NOTIFIABLE DISEASES IN NEW ZEALAND ANNUAL REPORT 2016

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Disclaimer

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SUMMARY

This report provides a summary of the key trends in notifiable diseases for 2016.

In 2016, a total of 16,305 notifications were reported through New Zealand's notifiable disease database, EpiSurv, compared with 14,306 in 2015.

From 2015 to 2016, notifications of the following diseases increased significantly: AIDS, campylobacteriosis, cryptosporidiosis, dengue fever, measles, shigellosis, verocytotoxin- or Shiga toxin-producing *Escherichia coli* (VTEC/STEC) infection, yersiniosis and Zika virus infection (Table 1). Notifications of chikungunya fever, leprosy and pertussis decreased significantly.

ENTERIC DISEASES

In 2016, 7456 cases (158.9 per 100,000) of campylobacteriosis were notified. This was a significant increase compared with 6218 cases (135.3 per 100,000) in 2015, whereas the rates of campylobacteriosis had been relatively stable between 2008 and 2015. Campylobacteriosis remains the most commonly notified disease in New Zealand (45.7% of all notifications in 2016). A campylobacteriosis outbreak (involving 964 cases) in Hawke's Bay in August 2016 largely accounts for the increase in cases in 2016, and also disrupted the usual seasonal trend of lower campylobacteriosis notifications during winter.

There were also significant increases in Cryptosporidiosis and VTEC/STEC notifications from 2015 to 2016. There were 1062 cases (22.6 per 100,000) of cryptosporidiosis notified in 2016—approximately a 50% increase from 2015 (696 cases, 15.1 per 100,000). However, the 2016 total did not reach the peak of 1348 cases notified in 2013. In 2016, 418 cases (8.9 per 100,000) of VTEC/STEC infection were notified, compared with 330 cases (7.2 per 100,000) in 2015. Notifications of VTEC/STEC infection have increased markedly since 2014 (187 cases, 4.1 per 100,000). Recent increases in cryptosporidiosis and VTEC/STEC notifications may be attributable to changes in laboratory testing methods and referral patterns.

There were 857 cases (18.3 per 100,000) of yersiniosis in 2016, a significant increase compared with 634 cases (13.8 per 100,000) in 2015. Since 2014 there has been a trend of increasing yersiniosis notifications. There were three outbreaks involving 88 cases reported in 2016.

In 2016, there was also a significant increase in notifications of shigellosis. There were 174 cases (3.7 per 100,000) of shigellosis notified in 2016, compared with 111 cases (2.4 per 100,000) in 2015. Most cases had a history of overseas travel during the incubation period.

VACCINE-PREVENTABLE DISEASES

There were 103 confirmed cases (2.2 per 100,000) of measles in 2016, compared with 10 confirmed cases (0.2 per 100,000) in 2015. The majority (95.1%, 98/103) of cases were associated with three import-related outbreaks. Immunisation status was known for 93 (90.3%) cases, of which 70 (75.3%) were not immunised (including 16 cases aged <15 months who were ineligible for vaccination under the New Zealand immunisation schedule).

There was a significant decrease in pertussis notifications (1096 cases, 23.4 per 100,000) in 2016, compared with 2015 (1168 cases, 25.4 per 100,000). In 2016, 56.6% (620/1096) of cases were laboratory-confirmed (151 by isolation, 469 by PCR, and 82 by isolation and PCR). The highest notification rate was for the less than 1 year age group (114.8 per 100,000, 68 cases) and approximately 56% (38/68) of cases in this age group were hospitalised.

EXOTIC DISEASES

Notifications of dengue fever significantly increased between 2015 and 2016. In 2016, 191 cases (4.1 per 100,000) of dengue fever were notified, compared with 125 cases (2.7 per 100,000) in 2015. All cases had travelled overseas during the incubation period, with Indonesia (62 cases) and Samoa (61 cases) the most commonly visited countries.

There were 100 cases (2.1 per 100,000) of Zika virus infection notified in 2016, a significant increase from 2015 (9 cases, 0.2 per 100,000). This reflects both outbreaks in locations commonly visited by New Zealanders and heightened public awareness of Zika virus infection in 2015. Of the 100 cases of Zika virus infection, 99 cases had travelled overseas, with Tonga (58 cases) and Samoa (23 cases) the most commonly visited countries. The remaining case had not travelled overseas and was associated with sexual transmission.

In contrast, there was a significant decrease in chikungunya fever notifications in 2016 (28 cases, 0.6 per 100,000), compared with 2015 (48 cases, 1.0 per 100,000). All cases had an overseas travel history which could account for their infection.

For further commentary on key trends in notifiable diseases reported in New Zealand in 2016, please refer to the ESR publication '*2016 Notifiable diseases at a glance'.*

Table 1. Number of cases and rates per 100,000 population for selected notifiable diseases in New Zealand, 2015 and 2016

Disease	Number of notifications		Rate per 100,000		Change[d,e]
	2015	2016	2015	2016	
AIDS[a]	9	22	0.2	0.5	↑
Campylobacteriosis	6218	7456	135.3	158.9	↑
Chikungunya fever	48	28	1.0	0.6	↓
Cryptosporidiosis	696	1062	15.1	22.6	↑
Dengue fever	125	191	2.7	4.1	↑
Gastroenteritis (acute)[b]	503	510	11.0	10.9	↑
Giardiasis	1510	1617	32.9	34.5	↑
Hepatitis A	47	35	1.0	0.7	↓
Hepatitis B[c]	34	34	0.7	0.7	NC
Hepatitis C[c]	35	30	0.8	0.6	↓
Invasive pneumococcal disease	447	475	9.7	10.1	↑
Legionellosis	247	247	5.4	5.3	NC
Leptospirosis	63	85	1.4	1.8	↑
Listeriosis	26	37	0.6	0.8	↑
Malaria	38	26	0.8	0.6	↓
Measles	10	103	0.2	2.2	↑
Meningococcal disease	64	75	1.4	1.6	↑
Mumps	13	20	0.3	0.4	↑
Paratyphoid fever	34	32	0.7	0.7	↓
Pertussis	1168	1096	25.4	23.4	↓
Rheumatic fever[f]	112	137	2.4	2.9	↑
Salmonellosis	1051	1091	22.9	23.2	↑
Shigellosis	111	174	2.4	3.7	↑
Tuberculosis disease	293	297	6.4	6.3	↑
Typhoid fever	43	38	0.9	0.8	↓
VTEC/STEC infection	330	418	7.2	8.9	↑
Yersiniosis	634	857	13.8	18.3	↑
Zika virus	9	100	0.2	2.1	↑

[a] Data source: AIDS Epidemiology Group [1]

[b] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.

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

[d] ↓= significant decrease, ↑ = significant increase, NC = no change, ↓ = not significant decrease, ↑ = not significant increase.

[e] Fisher's exact tests were used to determine statistical significance. Results are considered statistically significant when the *P* value is less than or equal to 0.05.

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

INTRODUCTION

The *Notifiable Diseases in New Zealand: Annual Report 2016* gives an overview of the current state of notifiable diseases in New Zealand. The report includes diseases currently notifiable under the Health Act 1956 and the Tuberculosis Act 1948.

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".[2] 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".[3]

Surveillance provides *information for action*. Specific objectives for disease surveillance may include the following:[4]

- 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 2016 and, where data is available, the trends since 1997, 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, outbreaks and sexually transmissible diseases 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) (report date) and not by the date of the onset of illness (onset date). 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 (eg, 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 location (usually a DHB).

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.[5] Issues associated with the cost of healthcare may also determine whether people visit healthcare providers for diagnosis.[6]

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 (eg, broad case definitions for viral communicable diseases) 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 and the Tuberculosis Act 1948, 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.

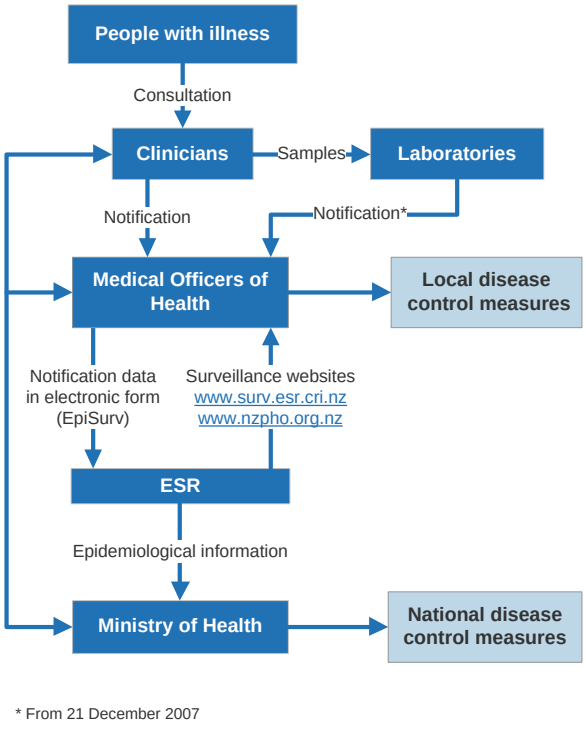
This report includes sections on all the diseases that are currently notifiable in New Zealand under the Health Act 1956 and the Tuberculosis Act 1948, excluding lead absorption, chemical poisoning from the environment and hazardous substances. Massey University's Centre for Public Health Research is responsible for the collection and reporting of these three conditions.

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 (May 2012).[7]

Information on trigger points for notification of a laboratory test result is in the 'Direct Laboratory Notification of Communicable Diseases: National Guidelines'.[8]

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

Figure 1. Notifiable disease surveillance system



* From 21 December 2007

Laboratory-based surveillance

Laboratory results for all organisms that meet the laboratory component of the notification criteria are reported directly to the medical officers of health. Laboratory reported cases may however not meet the clinical component 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 supplies 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.[9] 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 (eg, tuberculosis), for diseases that have long-term health impacts (eg, meningococcal disease) and may include re-admissions for acute diseases (eg, 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 numbers and notifications 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.[7]

New Zealand Paediatric Surveillance Unit

The New Zealand Paediatric Surveillance Unit (NZPSU) [10] 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 a reply-paid card to the NZPSU on which they indicate 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, VTEC/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 27 February 2017. Changes made to EpiSurv data by PHU staff after this date are not reflected in this report. Consequently, future analyses of data may produce revised results. Notification data published in previous annual reports (from 1997 to 2015) has been updated to reflect cases in EpiSurv as at 27 February 2017.

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 aggregated from the Statistics New Zealand 2016 mid-year population estimates for territorial authorities in New Zealand.

Table 2. District Health Board populations, 2016

DHB	Population
Northland	171,400
Waitemata	590,700
Auckland	507,200
Counties Manukau	534,200
Waikato	399,500
Lakes	106,600
Bay of Plenty	226,700
Tairawhiti	47,800
Taranaki	116,800
Hawke's Bay	161,400
Whanganui	63,000
MidCentral	174,200
Hutt Valley	145,900
Capital & Coast	306,600
Wairarapa	43,600
Nelson Marlborough	146,400
West Coast	32,500
Canterbury	539,600
South Canterbury	59,200
Southern	318,900
Total	**4,692,200**

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 speckled 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 [7], 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 2016 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 2016 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, eg, 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 necessarily mean that this was the source of the infection.

Vaccination data

Data on immunisation 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 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 when the *P* value is less than or equal to 0.05.

LIMITATIONS OF SURVEILLANCE DATA

Quality

Each year a report is prepared on the quality of selected EpiSurv fields to assist in the monitoring of a quality assurance programme. The latest report was published in 2016.[11]

Sensitivity

Sensitivity is a measure of our ability to identify the true burden of disease. Sensitivity was last assessed in 2003 using reporting on meningococcal disease.[12] This showed that the sensitivity of meningococcal disease surveillance is probably in excess of 87%. The sensitivity of surveillance for other diseases will often be less than for meningococcal disease, particularly for common enteric diseases where only a small proportion of those infected present to healthcare services. An acute gastrointestinal illness study conducted during 2005–2007 estimated that only 0.4% of community cases result in a notification.[13]

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 EpiSurv variables from 2006 to 2016.

The completeness of date of birth, age and sex data is generally very high (>98%), with little variation over the last five years. In 2016, the completeness of date of birth, age and sex data remained high (≥99%). The completeness of ethnicity data in 2016 (96.2%) was similar to that of 2015 (94.9%).

The National Health Index (NHI) provides a unique identifier for all healthcare users and is an important link between notifiable disease, immunisation and laboratory records.

Significant progress over recent years has meant a high percentage of EpiSurv records (>94% over the last five years) now record an NHI identifier. In 2016, 98.4% of notifications had NHI recorded, a slight increase from 97.7% in 2015. Laboratory reporting of notifiable diseases has improved the completion of NHI for notification records, but ethnicity is not provided with laboratory-reported notifications. For this reason, about 20% of notifications now have ethnicity derived from the NHI database rather than directly from the EpiSurv record.

Table 3. Complete data for selected EpiSurv variables, 2006–2016

Report year	Completeness of data (%)				
	Date of birth	Age	Sex	Ethnicity	NHI
2006	98.8	99.1	97.8	81.7	62.8
2007	98.7	99.0	99.2	79.2	63.9
2008	99.3	99.5	99.8	70.2	84.1
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

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 2016.

In 2016, 69.5% of disease notifications had an onset date recorded (compared with 64.6% in 2015). Of these, 45.9% were reported to a public health service (PHS) within one week of the onset of symptoms and 74.7% 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 (eg, giardiasis, pertussis, tuberculosis disease). For other diseases there may be delays in confirmation of the diagnosis due to the particular laboratory test required (eg, leptospirosis).

In 2016, 86.7% (89.7% in 2015) of the notifications were entered into EpiSurv within a day of being reported to a PHS, 99.1% were entered within one week and 99.6% were entered within two weeks.

Table 4. Timeliness of disease reporting and data entry for notifiable diseases, 2016

Disease	Onset date recorded (%)	Reporting delay[a]		Entry delay[b]		
		≤1 week	≤2 weeks	≤1 day	≤1 week	≤2 weeks
Campylobacteriosis	62.8	56.6	84.6	86.9	99.7	100.0
Chikungunya fever	92.9	26.9	69.2	92.9	100.0	100.0
Cryptosporidiosis	85.4	40.8	83.2	86.5	99.5	99.9
Dengue fever	89.0	31.2	74.7	93.2	98.4	100.0
Gastroenteritis[c]	62.7	84.4	94.4	82.2	92.2	95.1
Giardiasis	55.7	25.1	53.7	84.7	99.7	99.8
Hepatitis A	88.6	41.9	93.5	91.4	100.0	100.0
Invasive pneumococcal disease	71.6	67.6	91.5	87.4	98.9	99.4
Legionellosis	89.9	25.2	64.4	85.4	100.0	100.0
Leptospirosis	95.3	25.9	58.0	69.4	97.6	98.8
Measles	100.0	87.4	97.1	88.3	100.0	100.0
Meningococcal disease	98.7	93.2	97.3	92.0	100.0	100.0
Pertussis	93.7	18.4	37.9	86.8	99.2	99.7
Rheumatic fever - initial attack	94.9	30.0	63.8	81.8	97.1	99.3
Salmonellosis	85.3	51.1	84.9	86.0	99.6	99.9
Shigellosis	87.9	38.6	80.4	91.4	99.4	100.0
Tuberculosis disease	71.4	3.8	6.6	90.6	99.0	99.7
Typhoid fever	92.1	34.3	68.6	94.7	100.0	100.0
VTEC/STEC infection	92.1	51.4	82.3	90.4	99.8	100.0
Yersiniosis	63.1	24.6	62.1	87.9	99.4	100.0
Zika virus	93.0	49.5	81.7	94.0	100.0	100.0
Other	32.4	47.4	71.2	85.0	92.5	94.2
Total	**69.5**	**45.9**	**74.7**	**86.7**	**99.1**	**99.6**

[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, eg, 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: http://dnmeds.otago.ac.nz/departments/psm/research/aids/newsletters.html.

In 2016, 22 cases of AIDS were reported to the AEG compared with nine cases in 2015.

The 2016 AIDS notification rate (0.5 per 100,000 population) was higher than the 2015 rate (0.2 per 100,000).

Fifteen cases (68.2%) were men infected through sex with other men, three (13.6%) were infected through heterosexual contact (two men and one woman), two men by either injecting drug use or sex with other men (9.1%) and the mode of infection was unknown for two cases (9.1%).

The European or Other ethnic group (11 cases) had the highest number of cases, followed by Asian (6 cases), Māori (4 cases), and Pacific peoples (1 case).

The cases ranged from ages 23 to 64 years, with a mean age of 39 years.

Anthrax

No cases of anthrax were notified in New Zealand in 2016. 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.[14]

Arboviral diseases

This section includes any 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 New Zealand in 2016. Six cases have been notified since 1997; most recently two cases in 2009, all with a history of overseas travel.

Chikungunya fever

In 2016, 28 cases of Chikungunya fever were notified in New Zealand compared with 48 cases in 2015. The 2016 notification rate (0.6 per 100,000) was significantly lower than the 2015 rate (1.0 per 100,000).

Adults in the 40–49 years (1.0 per 100,000) age group had the highest rate followed by those in the 20–29, 30–39 and 50–59 (0.7, 0.9 and 0.8 per 100,000, respectively) years age groups.

Males (0.5 per 100,000) had a slightly lower rate than females (0.7 per 100,000).

Ethnicity was recorded for 26 (92.9%) cases. The Asian (2.0 per 100,000) ethnic group had the highest rate, followed by the Pacific peoples (1.7 per 100,000) ethnic group.

Hospitalisation status was recorded for 27 (96.4%) cases, of which 14 (51.9%) were hospitalised. All 28 cases were laboratory-confirmed.

All 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 commonly visited or lived in were Fiji (14 cases), India (9 cases), and Brazil (3 cases). Some cases reported travel to more than one country.

Japanese encephalitis

No cases of Japanese encephalitis were notified in New Zealand in 2016. Since 1997, only one case of Japanese encephalitis has been notified (in 2004). The case was overseas during the incubation period for the disease.

Ross River virus infection

Four cases of Ross River virus infection were notified in New Zealand in 2016, the same as in 2015 (4 cases).

The cases were in the 40–49 and 60–69 (2 cases each) years age groups. Three cases were male and one was female. All four cases were in the European or Other ethnic group.

No cases were hospitalised.

All four cases were laboratory-confirmed. Three cases had been in Australia and one case in Fiji during the incubation period for the disease.

Zika virus infection

In 2016, 100 cases of Zika virus infection were notified in New Zealand compared with 9 cases in 2015. The 2016 notification rate (2.1 per 100,000) was a significant increase from the 2015 rate (0.2 per 100,000).

Adults in the 30–39 years (4.5 per 100,000) age group had the highest rate followed by those in the 20–29 and 50–59 years (3.1 per 100,000, respectively) age groups.

Males (1.3 per 100,000) had a lower rate than females (2.9 per 100,000 Seven cases were pregnant.

Ethnicity was recorded for 98 (98.0%) cases. The Pacific peoples (22.9 per 100,000) ethnic group had the highest rate, followed by the Asian (0.9 per 100,000) ethnic group.

Hospitalisation status was recorded for 99 (99.0%) cases, of which 13 (13.1%) were hospitalised. Of the 100 cases, 95 (95.0%) were laboratory-confirmed.

Of the 100 cases, 99 cases had travelled overseas during the incubation period for the disease, the remaining case had not travelled and acquired the infection via sexual transmission. The countries commonly visited or lived in were Tonga (58 cases), Samoa (23 cases), and Fiji (9 cases). Some cases reported travel to more than one country.

Botulism

There were no cases of botulism notified in 2016 or 2015. One probable case of botulism was notified during 2014. This was the first case of botulism in New Zealand since 1985 when two cases were reported.[15]

Brucellosis

There were no cases of brucellosis notified in New Zealand in 2016. Since 1997, 15 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.[16]

Campylobacteriosis

In 2016, 7456 cases of campylobacteriosis were notified in New Zealand. The 2016 rate of 158.9 per 100,000 was significantly higher than the 2015 rate of 135.3 per 100,000 (6218 cases). Campylobacteriosis remains the most commonly notified disease, comprising 45.7% of all notifications in 2016. From 2008, the annual number of cases reported showed a significant decrease compared with the preceding decade (Figure 2).

