 6 weeks who were ineligible for vaccination. One hundred and twenty–seven (10.5%) of the vaccinated cases had received one dose of pertussis vaccine, 49 (4.0%) had received two doses and 819 (67.5%) had received three or more doses. A further 219 (18.0%) cases were reported as being vaccinated, but no dose information was available.

Vaccination status was known for 154 (67.8%) of the hospitalised cases. Of these, 76 (49.4%) cases had not been vaccinated (including 16 that were aged less than 6 weeks and therefore not yet eligible for vaccination), 29 (18.8%) had received one dose of pertussis vaccine, 12 (7.8%) had received two doses, and 29 (18.8%) had received three or more doses. A further eight (5.2%) cases were reported as being vaccinated, but no dose information was available.

In 2018, 47.9% (643/1343) of cases reported contact with a laboratory-confirmed case of pertussis.

No outbreaks of pertussis were reported in 2018 as PHUs are not required to report local outbreaks during a national outbreak.

Ministry of Health hospital discharge data for 2018 included 194 hospitalisations where pertussis was the principal diagnosis.

Plague

The last case of *Yersinia pestis* infection in New Zealand was reported in 1911, during the last plague pandemic that originated in Hong Kong in 1894.

From 1900 to 1911, 21 cases of plague were recorded in New Zealand, nine of which were fatal.[25]

Poliomyelitis (polio)

There were no polio notifications in 2018.

The New Zealand Paediatric Surveillance Unit carries out active surveillance of acute flaccid paralysis (AFP) to demonstrate the absence of wild poliovirus. In 2018, 10 cases of AFP were notified to the unit. All 10 cases were reviewed by the National Certification Committee for the Eradication of Poliomyelitis (NCCEP) and classified as non-polio.

Since the mass oral polio vaccine (OPV) vaccination campaigns in New Zealand in 1961 and 1962, six polio cases have been reported. All were either laboratory confirmed as vaccine associated (4 cases) or classified as probable vaccine-associated cases (2 cases).[17] The most recent vaccine-associated case occurred in 1999.[26]

Table 21. Age group and vaccination status of pertussis notifications, 2018

Age group	Total cases	One dose	Two doses	Three doses	Four doses	Five doses	Vaccinated (no dose info)	Not vaccinated	Unknown
0–5 weeks[a]	19	0	0	0	0	0	0	19	0
6 weeks–2 months	54	28	1	0	0	0	0	24	1
3–4 months	43	10	16	1	0	0	0	14	2
5 months–3 years	377	9	15	209	6	1	11	113	13
4–10 years	573	9	5	37	311	15	28	143	25
11+ years	1886	71	12	24	92	123	180	408	976
Total	**2952**	**127**	**49**	**271**	**409**	**139**	**219**	**721**	**1017**

[a] Children aged less than 6 weeks are ineligible for vaccination.

No cases have been reported since the inactivated polio vaccine (IPV) replaced OPV in 2002. In 1976, an imported case of wild poliovirus infection was managed in New Zealand after a child arrived unwell from Tonga. [17]

Primary amoebic meningoencephalitis

The last case of primary amoebic meningoencephalitis (*Naegleria fowleri)* in New Zealand was notified in 2000. There were five prior cases, four of which were part of the same outbreak in 1968. All six cases were fatal and were linked to swimming in geothermal pools in the central North Island.[27]

Q fever

No cases of Q fever (*Coxiella burnetii*) were notified in 2018. Only three cases of Q fever have been notified in New Zealand since 1997, one case each year in 2004, 2010 and 2011. All three cases reported overseas travel during the incubation period for the disease.

Rabies and other lyssaviruses

New Zealand is classified as a rabies-free country.[28] No cases of rabies or other lyssavirus have been reported in New Zealand.

Rheumatic fever

In 2018, 188 cases of rheumatic fever were notified compared with 155 cases in 2017. The 2018 notification rate (3.8 per 100,000) was similar to the 2017 rate (3.2 per 100,000).

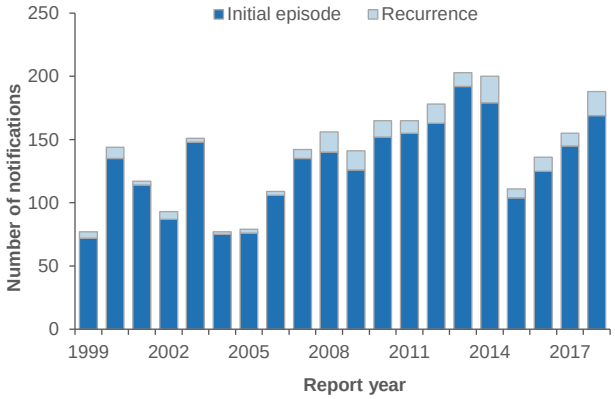
Of the 188 cases of rheumatic fever, 169 cases were initial episodes and 19 were recurrences. This is a rate of 3.5 per 100,000 for initial episodes and 0.4 per 100,000 for recurrences.

Figure 27 shows the number of initial episodes and recurrent cases of rheumatic fever reported each year since 1999.

Hospitalisation date was recorded for all of the 183 cases that were hospitalised. Of these, 123 (67.2%) cases were notified within seven days of hospital admission.

Ministry of Health hospital discharge data for 2018 included 228 hospitalisations where rheumatic fever was the principal diagnosis.

Figure 27. Rheumatic fever (initial episodes and recurrent cases) by year, 1999–2018



Initial episodes

Of the 169 initial episode cases notified, 126 were confirmed, 28 were probable and 15 were suspect cases.

Counties Manukau (13.6 per 100,000) DHB had the highest rate followed by Northland (6.7 per 100,000) and Auckland (3.5 per 100,000) DHBs.

Children aged 5–9 years (15.9 per 100,000) had the highest rate, followed those aged 10–14 years (15.4 per 100,000).

Males (3.8 per 100,000) had a slightly higher rate than females (3.1 per 100,000).

The ethnic group with the highest rate was Pacific peoples (33.4 per 100,000), followed by Māori (8.7 per 100,000). These two ethnic groups accounted for 96.4% of initial episode cases.

Hospitalisation status was recorded for all 169 cases, of which 165 (97.6%) were hospitalised.

Recurrences

In 2018, 19 recurrent cases were notified, from Counties Manukau (14 cases), Northland, Auckland, Waikato, Tairawhiti and Capital & Coast (1 case each) DHBs.

The cases ranged from 6 to 39 years of age. Eleven cases were male and eight were female. Twelve cases were Pacific peoples, six were Māori and one was Asian.

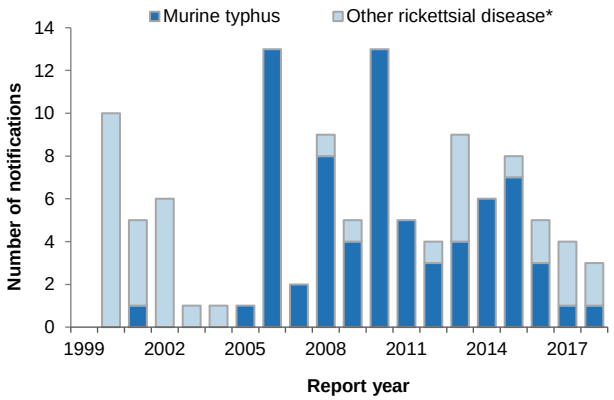
Eighteen (94.7%) recurrent cases were hospitalised.

Rickettsial disease

This section includes murine typhus (*Rickettsia typhi)*, typhus (*Rickettsia prowazekii*) and other rickettsial diseases caused by organisms of the *Rickettsia* genus. For Q fever, see its separate section.

Three cases of rickettsial disease were notified in 2018, compared with four cases in 2017 (Figure 28).

Figure 28. Rickettsial disease notifications, 1999–2018



* Includes all other diseases caused by organisms of the *Rickettsia* genus, except typhus.

Murine typhus (*Rickettsia typhi*)

A probable case of murine typhus was notified from Waikato DHB.

The case was a female, aged 30–39 years, of European or Other ethnicity. The case was hospitalised.

The case had not travelled overseas during the incubation period for the disease and is assumed to have acquired their infection in New Zealand.

Typhus (*Rickettsia prowazekii*)

No cases of typhus have been reported from 1997 to 2018.

Other rickettsial diseases

Two probable cases of other rickettsial diseases were notified, both caused by *Rickettsia conorii* (spotted fever).

The cases were males aged 15–19 and 60–69 years and both were of European or Other ethnicity. Both cases were hospitalised.

Both cases had travelled overseas during the incubation period for the disease; one to South Africa and the other to Australia.

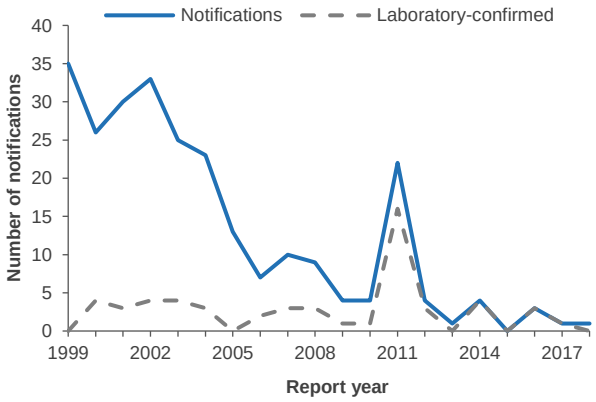
Rubella

Rubella vaccination was introduced in 1970 for all children at age 4 years. In 1979 it was limited to girls at age 11 years and then extended to all children again when MMR was introduced in 1990. The recommended vaccination schedule for rubella is two doses of MMR vaccine, given at 15 months and 4 years of age.[17] Rubella has been a notifiable disease since June 1996.[17]

One probable rubella case was notified in 2018, the same number as in 2017. The case was aged 1–4 years and of European or Other ethnicity. The child had been vaccinated with one dose of MMR and was in Australia during the incubation period.

