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NOTIFIABLE DISEASES IN NEW ZEALAND ANNUAL REPORT 2020

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The information presented in the report was prepared by the Epidemiology Team and other staff from the Health and Environment Group at ESR.

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SUMMARY

This report provides a summary of the key trends in notifiable diseases for 2020.

In 2020, a total of 14,234 notifications were reported through New Zealand's notifiable disease database, EpiSurv, compared with 18,719 notifications in 2019. This decrease in notifications is largely due to public health measures implemented to stop the spread of COVID-19, including the closure of the border to non-New-Zealanders from 20 March 2020. These measures will also have had an effect in limiting the transmission of other notifiable infectious diseases. In addition, the disruption to the delivery of health services during lockdowns may have impacted the diagnosis and testing of some diseases and therefore notifications.

Notifications of the following diseases decreased significantly from 2019 to 2020: acute gastroenteritis, campylobacteriosis, cryptosporidiosis, dengue fever, giardiasis, hepatitis A, invasive pneumococcal disease, leptospirosis, measles, meningococcal disease, mumps, pertussis, salmonellosis, shigellosis, shiga toxin-producing *Escherichia coli* (STEC) infection and typhoid fever (Table 1).

VACCINE-PREVENTABLE DISEASES

There were significant decreases in the number of notified cases of invasive pneumococcal disease, measles, mumps, and pertussis notifications from 2019 to 2020.

There were 352 cases (6.9 per 100,000) of invasive pneumococcal disease notified in 2020, compared with 495 cases (9.9 per 100,000) in 2019. Serotype 19A was the most prevalent serotype (71 cases). Nine deaths due to invasive pneumococcal disease were reported with one death in a child aged less than 5 years, due to a non-vaccine serotype.

Nine cases (0.2 per 100,000) of measles were notified in 2020, compared with 2190 cases (44.0 per 100,000) in 2019 when New Zealand experienced a large national measles outbreak. All nine cases were notified in January. Vaccination status was known for eight (89%) cases, and all were not vaccinated. The source of the virus was recorded for five cases; one was imported and four were import-related.

There was a significant decrease in the number of mumps cases, with 144 cases (2.8 per 100,000) notified in 2020 compared with 264 cases (5.3 per 100,000) in 2019. Vaccination status was known for 81 (56%) cases and the majority (75%) were vaccinated with at least one dose. Three mumps outbreaks were reported, involving 58 cases.

In 2020, 171 pertussis cases (3.4 per 100,000) were notified, compared with 1206 cases (24.2 per 100,000) in 2019. Over half (63%) of the cases aged less than 1 year were hospitalised. Vaccination status was known for 116 (68%) cases and 37% were not vaccinated.

ENTERIC DISEASES

There were significant decreases from 2019 to 2020 for most enteric diseases, apart from listeriosis and yersiniosis which had non-significant increases. Acute gastroenteritis, campylobacteriosis, cryptosporidiosis, giardiasis, hepatitis A, salmonellosis, STEC infection and typhoid fever all showed significant decreases. There was a non-significant decrease for paratyphoid fever.

Campylobacteriosis remained the most commonly notified disease accounting for 37.1% of all notifications (5289 cases) in 2020. Campylobacter notifications decreased from a rate of 124.6 per 100,000 in 2019 to 104.0 per 100,000 in 2020.

A total of 844 cases (16.6 per 100,000) of STEC infection were notified, compared with 1103 cases (22.2 per 100,000) in 2019. Notifications of STEC infection had been increasing steadily since 2014 (187 cases, 4.1 per 100,000), driven by the introduction of tests which are more sensitive to detecting non-O157 serotypes than traditional methods, and 2020 is the first year that there has been a decrease.

There were 24 cases of typhoid fever notified in 2020, compared with 55 cases in 2019. Twenty cases had travelled overseas during the incubation period, and all arrived in New Zealand before the border closed on 20 March 2020.

RESPIRATORY DISEASES

COVID-19 became a notifiable disease in New Zealand on 30 January 2020. A total of 2176 cases were reported (42.8 per 100,00) in 2020, including 25 deaths. Notifications for COVID-19 peaked in March and April before decreasing as a result of public health measures being implemented. Almost half of the cases (48%) were imported, and 22% were import-related. There were 40 outbreaks reported involving 900 cases.