Figure 2. Campylobacteriosis notifications by year, 1997–2016

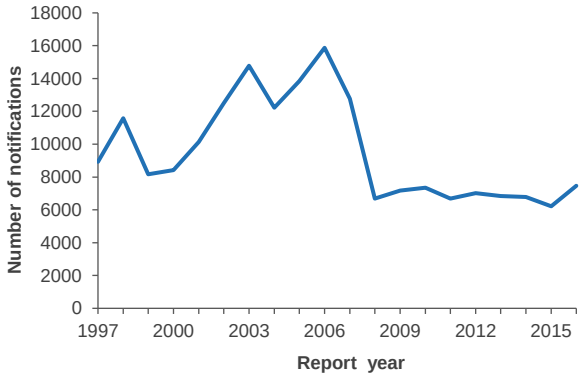
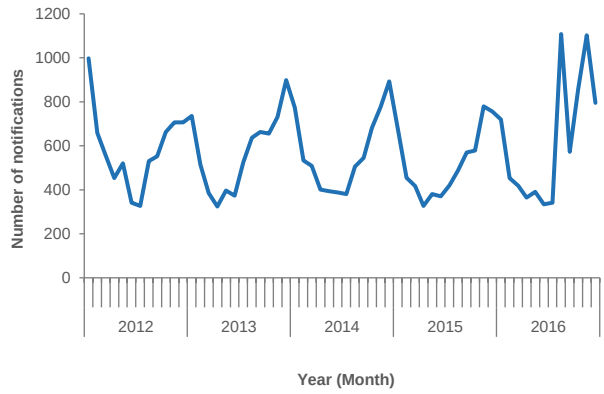


Figure 3 shows campylobacteriosis notifications by month since 2012. There is a distinct seasonal pattern, with an early summer peak and a winter trough. However, this trend was disrupted in 2016, due to a large outbreak in the Hawke's Bay region in August (964 cases were linked to this outbreak). Note some cases were reported late but their onset date was in August/September.

Figure 3. Campylobacteriosis notifications by month, January 2012–December 2016



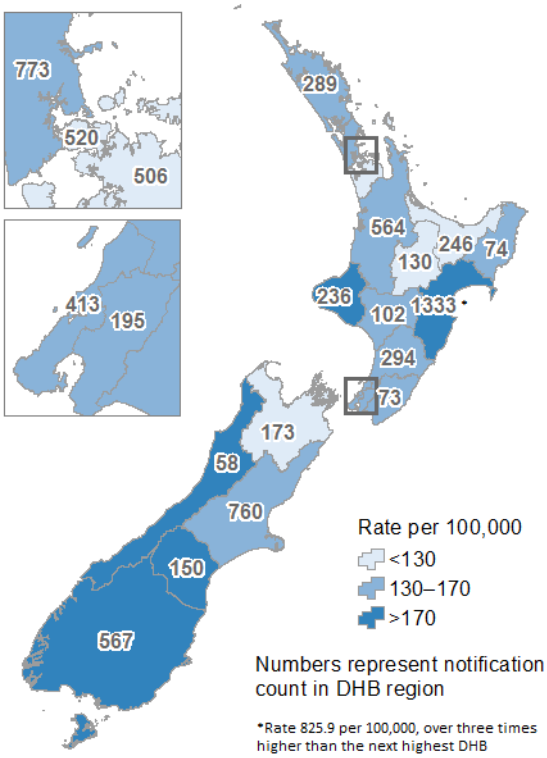
In 2016, the highest notification rates for campylobacteriosis were for people living in Hawke's Bay, South Canterbury, Taranaki, West Coast and Southern DHBs (825.9, 253.4, 202.1, 178.5, and 177.8 per 100,000 respectively) (Figure 4).

Children aged 1–4 years (273.6 per 100,000) and infants aged less than 1 year (251.5 per 100,000) had the highest notification rates.

Sex was recorded for 7454 (99.9%) cases. Males (177.3 per 100,000) had a higher rate than

females (141.0 per 100,000).

Figure 4. Campylobacteriosis notifications by DHB, 2016



Ethnicity was recorded for 7081 (95.0%) cases. The European and Other ethnic group (186.0 per 100,000) had the highest notification rate for campylobacteriosis, followed by the MELAA (99.5 per 100,000) and Māori (95.5 per 100,000) ethnic groups. Further information by DHB, sex, age and ethnic group are in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 4991 (66.9%) cases, of which 566 (11.3%) cases were hospitalised.

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

In 2016, 15 outbreaks of campylobacteriosis were reported involving 1008 cases.

Cholera

No cases of cholera were notified in New Zealand in 2016. Since 1997, a total of 12 laboratory-confirmed cases of cholera have been notified with the last two cases reported in 2010. All 12 cases were acquired while travelling overseas.

Creutzfeldt-Jakob disease

The National Creutzfeldt-Jakob Disease (CJD) 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 20th annual report of the Registry (1 January 2016 to 31 December 2016).[17]

In 2016, nine cases of suspected sporadic CJD (sCJD) were referred to the New Zealand CJD Registry for evaluation. These cases were subsequently classified as two definite cases, three probable cases, two possible cases, and two cases that have not met surveillance criteria for possible CJD. This equates to a rate of 1.07 (probable and definite notifications) per million population per year (95% exact Poisson confidence interval (0.35, 2.49)).

The age distribution of the notified cases was: 50–59 (1 case), 60–69 (2 cases) and 70–79 years (6 cases). Five cases were female and four were male.

Since 1997, the Registry has documented 90 cases of sCJD, including 41 definite and 49 probable (not including the possible case).

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

Table 5. Exposure to risk factors associated with campylobacteriosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed untreated water	1489	1608	4359	48.1
Consumed food from retail premises	1014	1150	5292	46.9
Contact with farm animals	929	1433	5094	39.3
Contact with faecal matter	381	1794	5281	17.5
Recreational water contact	357	1912	5187	15.7
Contact with other symptomatic people	294	1914	5248	13.3
Travelled overseas during the incubation period	282	2728	4446	9.4
Contact with sick animals	155	1906	5395	7.5

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

Cronobacter species invasive disease

Cronobacter species invasive disease (previously known as *Enterobacter sakazakii*) has been notifiable in New Zealand since mid-2005. There were no cases of *Cronobacter* species invasive disease notified in New Zealand in 2016. A total of eight cases of *Cronobacter* species invasive disease have been reported since the disease became notifiable, none of these were in neonates or infants.

Cryptosporidiosis

In 2016, 1062 cases (22.6 per 100,000) of cryptosporidiosis were notified in New Zealand. This was a significant increase from the 696 cases (15.1 per 100,000) notified in 2015 (Figure 5).

Figure 5. Cryptosporidiosis notifications by year, 1997–2016

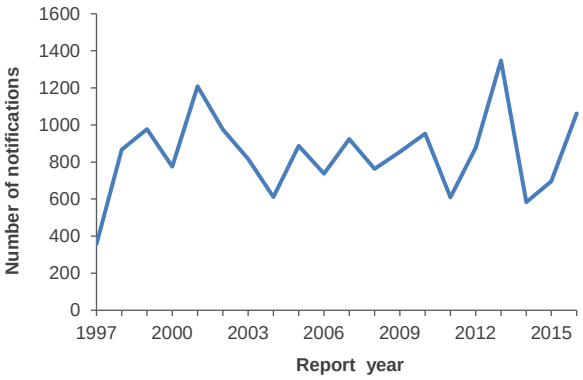
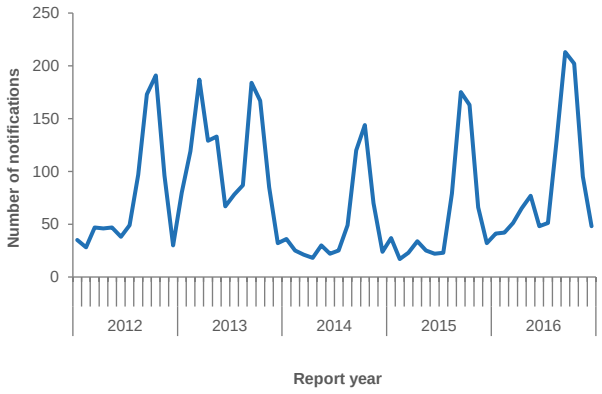


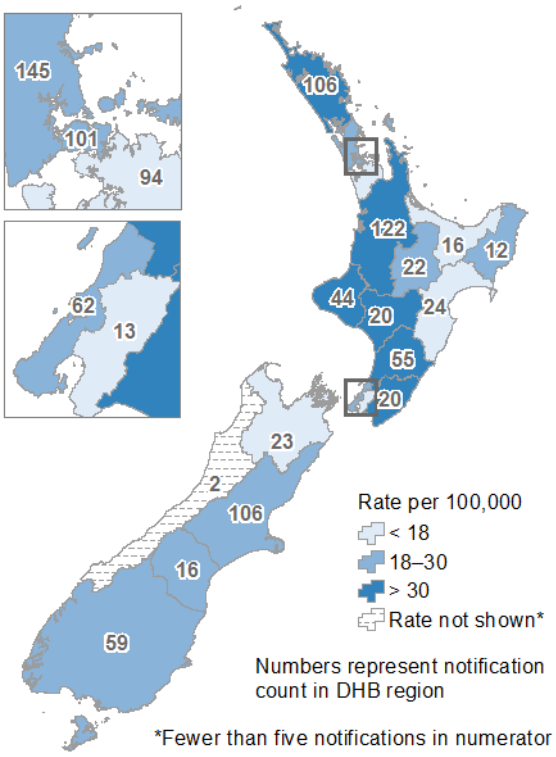
Figure 6 shows cryptosporidiosis cases by month since 2012. There is a distinct seasonal pattern, with the highest number of notifications generally reported during spring each year.

Figure 6. Cryptosporidiosis notifications by month, January 2012–December 2016



In 2016, the highest notification rates for cryptosporidiosis were reported in Northland, Wairarapa, Taranaki, Whanganui, MidCentral and Waikato DHBs (61.8, 45.9, 37.7, 31.7, 31.6 and 30.5 per 100,000 respectively) (Figure 7).

Figure 7. Cryptosporidiosis notifications by DHB, 2016



Children aged 1–4 years (124.3 per 100,000) and 5–9 years (41.6 per 100,000) had the highest notification rates compared with other age groups. Nearly half (48.8%) of all cases were children aged less than 15 years.

Females (24.0 per 100,000) had a slightly higher notification rate than males (21.3 per 100,000).

Ethnicity was recorded for 1026 (96.6%) cases. The European or Other ethnic group (26.7 per 100,000) had the highest notification rate for cryptosporidiosis, followed by the Māori (17.4 per 100,000) ethnic group.

Further information by DHB, sex, age and ethnic group are in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 977 cases (92.0%), of which 69 (7.1%) cases were hospitalised.

Contact with farm animals and consumption of untreated water were the most common risk factors associated with cryptosporidiosis cases in 2016 (Table 6).

In 2016, 33 outbreaks of cryptosporidiosis were reported, involving 188 cases.

Table 6. Exposure to risk factors associated with cryptosporidiosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Contact with farm animals	377	391	294	49.1
Consumed untreated water	251	441	370	36.3
Consumed food from retail premises	163	372	527	30.5
Recreational water contact	187	530	345	26.1
Contact with faecal matter	153	482	427	24.1
Contact with other symptomatic people	158	583	321	21.3
Contact with sick animals	140	532	390	20.8
Travelled overseas during the incubation period	100	805	157	11.0

[a] Percentage refers to the number of cases who 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

No cases of cysticercosis were notified in New Zealand in 2016. Since 1997, eight cysticercosis cases have been reported - three cases in 2005, two cases in 2007, and one each in 2013, 2014 and 2015.

Decompression sickness

No cases of decompression sickness were notified in New Zealand in 2016.

Ministry of Health hospitalisation data for 2016 recorded 17 cases with decompression sickness as the primary diagnosis.

Over the last five years the number of hospitalisations with decompression sickness as the principal diagnosis has ranged from 17 to 42 annually, compared with less than three notifications in EpiSurv per year, indicating consistent under-notification of this condition.

Dengue fever

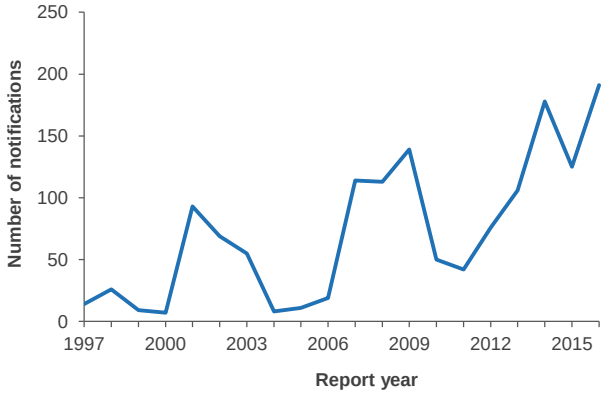
In 2016, 191 cases of dengue fever were notified in New Zealand compared with 125 cases in 2015 (Figure 8). The 2016 notification rate (4.1 per 100,000) was a significant increase from the 2015 rate (2.7 per 100,000).

Adults in the 30–39 (6.9 per 100,000) years age groups had the highest rate followed by those in the 20–29 (5.8 per 100,000) years age group.

Males (4.4 per 100,000) had a higher rate than females (3.7 per 100,000).

Ethnicity was recorded for 186 (97.4%) cases. The Pacific peoples (19.1 per 100,000) ethnic group had the highest rate, followed by the Asian and European or Other (3.2 and 3.1 per 100,000 respectively) ethnic groups.

Figure 8. Dengue fever notifications by year, 1997–2016



Hospitalisation status was recorded for 178 (93.2%) cases, of which 72 (40.4%) were hospitalised. Of the 191 cases, 189 (99.0%) were laboratory-confirmed.

All of the cases had travelled overseas during the incubation period for the disease. The countries commonly visited or lived in were Indonesia (62 cases), Samoa (61 cases), Fiji and Thailand (10 cases each). Some cases reported travelling to more than one country.

Two dengue fever outbreaks were reported in 2016, involving 12 cases.

Diphtheria

One confirmed case of cutaneous toxigenic diphtheria was notified in New Zealand in 2016. The case was in the 40–49 years age group and from Canterbury DHB. The case had recently travelled to Samoa.

The last case of toxigenic respiratory diphtheria was reported in 1998.[18]

In 2016, the Special Bacteriology Laboratory at ESR received 59 isolates of *Corynebacterium diphtheriae* for toxin testing. The majority (50

isolates, 84.7%) were from cutaneous sources, five were from the throat and three were invasive (blood, ankle aspirate and dialysis fluid). One isolate from a cutaneous sample was found to be a toxigenic strain.

Gastroenteritis (acute)

Acute gastroenteritis includes a number of communicable diseases. 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 (eg, food handler or early childcare centre worker) are notifiable on suspicion. Illnesses such as norovirus, rotavirus and sapovirus infections, and histamine (scombroid) poisoning are included in this section (Table 7). Toxic shellfish poisoning is reported separately at the end of this section. Diseases and conditions that are notifiable in their own right (eg, campylobacteriosis, giardiasis, VTEC/STEC and salmonellosis) are reported separately.

In 2016, 510 cases of acute gastroenteritis were notified in New Zealand. The 2016 notification rate of 10.9 per 100,000 was the same as the 2015 rate (503 cases). A causal agent was reported for 216 (42.4%) cases. Of these, the most common pathogen recorded was norovirus (71.8%, 155 cases).

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

The highest notification rates were reported from MidCentral, West Coast and Capital & Coast DHBs (24.7, 24.6, and 24.1 per 100,000 respectively).

Infants aged less than 1 year (86.1 per 100,000) had the highest notification rate, followed by children aged 1–4 years (37.5 per 100,000).

Females (11.4 per 100,000) had a higher rate than males (10.4 per 100,000).

The MELAA ethnic group (13.4 per 100,000) had the highest notification rate, followed by the European or Other (10.5 per 100,000), Asian (9.8 per 100,000) and Pacific peoples (9.7 per 100,000) ethnic groups.

Hospitalisation status was recorded for 342 (67.1%) cases, of which 44 cases (12.9%) were hospitalised.

Table 7. Acute gastroenteritis cases by agent type, 2016

Agent type[a]	Cases[b]	Percentage (%)
Agent identified	**216**	**42.4**
Norovirus infection	155	30.4
Rotavirus infection	39	7.6
Ciguatera fish poisoning	5	1.0
Clostridium perfringens	4	0.8
Sapovirus	4	0.8
Aeromonas species	2	0.4
Histamine (scombroid) poisoning	2	0.4
Vibrio parahaemolyticus	2	0.4
Bacillus cereus	1	0.2
Chemical food poisoning	1	0.2
Staphylococcus aureus	1	0.2
Agent not identified	**294**	**57.6**
Total	**510**	**100.00**

[a] Does not include diseases that are notifiable in their own right (eg, campylobacteriosis).

[b] Note: there may be more cases associated with specific disease agents through outbreak reporting - please refer to the Summary of Outbreaks report.

The risk factors recorded for acute gastroenteritis cases are shown in Table 8. The most common risk factor associated with gastroenteritis was consumption of food from retail premises.

In 2016, 215 outbreaks of acute gastroenteritis were reported involving 2473 cases, of which 92 cases were also reported as individual case notifications.

Table 8. Exposure to risk factors associated with acute gastroenteritis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	199	48	263	80.6
Contact with other symptomatic people	55	183	272	23.1
Consumed untreated water	38	180	292	17.4
Contact with faecal matter	38	183	289	17.2
Contact with farm animals	33	187	290	15.0
Recreational water contact	18	192	300	8.6
Travelled overseas during the incubation period	13	227	270	5.4

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

Toxic shellfish poisoning

In 2016, three cases of toxic shellfish poisoning were notified, the same as the number notified in 2015. Two cases were reported with paralytic shellfish poisoning and the poisoning type was not specified for one case.

The cases were aged in the 40–49 years, 50–59 years and 70 years and over age groups (1 case each). All cases were male. Cases were reported from Lakes, Nelson Marlborough and South Canterbury DHBs. Two cases were from the European or Other ethnic group and one case was of Māori ethnicity.

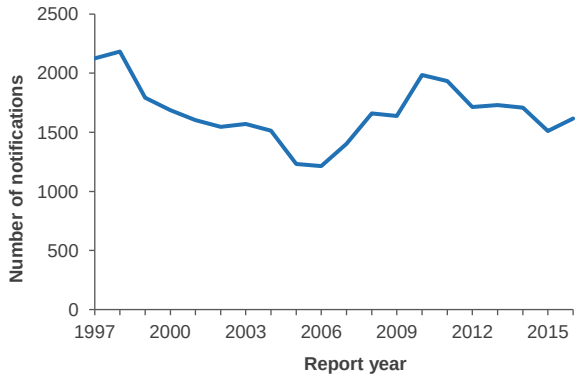
One case (33.3%) was hospitalised.

Two cases had eaten seafood purchased from a retail outlet and one case had eaten recreationally collected seafood.

Giardiasis

In 2016, 1617 cases of giardiasis were notified in New Zealand compared with 1510 in 2015. The notification rate (34.5 per 100,000) was slightly higher than the 2015 rate (32.9 per 100,000). Figure 9 shows giardiasis notifications by year from 1997 to 2016.

Figure 9. Giardiasis notifications by year, 1997–2016



In 2016, the highest notification rates for giardiasis were reported from Tairawhiti, Hawke's Bay, Lakes and Capital & Coast DHBs (156.9, 47.7, 45.0 and 40.8 per 100,000, respectively) (Figure 10).

Figure 10. Giardiasis notifications by DHB, 2016

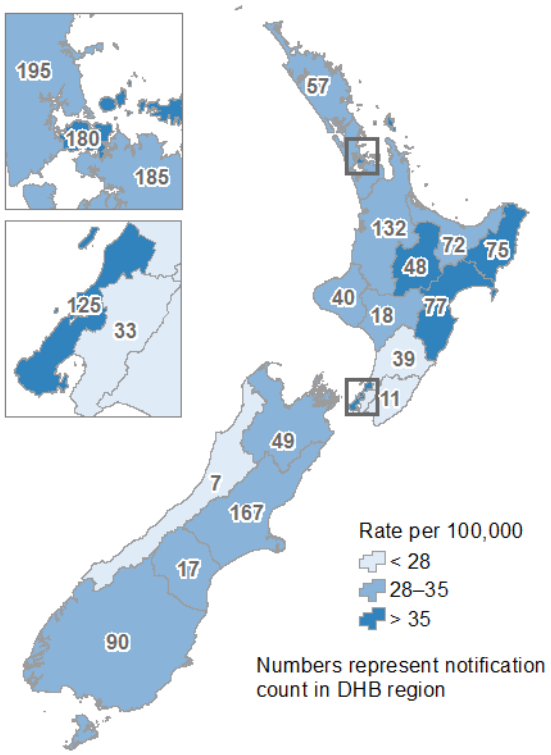


Table 9. Exposure to risk factors associated with giardiasis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Contact with faecal matter	306	449	862	40.5
Consumed untreated water	261	471	885	35.7
Consumed food from retail premises	237	431	949	35.5
Contact with other symptomatic people	268	513	836	34.3
Recreational water contact	264	528	825	33.3
Contact with farm animals	252	559	806	31.1
Travelled overseas during the incubation period	236	713	668	24.9
Contact with sick animals	33	708	876	4.5

[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.