The last national rubella outbreak occurred in 1995.[17] The number of rubella cases since 1999 is shown in Figure 29. There was an increase in notifications in 2011 during the measles outbreak.

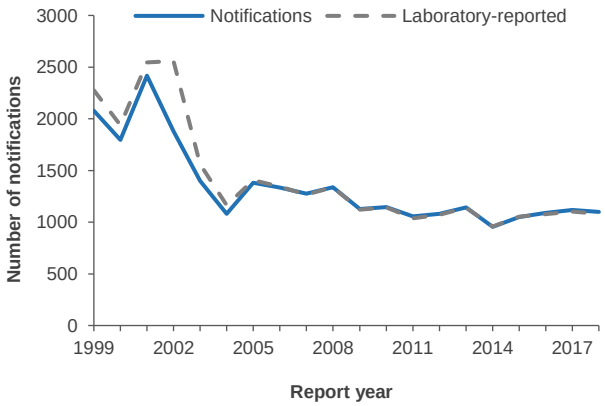
Figure 29. Rubella notifications and laboratory-confirmed cases by year, 1999–2018



Salmonellosis

In 2018, 1100 cases of salmonellosis were notified, compared with 1127 in 2017. The 2018 notification rate (22.5 per 100,000) was similar to the 2017 rate (23.5 per 100,000). A large decrease in salmonellosis notifications occurred between 2001 and 2004 and numbers have remained relatively stable since 2005 (Figure 30).

Figure 30. Salmonellosis notifications and laboratory-reported cases by year, 1999–2018



The highest rate of salmonellosis was reported from West Coast (42.9 per 100,000) DHB followed by Southern (35.4 per 100,000), Taranaki (30.1 per 100,000) and Canterbury (29.7 per 100,000) DHBs (Figure 31).

Notification rates were highest for infants aged less than 1 year and children aged 1–4 years (88.0 and 54.4 per 100,000 respectively).

The notification rate for males (23.5 per 100,000) was slightly higher than for females (21.5 per 100,000).

Ethnicity was recorded for 1071 (97.4%) cases. The ethnic group with the highest notification rate was European or Other (23.6 per 100,000), followed by Pacific peoples (21.7 per 100,000).

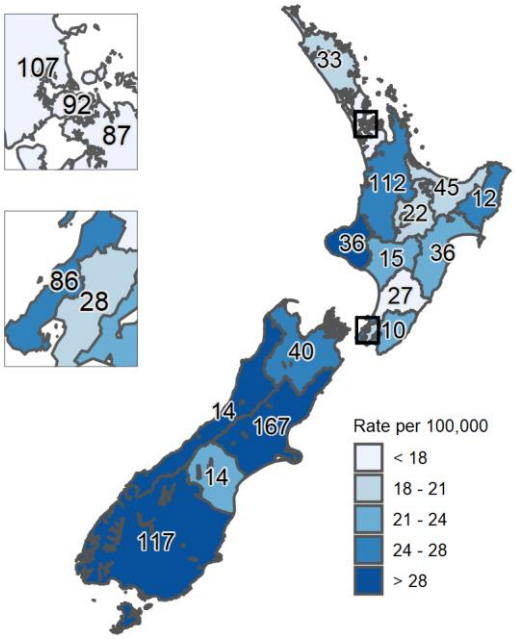
Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 1053 (95.7%) cases, of which 238 (22.6%) were hospitalised.

The most common risk factors reported for salmonellosis in 2018 were consumption of food from retail premises, overseas travel and contact with farm animals (Table 22).

In 2018, 14 outbreaks of salmonellosis were reported, involving 75 cases.

Figure 31. Salmonellosis notifications by DHB, 2018



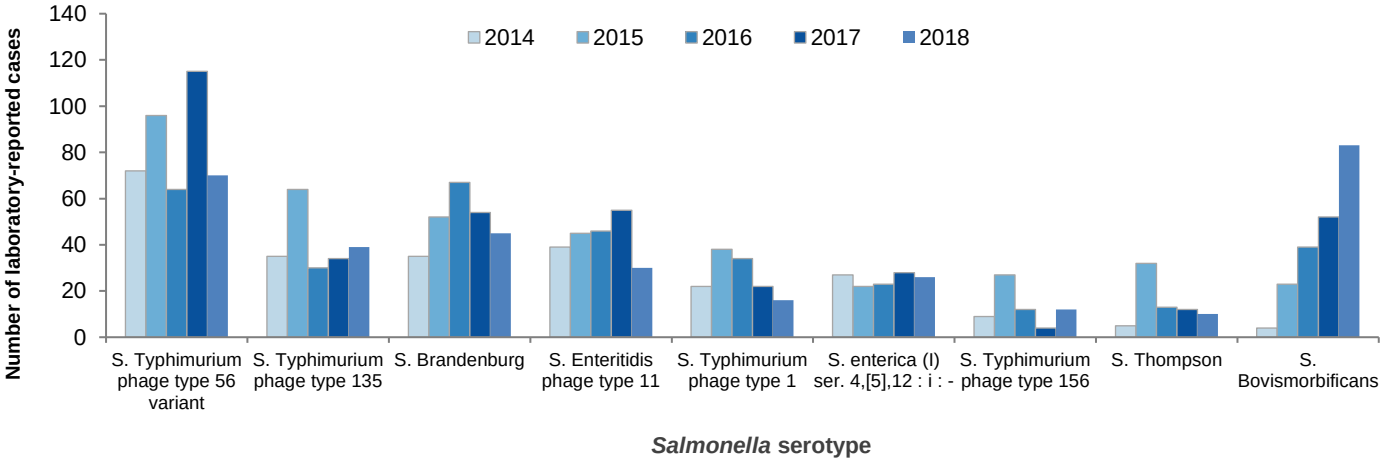
Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Table 22. Exposure to risk factors associated with salmonellosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	314	359	427	46.7
Travelled overseas during the incubation period	353	554	193	38.9
Contact with farm animals	204	517	379	28.3
Recreational water contact	187	514	399	26.7
Consumed untreated water	155	433	512	26.4
Contact with faecal matter	93	570	437	14.0
Contact with other symptomatic people	86	631	383	12.0
Contact with sick animals	42	611	447	6.4

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Figure 32. Laboratory-reported cases of selected *Salmonella* serotypes and phage types by year, 2014–2018



The Enteric Reference Laboratory at ESR confirmed the identity of *Salmonellae* isolated from 1051 cases of salmonellosis from humans in 2018 (excludes isolates of *S.* Paratyphi A, B and C, and *S.* Typhi). The most common serotypes identified were *S.* Typhimurium (345 cases), *S.* Enteritidis (130 cases), and *S.* Bovismorbificans (83 cases). The most common phage types within *Salmonella* Typhimurium (STM) were STM phage type 56 variant (70 isolates), STM phage type 101 (61 isolates), and STM phage type 135 (39 isolates).

The number of cases for selected *Salmonella* serotypes for the last five years is shown in Figure 32. Since 2014, the number of cases of *S.* Bovismorbificans has noticeably increased, from four cases in 2014 to 83 cases in 2018. This serotype is commonly found in animals. For other serotypes, the number of cases varies from year to year.

A summary of the laboratory-reported cases from 2014 to 2018 for selected *Salmonella* serotypes and phage types is provided in Table 36 in the Appendix.

Severe acute respiratory syndrome (SARS)

No cases of SARS have been diagnosed in New Zealand since SARS emerged in Southern China in 2003.[6]

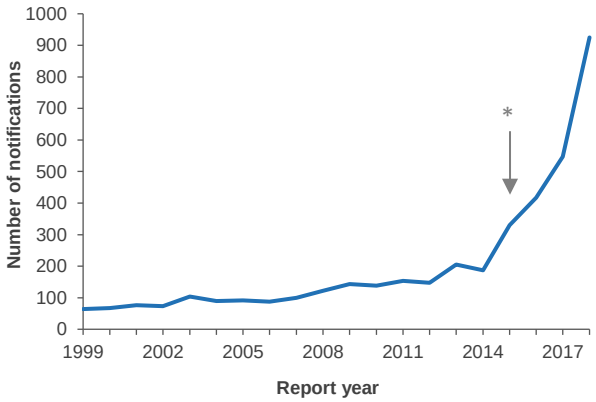
Shiga toxin-producing *Escherichia coli* infection (STEC)

Shiga toxin-producing *Escherichia coli* (STEC) may also be referred to as Verocytotoxin-producing *E. coli* (VTEC) or enterohaemorrhagic *E. coli* (EHEC). STEC is now the preferred term.

In 2018, 925 cases of STEC infection were notified, compared with 547 cases in 2017. The 2018 notification rate (18.9 per 100,000) was a significant increase from the 2017 rate (11.4 per 100,000). The introduction of diagnostic laboratory methods which are particularly sensitive to detecting non-O157 serotypes is the main contributor to the increase since mid-2015 (Figure 33).

Fourteen paediatric cases of haemolytic uraemic syndrome (HUS) were reported to the New Zealand Paediatric Surveillance Unit (NZPSU) in 2018. Twelve cases were confirmed to be STEC associated. A further six cases of STEC-associated HUS were notified in adults (age range 31–75 years).