There was a significant decrease in meningococcal disease cases, with 35 cases (0.7 per 100,000) notified in 2020 compared with 139 cases (2.8 per 100,000) in 2019. The group was confirmed for 32 cases and over half (18 cases, 56%) were group B, 11 (34%) were group W, two were group Y, and one was group C. Three deaths were reported.

ENVIRONMENTAL DISEASES

There was a significant decrease in leptospirosis cases, with 60 cases (1.2 per 100,000) notified in 2020 compared with 89 cases (1.8 per 100,000) in 2019. Occupation was recorded for 53 (88%) cases and two thirds were engaged in high-risk occupations (farmers, farm workers, meat processors), The most common serovars reported were *Leptospira borgpetersenii* serovars Ballum (41%) and Hardjo (37%).

EXOTIC DISEASES

There was a significant decrease in dengue fever notifications in 2020 (50 cases, 1.0 per 100,000), compared with 2019 (222 cases, 4.5 per 100,000) due to the dramatic reduction in overseas travel and the closure of the border for non-citizens from 20 March 2020. The most commonly visited countries were the Cook Islands (17 cases) and Fiji (11 cases).

Table 1. Number of cases and rate per 100,000 population for selected notifiable diseases in New Zealand, 2019 and 2020

Disease	Number of notifications		Rate per 100,000		Change[d,e]
	2019	2020	2019	2020	
AIDS[a]	19	17	0.4	0.3	↓
Campylobacteriosis	6203	5289	124.6	104.0	↓
COVID-19	NA	2176	NA	42.8	NA
Cryptosporidiosis	1035	735	20.8	14.5	↓
Dengue fever	222	50	4.5	1.0	↓
Gastroenteritis (acute)[b]	484	362	9.7	7.1	↓
Giardiasis	1749	1141	35.1	22.4	↓
Hepatitis A	58	22	1.2	0.4	↓
Hepatitis B[c]	28	18	0.6	0.4	↓
Hepatitis C[c]	24	28	0.5	0.6	↑
Hepatitis NOS	9	11	0.2	0.2	↑
Invasive pneumococcal disease	495	352	9.9	6.9	↓
Legionellosis	161	160	3.2	3.1	↓
Leptospirosis	89	60	1.8	1.2	↓
Listeriosis	31	34	0.6	0.7	↑
Malaria	27	17	0.5	0.3	↓
Measles	2190	9	44.0	0.2	↓
Meningococcal disease	139	35	2.8	0.7	↓
Mumps	264	144	5.3	2.8	↓
Paratyphoid fever	18	17	0.4	0.3	↓
Pertussis	1206	171	24.2	3.4	↓
Rheumatic fever[f]	171	153	3.4	3.0	↓
Salmonellosis	1188	708	23.9	13.9	↓
Shigellosis	215	61	4.3	1.2	↓
STEC infection	1103	844	22.2	16.6	↓
Tuberculosis disease[g]	319	321	6.4	6.3	↑
Typhoid fever	55	24	1.1	0.5	↓
Yersiniosis	1185	1261	23.8	24.8	↑

[a] Data source: AIDS Epidemiology Group.

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

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

[d] ↓↓= significant decrease, ↑↑ = significant increase, NA = not applicable, ↓ = non-significant decrease, ↑ = non-significant increase.

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

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

[g] Includes new tuberculosis cases and reactivations.

INTRODUCTION

The *Notifiable Diseases in New Zealand: Annual Report 2020* gives an overview of the state of notifiable diseases in New Zealand in 2020. The report includes diseases that are notifiable under the Health Act 1956.

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

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

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

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

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

The focus of this report is on diseases reported in 2020, with the aim of providing information for prevention and control measures. The report presents each notifiable disease, or disease grouping, in alphabetical order.

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

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

SURVEILLANCE METHODS

INTERPRETING DATA

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

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

- the date of data extraction from EpiSurv;
- the date used to aggregate data (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 DHB region.