Children aged 1–4 years (110.9 per 100,000), adults aged 30–39 years (55.4 per 100,000) and infants aged less than 1 year (43.9 per 100,000) had the highest notification rates. Males had a slightly higher rate of giardiasis than females (35.9 and 33.1 per 100,000 respectively).

Ethnicity was recorded for 1549 (95.8%) cases. The MELAA ethnic group (78.4 per 100,000) had the highest notification rate for giardiasis, followed by the European or Other ethnic group (41.4 per 100,000).

Hospitalisation status was recorded for 1068 (66.0%) cases, of which 47 (4.4%) were hospitalised.

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

In 2016, 45 giardiasis outbreaks were reported involving 238 cases.

Haemophilus influenzae serotype b disease

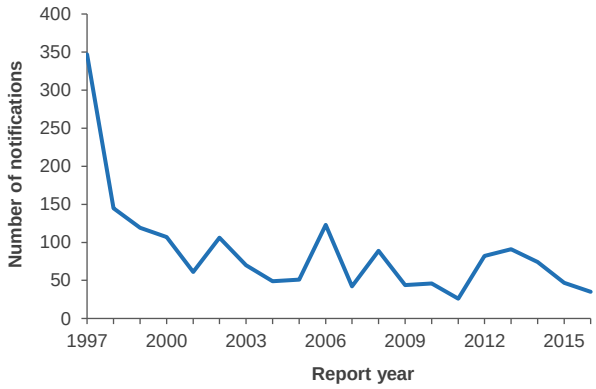
In 2016, two cases of *Haemophilus influenzae* serotype b (Hib) disease were notified in New Zealand. One case was laboratory-confirmed. The cases were in the 30–39 years and 50–59 years age groups. Both cases were of Māori ethnicity (1 male and 1 female), and the vaccination status was unknown for both cases.

A Hib vaccine was introduced in January 1994. The current immunisation schedule recommends a primary course of three doses of DTaP-IPV-HepB/Hib vaccine for infants when aged six weeks, three months and five months, and a booster of Hib vaccine when aged 15 months.[19]

Hepatitis A

In 2016, 35 cases of hepatitis A were notified in New Zealand, compared with 47 notifications in 2015. Since 2001, numbers have fluctuated, primarily due to outbreaks in 2002, 2006, 2008, 2012 and 2013 (Figure 11). The 2016 notification rate (0.7 per 100,000) was lower than the 2015 rate (1.0 per 100,000).

Figure 11. Hepatitis A notifications by year, 1997–2016



Capital & Coast (1.6 per 100,000), Waitemata, and Auckland (both 1.2 per 100,000) had the highest notification rates.

Adults aged 20–29 years (1.9 per 100,000) had the highest rate, followed by people aged 40–49 years (1.0 per 100,000).

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

Ethnicity was recorded for all cases. Of the ethnic groups with more than five cases reported, Pacific peoples (2.1 per 100,000) had the highest notification rate for hepatitis A, followed by the Asian (1.7 per 100,000) and European or Other (0.5 per 100,000) ethnic groups.

Hospitalisation status was recorded for all cases, of which, 18 (51.4%) were hospitalised.

Travel information was recorded for all cases, with 20 cases (57.1%) having travelled overseas during the incubation period for the disease. The countries most commonly visited were India, Pakistan (3 cases each), Australia, Kenya, Korea, Samoa, and the Solomon Islands (2 cases each). Five cases reported travelling to more than one country.

No hepatitis A outbreaks were reported in 2016.

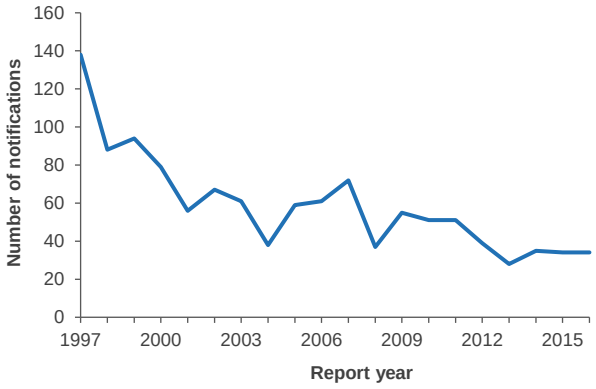
Hepatitis B

In New Zealand, only acute hepatitis B is a notifiable disease, so notification rates do not give an indication of the burden of chronic hepatitis B infection.

In 2016, 34 cases of hepatitis B were notified, the same number of cases as was notified in 2015 (Figure 12). The number of hepatitis B cases has ranged from 28 to 39 in the last five years.

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 universal childhood immunisation for hepatitis B in 1988.[19]

Figure 12. Acute hepatitis B notifications by year, 1997–2016



Auckland (8 cases, 1.6 per 100,000) and Counties Manukau (6 cases, 1.1 per 100,000) DHBs had the highest numbers of cases.

The highest notification rates were in the 50–59 years (2.1 per 100,000), 40–49 years (1.1 per 100,000) and 30–39 years (1.0 per 100,000) age groups.

Males (1.1 per 100,000) had a higher rate than females (0.4 per 100,000).

Ethnicity was recorded for 31 (91.2%) cases. The Asian (1.1 per 100,000) and European or Other (0.6 per 100,000) ethnic groups had the highest notification rates for hepatitis B.

Hospitalisation status was recorded for 33 (97.1%) cases, of which 14 (42.4%) were hospitalised.

The risk factors recorded for hepatitis B are shown in Table 10. The most common risk factors reported were overseas travel and household contact with a confirmed case or carrier.

Hepatitis C

In New Zealand, only acute hepatitis C is a notifiable disease, so notification rates do not give an indication of the burden of chronic hepatitis C infection.

In 2016, 30 cases of hepatitis C were notified compared with 35 cases in 2015. After a peak of 102 cases in 1998 notifications steadily declined until 2004. The number of notifications has ranged from 29 to 36 in the last five years Figure 13).

The 2016 notification rate (0.6 per 100,000) was similar to the 2015 rate (0.8 per 100,000).

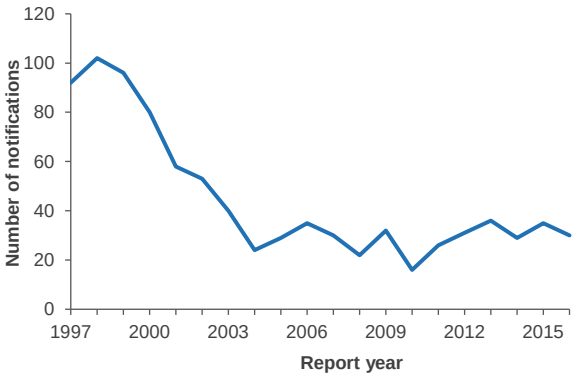
Nelson Marlborough (4.1 per 100,000) and Canterbury (1.3 per 100,000) DHBs had the highest notification rates.

Table 10. Exposure to risk factors associated with acute hepatitis B, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Travelled overseas during the incubation period	9	25	0	26.5
Household contact with confirmed case or carrier	5	23	6	17.9
Sexual contact with confirmed case or carrier	3	16	15	15.8
History of injecting drug use	4	28	2	12.5
Body piercing/tattooing in the last 12 months	3	27	4	10.0
Occupational exposure to blood	2	28	4	6.7
Case is a blood product or tissue recipient	1	30	3	3.2

[a] Percentage refers to the number of cases who 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 13. Acute hepatitis C notifications by year, 1997–2016



Adults aged 40–49 years (1.8 per 100,000) had the highest notification rate, followed by adults aged 30–39 (1.7 per 100,000) and 20–29 years (0.9 per 100,000).

Males (0.6 per 100,000) had a similar notification rate to females (0.7 per 100,000).

Ethnicity was recorded for all cases. The highest notification rate was in the Māori ethnic group (1.1 per 100,000), followed by the European or Other ethnic group (0.7 per 100,000).

Hospitalisation status was recorded for 27 (90.0%) cases, of which three (11.1%) were hospitalised.

For hepatitis C the most commonly reported risk factors were a history of injecting drug use, body piercing/tattooing in the last 12 months and sexual contact with confirmed case or carrier (Table 11).

Hepatitis (viral) not otherwise specified

In 2016, eight cases of hepatitis (viral) not otherwise specified (NOS) were notified, the same number of cases as was notified in 2015. Four cases were hepatitis D and four were hepatitis E.

Hepatitis D

The hepatitis D cases were in the 40–49 years (2 cases), 20–29 years and 50–59 years (1 case each) age groups. Two cases were male and two were female.

Three out of four cases had ethnicity information recorded of which all were in the Pacific peoples ethnic group.

Hospitalisation status was recorded for all cases, none of the cases were hospitalised.

None of the cases had any overseas information recorded.

All cases reported having co-infection with hepatitis B.

Hepatitis E

The hepatitis E cases were in the 20–29 years (2 cases), 50–59 years and 60–69 years (1 case each) age groups. Three cases were male and one case was female.

Cases were in the Asian (3 cases) and European or Other (1 case) ethnic groups.

Hospitalisation status was recorded for all cases, of which 75.0% were hospitalised.

Overseas information was recorded for three out of four cases, all of which reported travelling overseas during the incubation period. Risk factor information was unable to be obtained for the remaining case.

Table 11. Exposure to risk factors associated with acute hepatitis C, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
History of injecting drug use	20	6	4	76.9
Body piercing/tattooing in the last 12 months	5	15	10	25.0
Sexual contact with confirmed case or carrier	4	12	14	25.0
Household contact with confirmed case or carrier	3	16	11	15.8
Occupational exposure to blood	3	21	6	12.5

[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.

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.[20]

Hydatid disease

Two probable cases of hydatid disease (*Echinococcus granulosus)* were notified in 2016, similar to the number reported in 2015 (4 cases). Since 1997, 70 cases of hydatid disease have been notified.

Cases were reported from Counties Manukau and Waitemata (1 case each) DHBs. The cases were aged in the 30–39 years and 70 and over age groups (1 case each). One case was male and one was female. Cases were in the European or Other and Pacific peoples (1 case each) ethnic groups.

Both cases were hospitalised.

One case had recently travelled to and previously lived in Tonga and the other case had an onset date in 1950s.

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.

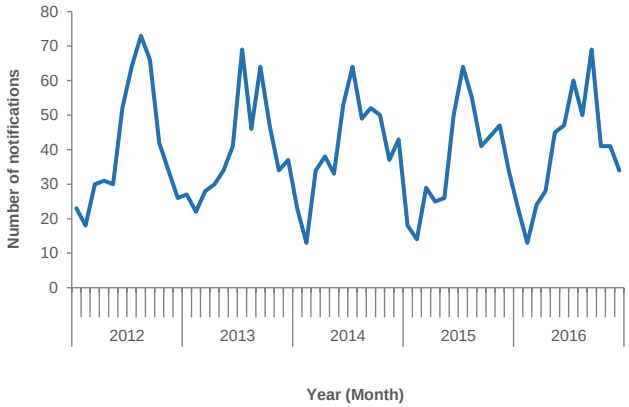
Invasive pneumococcal disease

A full description of the epidemiology of invasive pneumococcal disease (IPD) will be reported separately in the 2016 Invasive Pneumococcal Disease in New Zealand report.

In 2016, 475 cases of IPD were notified. The 2016 notification rate of 10.1 per 100,000 was similar to the 2015 rate (9.7 per 100,000, 447 cases).

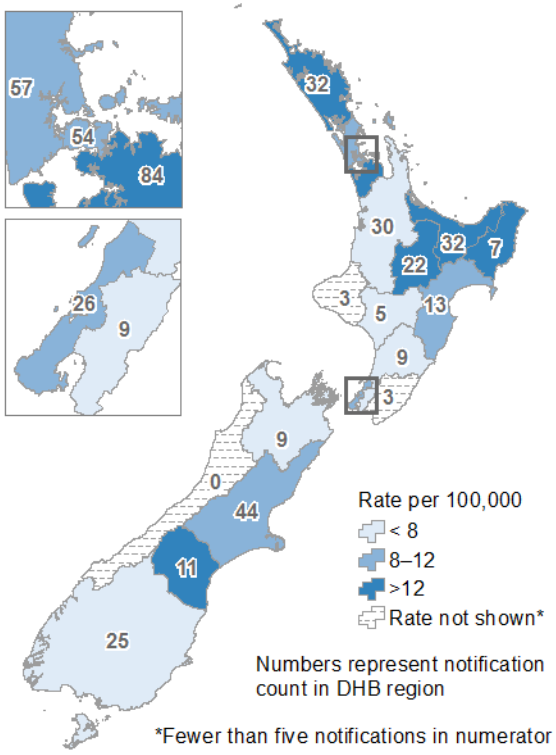
There is a distinct seasonal pattern for IPD, with the highest number of notifications reported during winter, and particularly in July, each year (Figure 14).

Figure 14. Invasive pneumococcal disease notifications by month, January 2012–December 2016



In 2016, the highest rates of IPD were reported from Lakes, Northland, South Canterbury and Counties Manukau DHBs (20.6, 18.7, 18.6 and 15.7 per 100,000, respectively) (Figure 15).

Figure 15. Invasive pneumococcal disease notifications by DHB, 2016



Adults aged 70 years and over (31.8 per 100,000), 60–69 years (18.6 per 100,000), children aged less than 1 year (15.2 per 100,000) and children aged 1–4 (15.1 per 100,000) had the highest rates of IPD.

Males (11.0 per 100,000) had higher rates than females (9.3 per 100,000).

Ethnicity was recorded for 459 (96.6%) cases. The Pacific peoples (26.7 per 100,000) and Māori (15.8 per 100,000) ethnic groups had the highest rates of IPD.

Further information on IPD rates by DHB, sex, age and ethnic group are in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 470 (98.9%) cases, of which 445 (94.7%) were hospitalised.

There were 22 deaths due to IPD reported in 2016. The deaths were in the less than 1 year (1 case), 50–59 (8 cases), 60–69 (4 cases) years and 70 years and over (9 cases) age groups.

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

Table 14 shows the vaccination status of cases by age group.

In June 2008, pneumococcal conjugate vaccine (PCV) was added to the New Zealand childhood immunisation schedule. The 7-valent conjugate vaccine (PCV7), Prevenar® was used until a schedule change to the 10-valent conjugate vaccine (PCV10), Synflorix® in July 2011. In July 2014, Synflorix® was replaced by the 13-valent conjugate vaccine (PCV13), Prevenar13®.

Table 12. Exposure to risk factors associated with invasive pneumococcal disease for cases aged less than 5 years, 2016

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Smoking in the household	8	5	33	61.5
Attends childcare	2	5	39	28.6
Chronic illness	6	35	5	14.6
Immunocompromised	6	37	3	14.0
Premature (<37 weeks gestation) [b]	1	7	1	12.5
Congenital or chromosomal abnormality	3	37	6	7.5

[a] Percentage refers to the percentage of cases who 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, 2016

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Chronic illness	244	150	35	61.9
Current smoker[b]	83	260	70	24.2
Immunocompromised	88	302	39	22.6
Chronic lung disease or cystic fibrosis	58	333	38	14.8
Resident in long-term or other chronic-care facility	24	366	39	6.2
Anatomical or functional asplenia	6	369	54	1.6
Congenital or chromosomal abnormality	2	373	54	0.5

[a] Percentage refers to the percentage of cases who 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 cochlear implants as a risk factor.
[b] Only cases aged 15 years and over are included in the reporting of this risk factor.

Table 14. Age group and vaccination status of invasive pneumococcal disease notifications, 2016

Age group	Total cases	One dose	Two doses	Three doses	Four doses	Not vaccinated	Unknown
<6 months	5	1	2	0	0	2	0
6 months–4 years	41	1	0	11	19	6	4
5–9 years	12	0	0	0	10	1	1
10–19 years	15	0	0	0	0	3	12
20+ years	402	6	0	0	0	106	290
Total	475	8	2	11	29	118	307

The recommended schedule for PCV is four doses given to infants at age six weeks, three months, five months and 15 months. For defined groups of high risk children, the schedule also includes 23-valent pneumococcal polysaccharide vaccine (23PPV).[19]

The Invasive Pathogens Laboratory at ESR received a *Streptococcus pneumoniae* isolate from a normally sterile site for serotyping for 453 (95.4%) notified cases in 2016. Table 15 shows the breakdown of these 453 culture-positive cases by serotype and age group. Just over 95% (38/40) of cases in the less than five years age group were due to serotypes not covered by PCV10, compared with 76.2% (176/231) and 85.7% (156/182) of cases in the 5–64 years age group and 65 years and over age group, respectively. Serotype 19A, a PCV13 serotype, was the most prevalent type across all ages (78 cases). Serotype 7F, a PCV10 serotype, was the second most prevalent type in the 5–64 years age group (26 cases). Serotype 22F, a 23PPV serotype, was the second most prevalent type in the 65 years and over age group (20 cases).

Table 15. Invasive pneumococcal disease notifications by serotype and age group, 2016

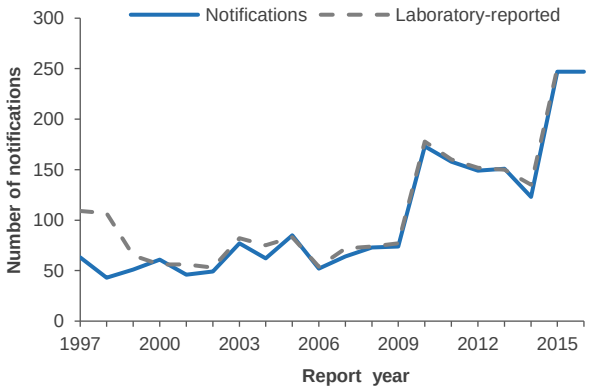
Serotype	<5 years	5–64 years	65+ years	Total
4	1	15	5	21
6B	0	1	0	1
9V	0	0	2	2
14	0	5	2	7
18C	0	1	1	2
19F	0	5	7	12
23F	0	0	2	2
1	0	0	1	1
5	0	2	0	2
7F	1	26	6	33
3	4	13	10	27
6A	0	0	1	1
19A	15	32	31	78
Other (non-PCV13)	19	131	114	264
Total[a]	**40**	**231**	**182**	**453**

[a] Totals are for isolates of culture-positive cases referred to ESR for serotyping. Note: The 7-valent pneumococcal conjugate vaccine (PCV7) covers serotypes 4, 6B, 9V, 14, 18C, 19F and 23F; PCV10 covers serotypes 1, 5 and 7F in addition to the PCV7 serotypes; and PCV13 covers serotypes 3, 6A and 19A in addition to the PCV10 serotypes.

Legionellosis

During 2016, 247 cases of legionellosis were notified, the same number as in 2015. The 2016 notification rate (5.3 per 100,000) was similar to the 2015 rate (5.4 per 100,000). The yearly number of cases was relatively stable between 1997 and 2009, but increased in 2010 and have since remained high (Figure 16). The 2010 increase could not be explained wholly due to outbreaks or the increasing use of PCR. In contrast, the increase in legionellosis notifications during 2015 and 2016 is likely due to the LegiNZ study, which involves testing hospitalised patients with suspected pneumonia for *Legionella* spp. using PCR. The study ran from May 2015 to May 2016 and included 20 hospitals in 17 DHBs.

Figure 16. Legionellosis notifications and laboratory-reported cases by year, 1997–2016



Northland, Bay of Plenty, Nelson Marlborough and Canterbury DHBs had the highest notification rates (12.3, 11.0, 7.5, and 6.9 per 100,000 respectively).

Adults aged 70 years and over (20.6 per 100,000) and 60–69 years (13.5 per 100,000) had the highest rates of legionellosis notifications.

Males (6.5 per 100,000) had a higher rate than females (4.1 per 100,000).

Ethnicity was recorded for 242 (98.0%) cases. The European or Other ethnic group (6.9 per 100,000) had the highest notification rate for legionellosis, followed by the Pacific peoples (3.5 per 100,000) ethnic group. Further information by DHB, age, sex and ethnic group is in Table 31 to 34 in the Appendix.

Table 16. Exposure to risk factors associated with legionellosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Exposure to known environmental risk factor during the incubation period	190	27	30	87.6
Pre-existing immunosuppressive or debilitating condition	58	164	25	26.1
Smokes cigarettes	29	201	17	12.6

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

Hospitalisation status was recorded for 241 cases (97.6%), of which 205 (85.1%) were hospitalised.