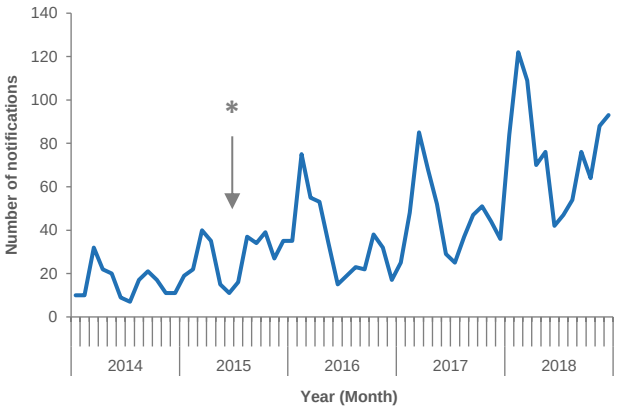
Figure 33. STEC infection notifications by year, 1999–2018



* Screening of faecal specimens using PCR begins in some laboratories

STEC infection notifications follow a seasonal pattern, with peaks occurring during autumn and spring each year (Figure 34).

Figure 34. STEC infection notifications by month, January 2014–December 2018



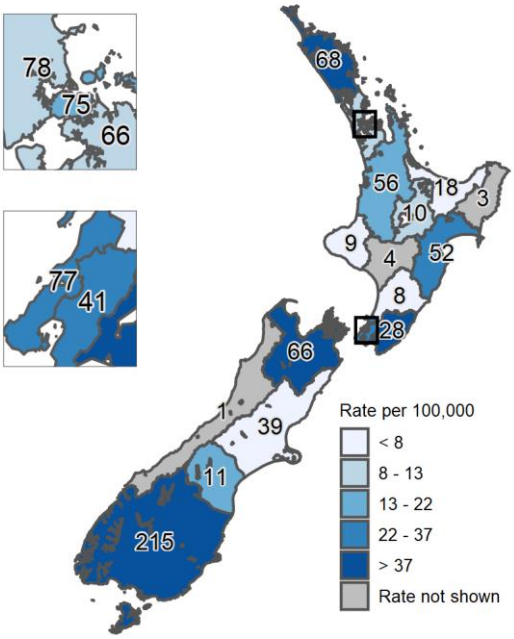
* Screening of faecal specimens using PCR begins in some laboratories

The highest rate of STEC infection notifications was from Southern (65.1 cases per 100,000) DHB, followed by Wairarapa (61.5 per 100,000), and Nelson Marlborough (43.8 per 100,000) DHBs (Figure 35). There was a statistically significant increase in rates from 2017 to 2018 for Auckland, Waikato, Hawke's Bay, Wairarapa, Hutt Valley, Capital & Coast, Nelson Marlborough and Southern DHBs.

Infants aged less than 1 year had the highest notification rate (69.7 per 100,000), followed by children aged 1–4 years (54.4 per 100,000).

Females had a higher notification rate (19.7 per 100,000) than males (18.1 per 100,000).

Figure 35. STEC infection notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Ethnicity was recorded for 900 (97.3%) cases. The ethnic group with the highest notification rate was European or Other (21.8 per 100,000), followed by MELAA (20.1 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 888 (96.0%) cases, of which 171 (19.3%) were hospitalised. Of these, 31.6% were O157:H7 (54 cases). HUS was confirmed in 18 cases and a serotype was determined in 14 of these (*E. coli* O157:H7, 9 cases; *E. coli* O26:H11 3 cases; *E. coli* O171:H2 and ONT:H11 1 case each).

Two deaths due to STEC infection were reported in 2018. Both cases were aged over 70 years.

The most common risk factors reported for STEC infection cases in 2018 were contact with pets, farm animals and animal manure (Table 23).

The most commonly consumed foods among STEC infection cases were dairy products, chicken or poultry products, raw fruit or vegetables and beef or beef products (Table 24).

Table 23. Exposure to risk factors associated with STEC infection, 2018

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with pets	382	58	485	86.8
Contact with farm animals	234	191	500	55.1
Contact with animal manure	136	217	572	38.5
Contact with recreational water	155	506	264	23.4
Contact with children in nappies	124	563	238	18.0
Contact with other animals	56	303	566	15.6
Travelled overseas during the incubation period	120	704	101	14.6
Contact with a person with similar symptoms	109	643	173	14.5

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

Table 24. Foods consumed by STEC infection cases, 2018

Foods consumed	Yes	No	Unknown	Percentage (%)[a]
Dairy products	508	130	287	79.6
Chicken or poultry products	473	128	324	78.7
Raw fruit or vegetables	484	136	305	78.1
Beef or beef products	464	208	253	69.0
Processed meat	315	338	272	48.2
Fruit or vegetable juice	224	354	347	38.8
Lamb or hogget or mutton	209	424	292	33.0
Home kill meat	143	546	236	20.8
Pink or undercooked meat	77	577	271	11.8
Unpasteurised milk or milk products	47	660	218	6.6

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known.

In 2018, 15 outbreaks of STEC infection were reported involving 57 cases.

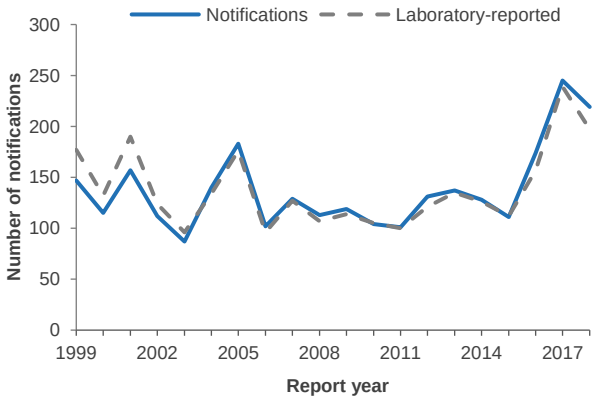
Ministry of Health hospital discharge data for 2018 included 19 hospitalisations where STEC infection was the principal diagnosis.

The Enteric Reference Laboratory at ESR confirmed 632 isolates of STEC in 2018. Of these, 194 (30.7%) were identified as *E. coli* O157:H7 and 376 (59.5%) as *E. coli* non-O157 serotypes. The most common non-O157 serotypes identified were *E. coli* O26:H11 (12.0%, 76 isolates) and *E.* coli O128:H2 (3.5%, 22 isolates). The serotype was undetermined in 62 (9.8%) cases, but verocytotoxin-producing genes were detected by PCR.

Shigellosis

In 2018, 219 cases of shigellosis were notified compared with 244 in 2017. The 2018 notification rate (4.5 per 100,000) was a decrease from the 2017 rate (5.1 per 100,000). Figure 36 shows total cases by year between 1999 and 2018.

Figure 36. Shigellosis notifications and laboratory-reported cases by year, 1999–2018



Auckland, Nelson Marlborough, Waitemata and Counties Manukau DHBs had the highest notification rates (9.1, 8.0, 6.3 and 6.1 per 100,000 respectively).

The highest notification rate was in children aged 1–4 years (9.3 per 100,000), followed by adults aged 20–29 (5.3 per 100,000), 60–69 (5.1 per 100,000) and 50–59 (4.6 per 100,000) years.

Males (4.8 per 100,000) had a similar rate to females (4.2 per 100,000).

Ethnicity was recorded for 212 (96.8%) cases. The ethnic group with the highest notification rate was Pacific peoples (21.4 per 100,000), followed by MELAA (9.2 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 216 (98.6%) cases, of which 51 (23.6%) were hospitalised.

The most commonly reported risk factors for shigellosis were overseas travel and consumption of food from retail premises (Table 25).

Overseas travel information was recorded for 205 (93.6%) cases, of which 136 (66.3%) had lived or travelled overseas during the incubation period for the disease. Nine further cases had a prior history of travel. The countries most commonly lived in or visited were India (31 cases), Samoa (22 cases), and Tonga (20 cases). Some cases reported travel to more than one country.

Seven outbreaks of shigellosis involving 36 cases were reported in 2018.

The Enteric Reference Laboratory at ESR confirmed 197 isolates as *Shigella* during 2018. The most common species identified were *S. sonnei* (100 isolates, 50.8%) and *S. flexneri* (84 isolates, 42.6%). The most common *S. sonnei* biotypes identified were biotype g (61 isolates, 61.6%) and biotype a (37 isolates, 37.4%).

Table 25. Exposure to risk factors associated with shigellosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Travelled overseas during the incubation period	136	69	4	66.3
Consumed food from retail premises	36	68	68	34.6
Recreational water contact	25	87	64	22.3
MSM[b]	12	44	163	21.4
Contact with other symptomatic people	30	121	45	19.9
Consumed untreated water	17	75	85	18.5
Contact with faecal matter	12	95	70	11.2

[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.
[b] MSM = Men who have sex with men.

Taeniasis

Four cases of taeniasis were notified in 2018, the same number as in 2017.

All four cases were overseas during the incubation period for the disease. Countries lived in or visited were Ethiopia (2 cases), Lebanon, and North Africa (not further defined) (1 case each).

A total of 60 cases have been notified since 1997, of which 59 cases (98.3%) reported a history of overseas travel. One case had an unknown travel history.

Tetanus

No cases of tetanus were notified in 2018.

Between 1997 and 2018, a total of 33 tetanus cases were reported. Of these, four were children aged less than 10 years. None were vaccinated. Of the 33 cases, two females aged over 70 years died from tetanus (one was not vaccinated and the vaccination status of the other was unknown).

Trichinellosis

No cases of trichinellosis were notified in 2018.