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

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

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

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

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

DATA SOURCES

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

EpiSurv – the national notifiable disease surveillance system

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

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

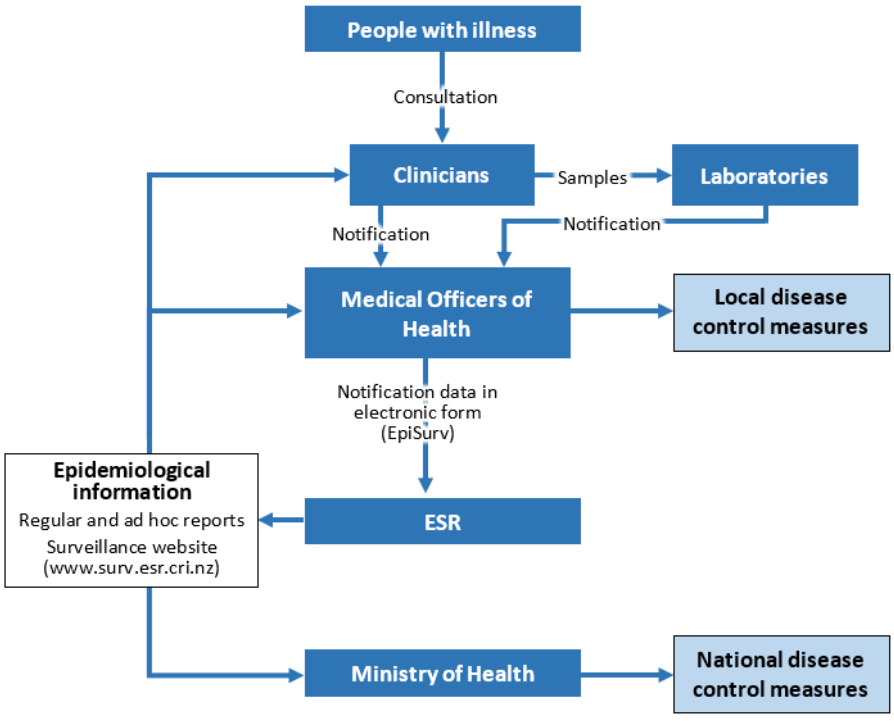
This report includes sections on diseases that are currently notifiable in New Zealand under the Health Act 1956, excluding gonorrhoea, HIV, syphilis, lead absorption and poisoning arising from chemical contamination of the environment. Sexually transmitted infections are reported elsewhere, while Massey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

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

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

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

Figure 1. Notifiable disease surveillance system



Laboratory-based surveillance

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

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

Statistics New Zealand

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

National Minimum Dataset

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

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

Hospital discharge data presented in this report includes multiple records for patients with chronic notifiable diseases (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 and notification numbers may differ.

AIDS Epidemiology Group

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

New Zealand Creutzfeldt-Jakob Disease Registry

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

New Zealand Paediatric Surveillance Unit

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

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

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

ANALYTICAL METHODS

Key analytical methods are provided below.

Dates

The notification data contained in this report is based on information recorded on EpiSurv as at 22 February 2021. Changes made to EpiSurv data by PHU staff after this date are largely not reflected in this report. Consequently, future analyses of data may produce revised results. Notification data published in previous annual reports has been updated to reflect cases in EpiSurv as at 22 February 2021.

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

Geographic breakdown

This report provides rates for current DHB regions. The DHB populations used are shown in Table 2. These are from the Statistics New Zealand 2020 mid-year population estimates.

Table 2. District Health Board populations, 2020

DHB	Population
Northland	194,600
Waitemata	639,500
Auckland	505,400
Counties Manukau	595,100
Waikato	438,300
Lakes	117,400
Bay of Plenty	263,900
Tairawhiti	50,700
Taranaki	124,700
Hawke's Bay	178,500
Whanganui	68,500
MidCentral	187,300
Hutt Valley	158,900
Capital & Coast	324,400
Wairarapa	48,900
Nelson Marlborough	161,200
West Coast	32,400
Canterbury	582,700
South Canterbury	62,000
Southern	349,700
Total	**5,084,300**

Map classification scheme

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

Case status for notifications

All notifications recorded in EpiSurv that meet the case definitions [6], apart from cases classified as 'not a case', are included for analysis in this report. In some instances, the investigation of a case may not be complete and the status may be set to 'under investigation'. Cases that are under investigation are included in this report. Any changes to the final case status 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 2020 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 2018 Census 'usually resident population' applied to the 2020 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 mean that this was the source of the infection.