One death due to legionellosis was reported in 2016. The case was in the 70 years and over age group. There were two additional deaths recorded among notified legionellosis cases, where the primary cause of death was unknown.

Table 16 provides a summary of risk factors for which data was available. A total of 190 (87.6%) cases reported exposure to known environmental risk factors during the incubation period for the disease. Further details of the exposures were recorded for 188 of these 190 cases as follows: compost, potting mix or soil (150), shower or hot water system (25), spa or pool (17), water fountain (6), water blasting (6) air conditioning unit (4) and respiratory therapy device (1). Some cases reported more than one exposure to known environmental risk factors. Seven people had travelled overseas during the incubation period for the disease.

The Legionella Reference Laboratory at ESR reported 248 cases infected with *Legionella* in 2016. Table 17 shows the strains identified for those cases. As in previous years, the most common *Legionella* species identified were *L. longbeachae* (67.3%, 167 cases) and *L. pneumophila* (20.6%, 51 cases).

In 2016, no outbreaks of *Legionella* were reported.

Table 17. *Legionella* strains for laboratory-reported cases, 2016

***Legionella* species and serogroup**	**Cases**	**Percentage (%)**
L. longbeachae	**167**	**67.3**
L. longbeachae sg 1	69	27.8
L. longbeachae sg 2	11	4.4
L. longbeachae sg 1&2	1	0.4
L. longbeachae sg not determined	86	34.7
L. pneumophila	**51**	**20.6**
L. pneumophila sg 1	29	11.7
L. pneumophila sg 2	3	1.2
L. pneumophila sg 4	1	0.4
L. pneumophila sg 6	1	0.4
L. pneumophila sg 12	8	3.2
L. pneumophila sg 15	1	0.4
L. pneumophila sg not determined	8	3.2
Other *Legionella* species	**30**	**12.1**
L. micdadei	5	2.0
L. sainthelensi	5	2.0
L. bozemanae sg 1	3	1.2
L. bozemanae sg 2	1	0.4
L dumoffii	2	0.8
Legionella strain D5382	2	0.8
L. oakridgensis	2	0.8
L. jordanis	1	0.4
Legionella species unknown	9	3.6
Total	**248**	**100**

Leprosy

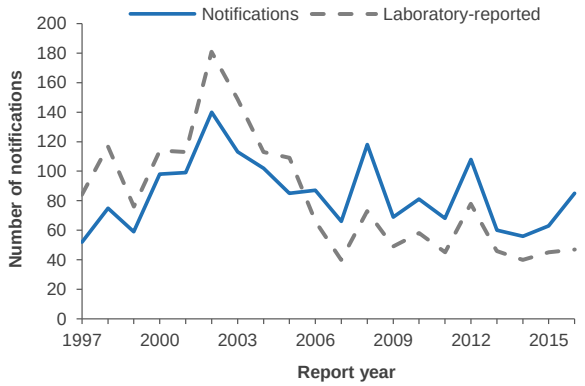
There were no cases of leprosy notified in New Zealand in 2016. A total of 78 cases of leprosy have been notified since 1997, including five cases in 2015, four cases in 2014 and seven cases in 2013.

Leptospirosis

In 2016, a total of 85 cases of leptospirosis were notified. The 2016 rate of 1.8 cases per 100,000 was a slight increase from the notification rate in 2015 (1.4 per 100,000, 63 cases). Of the 85 notified cases, 63 were laboratory-confirmed by either microscopic agglutination titre (MAT) (63 cases), or nucleic acid testing (NAAT) (25 cases) or both MAT and NAAT (6 cases). Two cases were not laboratory-confirmed.

Figure 17 shows the number of notified cases of leptospirosis each year since 1997.

Figure 17. Leptospirosis notifications by year, 1997–2016



The highest notification rates for leptospirosis were reported from Northland, Hawke's Bay, Waikato and Taranaki DHBs (8.8, 7.4, 5.3 and 4.3 per 100,000 respectively).

The highest notification rates were in the 50–59, 20–29, 40–49 and 60–69 years age groups (5.4, 2.5, 2.4 and 1.8 per 100,000 respectively).

Males (3.3 per 100,000) had higher rates than females (0.4 per 100,000).

Ethnicity was recorded for 82 (96.5%) cases. The highest notification rates were in the European or Other (2.1 per 100,000) and Māori (1.7 per 100,000) ethnic groups.

Hospitalisation status was recorded for 84 (98.8%) cases, of which 57 (67.9%) were hospitalised.

Occupation was recorded for 80 (94.1%) of the 85 cases. Of these, 61 (76.3%) were engaged in occupations previously identified as high-risk for exposure to *Leptospira* spp. in New Zealand.[21] The percentage of such cases was slightly lower than reported in 2015 (80.6%). Of the 61 cases with a high-risk occupation, 44 (72.1%) were farmers or farm workers, 12 (19.7%) worked in the meat processing industry (as freezing workers, meat process workers or butchers) and five (8.2%) worked in an occupation that involved contact with animals or their environment (eg, cattle exporter, hunter and trapper). Of the 24 cases that did not report a high-risk occupation (or had no occupation recorded), 11 reported animal/outdoor exposures, 10 had exposure to lakes, rivers or streams, and six had travelled overseas during the incubation period for the disease. Seven cases reported more than one risk factor. Three cases did not report any risk factors.

The Leptospira Reference Laboratory at ESR reported 42 cases of infection with *Leptospira* in 2016. Table 18 presents the species and serovars identified for those cases. The most common *Leptospira* serovars reported were *L. borgpetersenii* sv Hardjo (42.9%, 18 cases), *L. borgpetersenii* sv Ballum, (28.6%, 12 cases) and *L. interrogans* sv Tarassovi (21.4%, 9 cases).

No outbreaks of leptospirosis were reported in 2016.

Table 18. *Leptospira* species and serovars for laboratory-reported cases, 2016

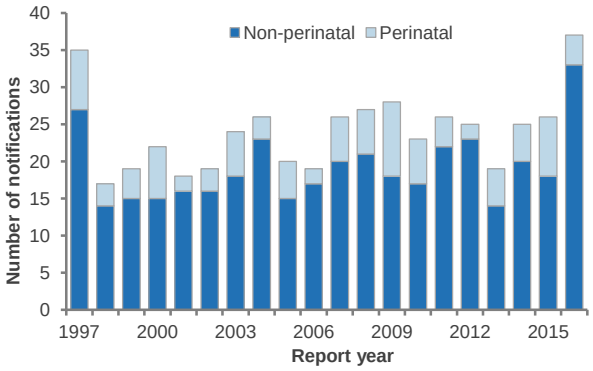
***Leptospira* species and serovar**	**Cases**	**Percentage (%)**
L. borgpetersenii	**39**	**92.9**
L. borgpetersenii sv Hardjo	18	42.9
L. borgpetersenii sv Ballum	12	28.6
L. borgpetersenii sv Tarassovi	9	21.4
L. interrogans	**3**	**7.1**
L. interrogans sv Pomona	3	7.1
Total	**42**	**100.00**

Listeriosis

In 2016, 37 cases of listeriosis were notified compared with 26 cases in 2015. Figure 18 shows listeriosis notifications (both perinatal and non-perinatal) for each year since 1997. The 2016 rate of 0.8 cases per 100,000 was a slight increase from the notification rate in 2015 (0.6 per 100,000). The notification rate has been relatively

stable for the past 18 years at around 0.6, since a peak of 0.9 per 100,000 in 1997.

Figure 18. Listeriosis notifications (perinatal and non-perinatal) by year, 1997–2016



Perinatal

Four cases of perinatal listeriosis were notified in 2016. The length of gestation was known for all perinatal cases, with a range of 24–36 weeks. The cases were in the 30–39 (2 cases), 15–19 and 20–29 years (1 case each) age groups. The ethnic groups of the cases were Pacific peoples (2 cases), Asian and European or Other (1 case each). Two perinatal deaths from listeriosis occurred in 2016.

Non-perinatal

The 33 non-perinatal listeriosis cases were from 12 DHBs, with the highest number of notifications reported in Auckland DHB (5 cases), followed by Waitemata, Bay of Plenty, and Hutt Valley DHBs (4 cases each).

The cases were in the 70 years and over (17 cases), 60–69 (7 cases), 50–59 (5 cases), 30–39 (2 cases), and 20–29, and <1 (1 case each) years age groups. Eighteen cases were female and fifteen were male.

The European or Other ethnic group (20 cases) had the highest number of cases of non-perinatal listeriosis, followed by the Māori (6 cases), Asian (5 cases) and Pacific peoples (2 cases) ethnic groups.

Thirty-two non-perinatal cases were hospitalised for listeriosis and ten were hospitalised for the treatment of another illness.

Information on underlying illness was recorded for 30 (90.9%) non-perinatal cases, of which 26 cases (86.7%) had an underlying illness such as cancer, autoimmune disease, heart disease, diabetes or another chronic illness. Fifteen cases were reported to be receiving immunosuppressive drugs. The Special Bacteriology Laboratory at ESR serotyped 38 isolates of Listeria monocytogenes in 2016. The serotypes identified were O4 (20 isolates, 52.6%) and O1/2 (17 isolates, 44.7%). One isolate was non-serotypable.

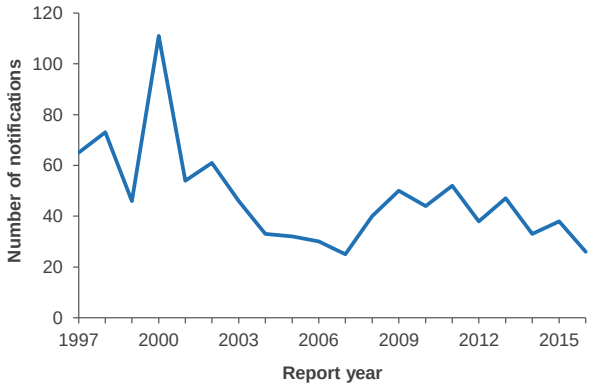
No outbreaks of *Listeria* were reported during 2016.

Malaria

In 2016, 26 cases of malaria were notified compared with 38 cases in 2015 (Figure 19). The 2016 notification rate (0.6 per 100,000) was similar to the 2015 rate (0.8 per 100,000).

Adults in the 20–29 years (1.7 per 100,000) age group had the highest rate followed by the 30–39 years (0.9 per 100,000) age group.

Figure 19. Malaria notifications by year, 1997–2016



Males (0.8 per 100,000) had a higher rate than females (0.3 per 100,000).

Ethnicity was recorded for 24 (92.3%) cases. The Asian (1.5 per 100,000) ethnic group had the highest rate, followed by the European or Other (0.3 per 100,000) ethnic group.

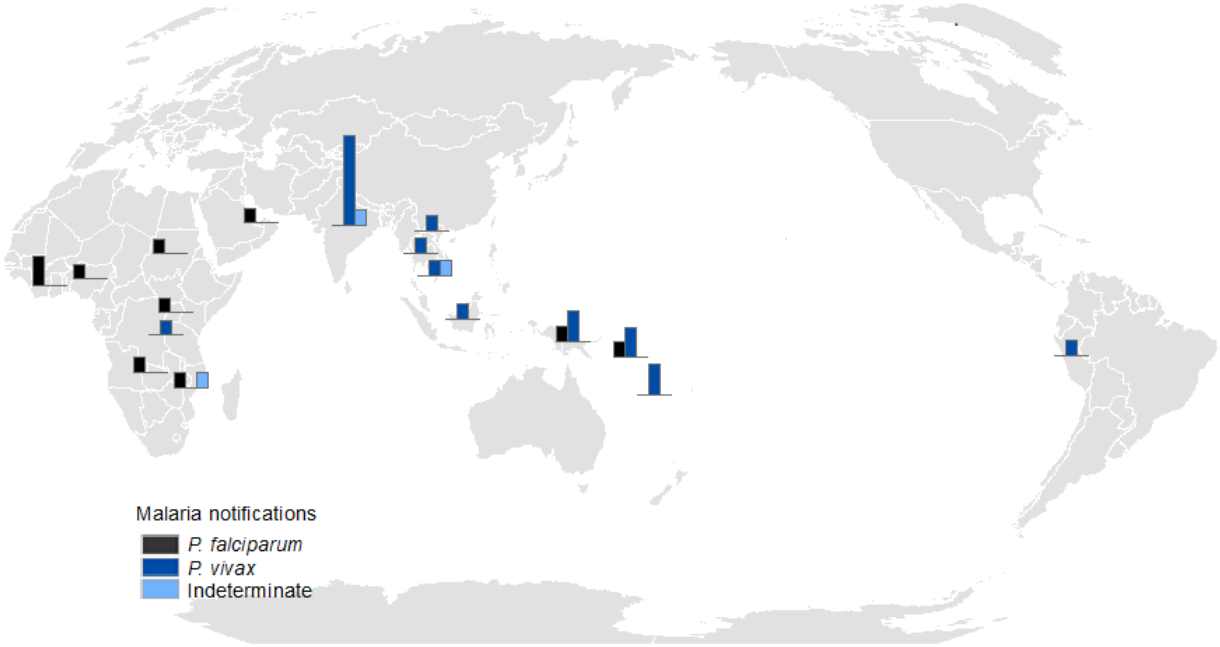
Hospitalisation status was recorded for 23 (88.5%) cases, of which 15 (65.2%) were hospitalised.

All cases had either lived or travelled overseas during the incubation period for the disease or had a prior history of travel to malaria-endemic areas.

Figure 20 presents the region and country of overseas travel and Plasmodium species identified for malaria notifications in 2016. The region most commonly reported for cases with *P. vivax* was Southern and Central Asia (8 cases) followed by Oceania (6 cases). For cases identified with P. falciparum, the region most

commonly reported was Sub-Saharan Africa (6 cases). The country with the highest number of malaria cases was India (7 cases), of which 6 cases were identified with *P. vivax* (Table 19). Some cases reported travelling to more than one country.

Figure 20. *Plasmodium* species and country of overseas travel for malaria notifications, 2016



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

Table 19. Region and country of overseas travel and *Plasmodium* species for malaria notifications, 2016

Region	Country resided in or visited	*Plasmodium* species		
		P. vivax	*P. falciparum*	Indeterminate
North Africa and the Middle East	Sudan		1	
	United Arab Emirates		1	
Sub-Saharan Africa	Ghana		2	
	Mozambique		1	1
	Nigeria		1	
	Rwanda	1		
	Tanzania	1		
	Uganda		1	
	Zambia		1	
Southern and Central Asia	India	6		1
South-East Asia	Cambodia	1		1
	Indonesia	1		
	Laos	1		
	Thailand	1		
The Americas	Peru	1		
Oceania	Papua New Guinea	2	1	
	Solomon Islands	2	1	
	Vanuatu	2		

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

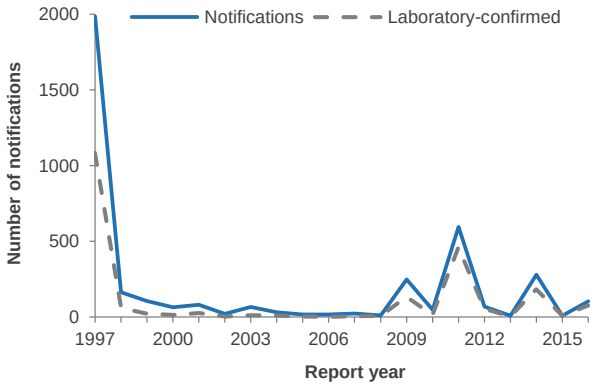
Measles

Measles immunisation was introduced in 1969 [19] and measles has been a notifiable disease since June 1996.[4] Since January 2001, the recommended measles, mumps and rubella (MMR) immunisation schedule has been two doses, the first given at age 15 months and the second at age four years. During measles outbreaks, the first dose may be advanced to age 12 months and the MMR vaccine may be recommended for infants aged less than 12 months if cases are occurring in the very young.[19]

In 2016, 103 confirmed cases of measles were notified (including 76 laboratory-confirmed cases). In 2015, 10 confirmed cases of measles were notified (including 9 laboratory-confirmed cases) (Figure 21). The 2016 notification rate (2.2 per 100,000) was a significant increase from the 2015 notification rate (0.2 per 100,000).

Waikato (14.0 per 100,000) DHB had the highest rate followed by MidCentral (12.1 per 100,000) DHB.

Figure 21. Measles notifications and laboratory-confirmed cases by year, 1997–2016



The <1 year (23.6 per 100,000) age group had the highest rate, followed by the 15–19 years (8.2 per 100,000) age group.

Males (2.3 per 100,000) and females (2.1 per 100,000) had a similar rate.

The Māori (7.2 per 100,000) ethnic group had the highest rate, followed by the Pacific peoples (3.8 per 100,000) ethnic group.

Twenty-nine (28.2%) cases were hospitalised.

Immunisation status was known for 93 (90.3%) cases, of which 70 (75.3%) were not immunised, including 16 cases who were aged <15 months and therefore ineligible for vaccination.

The source of the virus was recorded for all cases, of these 6 (5.8%) cases were imported. The countries the cases had been to during the incubation period for the disease were Indonesia (4 cases) and India (2 cases). The remaining 97 (94.2%) cases were import-related (ie, locally-acquired infections due to transmission from an imported case or other import-related case as supported by epidemiological and/or virological evidence).

Three measles outbreaks were reported in 2016, involving 98 cases.

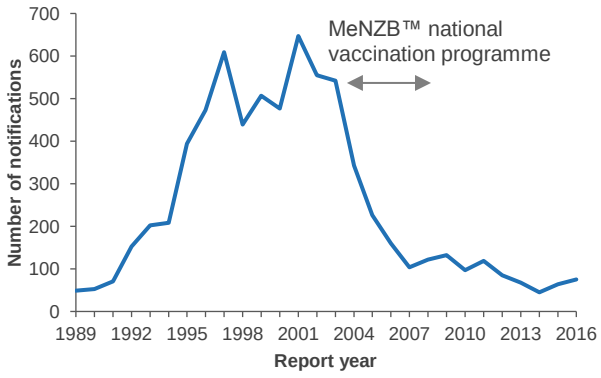
The Ministry of Health hospitalisation data included 34 hospitalisations in 2016 where measles was the principal diagnosis.

Meningococcal disease

In 2016, 75 cases of meningococcal disease were notified. The notification rate (1.6 per 100,000) was slightly higher than the 2015 rate (1.4 per 100,000, 64 cases). The rate was also a significant decrease from the peak rate (16.7 per 100,000 in 2001) experienced during the New Zealand meningococcal disease epidemic (driven by the B:P1.7-2,4 strain). The 2016 rate is similar to the rate of 1.5 per 100,000 observed in the immediate pre-epidemic years (1989–1990).

Figure 22 shows the number of meningococcal disease notifications from 1989 to 2016.

Figure 22. Meningococcal disease notifications by year, 1989–2016



Of the seven DHBs that reported five or more cases in 2016, the highest rate was for Southern (6.0 per 100,000, 19 cases), followed by Bay of Plenty (3.1 per 100,000, 7 cases), Capital & Coast (2.3 per 100,000, 7 cases), Counties Manukau (2.2 per 100,000, 12 cases), Waikato (2.0 per 100,000, 8 cases), Auckland (1.0 per 100,000, 5 cases), and Waitemata (0.8 per 100,0000, 5 cases) DHBs.

The highest rate was for the <1 year age group (18.6 per 100,000, 11 cases), followed by 1–4 years (6.9 per 100,000, 17 cases).

Males had a higher notification rate (1.9 per 100,000, 45 cases) than females (1.3 per 100,000, 30 cases).

Ethnicity was recorded for all cases. The Pacific peoples ethnic group (4.2 per 100,000, 12 cases) had the highest notification rate for meningococcal disease, followed by the Māori (2.6 per 100,000, 18 cases) ethnic group.

All 75 cases were hospitalised. Pre-hospital management information was recorded for 73 (97.3%) cases. Of these, 29 (39.7%) cases were seen by a doctor prior to hospital admission, of whom, only 10 (34.5%) were given intravenous or intramuscular antibiotics before admission. Three cases did not report seeing a doctor but were given intramuscular antibiotics prior to admission.

Two deaths were reported during 2016 giving a case fatality rate of 2.7%. Both cases had been admitted to hospital, none had been seen by a doctor prior to admission, but one had been given antibiotics by paramedics.