Trichinellosis was added to the notifiable diseases schedule in 1988. Since then four cases have been reported, with two cases reported in 2001.[29]

Tuberculosis disease

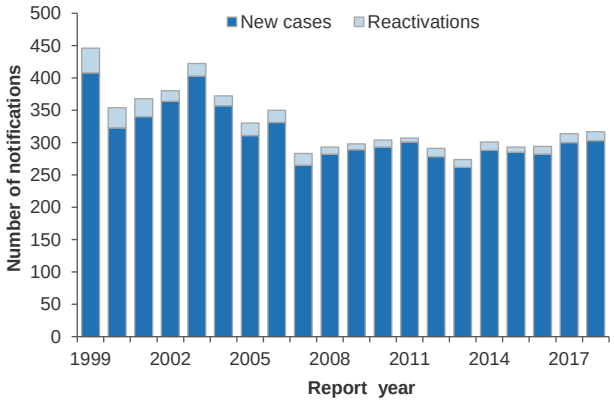
In 2018, 317 cases of tuberculosis were notified compared with 308 cases in 2017. The 2018 notification rate (6.5 per 100,000) was similar to the 2017 (6.4 per 100,000). There was a total of 303 (95.6%) new cases and 14 (4.4%) reactivations[*].

Figure 37 shows the total number of new and reactivation tuberculosis cases reported since 1999. The number of cases has remained fairly stable since 2007.

Laboratory information was available for 306 (96.5%) tuberculosis cases. Of these, 272 (88.9%) cases were reported as laboratory confirmed.

Information on tuberculosis disease cases by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Figure 37. Tuberculosis notifications (new cases and reactivations) by year, 1999–2018

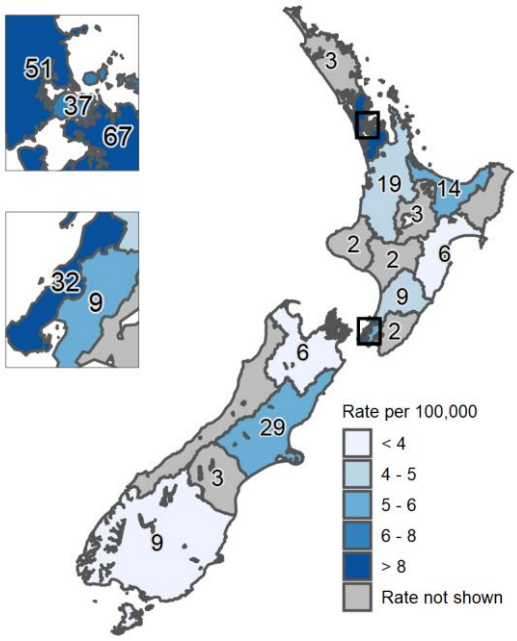


Ministry of Health hospitalisation discharge data for 2018 included 262 hospitalisations where tuberculosis was the principal diagnosis.

Tuberculosis disease – new cases

The highest notification rate for new tuberculosis cases was reported from Counties Manukau DHB (12.0 per 100,000), followed by Capital & Coast (10.1 per 100,000) and Waitemata (8.2 per 100,000) DHBs (Figure 38).

Figure 38. Tuberculosis notifications (new cases) by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Adults aged 30–39 years (10.5 per 100,000) had the highest notification rate for new tuberculosis followed by those aged 20–29 (8.7 per 100,000) and 60–69 (8.4 per 100,000) years. One case was a child aged less than 5 years.

[*] The term 'reactivation' refers to cases with second or subsequent episodes of tuberculosis disease.

Males and females had similar notification rates for new tuberculosis cases (6.4 and 6.0 per 100,000 respectively).

The ethnic group with the highest notification rate for new tuberculosis cases was Asian (35.7 per 100,000), followed by MELAA (23.8 per 100,000) and Pacific peoples (13.7 per 100,000).

Hospitalisation status was recorded for 294 (97.0%) new tuberculosis cases in 2018, of which 157 (53.4%) were hospitalised.

Three deaths due to tuberculosis were reported; two were aged 70 years and over and one was 40–49 years.

The tuberculosis case aged less than 5 years had not received the BCG vaccine and did not have miliary or meningeal tuberculosis.

The majority of new tuberculosis cases (245/302, 81.1%) were born overseas. Among the 57 cases born in New Zealand, 16 had been, or were presently, living with a person born outside New Zealand.

A total of 56 (24.8%) new tuberculosis cases reported contact with a confirmed case of tuberculosis.

Tuberculosis disease–reactivations/relapses

The 14 reactivation tuberculosis cases reported in 2018 were from six DHBs: Counties Manukau (4 cases), Auckland, Capital & Coast (3 cases each), Lakes (2 cases) Waikato, and Taranaki (1 case each).

The reactivation cases were all aged 20 years and over, with the highest numbers of cases aged 30–39 (5 cases) and 20–29 (4 cases) years.

Twelve reactivation tuberculosis cases were of Asian ethnicity, one was European or Other and one was MELAA.

Twelve of the 14 reactivation cases were born overseas, of which nine cases were diagnosed with previous disease overseas and two in New Zealand. The place of diagnosis was not recorded for one case. The two New Zealand born cases were previously diagnosed in New Zealand. Treatment status was recorded for 12 of the 14 reactivation cases, of which all had previously been treated for tuberculosis. Four cases were previously diagnosed and treated in New Zealand, one with pulmonary disease and three with extra pulmonary disease.

Hospitalisation status was recorded for 13 (92.9%) reactivation cases, of which eight were hospitalised.

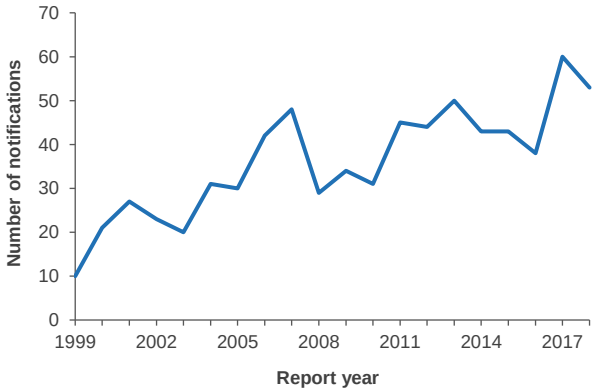
No deaths were reported among the reactivation tuberculosis cases.

Typhoid fever

In 2018, 53 cases of typhoid fever were notified compared with 59 cases in 2017. The 2018 notification rate (1.1 per 100,000) was similar to the 2017 rate (1.2 per 100,000).

Figure 39 shows an increasing trend in the number of typhoid fever notifications from 1999 to 2018. From 2011, the number of notified cases per year has ranged from 38 to 59.

Figure 39. Typhoid fever notifications by year, 1999–2018



Over half (54.7%) of the cases were reported from the three Auckland DHBs (Counties Manukau 16 cases, Auckland 8 cases, and Waitemata 5 cases).

Notification rates were highest for adults aged 20–29 (2.2 per 100,000) and 30–39 (2.1 per 100,000) years and children aged 10–14 (1.9 per 100,000) years.

Males (1.4 per 100,000) had a higher notification rate than females (0.8 per 100,000).

Ethnicity was recorded for 98.1% cases. The majority of cases were Asian (25 cases, 4.4 per 100,000) or Pacific peoples (23 cases, 7.7 per 100,000).

Hospitalisation status was recorded for 52 cases, of which 42 (80.8%) were hospitalised.

Of the 53 cases notified in 2018, 46 (86.8%) had travelled overseas during the incubation period for the disease. The countries most commonly visited were India (21 cases) and Samoa (19 cases). Some cases reported travel to more than one country.

Four typhoid fever outbreaks involving 24 cases were reported in 2018.

The Enteric Reference Laboratory at ESR confirmed isolates from 55 cases as being *Salmonella* Typhi during 2018. The most common phage types identified were *S.* Typhi phage type E1a (33 isolates) and *S.* Typhi phage type E9 variant (10 isolates).

Viral haemorrhagic fevers

No cases of viral haemorrhagic fever (including Ebola) have ever been reported in New Zealand.[6]

Yellow fever

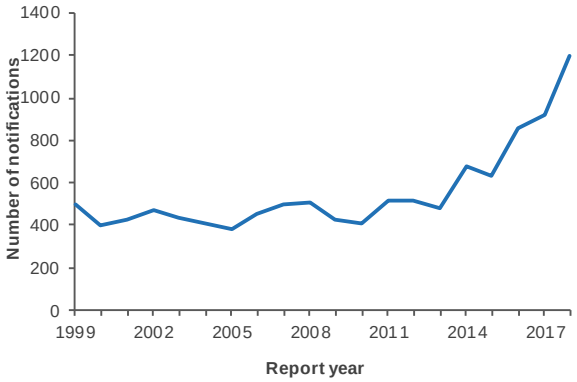
No cases of yellow fever have been notified in New Zealand since at least 1996.

Yersiniosis

In 2018, 1202 cases of yersiniosis were notified, compared with 917 cases in 1997. The 2018 notification rate (24.6 per 100,000) was a significant increase from the 2017 rate (19.1 per 100,000).

The number of notifications of yersiniosis has been steadily increasing since 2014, before the introduction of enteric PCR tests (Figure 40).

Figure 40. Yersiniosis notifications by year, 1999–2018

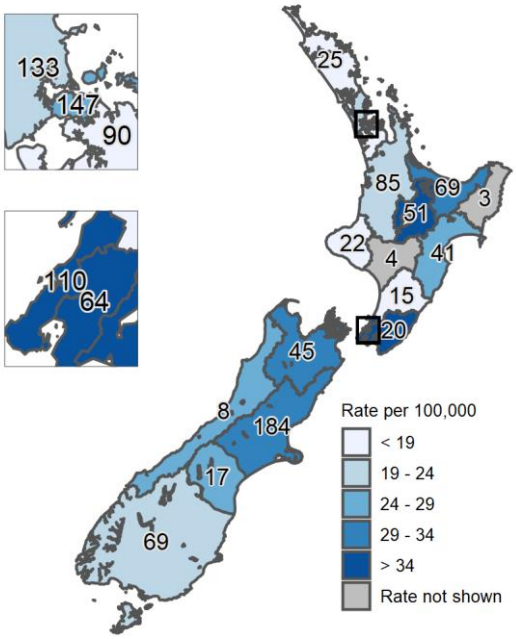


Lakes (46.5 per 100,000), Wairarapa (44.0 per 100,000) and Hutt Valley (42.8 per 100,000) DHBs had the highest notification rates for yersiniosis (Figure 41).