Vaccination data

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

Statistical tests

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

LIMITATIONS OF SURVEILLANCE DATA

Quality

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

Sensitivity

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

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

Completeness

The completeness of data recorded in EpiSurv varies among diseases. Table 3 shows the percentage of notifications for which complete data was provided for selected demographic variables from 2011 to 2020.

The completeness of date of birth, age and sex has remained very high (99%) over the past 10 years. The completeness of ethnicity and NHI data has improved over the same time period and was very high in both 2019 and 2020.

Table 3. Complete data for selected EpiSurv variables, 2011–2020

Report year	Completeness of data (%)				
	Date of birth	Age	Sex	Ethnicity	NHI
2011	99.6	99.7	99.0	95.7	94.9
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	96.3	98.5
2017	99.9	99.9	100.0	96.4	98.6
2018	99.9	99.9	100.0	93.4	99.0
2019	99.9	99.9	100.0	99.2	99.0
2020	99.7	99.8	100.0	99.7	99.4

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 2020.

In 2020, 60.6% of disease notifications had an onset date recorded (compared with 69.1% in 2019). Of these, 55.5% were reported to a public health unit (PHU) within one week of the onset of symptoms and 82.0% 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, rheumatic fever, tuberculosis disease. For other diseases there may be delays in confirmation of the diagnosis due to the particular laboratory test required eg, leptospirosis.

In 2020, 84.2% (82.5% in 2019) of the notifications were entered into EpiSurv within a day of being reported to a PHU and over 99% were entered within one week.

Table 4. Timeliness of disease reporting and data entry for selected notifiable diseases, 2020

Disease	Onset date recorded (%)	Reporting delay (%)[a]		Entry delay (%)[b]		
		≤1 week	≤2 weeks	≤1 day	≤1 week	≤2 weeks
Campylobacteriosis	46.7	62.6	91.5	81.5	99.4	99.9
Chikungunya fever	80.0	0.0	50.0	100.0	100.0	100.0
COVID-19	84.1	70.8	92.8	98.9	99.8	100.0
Cryptosporidiosis	50.7	42.9	89.5	80.4	99.2	100.0
Dengue fever	92.0	23.9	65.2	88.0	98.0	100.0
Gastroenteritis (acute)[c]	89.5	75.7	92.4	75.1	96.9	99.7
Giardiasis	47.8	20.6	47.4	81.2	99.6	100.0
Hepatitis A	90.9	70.0	85.0	95.5	100.0	100.0
Invasive pneumococcal disease	78.1	74.1	94.2	83.8	99.4	99.4
Legionellosis	87.5	46.4	78.6	80.0	98.8	100.0
Leptospirosis	91.8	41.1	71.4	67.2	98.4	100.0
Measles	100.0	88.9	100.0	66.7	100.0	100.0
Meningococcal disease	100.0	94.3	100.0	94.3	100.0	100.0
Pertussis	92.9	20.3	43.0	78.8	100.0	100.0
Rheumatic fever - initial episode	97.4	28.9	60.4	89.5	98.0	98.7
Salmonellosis	70.7	64.3	91.2	83.2	99.3	99.7
Shigellosis	88.5	61.1	77.8	82.0	100.0	100.0
STEC infection	78.1	51.2	79.5	78.3	98.9	99.9
Tuberculosis disease	72.4	3.0	8.7	91.2	99.4	99.7
Typhoid fever	95.8	30.4	73.9	91.7	100.0	100.0
Yersiniosis	44.8	31.0	65.3	82.2	99.2	99.9
Zika Virus	100.0	0.0	0.0	100.0	100.0	100.0
Other	57.6	66.9	81.7	82.8	94.5	94.7
Total	**60.6**	**55.5**	**82.0**	**84.2**	**99.2**	**99.7**

[a] Percentage of notifications reported (with onset date recorded) to a public health unit 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 PHU.
[c] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg food handler or childcare worker) 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: https://www.otago.ac.nz/aidsepigroup/newsletters/

In 2020, 17 cases of AIDS were reported to the AEG compared with 19 cases in 2019.

The 2020 and 2019 AIDS notification rates were similar (0.3 and 0.4 per 100,000 population, respectively).

The cases ranged from ages 25 to 69 years, with a mean age of 47.8 years.

Thirteen cases were male and four were female.

Eight cases were of European or Other ethnicity, four were Asian, three Māori, one Pacific peoples and one was MELAA.