Seventy (93.3%) cases were laboratory-confirmed and the strain type was determined for 67 cases: group B (47 cases, including 23 B:P1.7-2,4), group C (8 cases), group Y (7 cases), and group W (5 cases) (Table 20). Of the 26 laboratory-confirmed cases in children <5 years of age, all were able to be typed and, of these, 17 (65.4%) were determined to be group B strain.

Two *N. meningitidis* outbreaks were reported in 2016, involving four cases. Although there were increased case numbers for a common strain (B:1.7-2,4) seen in the 15–24 years age group in Dunedin City and Queenstown-Lakes District the case numbers and rates did not meet the threshold to be reported as a community outbreak.

The antimicrobial susceptibility of 54 viable meningococcal isolates received by ESR from cases of invasive disease in 2016 was tested. All isolates were susceptible to ceftriaxone, rifampicin and ciprofloxacin. Twenty-nine isolates (53.7%) had reduced susceptibility to penicillin, with minimum inhibitory concentrations of 0.12–0.5 mg/L.

Table 20. Meningococcal disease strain group distribution by year, 2012–2016

	2012	2013	2014	2015	2016
Group B	**43**	**30**	**26**	**41**	**47**
B:P1.7-2,4	15	11	13	10	23
Other group B	28	19	13	31	24
Group C	**23**	**17**	**6**	**6**	**8**
C:P1.5-1,10-8	18	15	5	3	4
Other group C	**5**	**2**	**1**	**3**	**4**
Other	**2**	**10**	**4**	**12**	**12**
Group W	0	5	0	6	5
Group Y	2	4	3	6	7
Group E	0	0	1	0	0
Non-groupable	0	1	0	0	0
Total*	**68**	**57**	**36**	**59**	**67**

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

Middle East Respiratory Syndrome (MERS)

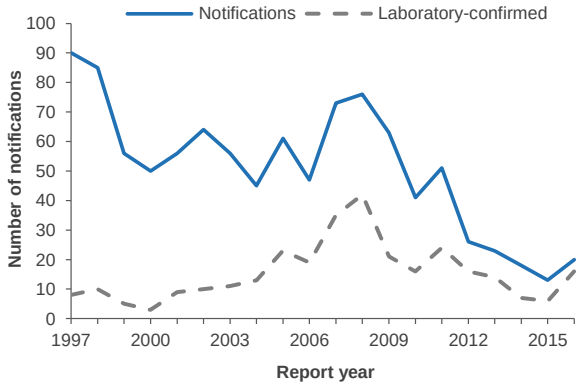
MERS became notifiable in New Zealand on 6 September 2013. Although no cases have been reported in New Zealand, worldwide 1864 laboratory-confirmed cases of human infection with MERS Coronavirus (MERS-CoV), including 659 related deaths, were reported to WHO from September 2012 to 19 December 2016.[22]

Mumps

Immunisation against mumps was introduced to the New Zealand Immunisation Schedule in 1990 as part of the MMR vaccine,[19] and mumps became notifiable in June 1996.[4] The last epidemic occurred in 1994.[19]

In 2016, 20 cases of mumps were notified (16 were laboratory-confirmed) compared with 13 cases in 2015 (6 laboratory-confirmed). Figure 23 shows notifications and laboratory-confirmed cases from 1997 to 2016. The 2016 notification rate (0.4 per 100,000) was slightly higher than the 2015 rate (0.3 per 100,000).

Figure 23. Mumps notifications and laboratory-confirmed cases by year, 1997–2016



Cases were reported from Waitemata (7 cases), Counties Manukau (4 cases), Auckland, Lakes and Capital & Coast (2 cases each), Hawke's Bay, West Coast, and Southern (1 case each) DHBs.

Cases ranged in age from 2 to 48 years, with half of the cases aged less than 15 years. Fourteen cases were male and six cases were female.

Ethnicity was recorded for 18 (90.0%) of cases. The Pacific peoples ethnic group (6 cases) had the highest number of cases reported, followed by the European or Other (5 cases), Asian (4 cases), and Māori (3 cases) ethnic groups.

Hospitalisation status was recorded for all cases, of which two (10.0%) cases were hospitalised.

Of the cases for which risk factor information was recorded, 46.7% (7/15) reported travelling overseas during the incubation period for the disease and 33.3% (5/15) attended school, pre-school or childcare.

One mumps outbreak was reported in 2016, involving five cases.

The recommended vaccination schedule for mumps is two doses of the MMR vaccine, at ages 15 months and four years.[19] In 2016, 13 cases (65.0%) had a known vaccination status. Of these, five were not vaccinated. Four cases had received one dose of vaccine and three cases had received two doses of vaccine (Table 21).

The Ministry of Health hospitalisation data recorded ten hospitalisations in 2016 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.

Table 21. Age group and vaccination status of mumps notifications, 2016

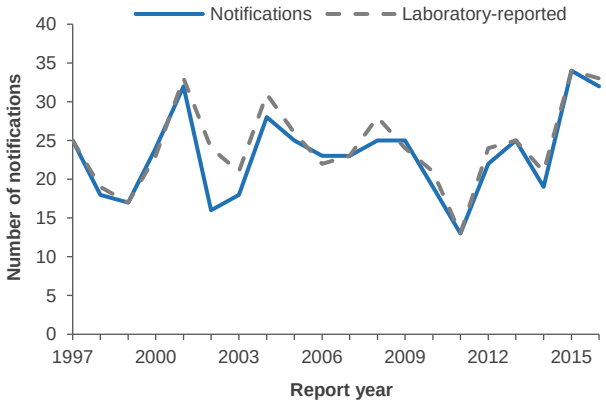
Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 months[a]	0	0	0	0	0	0
15 months–3 years	3	3	0	0	0	0
4–9 years	3	0	1	0	1	1
10–19 years	5	0	2	0	1	2
20+ years	9	1	0	1	3	4
Total	**20**	**4**	**3**	**1**	**5**	**7**

[a] Children aged less than 15 months are ineligible for vaccination.

Paratyphoid fever

In 2016, 32 cases of paratyphoid fever were notified compared with 34 cases in 2015. The 2016 notification rate was the same as the 2015 rate (0.7 per 100,000). Figure 24 shows the number of notifications and laboratory-reported cases of paratyphoid fever each year since 1997.

Figure 24. Paratyphoid fever notifications and laboratory-reported cases by year, 1997–2016



Adults aged 20–29 and 30–39 years had the highest notification rates (1.5 and 1.7 per 100,000 respectively).

Males (0.9 per 100,000) had a slightly higher rate than females (0.5 per 100,000).

The Asian (2.6 per 100,000) ethnic group had the highest notification rate, followed by the European or Other (0.5 per 100,000) ethnic group. No cases of paratyphoid fever were reported among Māori, Pacific peoples or MELAA ethnic groups.

Hospitalisation status was known for 31 (96.9%) cases, of which 13 (41.9%) were hospitalised.

Of the 32 cases notified in 2016, 28 (87.5%) had travelled overseas during the incubation period for the disease. Four cases had not travelled overseas. The countries most commonly visited were India (12 cases), Indonesia (10 cases) and Malaysia (3 cases). Some cases reported travelling to more than one country.

The Enteric Reference Laboratory at ESR confirmed 33 isolates as *Salmonella* Paratyphi during 2016. The serotypes identified were *S*. Paratyphi B var. Java (18 isolates) and *S*. Paratyphi A (12 isolates) and *S*. Paratyphi B (3 isolates). It should be noted that isolates of *S*. Paratyphi B var. Java are currently notified as paratyphoid fever. However, the spectrum of illness associated with *S*. Paratyphi B var. Java infection is more consistent with non-typhoidal salmonellosis.[23] *S*. Paratyphi B var. Java was identified in three cases with no history of overseas travel. *S.* Paratyphi B was identified in one case that had a prior history of travel (outside of the incubation period for the disease).

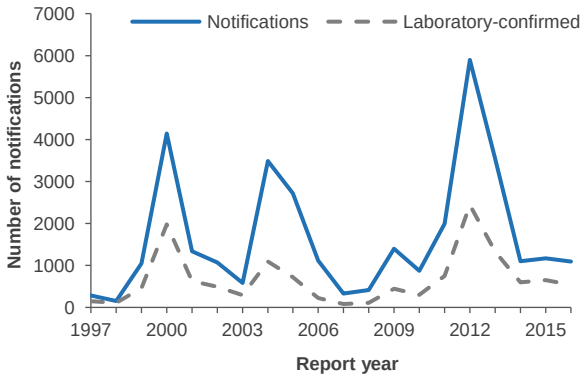
No outbreaks of paratyphoid fever were reported in 2016.

Pertussis (whooping cough)

Pertussis is a vaccine-preventable disease caused by the bacterial agent *Bordetella pertussis*. Epidemics occur every 2–5 years, predominantly in young children, with a periodicity that is less affected by mass immunisation than other childhood vaccine-preventable diseases.[19] A recent national outbreak of pertussis occurred from 2011 to 2013. Pertussis vaccination has been part of the routine immunisation schedule in New Zealand since 1960. Pertussis has been notifiable since 1996.[4]

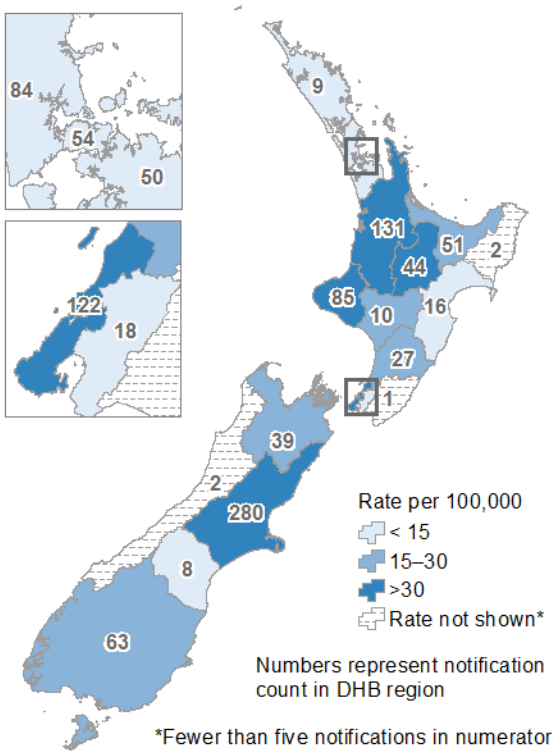
In 2016, 1096 pertussis cases were notified, of which 538 (49.1%) were laboratory-confirmed (69 by isolation only, 387 by PCR only, and 82 by isolation and PCR). The 2016 notification rate (23.4 per 100,000) was significantly lower than the 2015 notification rate (25.4 per 100,000, 1168 cases) (Figure 25).

Figure 25. Pertussis notifications and laboratory-confirmed cases by year, 1997–2016



The pertussis notification rate varied by DHB region (Figure 26), with the highest rate reported in Taranaki DHB (72.8 per 100,000, 85 cases), followed by Canterbury (51.9 per 100,000, 280 cases), Lakes (41.3 per 100,000, 44 cases), and Capital & Coast (39.8 per 100,000, 122 cases) DHBs.

Figure 26. Pertussis notifications by DHB, 2016



The highest notification rate was for the less than 1 year age group (114.8 per 100,000, 68 cases), followed by the 1–4 (44.4 per 100,000, 109 cases), 5–9 (37.2 per 100,000, 120 cases) and 10–14 years (33.3 per 100,000, 98 cases) age groups.

Females (26.2 per 100,000, 624 cases) had a higher notification rate than males (20.4 per 100,000, 472 cases).

The European or Other (26.0 per 100,000, 809 cases) ethnic group had the highest notification rate for pertussis, followed by MELAA (24.9 per 100,000, 13 cases), and Māori (24.4 per 100,000, 170 cases) ethnic groups.

Hospitalisation status was recorded for 1057 (96.4%) cases, of which 97 (9.2%) were hospitalised. Approximately 56% (38/68) of cases in the less than 1 year age group were hospitalised.

The proportion of hospitalised cases (for all age groups) by ethnic group was: Pacific peoples (45.2%, 19/42), Māori (15.4%, 25/162), Asian (15.0%, 6/40), MELAA (8.3%, 1/12) and European or Other (5.5%, 43/784).

The current immunisation schedule for pertussis is a primary course of DTaP-IPV-HepB/Hib at ages six weeks, three months and five months, followed by booster doses at ages four years (DTaP-IPV) and 11 years (Tdap). Vaccination with Tdap is also recommended for pregnant women from 28 to 38 weeks gestation.[19]

Vaccination status was known for 655 (59.8%) cases (Table 22). Of these, 251 (38.3%) cases were not vaccinated, including 11 infants aged under six weeks who were ineligible for vaccination. Fifty (12.4%) of the vaccinated cases had received one dose of pertussis vaccine, 19 (4.7%) had received two doses and 218 (54.0%) had received three or more doses. A further 117 (29.0%) cases were reported as being vaccinated, but no dose information was available. Vaccination status was known for 62 (63.9%) of the hospitalised cases. Of these, 26 (41.9%) cases had not been vaccinated (including 9 that were aged 0–5 weeks and therefore not yet eligible for vaccination), 12 (19.4%) had received one dose of pertussis vaccine, four (6.5%) had received two doses, and nine (14.5%) had received three or more doses. A further 11 (17.7%) cases were reported as being vaccinated, but no dose information was available.

Table 22. Age group and vaccination status of pertussis notifications, 2016

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]	11	0	0	0	0	0	0	11	0
6 weeks–2 months	20	11	1	0	0	0	0	7	1
3–4 months	13	4	5	0	0	0	0	4	0
5 months–3 years	106	1	5	53	5	0	6	32	4
4–10 years	173	2	0	10	77	2	16	48	18
11+ years	773	32	8	9	22	40	95	149	418
Total	**1096**	**50**	**19**	**72**	**104**	**42**	**117**	**251**	**441**

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

In 2016, 36.2% (340/938) of cases had attended school, pre-school or childcare and 33.1% (219/662) of cases reported contact with a laboratory-confirmed case of pertussis.

Twenty-seven outbreaks of *Bordetella pertussis* were reported in 2016, involving 108 cases.

Ministry of Health hospitalisation data for 2016 included 72 hospitalisations for which 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.[24]

Poliomyelitis (polio)

There were no polio notifications in 2016.

The New Zealand Paediatric Surveillance Unit carries out active surveillance of acute flaccid paralysis (AFP) to demonstrate the absence of wild polio virus. In 2016, 12 cases of AFP were notified to the Unit. All 12 cases were reviewed by the National Certification Committee for the Eradication of Polio (NCCEP) and classified as non-polio.

Since the mass oral polio vaccine (OPV) immunisation 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).[19] The most recent vaccine-associated case occurred in 1999.[25] No cases have been reported since the inactivated polio vaccine (IPV) replaced OPV in 2002.

In 1976, an imported case of wild polio virus infection was managed in New Zealand after a child arrived unwell from Tonga.[19]

Primary amoebic meningoencephalitis

The last case of primary amoebic meningoencephalitis (*Naegleria fowleri)* in New Zealand was notified in 2000. There were five prior cases in New Zealand, four of which were part of the same outbreak in 1968. All six cases in New Zealand were fatal and were linked to swimming in geothermal pools in the central North Island.[26]

Q fever

No cases of Q fever (*Coxiella burnetii*) were notified in 2016. 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 travelling overseas during the incubation period for the disease.

Prior to 2012, Q fever was reported under the rickettsial diseases section.

Rabies and other lyssaviruses

New Zealand is classified as a rabies-free country.[27] No cases of rabies or other lyssavirus have been reported in New Zealand.

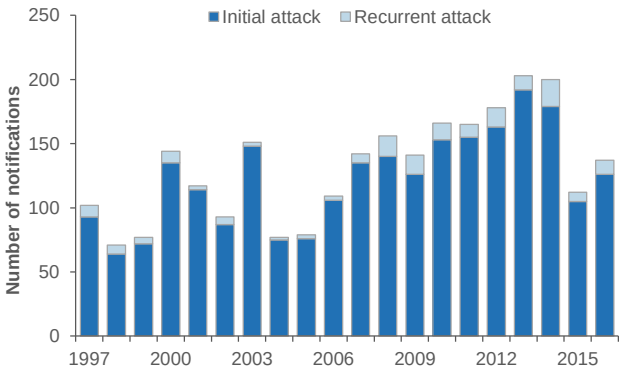
Rheumatic fever

In 2016, 137 cases of rheumatic fever were notified compared with 112 cases in 2015. The 2016 notification rate (2.9 per 100,000) was a slight increase from the 2015 rate (2.4 per 100,000).

Of the 137 cases of rheumatic fever, 126 cases were initial episodes and 11 were recurrences. This is a rate of 2.7 per 100,000 for initial episodes and 0.2 per 100,000 for recurrences.

Figure 27 shows the number of initial episodes and recurrent cases of rheumatic fever reported each year since 1997.

Figure 27. Rheumatic fever (initial episodes and recurrent cases) by year, 1997–2016



Hospitalisation date was recorded for all of the 132 cases that were hospitalised. Of these, 91 (68.9%) cases were notified within seven days of hospital admission.

Ministry of Health hospitalisation data for 2016 included 183 hospitalisations where rheumatic fever was the principal diagnosis.

A full description of the epidemiology of rheumatic fever will be reported separately in the Rheumatic Fever in New Zealand Annual Report available from www.surv.esr.cri.nz.

Initial episodes

Of the 126 initial episode cases notified, 93 were confirmed, 25 were probable and 8 were suspect cases.

Counties Manukau (7.5 per 100,000) DHB had the highest rate followed by Lakes (4.7 per 100,000) and Auckland (4.1 per 100,000) DHBs.

Children in the 10–14 years (20.7 per 100,000) age group had the highest rate, followed by the 5–9 years (6.2 per 100,000) age group.

Males (3.2 per 100,000) had a higher rate than females (2.2 per 100,000).

The Pacific peoples (25.3 per 100,000) ethnic group had the highest rate followed by the Māori (6.9 per 100,000) ethnic group and accounted for 96.0% of initial episode cases.

Hospitalisation status was recorded for 125 (99.2%) cases, of which 122 (97.6%) were hospitalised.

Recurrences

In 2016, 11 recurrent cases were notified, from Counties Manukau (4 cases), Auckland (3 cases), Hawke's Bay (2 cases), Northland and Waikato (1 case each) DHBs.

The age range of cases was 17 to 34 years. Three cases were male and eight were female.

All 11 recurrent cases were either from the Pacific peoples (7 cases) or Māori (4 cases) ethnic groups.

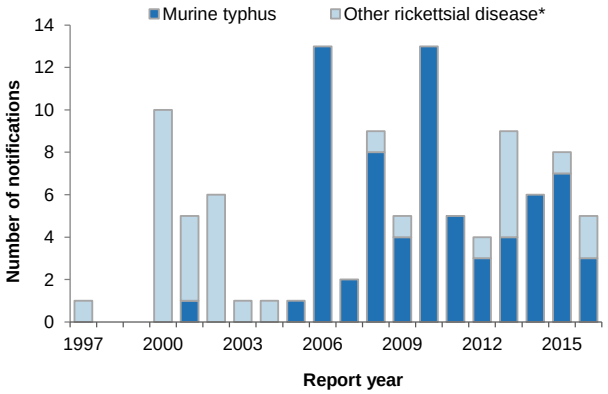
Ten (90.9%) of the recurrent cases were hospitalised.

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.

In 2016, five cases of rickettsial disease were notified compared with eight cases in 2015 (Figure 28). The 2016 notification rate (0.1 per 100,000) was similar to the 2015 rate (0.2 per 100,000). Three of the notifications were for murine typhus and two were for other rickettsial diseases (one caused by *Orientia tsutsugamushi* (scrub typhus) and the other caused by *Rickettsia conorii*).

Figure 28. Rickettsial disease notifications, 1997–2016



* Includes all other diseases caused by organisms of the *Rickettsia* genus, except typhus. No cases of typhus (caused by *Rickettsia prowazekii*) have been reported between 1997 and 2016.

Murine typhus

Three laboratory-confirmed cases of murine typhus (caused by *Rickettsia typhi*) were notified, from Waikato (2 cases) and Waitemata (1 case) DHBs.

The cases were in the 50–59 (2 cases) and 60–69 (1 cases) years age groups. All three cases were females in the European or Other ethnic group.

One (33.3%) case was hospitalised. None of the cases had travelled overseas during the incubation period for the disease and are assumed to have acquired their infection in New Zealand.

Typhus

No cases of typhus (caused by *Rickettsia prowazekii*) have been reported from 1997 to 2016.

Other rickettsial diseases

Two laboratory-confirmed cases of other rickettsial diseases were notified, one caused by *Orientia tsutsugamushi* (scrub typhus) and the other caused by *Rickettsia conorii*.