Infants aged less than 1 year and children aged 1–4 years had the highest notification rates (132.8 and 80.0 per 100,000 respectively).

Males (25.9 per 100,000) had a higher notification rate than females (23.4 per 100,000).

Figure 41. Yersiniosis notifications by DHB, 2018



Numbers represent notification count in DHB region.
Where fewer than five cases, the rate is not shown.

Ethnicity was recorded for 1095 (91.1%) cases. The ethnic group with the highest notification rate was Asian (40.7 per 100,000), followed by MELAA (23.8 per 100,000), and European or Other (21.6 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 33 to Table 36 in the Appendix.

Hospitalisation status was recorded for 810 (67.4%) cases, of which 102 (12.6%) were hospitalised.

The most commonly reported risk factors were consumption of food from retail premises and contact with farm animals (Table 26).

Two outbreaks due to *Yersinia* were reported in 2018, involving eight cases.

The Enteric Reference Laboratory at ESR confirmed 1049 isolates as *Yersinia enterocolitica* and 15 as *Y. pseudotuberculosis* during 2018. The most common *Y. enterocolitica* biotypes identified were biotype 2/3 serotype O:9 (594 isolates, 56.6%), biotype 4 serotype O:3 (207 isolates, 19.7%), and biotype 1A (201 isolates, 19.2). Diagnostic laboratories in the upper half of the North Island no longer routinely detect *Y. pseudotuberculosis* from faecal specimens, so this species is likely to be under-detected.

Table 26. Exposure to risk factors associated with yersiniosis, 2018

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	219	292	691	42.9
Contact with farm animals	151	420	631	26.4
Contact with faecal matter	128	419	655	23.4
Recreational water contact	130	429	643	23.3
Consumed untreated water	92	428	682	17.7
Contact with other symptomatic people	63	459	680	12.1
Travelled overseas during the incubation period	36	613	553	5.5
Contact with sick animals	21	512	669	3.9

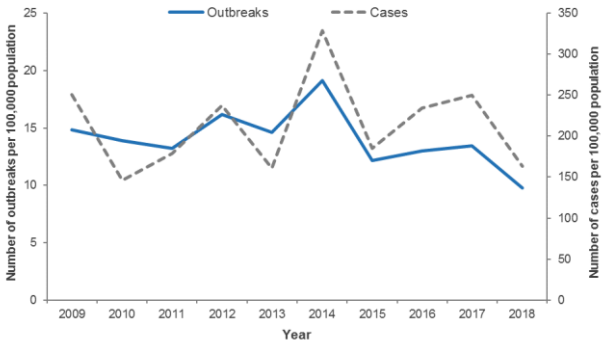
[a] Percentage refers to the number of cases that answered “yes” out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

OUTBREAKS

This section summarises outbreaks that were recorded in EpiSurv during 2018. There were 477 reported outbreaks in 2018, a significant decrease from the 644 reported in 2017. A total of 7962 cases were associated with outbreaks in 2018, compared with 11,963 cases in 2017.

The outbreak rate in 2018 (9.8 per 100,000 population) is the lowest annual rate reported in the last 10 years (Figure 42). The outbreak case rate was also down in 2018 (163.0 cases per 100,000 population), with the rate only lower in 2013 (160.8 cases per 100,000) and 2010 (145.9 per 100,000).

Figure 42. Number of outbreaks and associated cases by year, 2009–2018



Causal agents

A causal agent or condition was identified in 63.3% (302/477) of outbreaks, involving 71.5% (5687/7962) of all outbreak-associated cases (Table 29). No specific pathogen or condition was identified in the remaining 175 outbreaks, all of which were recorded as gastroenteritis.

Enteric agents were implicated in the majority of outbreaks (93.7%, 447/477) and accounted for the majority of associated cases (90.7%, 7222/7962) (Table 27). Norovirus (35.8%, 171/477) was the most common causal agent implicated in outbreaks in 2018 and accounted for 53.8% of outbreak cases.

Non-enteric agents accounted for 6.3% (30/477) of outbreaks.

Outbreak settings

Most (76.9%, 367/477) outbreaks were set in institutions, with long-term care facilities (33.5%, 160/477) and childcare centres (25.2%, 120/477) accounting for over half of the reported outbreaks (Table 28). Outbreaks in long-term care facilities also had the highest number of associated cases (3345).

Modes of transmission

The most commonly reported mode of transmission in 2018 was person-to-person (84.5%, 403/477 outbreaks) (Table 29). Person-to-person transmission also accounted for the highest percentage of associated cases (94.5%, 7522/7962).

Table 27. Outbreaks and associated cases by pathogen, 2018

Pathogen or condition	Outbreaks[1]			Cases[1]	
	Total	% of outbreaks (n=477)	Median cases per outbreak	Total	% of cases (n=7962)
Enteric	**447**	**93.7**	**12.0**	**7222**	**90.7**
Norovirus	171	35.8	17	4280	53.8
Cryptosporidium spp.	19	4.0	6	209	2.6
Campylobacter spp.	16	3.4	4.5	92	1.2
Giardia spp.	16	3.4	4	106	1.3
STEC infection	15	3.1	2	57	0.7
Salmonella spp.[2]	14	2.9	2.5	75	0.9
Shigella spp.	7	1.5	3	36	0.5
Rotavirus	5	1.0	12	71	0.9
Hepatitis A	4	0.8	3	17	0.2
Typhoid fever	4	0.8	3	24	0.3
Sapovirus	3	0.6	14	44	0.6
Histamine (scombroid) fish poisoning	2	0.4	2.5	5	0.1
Yersinia spp.	2	0.4	4	8	0.1
Adenovirus	1	0.2	16	16	0.2
Astrovirus	1	0.2	23	23	0.3
Clostridium perfringens	1	0.2	21	21	0.3
Cyanobacteria spp.	1	0.2	18	18	0.2
Staphylococcus aureus	1	0.2	9	9	0.1
Pathogen not identified[3]	175	36.7	11	2267	28.5
Non-enteric	**30**	**6.3**	**5.5**	**740**	**9.3**
Influenza[4]	19	4.0	8	685	8.6
Measles virus	4	0.8	3.5	25	0.3
Mumps virus	4	0.8	4	21	0.3
Streptococcus A	2	0.4	2	4	0.1
Legionella spp.	1	0.2	2	2	0.0
Neisseria meningitidis B	1	0.2	5	5	0.1

[1] More than one agent was reported in nine outbreaks, therefore the numbers don't add up to the group totals.
[2] Includes non-typhoidal *Salmonella* species only. Outbreaks of *S.* Typhi and *S.* Paratyphi are reported separately.
[3] All enteric outbreaks with no identified pathogen were recorded as gastroenteritis.
[4] Includes outbreaks of acute respiratory infection (1 outbreak, 8 cases), influenza A (17 outbreaks, 662 cases) and RSV (1 outbreak, 15 cases).

Table 28. Outbreaks and associated cases by setting of exposure, 2018

Outbreak setting	Outbreaks[1]		Cases[1]	
	Total	% of outbreaks (n=477)	Total	% of cases (n=7962)
Institution	**367**	**76.9**	**7292**	**91.6**
Long term care facility	160	33.5	3345	42.0
Childcare centre	120	25.2	1956	24.6
Hospital (acute care)	33	6.9	321	4.0
School	25	5.2	1216	15.3
Camp	5	1.0	97	1.2
Hostel / boarding house	4	0.8	152	1.9
Hotel / motel	2	0.4	22	0.3
Marae	2	0.4	29	0.4
Other institution	16	3.4	154	1.9
Commercial food operators	**29**	**6.1**	**163**	**2.0**
Restaurant / café / bakery	13	2.7	92	1.2
Takeaway	4	0.8	9	0.1
Supermarket / delicatessen	3	0.6	9	0.1
Caterers	2	0.4	26	0.3
Fast food restaurant	1	0.2	12	0.2
Other food outlet	6	1.3	15	0.2
Workplace / Community / Other	**79**	**16.6**	**538**	**6.8**
Home	53	11.1	196	2.5
Workplace	5	1.0	32	0.4
Farm	4	0.8	23	0.3
Community, church, sports gathering	4	0.8	71	0.9
Cruise ship, airline, tour bus, train	1	0.2	2	0.0
Other setting	12	2.5	214	2.7
Unknown setting	**11**	**2.3**	**46**	**0.6**

[1] More than one setting was recorded in nine outbreaks, therefore the numbers don't add up to the group totals

Table 29. Outbreaks and associated cases by mode of transmission, 2018

Mode of transmission	Outbreaks				Cases	
	Primary mode	Secondary mode	Total	Percentage of outbreaks (n=477)[1]	Total	Percentage of cases (n=7962)[1]
Person-to-person	339	64	403	84.5	7522	94.5
Environmental	7	66	73	15.3	1585	19.9
Foodborne	35	8	43	9.0	580	7.3
Zoonotic	2	3	5	1.0	42	0.5
Waterborne	5	4	9	1.9	83	1.0
Other	2	1	3	0.6	36	0.5
Unknown	-	-	33	6.9	173	2.2

[1] More than one mode of transmission was recorded for 86 outbreaks therefore the totals add up to more than 100%.
Note: No outbreaks with sexual, vector borne or parenteral transmission were reported in 2018.