Seven cases (41.2%) were men who had sex with other men (MSM), eight (47.1%) were infected heterosexually, and for two cases (11.8%) the means of infection was not reported.

Two deaths from AIDS were reported in 2020.

Anthrax

No cases of anthrax were notified in 2020. The last case was notified in 1940. New Zealand has been considered free of anthrax since the last recorded outbreak among domestic livestock in 1954.[12]

Arboviral diseases

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

Barmah Forest virus infection

No cases of Barmah Forest virus infection were notified in 2020. Six cases have been notified since 1997, most recently two cases in 2009, all with a history of travel to Australia.

Chikungunya fever

Four cases of chikungunya fever were notified in 2020, compared with 11 cases in 2019. Three cases were laboratory confirmed and one was probable.

The cases were aged 50–59 (2 cases), 30–39, and 60–69 years (1 case each). Three cases were male, and one was female. Three cases were of European or Other ethnicity and one was Asian.

Hospitalisation status was recorded for all four cases, and one was hospitalised.

All four cases had travelled overseas during the incubation period for the disease. The countries visited or lived in were Thailand (2 cases), India, and Myanmar (1 case each).

Japanese encephalitis

No cases of Japanese encephalitis were notified in 2020. Since 1997, only one case of Japanese encephalitis has been notified (in 2004).

Ross River virus infection

Three cases of Ross River virus infection were notified in 2020, compared with five cases in 2019. All three cases were laboratory confirmed.

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

No cases were hospitalised.

All three cases had travelled to Australia during the incubation period for the disease.

Zika virus infection

No cases of Zika virus infection were notified in 2020, compared with seven cases in 2019.

Botulism

Four cases of botulism were notified in 2020. One case was laboratory confirmed. Two cases were aged 50–59 years, one was 60–69 years and one was 70 years and over. Three cases were hospitalised. The four cases were part of an outbreak and the source was identified as consumption of home-preserved sea snails (pupu). The previous case of botulism was reported in 2014.[13]

Brucellosis

Two cases of brucellosis were notified in 2020. One case was laboratory confirmed and was a male aged 20–29 years who is a farm worker in Tonga. The other was a probable case and was a female aged 60–69 years who had occupational exposure to brucellosis laboratory samples.

Since 1997, 24 cases of brucellosis have been notified. There has been no evidence of locally acquired brucellosis in humans since New Zealand's declaration of freedom from bovine brucellosis in 1996.[14]

Campylobacteriosis

In 2020, 5289 cases of campylobacteriosis were notified, compared with 6203 cases in 2019. The 2020 rate of 104.0 per 100,000 was a significant decrease from the 2019 rate of 124.6 per 100,000. Campylobacteriosis was the most commonly notified disease accounting for 37.1% of all notifications in 2020. Since 2008, the annual number of campylobacteriosis cases reported has been much lower than in preceding years (Figure 2).

Figure 2. Campylobacteriosis notifications by year, 2001–2020

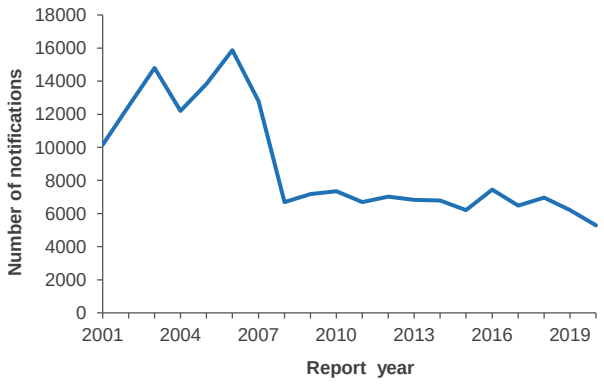
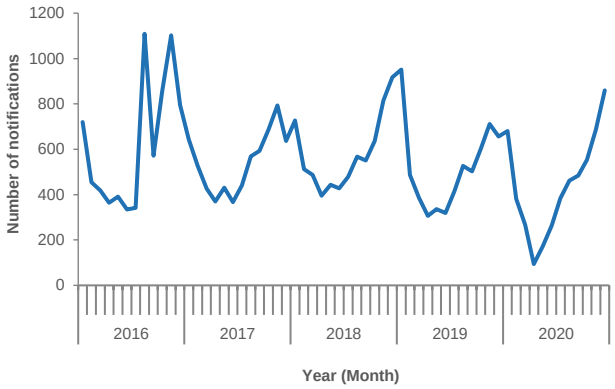