The cases were a male and female in the 30–39 and 50–59 years age groups. One case was in the Asian ethnic group and the other in the European or Other ethnic group.

Both of the cases were hospitalised and had travelled overseas during the incubation period for the diseases. Countries travelled to were Australia and India.

Rubella (German measles)

Rubella immunisation was introduced in 1970 for all children at age four 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 immunisation schedule for rubella is two doses of MMR vaccine, given at 15 months and 4 years of age.[19]

Rubella has been a notifiable disease since June 1996.[19]

Three cases of rubella were notified in 2016, compared with no cases in 2015.

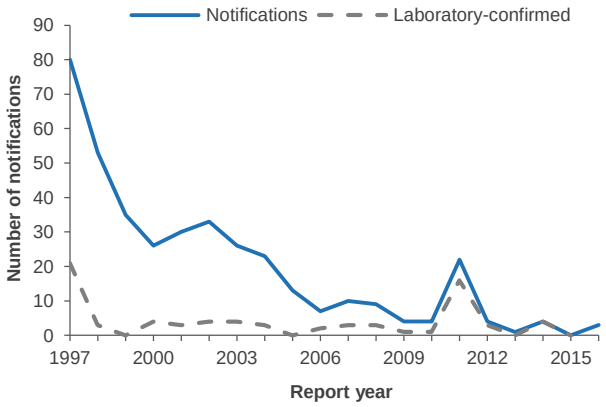
The cases were in the 1–4, 20–29 and 30–39 (1 case each) years age groups. One case was male and two were female. Two cases were in the Asian ethnic group and one case was in the European or Other ethnic group.

Two cases were hospitalised.

All three cases were laboratory-confirmed and all had been overseas during the incubation period for the disease. Although two of the cases had travelled to multiple counties, all three cases had India identified as the source country for the infection.

Since the last national rubella outbreak in 1995 [19], the number of rubella cases notified each year has decreased steadily, except for an increase in notifications in 2011 during the measles outbreak (Figure 29).

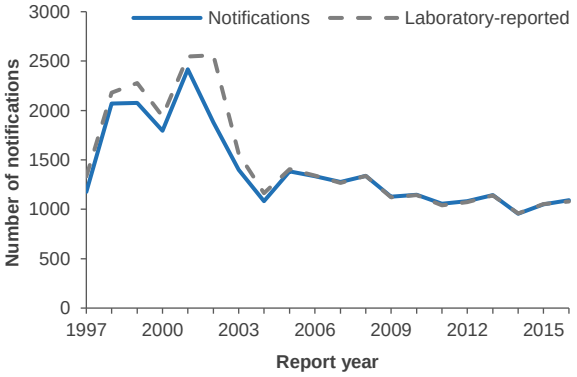
Figure 29. Rubella notifications and laboratory-confirmed cases by year, 1997–2016



Salmonellosis

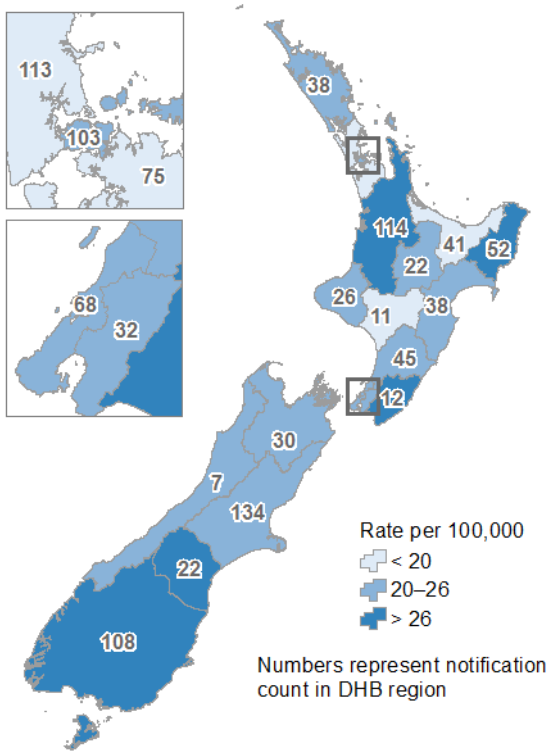
In 2016, 1091 cases of salmonellosis were notified. The 2016 notification rate (23.2 per 100,000) showed a slight increase from the 2015 rate (22.9 per 100,000, 1051 cases). Notifications for salmonellosis saw a large decrease between 2001 and 2004 and have remained relatively stable since 2005 (Figure 30).

Figure 30. Salmonellosis notifications and laboratory-reported cases by year, 1997–2016



The salmonellosis notification rate varied throughout the country (Figure 31). The highest rates were in Tairawhiti (108.8 per 100,000, 52 cases), South Canterbury (37.2 per 100,000, 22 cases), Southern (33.9 per 100,000, 108 cases) and Waikato (28.5 per 100,000, 114 cases) DHBs.

Figure 31. Salmonellosis notifications by DHB, 2016



Ethnicity was recorded for 1057 (96.9%) cases. Notification rates were highest for infants aged less than 1 year and children aged 1–4 years (114.8 and 66.9 per 100,000 respectively).

The notification rate for males (23.8 per 100,000) was slightly higher than females (22.7 per 100,000).

The highest notification rates were for the European or Other (25.0 per 100,000) and the Pacific peoples (21.8 per 100,000) ethnic groups.

Further information by DHB, sex, age and ethnic group is in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 1015 (93.0%) cases, of which 223 (22.0%) were hospitalised.

The most common risk factors reported for salmonellosis in 2016 were consuming food from retail premises, travelling overseas and having contact with farm animals (Table 23).

The Enteric Reference Laboratory at ESR confirmed 1073 isolates of *Salmonella* from humans (excluding *S.* Paratyphi and *S.* Typhi) in 2016. The most common serotypes identified were *S.* Brandenburg (67 isolates), *S.* Typhimurium phage type 56 variant (64 isolates), *S.* Stanley (60 isolates), *S.* Typhimurium phage type 101 (47 isolates), and *S.* Enteritidis phage type 11 (46 isolates).

A summary of the laboratory-reported cases from 2012 to 2016 for selected *Salmonella* serotypes and phage types is provided in Table 36 in the Appendix.

The yearly trend 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 4 cases in 2014 to 39 cases in 2016. For other serotypes, the number of cases varies from year to year.

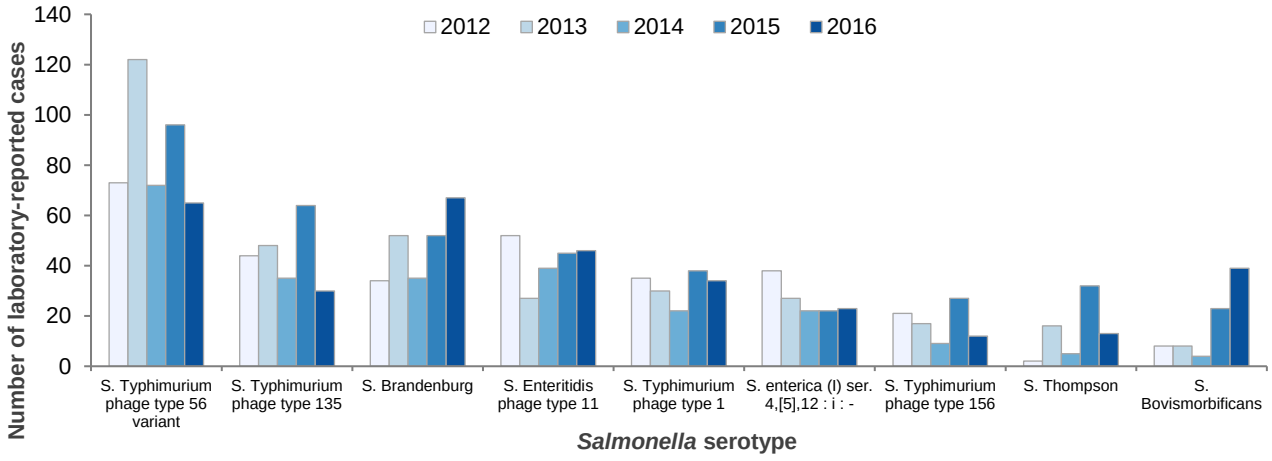
In 2016, 24 outbreaks of salmonellosis were reported, involving 130 cases.

Table 23. Exposure to risk factors associated with salmonellosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	275	325	491	45.8
Travelled overseas during the incubation period	288	640	163	31.0
Contact with farm animals	173	530	388	24.6
Contact with untreated water	130	503	458	20.5
Recreational water contact	135	534	422	20.2
Contact with faecal matter	97	537	457	15.3
Contact with other symptomatic people	89	647	355	12.1
Contact with sick animals	30	623	438	4.6

[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.

Figure 32. Laboratory-reported cases of selected *Salmonella* serotypes and phage types by year, 2012–2016



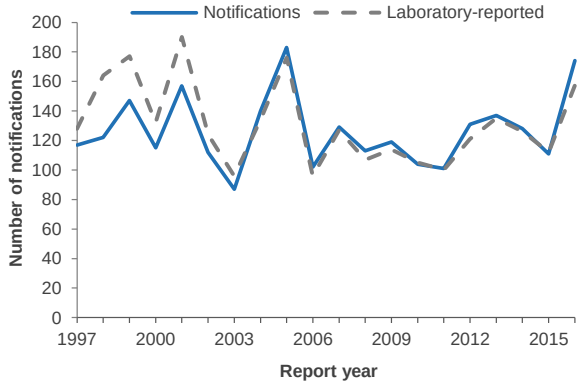
Severe acute respiratory syndrome (SARS)

No cases of SARS have ever been diagnosed in New Zealand since SARS emerged in Southern China in 2003 [7].

Shigellosis

In 2016, 174 cases of shigellosis were notified compared with 111 in 2015. The 2016 notification rate (3.7 per 100,000) was a significant increase from the 2015 rate (2.4 per 100,000). Figure 33 shows total cases by year between 1997 and 2016.

Figure 33. Shigellosis notifications and laboratory-reported cases by year, 1997–2016



Waitemata, Counties Manukau, and Auckland DHBs had the highest notification rates (7.1, 6.4, and 6.1 per 100,000 respectively).

The highest notification rate was in the 1–4 years age group (7.3 per 100,000), followed by the 60–69 (4.7 per 100,000), 5–9 and 30–39 (both 4.3 per 100,000) years age groups.

Males (4.1 per 100,000) had a higher rate than females (3.3 per 100,000).

Ethnicity was recorded for 166 (95.4%) cases. The Pacific peoples ethnic group had the highest notification rate (16.3 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 31 to 34 in the Appendix

Hospitalisation status was recorded for 159 (91.4%) cases, of which 48 (30.2%) were hospitalised.

The risk factors recorded for shigellosis are shown in Table 24.

Overseas travel information was recorded for 165 (94.8%) cases, of which 101 (61.2%) had lived or travelled overseas during the incubation period for the disease. Two further cases had a prior history of travel. The countries most commonly lived in or visited were India (21 cases), Samoa (16 cases) and Tonga (13 cases). Some cases reported travel to more than one country.

The Enteric Reference Laboratory at ESR confirmed 157 isolates as *Shigella* during 2016. The most common species identified were *S. sonnei* (87 isolates, 55.4%) and *S. flexneri* (64 isolates, 40.8%). The most common *S. sonnei* biotypes identified were biotype g (55 isolates, 63.2%) and biotype a (31 isolates, 35.6%).

Two outbreaks of shigellosis involving 13 cases were reported in 2016.

Table 24. Exposure to risk factors associated with shigellosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Travelled overseas during the incubation period	101	64	9	61.2
Consumed food from retail premises	27	33	114	45.0
Recreational water contact	13	58	103	18.3
Consumed untreated water	11	54	109	16.9
Contact with other symptomatic people	16	101	57	13.7
Contact with farm animals	8	72	94	10.0
Contact with faecal matter	6	62	106	8.8

[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.

Taeniasis

Four cases of taeniasis were notified in 2016, compared to five cases notified in 2015.

All four cases were overseas during the incubation period for the disease. Countries lived in or visited were Thailand (2 cases), Ethiopia and the Philippines (1 case each).

A total of 52 cases have been notified since 1997. Of these, 51 cases (98.1%) reported a history of travelling overseas. The other case had an unknown travel history.

Tetanus

One case of tetanus was notified in New Zealand in 2016. The case was a female in the 60–69 years age group.

Between 1997 and 2016, 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 2016.

Trichinellosis was added to the notifiable diseases schedule in 1988. Since then three cases have been reported, the most recent in 2001.[28]

Tuberculosis disease

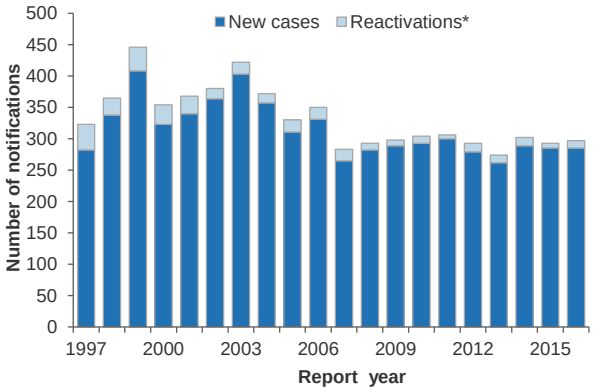
A full description of the epidemiology of tuberculosis and data on antimicrobial drug-resistant tuberculosis in New Zealand for 2016 will be reported separately in the report titled 'Tuberculosis in New Zealand: Annual Report 2016' available at www.surv.esr.cri.nz.

In 2016, a total of 297 cases of tuberculosis disease were notified, including 285 (96.0%) new cases and 12 (4.0%) reactivations*. Figure 34 shows the total number of new tuberculosis cases and reactivations reported since 1997. The overall rate in 2016 was 6.3 per 100,000, similar to the rate in 2015 (6.4 per 100,000). The number of cases has remained fairly static since 2007.

In 2016, laboratory information was available for 296 (99.7%) cases. Of these, 257 (86.8%) cases were reported as laboratory-confirmed.

In 2016, five outbreaks of tuberculosis were reported, involving 48 cases.

Figure 34. Tuberculosis notifications (new cases and reactivations) by year, 1997–2016



Ministry of Health hospitalisation data for 2016 included 200 hospitalisations where tuberculosis was the principal diagnosis.

Tuberculosis disease - new cases

In 2016, the rates of new tuberculosis notifications varied by geographical region (Figure 35). Counties Manukau DHB had the highest notification rate (11.4 per 100,000, 61 cases), followed by Auckland (10.6 per 100,000, 54 cases) and Hawke's Bay (9.9 per 100,000, 16 cases) DHBs.

Tuberculosis rates were highest for adults in the 20–29 years (11.8 per 100,000, 81 cases), 30–39 years (11.2 per 100,000, 65 cases) and 70 years and over (6.7 per 100,000, 31 cases) age groups. Six cases were children aged less than five years.

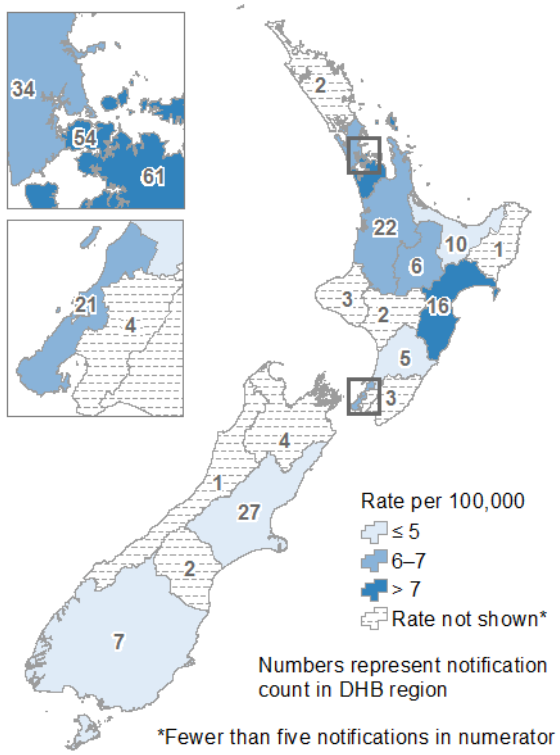
Males had a higher notification rate (6.5 per 100,000, 151 cases) than females (5.6 per 100,000, 134 cases).

The Asian ethnic group had the highest notification rate for tuberculosis (32.9 per 100,000, 177 cases), followed by MELAA (21.0 per 100,000, 11 cases) and the Pacific peoples (12.1 per 100,000, 35 cases) ethnic groups.

Further information on DHB, sex, age and ethnic group is in Table 31 to 34 in the Appendix.

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

Figure 35. Tuberculosis notifications (new cases) by DHB, 2016



Hospitalisation status was recorded for 284 (99.6%) new tuberculosis disease cases in 2016, of which 151 (53.2%) were hospitalised. Five deaths due to tuberculosis were reported among the 20–29 years (2 cases), 40–49 years, 60–69 years and 70 years and over age groups (1 case each).

Of the six children aged less than five years, two were reported as having received the BCG vaccine and four were reported as not having received the BCG vaccine.

The majority of cases (226/285, 79.3%) were born overseas. Among the 59 cases born in New Zealand, 15 had been or were presently living with a person born outside New Zealand.

A total of 70 (28.3%) new tuberculosis cases reported contact with a confirmed case of tuberculosis.

Tuberculosis disease - reactivation/relapse cases

The 12 tuberculosis reactivation or relapse cases reported in 2016 were from six DHBs: Waikato (4 cases), Auckland (3 cases), Canterbury (2 cases), Bay of Plenty, MidCentral, and Nelson Marlborough (1 case each). Those experiencing reactivated or relapsed tuberculosis were all aged 20 years and over, with the highest numbers of cases in the 70 years and over (4 cases) and 20–29 years (3 cases) age groups.

The Asian ethnic group (5 cases) had the highest number of cases, followed by the Māori (3 cases), Pacific peoples and European or Other (2 cases each) ethnic groups.

Seven of the 12 cases with reactivated/relapse tuberculosis were born overseas, of which five cases were diagnosed with previous disease overseas and two in New Zealand. Of the five New Zealand born cases, all were previously diagnosed in New Zealand. Treatment status was recorded for 10 of the 12 cases, of which nine had previously been treated for the disease.

Hospitalisation status was recorded for all reactivation cases, of which nine were hospitalised.

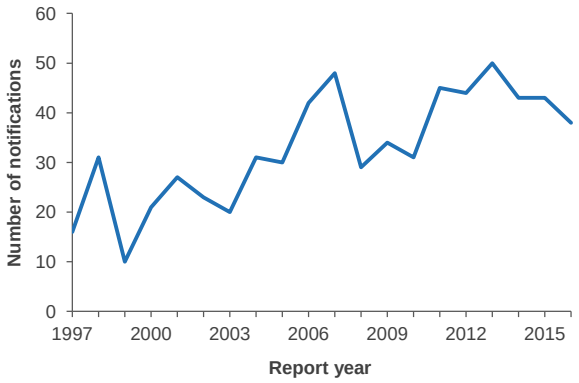
No deaths were reported among the reactivation cases.

Of the five cases where BCG vaccination status was recorded, all had been vaccinated.

Typhoid fever

In 2016, 38 cases of typhoid fever were notified compared with 43 cases in 2015. The 2016 notification rate (0.8 per 100,000) is similar to the 2015 rate (0.9 per 100,000). Figure 36 shows an increasing trend in the number of typhoid fever notifications from 1997 to 2013. From 2011 to 2016 the number of notified cases per year has ranged from 38 to 50.

Figure 36. Typhoid fever notifications by year, 1997–2016



Nearly two-thirds (65.8%) of cases were reported by Counties Manukau (13 cases) and Auckland (12 cases) DHBs.

Notification rates were highest for the 20–29 (1.7

per 100,000) and 30–39 (1.4 per 100,000) age groups.

Males (1.0 per 100,000) had a slightly higher notification rate compared with females (0.6 per 100,000).

Ethnicity was recorded for all 38 cases. The Pacific peoples (6.2 per 100,000) and Asian (3.5 per 100,000) ethnic groups had the highest notification rates.

Hospitalisation status was recorded for all 38 cases, of which 32 (84.2%) were hospitalised.

Of the 38 cases notified in 2016, 31 (81.6%) cases had travelled overseas during the incubation period for the disease. The countries most commonly visited were India (17 cases) and Samoa (9 cases). Some cases reported travelling to more than one country.