APPENDIX: NATIONAL DATA AND TRENDS

Table 30. Numbers of cases for rare notifiable diseases in New Zealand, 2017 and 2018

Disease[a]	2018	2017
Brucellosis	3	1
Cholera	1	0
Creutzfeldt-Jakob disease[b]	7	13
Cysticercosis	1	0
Decompression sickness	1	0
Diphtheria	0	1
Haemophilus influenzae type b disease	3	4
Hepatitis NOS	7	10
Hydatid disease	0	1
Leprosy	3	3
Rickettsial disease	3	4
Ross River virus infection	1	7
Rubella	1	1
Taeniasis	4	4
Zika virus	2	11

[a] No cases of the following notifiable diseases were reported in 2017 or 2018: anthrax, Barmah Forest virus infection, botulism, congenital rubella, *Cronobacter* species invasive disease, highly pathogenic avian influenza (HPAI), Japanese encephalitis, Middle East respiratory syndrome (MERS), non-seasonal influenza, plague, poliomyelitis, primary amoebic meningoencephalitis, Q fever, rabies, severe acute respiratory syndrome (SARS), tetanus, trichinellosis, viral haemorrhagic fever and yellow fever.

[b] Creutzfeldt-Jakob disease data is provided by the National CJD Registry, University of Otago.

Table 31. Deaths due to notifiable diseases, as recorded in EpiSurv, 1999–2018

Disease	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AIDS [a]	18	19	14	11	10	14	15	15	11	8	9	15	5	9	8	7	6	3	11	5
Campylobacteriosis	1	3	1	1	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0
Creutzfeldt-Jakob disease[b]	2	7	1	3	4	6	3	5	5	4	7	3	4	10	4	9	6	4	13	4
Gastroenteritis[c]	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0
Giardiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Hepatitis B	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1	1	0	0	1
Hydatid disease	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Invasive pneumococcal disease[d]										7	33	25	30	29	18	23	27	22	27	20
Legionellosis[e]	1	5	2	3	1	1	4	2	1	4	2	5	4	6	3	1	4	1	5	3
Listeriosis – non-pregnancy associated	1	2	1	0	2	3	1	0	2	3	2	3	1	4	2	3	1	0	0	2
Listeriosis – pregnancy associated	2	4	1	2	2	2	4	1	1	2	2	4	0	2	3	1	3	2	0	0
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Meningococcal disease	23	17	26	18	13	8	14	7	7	8	5	6	13	6	4	3	4	2	9	10
Non seasonal influenza A (H1N1)[f]											36	17	0	0	0	0	0	0	0	0
Pertussis	0	1	0	1	1	1	1	0	0	0	0	0	1	2	1	0	0	0	0	0
Primary amoebic meningoencephalitis	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatic fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	1	7	2	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0
Shigellosis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
STEC infection	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
Tetanus	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Tuberculosis disease	14	8	2	6	6	6	4	6	3	4	4	9	3	4	3	5	6	5	1	3
Typhoid fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Yersiniosis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[a] Data source: AIDS Epidemiology Group.

[b] Data source: CJD Registry.[15]

[c] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication

[d] Invasive pneumococcal disease became notifiable on 17 October 2008.

[e] One further legionellosis death occurred in a laboratory-reported but non-notified case in 2002.

[f] Non-seasonal influenza became notifiable on 26 April 2009. Deaths recorded in 2009 and 2010 were due to influenza A(H1N1)pdm09. Influenza A(H1N1)pdm09 virus was re-classified as seasonal influenza from 1 January 2011.

Note: The numbers in this table are those recorded in EpiSurv where the notifiable disease was the primary cause of death. Information on a death is most likely to be reported by public health services when it occurs close to the time of notification and investigation.

Table 32. Hospital admissions for selected notifiable diseases, 2016–2018

Disease	ICD 10 codes	2016		2017		2018	
		Prin [a]	Oth [b]	Prin [a]	Oth [b]	Prin [a]	Oth [b]
AIDS	B20-B24	9	241	6	263	7	278
Arboviral diseases	A83, A84, A85.2, A92, A93, A94, B33.1	12	11	6		3	
Brucellosis	A23				1	1	3
Campylobacteriosis	A04.5	609	124	591	142	630	150
Cholera	A00	1		2		2	2
Creutzfeldt-Jakob disease	A81.0	6	2	19	6	3	
Cryptosporidiosis	A07.2	39	11	46	21	82	53
Cysticercosis	B69			1		4	1
Decompression sickness	T70.3	17	6	25	2	16	1
Dengue fever	A90, A91	63	5	83	4	155	15
Diphtheria	A36	1	1	2	3	1	1
Giardiasis	A07.1	29	22	38	33	38	26
Hepatitis A	B15	19	65	40	42	47	49
Hepatitis B	B16	19	33	9	21	22	17
Hepatitis C	B17.1	7	8	6	10	10	11
Hydatid disease	B67.0-B67.4			1	1	2	1
Legionellosis	A48.1	70	82	82	89	70	74
Leprosy	A30	1	1		1	2	
Leptospirosis	A27	70	17	100	16	84	17
Listeriosis	A32	21	22	7	12	17	24
Malaria	B50-B54	20	1	31	3	24	2
Measles	B05	33	3	5		9	2
Meningococcal disease	A39	92	27	114	35	118	50
Mumps	B26	10	4	108	10	22	7
Paratyphoid	A01.1-A01.4	6		14	5	12	
Pertussis	A37	75	27	141	39	194	64
Q fever	A78					2	
Rheumatic fever	I00, I01, I02	187	37	207	26	228	38
Rickettsial diseases	A75, A77, A79	5		4		6	1
Rubella	B06		3	1			2
Salmonellosis	A02	159	53	175	40	199	61
Shigellosis	A03	21	10	33	12	37	22
STEC infection	A04.3	10	6	11	9	19	22
Taeniasis	B689						
Tetanus	A33-A35	3	1	3	3		1
Tuberculosis	A15-A19, P37.0	207	127	224	123	262	135
Typhoid	A01.0	39	6	65	4	60	8
Viral haemorrhagic fevers	A95, A98, A99	1	2				
Yellow fever	A95						
Yersiniosis	A04.6	41	26	54	37	85	67

[a] Principal diagnosis.

[b] Other relevant diagnosis.

Note: Hospital admission data may include multiple admissions (to the same or different hospitals) for the same case, and admissions may relate to cases first diagnosed in previous years.

Table 33. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2018

Disease	District Health Board [a]																			
	Northland		Waitemata		Auckland		Counties Manukau		Waikato		Lakes		Bay of Plenty		Tairawhiti		Taranaki		Hawke's Bay	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	244	136.2	903	145.6	586	109.2	577	103.4	675	162.1	154	140.4	242	102.1	54	110.0	222	185.3	294	177.3
Cryptosporidiosis	72	40.2	198	31.9	170	31.7	206	36.9	132	31.7	25	22.8	54	22.8	10	20.4	35	29.2	77	46.4
Dengue fever	7	3.9	49	7.9	58	10.8	80	14.3	22	5.3			11	4.6			3		5	3.0
Gastroenteritis[b]	41	22.9	9	1.5	5	0.9	3		17	4.1	10	9.1	15	6.3			2			
Giardiasis	56	31.3	177	28.5	233	43.4	150	26.9	151	36.3	32	29.2	82	34.6	34	69.2	25	20.9	68	41.0
Hepatitis A	2		11	1.8	16	3.0	8	1.4	6	1.4									3	
Hepatitis B[c]	1		5	0.8	7	1.3	6	1.1					1				3			
Hepatitis C[c]			1		5	0.9	1										1		3	
Invasive pneumococcal disease	30	16.8	51	8.2	35	6.5	93	16.7	48	11.5	25	22.8	31	13.1	6	12.2	19	15.9	32	19.3
Legionellosis	11	6.1	20	3.2	18	3.4	22	3.9	6	1.4	3		12	5.1			4			
Leptospirosis	8	4.5	7	1.1	2		4		23	5.5	4		8	3.4	6	12.2	2		19	11.5
Listeriosis	2		4		3		4		1				2							
Malaria	2		6	1.0	7	1.3	3		3						1		1		2	
Measles			2		3				1											
Meningococcal disease	13	7.3	13	2.1	12	2.2	13	2.3	8	1.9	3		10	4.2	1		4			
Mumps	23	12.8	80	12.9	93	17.3	96	17.2	9	2.2	42	38.3	7	3.0	2		3		11	6.6
Paratyphoid fever			3		5	0.9	2												2	
Pertussis	115	64.2	274	44.2	209	38.9	220	39.4	326	78.3	84	76.6	309	130.4	14	28.5	37	30.9	73	44.0
Rheumatic fever[d]	13	7.3	15	2.4	20	3.7	90	16.1	12	2.9	4		6	2.5	2		1		4	
Salmonellosis	33	18.4	107	17.2	92	17.1	87	15.6	112	26.9	22	20.1	45	19.0	12	24.4	36	30.1	36	21.7
Shigellosis	2		39	6.3	49	9.1	34	6.1	17	4.1	2		8	3.4	1		4		9	5.4
STEC infection	68	38.0	78	12.6	75	14.0	66	11.8	56	13.4	10	9.1	18	7.6	3		9	7.5	52	31.4
Tuberculosis disease	3		51	8.2	40	7.5	71	12.7	20	4.8	5	4.6	14	5.9			3		6	3.6
Typhoid fever			5	0.8	8	1.5	16	2.9	4		1		1							
Yersiniosis	25	14.0	133	21.4	147	27.4	90	16.1	85	20.4	51	46.5	69	29.1	3		22	18.4	41	24.7

[a] Table is continued on the following page.

[b] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication.

[c] Only acute cases of this disease are notifiable.

[d] Includes rheumatic fever initial episodes and recurrent cases.

Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

Table 33. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2018 (continued)

Disease	District Health Board [a]																			
	Whanganui		MidCentral		Hutt Valley		Capital & Coast		Wairarapa		Nelson Marlborough		West Coast		Canterbury		South Canterbury		Southern	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	81	124.8	297	165.6	195	130.4	432	136.1	79	173.6	239	158.7	50	153.4	762	135.3	150	250.4	721	218.4
Cryptosporidiosis	15	23.1	80	44.6	58	38.8	186	58.6	20	44.0	34	22.6	6	18.4	99	17.6	21	35.1	113	34.2
Dengue fever	2		6	3.3	1		14	4.4			7	4.6			20	3.6	1		8	2.4
Gastroenteritis[b]	3		1		17	11.4	41	12.9	4		9	6.0	4		47	8.3			6	1.8
Giardiasis	14	21.6	43	24.0	51	34.1	130	40.9	22	48.4	35	23.2	6	18.4	167	29.7	25	41.7	84	25.4
Hepatitis A	2		2				1				3				4				10	3.0
Hepatitis B[c]							1		1		2				3		1		3	
Hepatitis C[c]							1				5	3.3	1		10	1.8	1		5	1.5
Invasive pneumococcal disease	12	18.5	13	7.3	19	12.7	29	9.1	10	22.0	17	11.3	4		42	7.5	2		39	11.8
Legionellosis	1		2		1		1				3				51	9.1			19	5.8
Leptospirosis	4		6	3.3			1		3		2		1		7	1.2			3	
Listeriosis	1		1		1		4		1		1				3				2	
Malaria					3		4				1				2				1	
Measles							1				2				13	2.3			8	2.4
Meningococcal disease	3		4		2		6	1.9	1		4				10	1.8	1		12	3.6
Mumps	1		2		4		7	2.2	1		9	6.0	1		4		2		45	13.6
Paratyphoid fever							2				1		1		2				1	
Pertussis	13	20.0	47	26.2	95	63.5	261	82.2	64	140.7	369	245.0	152	466.3	178	31.6	18	30.1	94	28.5
Rheumatic fever[d]	1		2		3		10	3.1			1				3				1	
Salmonellosis	15	23.1	27	15.1	28	18.7	86	27.1	10	22.0	40	26.6	14	42.9	167	29.7	14	23.4	117	35.4
Shigellosis	1				8	5.4	12	3.8			12	8.0			14	2.5	1		6	1.8
STEC infection	4		8	4.5	41	27.4	77	24.3	28	61.5	66	43.8	1		39	6.9	11	18.4	215	65.1
Tuberculosis disease	2		9	5.0	9	6.0	35	11.0	2		6	4.0			29	5.1	3		9	2.7
Typhoid fever	1				5	3.3	3								7	1.2			2	
Yersiniosis	4		15	8.4	64	42.8	110	34.6	20	44.0	45	29.9	8	24.5	184	32.7	17	28.4	69	20.9

[a] Table is continued from the previous page.

[b] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication.

[c] Only acute cases of this disease are notifiable.

[d] Includes rheumatic fever initial episodes and recurrent cases.

Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

Table 34. Number of cases and rate per 100,000 population of notifiable diseases by sex, 2018

Disease	Sex					
	Male		Female		Total [a]	
	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	3871	160.7	3085	124.6	6957	142.4
Cryptosporidiosis	718	29.8	892	36.0	1611	33.0
Dengue fever	144	6.0	149	6.0	294	6.0
Gastroenteritis (acute)[b]	101	4.2	131	5.3	234	4.8
Giardiasis	848	35.2	737	29.8	1585	32.4
Hepatitis A	37	1.5	31	1.3	68	1.4
Hepatitis B[c]	25	1.0	9	0.4	34	0.7
Hepatitis C[c]	16	0.7	18	0.7	34	0.7
Invasive pneumococcal disease	277	11.5	280	11.3	557	11.4
Legionellosis	113	4.7	61	2.5	174	3.6
Leptospirosis	96	4.0	14	0.6	110	2.3
Listeriosis	14	0.6	16	0.6	30	0.6
Malaria	24	1.0	12	0.5	36	0.7
Measles	17	0.7	13	0.5	30	0.6
Meningococcal disease	59	2.4	61	2.5	120	2.5
Mumps	233	9.7	208	8.4	442	9.0
Paratyphoid fever	12	0.5	7	0.3	19	0.4
Pertussis	1306	54.2	1644	66.4	2952	60.4
Rheumatic fever[d]	103	4.3	85	3.4	188	3.8
Salmonellosis	566	23.5	533	21.5	1100	22.5
Shigellosis	115	4.8	104	4.2	219	4.5
STEC infection	437	18.1	488	19.7	925	18.9
Tuberculosis disease	161	6.7	156	6.3	317	6.5
Typhoid fever	33	1.4	20	0.8	53	1.1
Yersiniosis	623	25.9	579	23.4	1202	24.6

[a] Total includes cases where sex was unknown.

[b] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication.

[c] Only acute cases of this disease are notifiable.

[d] Includes rheumatic fever initial episodes and recurrent cases.

Table 35. Number of cases and rate per 100,000 population of notifiable diseases by age group, 2018

Disease	<1 year		1–4 years		5–9 years		10–14 years		15–19 years		20–29 years		30–39 years		40–49 years		50–59 years		60–69 years		70+ years		Total[a]	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	138	229.2	746	302.9	300	91.7	232	74.6	391	124.5	1057	143.2	761	121.1	775	125.9	877	140.2	799	156.9	880	172.6	6957	142.4
Cryptosporidiosis	38	63.1	384	155.9	193	59.0	91	29.3	92	29.3	271	36.7	252	40.1	129	21.0	59	9.4	60	11.8	42	8.2	1611	33.0
Dengue fever			1		5	1.5	16	5.1	27	8.6	55	7.4	61	9.7	54	8.8	38	6.1	27	5.3	10	2.0	294	6.0
Gastroenteritis[b]	6	10.0	21	8.5	6	1.8	4		14	4.5	30	4.1	39	6.2	33	5.4	31	5.0	24	4.7	17	3.3	234	4.8
Giardiasis	20	33.2	261	106.0	98	29.9	46	14.8	32	10.2	217	29.4	325	51.7	186	30.2	191	30.5	144	28.3	65	12.8	1585	32.4
Hepatitis A			5	2.0	13	4.0	3		7	2.2	21	2.8	7	1.1	4		2		3		3		68	1.4
Hepatitis B[c]	1								3		9	1.2	6	1.0	9	1.5	2		2		2		34	0.7
Hepatitis C[c]									1		8	1.1	10	1.6	6	1.0	5	0.8	3		1		34	0.7
Invasive pneumococcal disease	17	28.2	29	11.8	20	6.1	9	2.9	14	4.5	19	2.6	39	6.2	44	7.1	85	13.6	103	20.2	178	34.9	557	11.4
Legionellosis					1				2		3		7	1.1	22	3.6	37	5.9	43	8.4	59	11.6	174	3.6
Leptospirosis									3		24	3.3	19	3.0	22	3.6	21	3.4	18	3.5	3		110	2.3
Listeriosis											1		3		2		2		5	1.0	17	3.3	30	0.6
Malaria			1		1		1		3		13	1.8	7	1.1	5	0.8	4		1				36	0.7
Measles	2		4				1		2		7	0.9	5	0.8	7	1.1	2						30	0.6
Meningococcal disease	17	28.2	15	6.1	9	2.8	5	1.6	19	6.0	15	2.0	8	1.3	6	1.0	6	1.0	9	1.8	11	2.2	120	2.5
Mumps	10	16.6	38	15.4	45	13.8	37	11.9	51	16.2	156	21.1	45	7.2	30	4.9	23	3.7	5	1.0	2		442	9.0
Paratyphoid fever			1						1		9	1.2	3		3		1		1				19	0.4
Pertussis	184	305.5	370	150.2	407	124.4	306	98.4	192	61.1	254	34.4	296	47.1	372	60.4	274	43.8	163	32.0	134	26.3	2952	60.4
Rheumatic fever[d]			2		53	16.2	50	16.1	34	10.8	35	4.7	13	2.1	1								188	3.8
Salmonellosis	53	88.0	134	54.4	71	21.7	29	9.3	65	20.7	160	21.7	120	19.1	126	20.5	147	23.5	109	21.4	86	16.9	1100	22.5
Shigellosis	1		23	9.3	12	3.7	7	2.3	8	2.5	39	5.3	28	4.5	25	4.1	29	4.6	26	5.1	21	4.1	219	4.5
STEC infection	42	69.7	134	54.4	49	15.0	42	13.5	47	15.0	103	14.0	79	12.6	78	12.7	89	14.2	110	21.6	152	29.8	925	18.9
Tuberculosis disease			1		1		7	2.3	13	4.1	68	9.2	71	11.3	38	6.2	32	5.1	44	8.6	42	8.2	317	6.5
Typhoid fever			3		2		6	1.9	1		16	2.2	13	2.1	4		3		3		2		53	1.1
Yersiniosis	80	132.8	197	80.0	48	14.7	53	17.0	55	17.5	152	20.6	141	22.4	110	17.9	147	23.5	106	20.8	113	22.2	1202	24.6

[a] Total includes cases where age was unknown.

[b] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication

[c] Only acute cases of this disease are notifiable.

[d] Includes rheumatic fever initial episodes and recurrent cases.

Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

Table 36. Number of cases and rate per 100,000 population of notifiable diseases by ethnic group, 2018

Disease	Ethnic group											
	Māori		Pacific peoples		Asian		MELAA[a]		European or Other		Total[b]	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	577	79.9	142	47.5	367	65.2	44	80.5	4977	153.3	6957	142.4
Cryptosporidiosis	205	28.4	72	24.1	86	15.3	13	23.8	1078	33.2	1611	33.0
Dengue fever	6	0.8	174	58.2	37	6.6	2		69	2.1	294	6.0
Gastroenteritis[c]	22	3.0	10	3.3	15	2.7	2		167	5.2	234	4.8
Giardiasis	144	20.0	23	7.7	98	17.4	27	49.4	1132	34.9	1585	32.4
Hepatitis A	5	0.7	21	7.0	18	3.2	5	9.2	17	0.5	68	1.4
Hepatitis B[d]	5	0.7	12	4.0	6	1.1	1		8	0.2	34	0.7
Hepatitis C[d]	10	1.4	1		1				21	0.6	34	0.7
Invasive pneumococcal disease	128	17.7	93	31.1	25	4.4			292	9.0	557	11.4
Legionellosis	14	1.9	5	1.7	6	1.1	3		144	4.4	174	3.6
Leptospirosis	18	2.5	6	2.0	1				85	2.6	110	2.3
Listeriosis	1		3		3				23	0.7	30	0.6
Malaria	1		3		12	2.1	7	12.8	10	0.3	36	0.7
Measles			1		5	0.9			23	0.7	30	0.6
Meningococcal disease	33	4.6	15	5.0	9	1.6	2		61	1.9	120	2.5
Mumps	68	9.4	110	36.8	75	13.3	15	27.5	158	4.9	442	9.0
Paratyphoid fever	2				12	2.1			4		19	0.4
Pertussis	553	76.6	154	51.5	92	16.3	19	34.8	2090	64.4	2952	60.4
Rheumatic fever[e]	69	9.6	112	37.4	1				6	0.2	188	3.8
Salmonellosis	122	16.9	65	21.7	107	19.0	10	18.3	767	23.6	1100	22.5
Shigellosis	16	2.2	64	21.4	30	5.3	5	9.2	97	3.0	219	4.5
STEC infection	96	13.3	27	9.0	57	10.1	11	20.1	709	21.8	925	18.9
Tuberculosis disease	24	3.3	41	13.7	213	37.9	14	25.6	20	0.6	317	6.5
Typhoid fever			23	7.7	25	4.4			4		53	1.1
Yersiniosis	102	14.1	49	16.4	229	40.7	13	23.8	702	21.6	1202	24.6

[a] Middle Eastern/Latin American/African.

[b] Total includes cases where ethnicity was unknown.

[c] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication.

[d] Only acute cases of this disease are notifiable.

[e] Includes rheumatic fever initial episodes and recurrent cases.

Note: Denominator data used to determine disease rates for ethnic groups is based on the proportion of people in each ethnic group from the estimated resident 2013 census population applied to the 2017 mid-year population estimates from Statistics New Zealand. Ethnicity is prioritised in the following order: Māori, Pacific peoples, Asian, MELAA and European or Other (including New Zealander) ethnic groups. Where fewer than five cases have been notified a rate has not been calculated and the cell is blank.

Table 37. Number of notifiable disease cases by year, 2009–2018

Disease	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AIDS	28	39	24	20	25	19	9	23	12	15
Campylobacteriosis	7177	7346	6686	7016	6837	6782	6218	7457	6482	6957
Cholera	0	2	0	0	0	0	0	0	0	1
Creutzfeldt-Jakob disease	7	3	4	10	4	9	6	4	13	4
Cryptosporidiosis	854	954	610	877	1348	584	696	1062	1192	1611
Dengue fever	139	50	42	76	106	178	125	191	161	294
Gastroenteritis [a]	712	493	567	735	557	756	503	510	324	234
Giardiasis	1639	1985	1934	1714	1729	1709	1510	1616	1648	1585
Haemophilus influenzae type b	10	8	8	4	2	5	3	2	4	3
Hepatitis A	44	46	26	82	91	74	47	35	58	68
Hepatitis B	55	51	51	39	28	35	34	34	27	34
Hepatitis C [b]	32	16	26	31	36	29	35	31	21	34
Hydatid disease	2	4	6	1	7	4	4	2	1	0
Invasive pneumococcal disease	697	535	552	489	479	489	447	480	522	557
Legionellosis	74	173	158	149	151	123	246	247	221	174
Leprosy	3	3	1	2	7	4	5	0	3	3
Leptospirosis	68	81	68	108	60	56	63	85	139	110
Listeriosis	28	23	26	25	19	25	26	36	21	30
Malaria	50	44	52	38	47	33	38	26	42	36
Measles	248	48	596	68	8	280	10	103	15	30
Meningococcal disease	132	97	119	85	68	45	64	75	112	120
Mumps	63	41	51	26	23	18	13	20	1338	442
Paratyphoid fever	25	19	13	22	25	19	34	32	37	19
Pertussis	1398	872	1996	5897	3540	1099	1168	1093	2142	2952
Rheumatic fever - initial episode	126	152	155	163	192	179	104	125	145	169
Rubella	4	4	22	4	1	4	0	3	1	1
Salmonellosis	1128	1146	1055	1081	1143	955	1051	1091	1127	1100
Shigellosis	119	104	101	131	137	128	111	174	244	219
STEC infection	143	138	153	147	205	187	330	417	547	925
Tetanus	1	7	0	2	1	0	1	1	0	0
Tuberculosis disease	298	304	307	291	274	301	293	295	308	317
Typhoid fever	34	31	45	44	50	43	43	38	59	53
Yersiniosis	430	406	513	514	483	680	634	858	917	1202
Zika virus	-	-	-	-	-	57	9	100	11	2

[a] Cases of acute gastroenteritis from a common source or person in a high risk category (e.g. food handler or childcare worker) or foodborne intoxication, e.g., staphylococcal intoxication..

[b] Only acute cases of this disease are notifiable.

Table 38. Number of laboratory-reported cases of salmonellosis for selected *Salmonella* serotypes and phage types, 2014–2018

Serotype[a]	2014	2015	2016	2017	2018
S. Typhimurium	**392**	**447**	**389**	**429**	**345**
1	22	38	34	22	16
9	17	27	42	14	21
12[a]	20	18	6	7	7
56 variant[b]	72	96	64	115	70
101	41	56	47	65	61
135	35	64	30	34	39
156	9	27	12	4	12
160	27	9	6	5	7
Other phage types or unidentified	149	112	148	163	112
S. Enteritidis	**116**	**110**	**114**	**151**	**130**
1b	5	4	8	7	14
11[c]	39	45	46	55	30
Other phage types or unidentified	72	61	60	89	86
Other serotypes	**450**	**496**	**570**	**523**	**576**
S. Agona	15	12	18	16	27
S. Bovismorbificans	4	23	39	52	83
S. Brandenburg	35	52	67	54	45
S. Infantis	56	52	14	18	16
S. Mississippi	21	16	21	15	15
S. Montevideo	7	3	2	2	5
S. Saintpaul	26	37	35	27	39
S. Stanley	34	25	60	39	35
S. Thompson	5	32	13	12	10
S. Virchow	5	16	10	7	7
S. Weltevreden	31	18	18	21	21
S. enterica (I) ser. 4,[5],12 : i : -	27	22	23	28	26
S. Paratyphi var Java[d]					32
Other serotypes or unidentified	184	188	250	232	215
Total	**958**	**1053**	**1073**	**1103**	**1051**

[a] Excludes *S.* Paratyphi and *S.* Typhi.

[b] Prior to 2013, *S.* Typhimurium phage type 56 variant was known as *S.* Typhimurium RDNC-May 06.

[c] Prior to 2012, *S.* Enteritidis phage type 11 was known as a 9a. Further typing was performed on isolates previously confirmed as *S.* Enteritidis phage type 9a, however, typing results revealed that some isolates previously reported as *S.* Enteritidis phage type 9a were phage type 11.

[d] Prior to 2018 S. Paratyphi var Java was included in the paratyphoid counts. From this time it is classified as salmonellosis.

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Description
AEG	AIDS Epidemiology Group
AFP	Acute flaccid paralysis
AIDS	Acquired immunodeficiency syndrome
BCG	Bacillus Calmette-Guérin
CJD	Creutzfeldt-Jakob disease
CRS	Congenital rubella syndrome
DHB	District Health Board
DTaP-IPV-HepB/Hib	Diphtheria, tetanus, acellular pertussis, inactivated polio, hepatitis B and *Haemophilus influenzae* type b vaccine
ESR	Institute of Environmental Science and Research Limited
Hib	*Haemophilus influenzae* serotype b
HIV	Human immunodeficiency virus
HPAI	Highly pathogenic avian influenza
HUS	Haemolytic uraemic syndrome
ICD	International Classification of Diseases
IPD	Invasive pneumococcal disease
IPV	Inactivated polio vaccine
MAT	Microscopic agglutination titre
MELAA	Middle Eastern/Latin American/African
MeNZB™	Meningococcal B outer membrane vesicle vaccine
MERS-CoV	Middle East respiratory syndrome Coronavirus
MMR	Measles, mumps and rubella
NAAT	Nucleic acid amplification test
NCCEP	National Certification Committee for the Eradication of Polio
NHI	National Health Index
NMDS	National Minimum Dataset
NOS	Not otherwise specified
OPV	Oral polio vaccine
NZPSU	New Zealand Paediatric Surveillance Unit
PCR	Polymerase chain reaction
PCV7	7-valent pneumococcal conjugate vaccine
PCV10	10-valent pneumococcal conjugate vaccine
PCV13	13-valent pneumococcal conjugate vaccine
PHU	Public health unit
PHS	Public health service
RDNC	Reacts but does not conform to a known phage type pattern
SARS	Severe acute respiratory syndrome
sv	Serovar
STEC	Shiga toxin-producing *Escherichia coli*
Tdap	Tetanus, diphtheria and acellular pertussis vaccine
VTEC	Verocytotoxin-producing *Escherichia coli*
WHO	World Health Organization
23PPV	23-valent pneumococcal polysaccharide vaccine

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