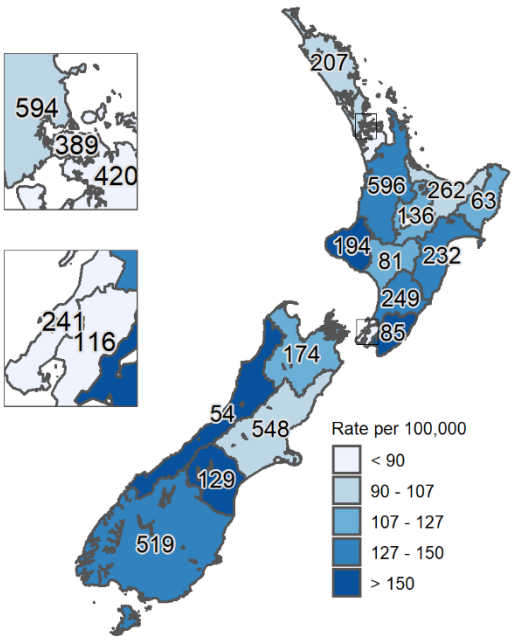
Figure 3 shows campylobacteriosis notifications by month since 2016. There is a distinct seasonal pattern, with an early summer peak and a winter trough. However, this trend was disrupted in 2016, due to a large outbreak in Hawke's Bay in August (964 cases were linked to the outbreak). The second peak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

Figure 3. Campylobacteriosis notifications by month, January 2016–December 2020



The highest notification rates for campylobacteriosis were reported from South Canterbury, Wairarapa, West Coast, and Taranaki DHBs (208.1, 173.8, 166.7 and 155.6 per 100,000 respectively) (Figure 4).

Figure 4. Campylobacteriosis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Infants aged less than 1 year (227.3 per 100,000) and children aged 1–4 years (218.3 per 100,000) had the highest notification rates.

Sex was recorded for 5285 cases. Males (118.0 per 100,000) had a higher rate than females (90.1 per 100,000).

Ethnicity was recorded for 5246 (99.2%) cases. The ethnic group with the highest notification rate for campylobacteriosis was European or Other (136.0 per 100,000), followed by Māori (65.8 per 100,000) and MELAA (63.5 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 3055 (57.8%) cases, of which 478 (15.6%) were hospitalised.

Contact with farm animals and consumption of food from retail premises were the most common risk factors reported for campylobacteriosis (Table 5). Multiple risk factors are often reported for individual cases.

In 2020, 19 outbreaks of campylobacteriosis were reported, involving 119 cases (Table 29).

Cholera

No cases of cholera were notified in 2020. Since 1997, 13 laboratory-confirmed cases of cholera have been notified, with the last case reported in 2018. All 13 cases were overseas during the incubation period for the disease.

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 24th annual report of the CJD Registry (1 January 2020 to 31 December 2020).[15]

In 2020, seven 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, and two cases that did not meet the surveillance criteria for possible CJD.

The five definite or probable cases were aged 50–59 years (1 case), 60–69 years (1 case), and 70 years and over (3 cases).

Four cases were female and one was male.

Since 1997, the Registry has documented 118 cases of sCJD, consisting of 53 definite and 65 probable cases.

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

COVID-19

COVID-19 became a notifiable disease in New Zealand on 30 January 2020.[16]

In 2020, 2176 cases of COVID-19 were notified, giving a notification rate of 42.8 per 100,000.

Notifications for COVID-19 peaked in March and April before decreasing as a result of public health measures that were implemented.[17]

The smaller peak in August marks a large community outbreak in the Auckland region (Figure 5).