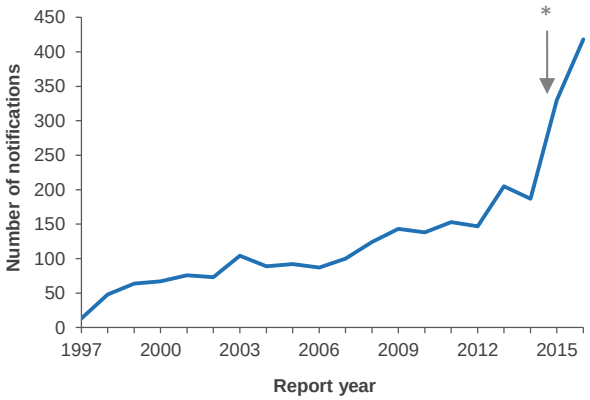
The Enteric Reference Laboratory at ESR confirmed 45 isolates as *Salmonella* Typhi during 2016. The most common phage types identified were *S.* Typhi phage type E1a (19 isolates) and *S.* Typhi phage type E7 variant (4 isolates).

No outbreaks of typhoid fever were reported in 2016.

Verotoxin- or Shiga toxin-producing *Escherichia coli* infection

In 2016, 418 cases of verocytotoxin- or Shiga toxin-producing *Escherichia coli* (VTEC/STEC) infection were notified compared with 330 notifications in 2015. The 2016 notification rate (8.9 per 100,000) was significantly higher than the 2015 rate (7.2 per 100,000). The 2015 notification rate was also significantly higher than the 2014 rate (4.1 per 100,000, 187 cases). The introduction of screening of all faecal specimens using PCR in an Auckland laboratory in July 2015 resulted in increased VTEC/STEC detection and contributed to this change in notification rate. The number of notifications of VTEC/STEC infection has been increasing since 1997 (Figure 37). This is partly due to changes in laboratory testing practices, with increasingly sensitive assays and algorithms used for the detection of VTEC/STEC.

Figure 37. VTEC/STEC notifications by year, 1997–2016

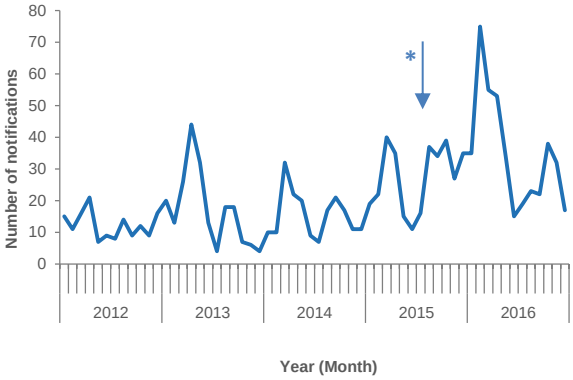


* Introduction of screening of all faecal specimens using PCR in an Auckland laboratory.

Fourteen paediatric cases of haemolytic uraemic syndrome (HUS) were reported to the New Zealand Paediatric Surveillance Unit (NZPSU) in 2016. Eight cases were confirmed to be VTEC/STEC-associated.

VTEC/STEC infection notifications follow a seasonal pattern, with peaks occurring during autumn and spring each year (Figure 38). In 2016 the autumn peak reported the highest amount of recorded cases for a single month in the past eight years. The highest monthly total for 2016 occurred in February, when 75 cases were notified.

Figure 38. VTEC/STEC infection notifications by month, January 2012–December 2016



* Introduction of screening of all faecal specimens using PCR in an Auckland laboratory.

The rate for VTEC/STEC infection notifications varied throughout the country, with the highest rates in Northland (27.4 cases per 100,000), Waitemata (14.9 cases per 100,000), Counties Manukau and Taranaki DHBs (12.0 cases per 100,000 each) (Figure 39). A statistically significant increase in rates from 2015 to 2016 was detected for Northland and Southern DHBs, as the rates for both DHBs almost doubled from 14.3 to 27.4 and 5.1 to 9.7 per 100,000

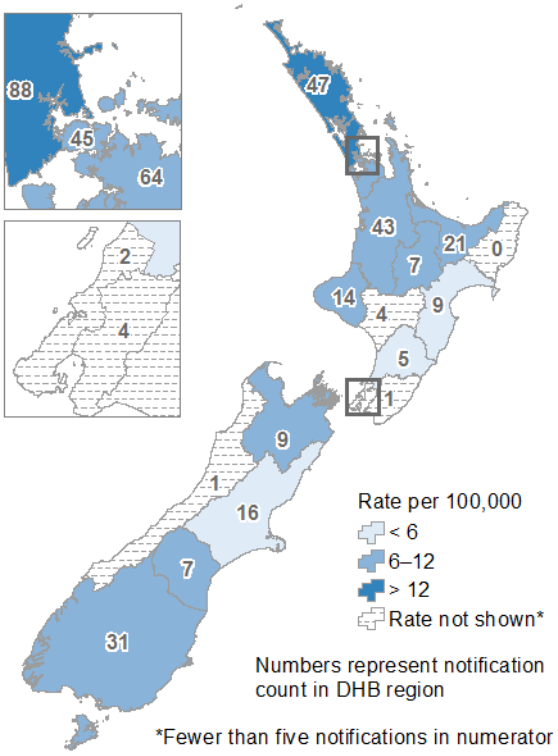
respectively. There were slight decreases in rates in both Nelson Marlborough and Waikato DHBs (8.3 to 6.1 and 13.6 to 10.8 per 100,000, respectively).

Children aged 1–4 years had the highest notification rate (44.4 per 100,000, 109 cases), followed by children aged less than 1 year (43.9 per 100,000, 26 cases).

Females had a slightly higher notification rate (10.2 per 100,000) than males (7.6 per 100,000).

Ethnicity was recorded for 408 (97.6%) cases. The MELAA ethnic group had the highest notification rate (13.4 per 100,000, 7 cases), followed by the European or Other (9.5 per 100,000, 297 cases) ethnic group.

Figure 39. VTEC/STEC infection notifications by DHB, 2016



Further information regarding DHB, sex, age and ethnic group is in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 408 (97.6%) cases, of which 115 (28.2%) were hospitalised. Of the 115 hospitalised cases, 11 had HUS. No deaths due to VTEC/STEC infection were reported in 2016.

The most common risk factors reported for VTEC/STEC infection cases in 2016 were contact with pets, farm animals and animal manure, as shown in Table 25.

The most common foods that the cases consumed during the incubation period were raw fruit or vegetables, dairy products and chicken or poultry products (Table 26).

The Enteric Reference Laboratory at ESR confirmed 491 isolates of VTEC/STEC in 2016. Of these, 205 (41.8%) were identified as *E. coli* O157:H7 and 181 (36.9%) as *E. coli* non-O157 serotypes. The serotype was undetermined in 105 (21.4%) cases, but verocytotoxin-producing genes were detected by PCR.

In 2016, 16 outbreaks of VTEC/STEC infection were reported involving 52 cases.

Ministry of Health hospitalisation data recorded nine hospitalisations in 2016 where VTEC/STEC infection was the primary diagnosis.

Table 25. Exposure to risk factors associated with VTEC/STEC infection, 2016

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with pets	158	16	244	90.8
Contact with farm animals	89	58	271	60.5
Contact with animal manure	41	61	316	40.2
Contact with recreational water	72	204	142	26.1
Contact with children in nappies	59	171	188	25.7
Contact with other animals	29	85	304	25.4
Contact with a person with similar symptoms	62	315	41	16.5
Travelled overseas during the incubation period	37	360	21	9.3

[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.

Table 26. Foods consumed by VTEC/STEC infection cases, 2016

Foods consumed	Yes	No	Unknown	Percentage (%)[a]
Raw fruit or vegetables	167	33	218	83.5
Dairy products	157	45	216	77.7
Chicken or poultry products	145	45	228	76.3
Beef or beef products	137	55	226	71.4
Processed meat	91	97	230	48.4
Lamb or hogget or mutton	63	119	236	34.6
Fruit or vegetable juice	54	126	238	30.0
Home kill meat	49	141	228	25.8
Pink or undercooked meat	19	149	250	11.3
Unpasteurised milk or milk products	21	187	210	10.1

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

Viral haemorrhagic fevers

No cases of viral haemorrhagic fever (including Ebola) have ever been reported in New Zealand.[7]

Yellow fever

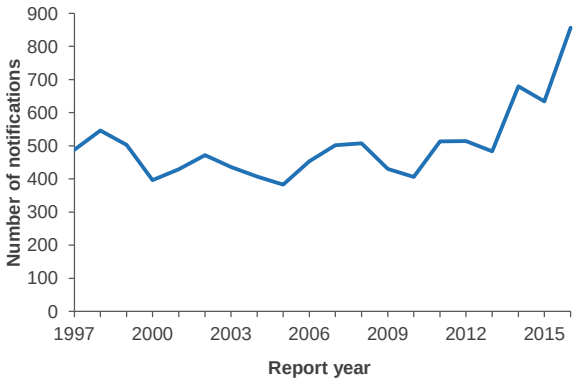
No cases of yellow fever have been notified in New Zealand since at least 1996.

Yersiniosis

In 2016, 857 cases of yersiniosis were notified. The 2016 notification rate (18.3 per 100,000) was significantly higher than the 2015 rate (13.8 per 100,000, 634 cases).

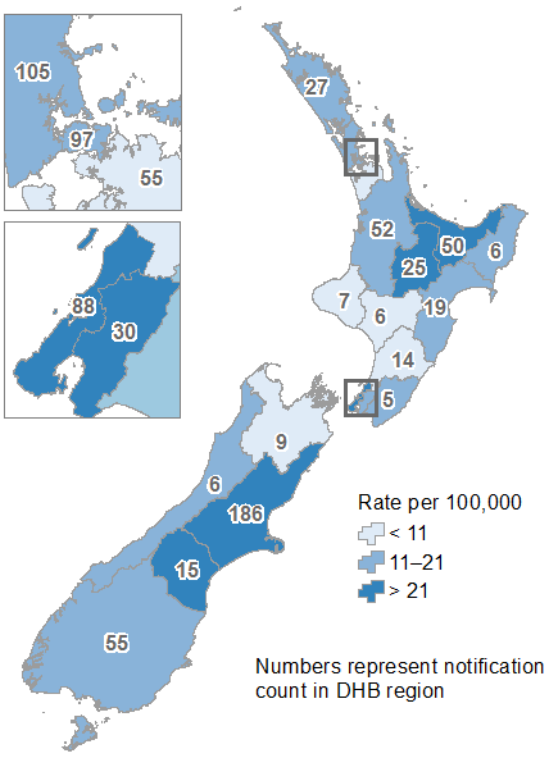
Figure 40 shows the number of notified yersiniosis cases by year since 1997.

Figure 40. Yersiniosis notifications by year, 1997–2016



Canterbury, Capital & Coast, South Canterbury and Lakes DHBs had the highest notification rates (34.5, 28.7, 25.3, and 23.5 per 100,000, respectively) (Figure 41).

Figure 41. Yersiniosis notifications by DHB, 2016



Infants aged less than 1 year and children aged 1–4 years had the highest notification rates (77.7 and 57.9 per 100,000, respectively).

Females (19.4 per 100,000) had a slightly higher notification rate than males (17.1 per 100,000).

Ethnicity was recorded for 819 (95.6%) cases. The Asian (33.6 per 100,000), European or Other (16.9 per 100,000) and MELAA (15.3 per 100,000) ethnic groups had the highest notification rates.

Further information by DHB, sex, age and ethnic group is in Table 31 to 34 in the Appendix.

Hospitalisation status was recorded for 679 (79.2%) cases, of which 75 (11.0%) were hospitalised.

The risk factors recorded for yersiniosis cases are shown in Table 27. The most common risk factors reported were consuming food from retail premises and contact with farm animals.

The Enteric Reference Laboratory at ESR confirmed 748 isolates as *Yersinia enterocolitica* and 32 isolates as *Y. pseudotuberculosis* during 2016. The most common *Y. enterocolitica* biotypes identified were biotype 2 (411 isolates, 54.9%), biotype 1A (157 isolates, 21.0%), biotype 4 (96 isolates, 12.8%) and biotype 3 (82 isolates, 11.0%).

Three outbreaks due to *Yersinia* were reported in 2016, involving 88 cases.

Table 27. Exposure to risk factors associated with yersiniosis, 2016

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	215	207	435	50.9
Contact with farm animals	107	388	362	21.6
Contact with faecal matter	85	360	412	19.1
Recreational water contact	89	379	389	19.0
Consumed untreated water	83	381	393	17.9
Contact with other symptomatic people	53	406	398	11.5
Travelled overseas during the incubation period	45	510	302	8.1
Contact with sick animals	12	440	405	2.7

[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.

APPENDIX: NATIONAL DATA AND TRENDS

Comparison of notifiable disease cases and rates for 2015 and 2016

Table 28. Numbers of cases for rare (fewer than 10 cases reported in a single year) notifiable diseases in New Zealand, 2015 and 2016

Disease[a]	2015	2016
Brucellosis	1	0
Creutzfeldt-Jakob disease[b]	6	9
Cronobacter species invasive disease	3	0
Cysticercosis	1	0
Diphtheria	2	1
Haemophilus influenzae type b disease	3	2
Hepatitis NOS	4	8
Hydatid disease	4	2
Leprosy	5	0
Rickettsial disease	8	5
Ross River virus infection	4	4
Rubella	0	3
Taeniasis	5	4
Tetanus	1	1

[a] No cases of the following notifiable diseases were reported in 2015 or 2016: anthrax, Barmah Forest virus infection, cholera, congenital rubella, decompression sickness, highly pathogenic avian influenza, Middle East respiratory syndrome (MERS), non-seasonal influenza, plague, poliomyelitis, primary amoebic meningo-encephalitis, Q fever, rabies, severe acute respiratory syndrome (SARS), trichinosis, viral haemorrhagic fever and yellow fever.

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

Deaths due to notifiable diseases, as recorded in EpiSurv, 1997–2016

Table 29. Deaths due to notifiable diseases, as recorded in EpiSurv, 1997–2016

Disease	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AIDS [a]	34	19	18	19	14	11	10	13	15	14	5	2	2	8	1	3	6	3	-	-
Campylobacteriosis	2	2	1	3	1	1	0	0	1	1	1	0	0	0	0	0	1	0	0	0
Creutzfeldt-Jakob disease[b]	3	0	2	3	1	3	4	3	0	5	0	0	0	0	0	8	6	6	6	9
Gastroenteritis[c]	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1
Giardiasis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	1	0	0	0	1	1	2	0	0	0	0	0	0	1	0	1	0	0	0	0
Hepatitis B	2	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1	1	0
Hydatid disease	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Invasive pneumococcal disease[d]												8	35	27	32	32	18	22	26	22
Legionellosis[e]	4	1	1	5	2	3	1	1	4	3	1	4	2	5	4	6	3	1	4	1
Listeriosis - non-perinatal	2	0	1	2	1	0	2	3	1	0	2	3	2	3	1	4	2	3	1	0
Listeriosis - perinatal	6	0	2	4	1	3	2	2	4	1	2	2	2	4	0	2	3	2	3	2
Malaria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Meningococcal disease	24	23	23	17	26	18	13	8	14	7	7	8	5	6	13	6	4	3	4	2
Non seasonal influenza A (H1N1)[f]													36	17	0	0	0	0	0	0
Pertussis	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	2	1	0	0	0
Primary amoebic meningoencephalitis	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatic fever	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	2	2	1	7	2	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Shigellosis	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tetanus	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Tuberculosis disease	15	8	14	8	2	6	6	6	4	6	3	4	4	9	3	5	2	4	6	5
VTEC/STEC infection	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Yersiniosis	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

[a] Data source: AIDS Epidemiology Group, 2015 and 2016 data not available.[1]

[b] Data source: CJD Registry.[17]

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

Morbidity data for selected notifiable diseases, 2014–2016 (Ministry of Health)

Table 30. Hospital admissions for selected notifiable diseases, 2014–2016

Disease	ICD 10 codes	2014		2015		2016	
		Prin [a]	Oth [b]	Prin [a]	Oth [b]	Prin [a]	Oth [b]
AIDS	B20-B24	11	266	7	277	6	234
Arboviral diseases	A83, A84, A85.2, A92, A93, A94, B33.1	16	1	17	7	11	10
Brucellosis	A23			1			
Campylobacteriosis	A04.5	612	117	574	117	595	117
Cholera	A00				1	1	
Creutzfeldt-Jakob disease	A81.0	9	3	5	1	6	2
Cryptosporidiosis	A07.2	22	4	22	9	39	11
Cysticercosis	B69	1					
Decompression sickness	T70.3	23	2	25	5	17	6
Dengue fever	A90, A91	67	2	54	4	62	5
Diphtheria	A36	1	1	1	1	1	
Giardiasis	A07.1	43	25	34	21	27	20
Hepatitis A	B15	33	16	27	39	19	65
Hepatitis B	B16	26	30	20	27	17	33
Hepatitis C	B17.1	10	26	4	9	7	8
Hydatid disease	B67	8	14	20	11	4	4
Legionellosis	A48.1	51	29	49	85	65	82
Leprosy	A30	2	1	4	2	1	1
Leptospirosis	A27	34	10	52	16	67	17
Listeriosis	A32	15	13	19	14	21	20
Malaria	B50-B54	24		36	1	20	2
Measles	B05	65	9	5	2	34	3
Meningococcal disease	A39	50	16	76	16	87	25
Mumps	B26	16	2	9	4	10	4
Paratyphoid	A01.1-A01.4	5		4		6	
Pertussis	A37	112	35	112	53	72	25
Q fever	A78						
Rheumatic fever	I00, I01, I02	223	33	148	32	183	33
Rickettsial diseases	A75, A77, A79	4		5		5	
Rubella	B06	1	1				3
Salmonellosis	A02	110	40	148	33	154	53
Shigellosis	A03	12	6	10	10	20	10
Taeniasis	B689						
Tetanus	A33-A35	1	1		1	2	
Tuberculosis	A15-A19, P37.0	299	138	231	118	200	122
Typhoid	A01.0	37		49	4	39	5
Viral haemorrhagic fevers	A95, A98, A99			1		1	
VTEC/STEC infection	A04.3	7	5	14	6	9	6
Yellow fever	A95						
Yersiniosis	A04.6	26	25	38	24	41	24

[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.

Notifiable disease cases and rates by District Health Board, 2016

Table 31. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2016

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	289	168.6	773	130.9	520	102.5	506	94.7	564	141.2	130	122	246	108.5	74	154.8	236	202.1	1333	825.9
Cryptosporidiosis	106	61.8	145	24.5	101	19.9	94	17.6	122	30.5	22	20.6	16	7.1	12	25.1	44	37.7	24	14.9
Dengue fever	2		22	3.7	24	4.7	39	7.3	12	3.0	1		15	6.6	3		4		9	5.6
Gastroenteritis[b]	14	8.2	56	9.5	101	19.9	44	8.2	8	2.0	12	11.3	28	12.4	1		8	6.8	3	
Giardiasis	57	33.3	195	33.0	180	35.5	185	34.6	132	33.0	48	45.0	72	31.8	75	156.9	40	34.2	77	47.7
Hepatitis A	2		7	1.2	6	1.2	4										1			
Hepatitis B[c]	1		2		8	1.6	6	1.1	3				1				2		1	
Hepatitis C[c]	1										1						3		1	
Invasive pneumococcal disease	32	18.7	57	9.6	54	10.6	84	15.7	30	7.5	22	20.6	32	14.1	7	14.6	3		13	8.1
Legionellosis	21	12.3	32	5.4	27	5.3	23	4.3	16	4.0	2		25	11.0			3		4	
Leptospirosis	15	8.8	3		1		5	0.9	21	5.3	1		3		1		5	4.3	12	7.4
Listeriosis			4		5	1.0	4		3				4		1				2	
Malaria	1		5	0.8	9	1.8			2				2						1	
Measles	6	3.5	2		2		6	1.1	56	14.0										
Meningococcal disease	2		5	0.8	5	1.0	12	2.2	8	2.0	1		7	3.1					2	
Mumps			7	1.2	2		4				2								1	
Paratyphoid fever			2		9	1.8	4						1				1		3	
Pertussis	9	5.3	84	14.2	54	10.6	50	9.4	131	32.8	44	41.3	51	22.5	2		85	72.8	16	9.9
Rheumatic fever[d]	4		17	2.9	24	4.7	44	8.2	6	1.5	5	4.7	8	5.5	2		1		8	3.7
Salmonellosis	38	22.2	113	19.1	103	20.3	75	14	114	28.5	22	20.6	41	18.1	52	108.8	26	22.3	38	23.5
Shigellosis	4		42	7.1	31	6.1	34	6.4	16	4.0			8	3.5	4				3	
Tuberculosis disease	2		34	5.8	57	11.2	61	11.4	26	6.5	6	5.6	11	4.9	1		3		16	9.9
Typhoid fever			3		12	2.4	13	2.4	3		1		2							
VTEC/STEC infection	47	27.4	88	14.9	45	8.9	64	12.0	43	10.8	7	6.6	21	9.3			14	12.0	9	5.6
Yersiniosis	27	15.8	105	17.8	97	19.1	55	10.3	52	13.0	25	23.5	50	22.1	6	12.6	7	6.0	19	11.8
Zika virus	3		12	2	28	5.5	19	3.6	7	1.8			2				1			

[a] Table is continued on the following page.

[b] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.

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

[d] Includes rheumatic fever initial attack 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.

Notifiable disease cases and rates by District Health Board, 2016

Table 31. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2016 (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	102	161.9	294	168.8	195	133.7	413	134.7	73	167.4	173	118.2	58	178.5	760	140.8	150	253.4	567	177.8
Cryptosporidiosis	20	31.7	55	31.6	13	8.9	62	20.2	20	45.9	23	15.7	2		106	19.6	16	27.0	59	18.5
Dengue fever			3		6	4.1	18	5.9	1		7	4.8			14	2.6	1		10	3.1
Gastroenteritis[b]	14	22.2	43	24.7	29	19.9	74	24.1	10	22.9	3		8	24.6	40	7.4			14	4.4
Giardiasis	18	28.6	39	22.4	33	22.6	125	40.8	11	25.2	49	33.5	7	21.5	167	30.9	17	28.7	90	28.2
Hepatitis A					1		5	1.6			4		1		1				3	
Hepatitis B[c]							3		1						4				2	
Hepatitis C[c]					3		1		1		6	4.1			7	1.3	3		3	
Invasive pneumococcal disease	5	7.9	9	5.2	9	6.2	26	8.5	3		9	6.1			44	8.2	11	18.6	25	7.8
Legionellosis			4		9	6.2	11	3.6	3		11	7.5	3		37	6.9	2		14	4.4
Leptospirosis	2		4				1				3		1		1				6	1.9
Listeriosis					4		2				3				3				2	
Malaria			1						1		1				3					
Measles			21	12.1	1		5	1.6			3								1	
Meningococcal disease			2				7	2.3	1		1				3				19	6.0
Mumps							2						1						1	
Paratyphoid fever					1		2		1						5	0.9			3	
Pertussis	10	15.9	27	15.5	18	12.3	122	39.8	1		39	26.6	2		280	51.9	8	13.5	63	19.8
Rheumatic fever[d]			4		3		7	2.3							3				1	
Salmonellosis	11	17.5	45	25.8	32	21.9	68	22.2	12	27.5	30	20.5	7	21.5	134	24.8	22	37.2	108	33.9
Shigellosis	1				4		8	2.6			2				10	1.9			7	2.2
Tuberculosis disease	2		6	3.4	4		21	6.8	3		5	3.4	1		29	5.4	2		7	2.2
Typhoid fever							1				1				1				1	
VTEC/STEC infection	4		5	2.9	4		2		1		9	6.1	1		16	3.0	7	11.8	31	9.7
Yersiniosis	6	9.5	14	8.0	30	20.6	88	28.7	5	11.5	9	6.1	6	18.5	186	34.5	15	25.3	55	17.2
Zika virus	1		2		3		9	2.9			1				8	1.5	2		2	

[a] Table is continued from the previous page.

[b] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.

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

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

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

Notifiable disease cases and rates by sex, 2016

Table 32. Number of cases and rate per 100,000 population of notifiable diseases by sex, 2016

Disease	Sex					
	Male		Female		Total [a]	
	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	4093	177.3	3361	141.0	7456	158.9
Cryptosporidiosis	491	21.3	571	24.0	1062	22.6
Dengue fever	102	4.4	89	3.7	191	4.1
Gastroenteritis (acute)[b]	239	10.4	271	11.4	510	10.9
Giardiasis	828	35.9	789	33.1	1617	34.5
Hepatitis A	22	1.0	13	0.5	35	0.7
Hepatitis B[c]	25	1.1	9	0.4	34	0.7
Hepatitis C[c]	14	0.6	16	0.7	30	0.6
Invasive pneumococcal disease	254	11.0	221	9.3	475	10.1
Legionellosis	149	6.5	98	4.1	247	5.3
Leptospirosis	76	3.3	9	0.4	85	1.8
Listeriosis	15	0.6	22	0.8	37	0.8
Malaria	18	0.8	8	0.3	26	0.6
Measles	53	2.3	50	2.1	103	2.2
Meningococcal disease	45	1.9	30	1.3	75	1.6
Mumps	14	0.6	6	0.3	20	0.4
Paratyphoid fever	20	0.9	12	0.5	32	0.7
Pertussis	472	20.4	624	26.2	1096	23.4
Rheumatic fever[d]	77	3.2	60	2.5	137	2.9
Salmonellosis	549	23.8	542	22.7	1091	23.2
Shigellosis	95	4.1	79	3.3	174	3.7
Tuberculosis disease	157	6.8	140	5.9	297	6.3
Typhoid fever	24	1.0	14	0.6	38	0.8
VTEC/STEC infection	175	7.6	243	10.2	418	8.9
Yersiniosis	395	17.1	462	19.4	857	18.3
Zika virus	30	1.3	70	2.9	100	2.1

[a] Total includes cases where sex was unknown.

[b] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.

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

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

Notifiable disease cases and rates by age group, 2016

Table 33. Number of cases and rate per 100,000 population of notifiable diseases by age group, 2016

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	149	251.5	671	273.6	345	107.1	292	99.2	452	142.0	1083	157.6	766	132.5	795	128.3	964	157.3	876	178.6	1063	228.6	7456	158.9
Cryptosporidiosis	18	30.4	305	124.3	134	41.6	61	20.7	57	17.9	161	23.4	148	25.6	74	11.9	52	8.5	32	6.5	20	4.3	1062	22.6
Dengue fever							7	2.4	6	1.9	40	5.8	40	6.9	29	4.7	33	5.4	27	5.5	9	1.9	191	4.1
Gastroenteritis[b]	51	86.1	92	37.5	24	7.4	14	4.8	19	6.0	52	7.6	59	10.2	46	7.4	53	8.6	47	9.5	48	10.3	510	10.9
Giardiasis	26	43.9	272	110.9	125	38.8	42	14.3	46	14.4	197	28.7	320	55.4	201	32.4	183	29.9	154	31.4	51	11.0	1617	34.5
Hepatitis A			3		3				1		13	1.9	2		6	1.0	3		2		2		35	0.7
Hepatitis B[c]											4		6	1.0	7	1.1	13	2.1	4				34	0.7
Hepatitis C[c]											6	0.9	10	1.7	11	1.8	2		1				30	0.6
Invasive pneumococcal disease	9	15.2	37	15.1	12	3.7	4		11	3.5	27	3.9	25	4.3	45	7.3	66	10.8	91	18.6	148	31.8	475	10.1
Legionellosis					1				2		3		7	1.2	23	3.7	49	8.0	66	13.5	96	20.6	247	5.3
Leptospirosis									2		17	2.5	8	1.4	15	2.4	33	5.4	9	1.8	1		85	1.8
Listeriosis	1								1		2		4				5	0.8	7	1.4	17	3.7	37	0.7
Malaria					1		1		2		12	1.7	5	0.9	3		2						26	0.6
Measles	14	23.6	15	6.1	7	2.2	18	6.1	26	8.2	17	2.5	4		1		1						103	2.2
Meningococcal disease	11	18.6	17	6.9	5	1.6	2		10	3.1	11	1.6			7	1.1	2		4		6	1.3	75	1.6
Mumps			3		3		4		1		5	0.7	3		1								20	0.4
Paratyphoid fever	1		1						2		10	1.5	10	1.7	2		2		3		1		32	0.7
Pertussis	68	114.8	109	44.4	120	37.2	98	33.3	91	28.6	107	15.6	125	21.6	157	25.3	113	18.4	62	12.6	46	9.9	1096	23.4
Rheumatic fever[d]					20	6.2	61	20.7	18	5.7	26	3.8	12	2.1									137	2.9
Salmonellosis	68	114.8	164	66.9	64	19.9	32	10.9	50	15.7	155	22.6	114	19.7	143	23.1	134	21.9	89	18.1	78	16.8	1091	23.2
Shigellosis	3		18	7.3	14	4.3	4		5	1.6	26	3.8	25	4.3	25	4.0	19	3.1	23	4.7	12	2.6	174	3.7
Tuberculosis disease			6	2.4	2		6	2.0	17	5.3	84	12.2	67	11.6	32	5.2	23	3.8	25	5.1	35	7.5	297	6.3
Typhoid fever			3		1		2		3		12	1.7	8	1.4	4		3		1		1		38	0.8
VTEC/STEC infection	26	43.9	109	44.4	27	8.4	18	6.1	21	6.6	49	7.1	27	4.7	32	5.2	27	4.4	41	8.4	41	8.8	418	8.9
Yersiniosis	46	77.7	142	57.9	24	7.4	33	11.2	36	11.3	115	16.7	126	21.8	84	13.6	102	16.6	78	15.9	71	15.3	857	18.3
Zika virus			1		2		1		9	2.8	21	3.1	26	4.5	11	1.8	19	3.1	8	1.6	2		100	2.1

[a] Total includes cases where age was unknown.

[b] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.

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

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

Note: For fewer than five cases notified, a rate is not calculated and the cell is blank.

Notifiable disease cases and rates by ethnic group, 2016

Table 34. Number of cases and rate per 100,000 population of notifiable diseases by ethnic group, 2016

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	666	95.5	159	55.1	406	75.4	52	99.5	5798	186.0	7456	158.9
Cryptosporidiosis	121	17.4	17	5.9	48	8.9	9	17.2	831	26.7	1062	22.6
Dengue fever	15	2.2	55	19.1	17	3.2	2		97	3.1	191	4.1
Gastroenteritis[c]	52	7.6	28	9.7	53	9.8	7	13.4	324	10.5	510	10.9
Giardiasis	107	15.4	17	5.9	94	17.5	41	78.4	1290	41.4	1617	34.5
Hepatitis A	2		6	2.1	9	1.7	2		16	0.5	35	0.7
Hepatitis B[d]	4		2		6	1.1	1		18	0.6	34	0.7
Hepatitis C[d]	8	1.1							22	0.7	30	0.6
Invasive pneumococcal disease	110	15.8	77	26.7	21	3.9	2		249	8.0	475	10.1
Legionellosis	10	1.4	10	3.5	8	1.5			214	6.9	247	5.3
Leptospirosis	12	1.7	3						67	2.1	85	1.8
Listeriosis	6	0.9	4		6	1.1			21	0.7	37	0.8
Malaria			4		8	1.5	4		8	0.3	26	0.6
Measles	50	7.2	11	3.8	4				36	1.2	103	2.2
Meningococcal disease	18	2.6	12	4.2	5	0.9	1		39	1.3	75	1.6
Mumps	3		6	2.1	4				5	0.2	20	0.4
Paratyphoid fever					14	2.6			16	0.5	32	0.7
Pertussis	170	24.4	43	14.9	43	8.0	13	24.9	809	26.0	1096	23.4
Rheumatic fever[e]	52	7.5	80	27.7	1				4		137	2.9
Salmonellosis	128	18.4	63	21.8	76	14.1	10	19.1	780	25.0	1091	23.2
Shigellosis	12	1.7	47	16.3	13	2.4			94	3.0	174	3.7
Tuberculosis disease	27	3.9	37	12.8	181	33.6	11	21.0	37	1.1	297	6.3
Typhoid fever			18	6.2	19	3.5	1				38	0.8
VTEC/STEC infection	48	6.9	16	5.5	40	7.4	7	13.4	297	9.5	418	8.9
Yersiniosis	81	11.6	22	7.6	181	33.6	8	15.3	527	16.9	857	18.3
Zika virus	2		66	22.9	5	0.9	2		23	0.7	100	2.1

[a] Middle Eastern/Latin American/African.
[b] Total includes cases where ethnicity was unknown.
[c] Cases of acute gastroenteritis from a common source or foodborne intoxication, eg, staphylococcal intoxication.
[d] Only acute cases of this disease are notifiable.
[e] Includes rheumatic fever initial attack 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 2016 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. For fewer than five cases notified, a rate is not calculated and the cell is blank.

Notifiable disease cases by year and source, 1991–2016

Table 35. Number of notifiable disease cases by year and source, 1991–2003[a]

Disease	Source	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
AIDS	N	78	50	70	44	49	76	43	29	33	26	26	17	33
Campylobacteriosis	N	4148	5144	8101	7714	7442	7635	8924	11572	8161	8418	10145	12493	14788
Cholera	N	0	0	0	2	2	0	0	1	1	0	3	1	1
Creutzfeldt-Jakob disease	N						2	1	0	2	3	1	3	6
Cryptosporidiosis	N						119	357	866	977	775	1208	975	817
Dengue fever	N	3	1	1	0	6	23	14	26	9	7	93	69	55
Gastroenteritis [c]	N						555	316	493	608	730	942	1088	1030
Giardiasis	N						1235	2127	2183	1793	1688	1604	1547	1570
Haemophilus influenzae type b	N						26	9	11	10	13	11	3	12
	L	148	166	118	75	14	24	8	10	9	10	8	3	9
Hepatitis A	N	224	288	257	179	338	311	347	145	119	107	61	106	70
Hepatitis B [d]	N	227	221	145	133	125	104	138	88	94	79	56	67	61
Hepatitis C [d]	N	25	89	91	79	88	59	92	102	96	80	58	53	40
Hydatid disease	N	0	4	4	1	5	3	2	2	8	3	7	2	0
Legionellosis	N	14	11	24	66	33	36	63	43	51	61	46	49	77
	L	42	60	76	121	76	60	109	107	65	56	56	53	82
Leprosy	N	4	5	3	1	1	10	3	3	10	4	3	4	4
Leptospirosis	N	106	70	116	70	65	56	52	75	59	98	99	140	113
	L	176	218	234	168	183	140	84	117	76	114	113	181	149
Listeriosis	N	26	16	11	8	13	10	35	17	19	22	18	19	24
Malaria	N	39	29	58	34	41	107	65	73	46	111	54	61	46
Measles	N						68	1984	164	107	64	82	21	66
Meningococcal disease	N	71	153	202	208	394	473	609	439	507	477	648	555	542
Mumps	N						76	90	85	56	50	56	64	56
Paratyphoid fever	N	1	2	10	7	24	20	25	18	17	24	32	16	18
Pertussis	N						1022	284	153	1046	4140	1334	1068	585
Rheumatic fever - initial attack	N	97	70	81	98	88	110	93	64	72	135	114	87	148
Rubella	N						306	80	53	35	26	30	33	26
Salmonellosis	N	1244	1239	1340	1522	1334	1141	1177	2069	2077	1795	2417	1880	1401
Shigellosis	N	152	124	128	185	191	167	117	122	147	115	157	112	87
Tetanus	N	0	8	2	2	2	3	0	2	6	1	4	1	2
Tuberculosis disease	N	335	327	323	352	391	352	323	365	446	354	368	380	422
Typhoid fever	N	9	11	14	24	21	15	16	31	10	21	27	23	20
VTEC/STEC infection	N			3	3	6	7	13	48	64	67	76	73	104
Yersiniosis	N						330	488	546	503	396	429	472	436
Zika virus	N													

[a] Table is continued on the following page.

[b] Source: notification (N), laboratory (L), sentinel isolates (S).

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

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

Table 35. Number of notifiable disease cases by year and source, 2004–2016 [a] (continued)

Disease	Source	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AIDS	N	38	49	29	31	48	28	39	24	20	25	19	9	22
Campylobacteriosis	N	12215	13836	15873	12778	6694	7177	7346	6686	7016	6837	6782	6218	7456
Cholera	N	2	0	0	1	0	0	2	0	0	0	0	0	0
Creutzfeldt-Jakob disease	N	8	3	5	8	5	8	5	4	9	6	6	6	9
Cryptosporidiosis	N	611	888	737	924	764	854	954	610	877	1348	584	696	1062
Dengue fever	N	8	11	19	114	113	139	50	42	76	106	178	125	191
Gastroenteritis [c]	N	1362	560	938	625	687	713	502	570	765	558	756	503	510
Giardiasis	N	1514	1231	1214	1402	1660	1639	1985	1934	1714	1729	1709	1510	1617
Haemophilus influenzae type b	N	4	7	9	15	9	10	8	8	4	2	5	3	2
	L	3	6	8	13	4	8	8	8	4	2	2	2	1
Hepatitis A	N	49	51	123	42	89	44	46	26	82	91	74	47	35
Hepatitis B [d]	N	38	59	61	72	37	55	51	51	39	28	35	34	34
Hepatitis C [d]	N	24	29	35	30	22	32	16	26	31	36	29	35	30
Hydatid disease	N	1	2	0	6	7	2	4	6	1	7	4	4	2
Legionellosis	N	62	85	52	64	73	74	173	158	149	151	123	247	247
	L	75	83	54	72	74	77	178	160	152	150	135	251	248
Leprosy	N	3	2	4	8	5	3	3	1	2	7	4	5	0
Leptospirosis	N	102	85	87	66	118	69	81	68	108	60	56	63	85
	L	113	109	66	40	73	49	58	45	78	46	40	45	47
Listeriosis	N	26	20	19	26	27	28	23	26	25	19	25	26	37
Malaria	N	33	32	30	25	40	50	44	52	38	47	33	38	26
Measles	N	32	18	18	24	12	248	48	596	68	8	280	10	103
Meningococcal disease	N	343	226	160	104	122	132	97	119	85	68	45	64	75
Mumps	N	45	61	47	73	76	63	41	51	26	23	18	13	20
Paratyphoid fever	N	28	25	23	23	25	25	19	13	22	25	19	34	32
Pertussis	N	3485	2719	1120	332	417	1398	872	1996	5897	3540	1099	1168	1096
Rheumatic fever - initial attack	N	75	76	106	135	140	126	153	155	163	191	179	105	126
Rubella	N	23	13	7	10	9	4	4	22	4	1	4	0	3
Salmonellosis	N	1081	1382	1335	1275	1339	1128	1146	1055	1081	1143	955	1051	1091
Shigellosis	N	140	183	102	129	113	119	104	101	131	137	128	111	174
Tetanus	N	1	1	1	1	0	1	7	0	2	1	0	1	1
Tuberculosis disease	N	372	330	350	283	293	298	304	306	293	274	302	293	297
Typhoid fever	N	31	30	42	48	29	34	31	45	44	50	43	43	38
VTEC/STEC infection	N	89	92	87	100	124	143	138	153	147	205	187	330	418
Yersiniosis	N	407	383	453	502	508	430	406	513	514	483	680	634	857
Zika virus	N											57	9	100

[a] Table is continued from the previous page.

[b] Source: notification (N), laboratory isolate received at ESR (L), sentinel isolates (S).

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

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

Table 36. Number of laboratory-reported cases of salmonellosis for selected *Salmonella* serotypes and phage types, 2012–2016

Serotype[a]	2012	2013	2014	2015	2016
S. Typhimurium	**459**	**481**	**392**	**447**	**389**
1	35	30	22	38	34
9	11	13	17	27	42
12[a]	26	15	20	18	6
56 variant[b]	73	122	72	96	64
101	26	26	41	56	47
135	44	48	35	64	30
156	21	17	9	27	12
160	58	69	27	9	6
Other phage types or unidentified	165	141	149	112	148
S. Enteritidis	**125**	**137**	**116**	**110**	**114**
1b	9	14	5	4	8
11[c]	52	27	39	45	46
Other phage types or unidentified	64	96	72	61	60
Other serotypes	**460**	**523**	**450**	**496**	**570**
S. Agona	11	11	15	12	18
S. Bovismorbificans	8	8	4	23	39
S. Brandenburg	34	52	35	52	67
S. Infantis	52	70	56	52	14
S. Mississippi	12	20	21	16	21
S. Montevideo	26	11	7	3	2
S. Saintpaul	27	43	26	37	35
S. Stanley	22	31	34	25	60
S. Thompson	2	16	5	32	13
S. Virchow	17	15	5	16	10
S. Weltevreden	24	28	31	18	18
S. enterica (I) ser. 4,[5],12 : i : -	38	27	27	22	23
Other serotypes or unidentified	187	191	184	188	250
Total	**1044**	**1141**	**958**	**1053**	**1073**

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

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

[c] Before 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

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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	Verotoxin-producing *Escherichia coli*
WHO	World Health Organization
23PPV	23-valent pneumococcal polysaccharide vaccine

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