Figure 5. COVID-19 notifications by month, January–December 2020

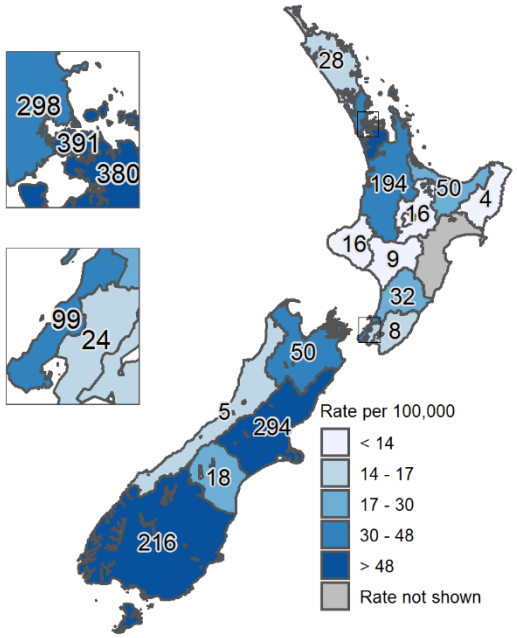
The highest notification rates were reported from Auckland, Counties Manukau, Southern and Canterbury DHBs (77.4, 63.9, 61.8 and 50.5 per 100,000, respectively) (Figure 6). These rates reflect the locations of managed isolation and quarantine facilities as well as the regions with the largest number of cases.

Table 5. Exposure to risk factors associated with campylobacteriosis, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with farm animals	851	907	3531	48.4
Consumed food from retail premises	654	902	3733	42.0
Consumed untreated water	483	1050	3756	31.5
Contact with faecal matter	259	1301	3729	16.6
Recreational water contact	230	1369	3690	14.4
Contact with other symptomatic people	222	1367	3700	14.0
Contact with sick animals	96	1399	3794	6.4
Travelled overseas during the incubation period	66	2117	3106	3.0
Contact with farm animals	851	907	3531	48.4

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

Figure 6. COVID-19 notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Adults aged 20–29 years (71.4 per 100,000) had the highest rate of COVID-19, followed by adults aged 30–39 years (55.8 per 100,000), 50–59 years (49.0 per 100,00) and 40–49 years (48.4 per 100,000).

Females (44.7 per 100,000) had a higher rate than males (40.9 per 100,000).

Ethnicity was recorded for 2166 (99.5%) cases. The ethnic group with the highest rate of COVID-19 was MELAA (104.0 rate per 100,000), followed by Pacific peoples (53.7 per 100,000) and Asian (50.7 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 2143 (98.5%) cases, of which 122 (5.7%) were hospitalised.

There were 25 deaths due to COVID-19 reported in 2020. All were in adults aged 50 years and over: 20 were aged 70 years and over, three were aged 60–69 years and two were aged 50–59 years.

A quarter (559, 25.7%) of cases reported one or more underlying condition, of which cardiovascular disease (171, 30.6%) and diabetes (84, 15.0%) were the most commonly reported conditions.

Almost half of the cases (1035, 47.6%) were imported, 482 (22.2%) were import-related, 563 (25.9%) were infected by a local case and 96 (4.4%) were locally acquired but the source was unknown.

The most commonly reported risk factors for COVID-19 were contact with a known COVID-19 case, overseas travel, and close contact with someone with an acute respiratory infection (Table 6).

In 2020, 40 outbreaks of COVID-19 were reported, involving 900 cases (Table 29).

Cronobacter species invasive disease

Cronobacter species invasive disease (previously known as *Enterobacter sakazakii*) has been notifiable in New Zealand since mid-2005. In December 2017, the case definition of *Cronobacter* species invasive disease was restricted to infants less than 1 year.

No cases of *Cronobacter* species invasive disease were notified in 2020, and there have been no cases in infants or neonates since it became notifiable in mid-2005.

Table 6. Exposure to risk factors associated with COVID-19, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with a known COVID-19 case	1346	667	163	66.9
Overseas travel within suspected incubation	1032	1138	6	47.6
Contact with acute respiratory infection case	888	1058	230	45.6
Underlying condition(s)	559	1617	0[b]	25.7
Recently visited a healthcare facility	441	1634	101	21.3
Health care worker	211	1954	11	9.7
Recently visited a live animal market	6	2033	137	0.3

[a] Percentage refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was known.
[b] It is assumed that all underlying conditions were recorded, however, this may be an underestimate of the number of cases with unknown conditions.
Some cases had more than one risk factor recorded.

Cryptosporidiosis

In 2020, 735 cases of cryptosporidiosis were notified, compared with 1035 cases in 2019 (Figure 7). The 2020 notification rate (14.5 per 100,000) was a significant decrease from the 2019 rate (20.8 per 100,000).

Figure 7. Cryptosporidiosis notifications by year, 2001–2020

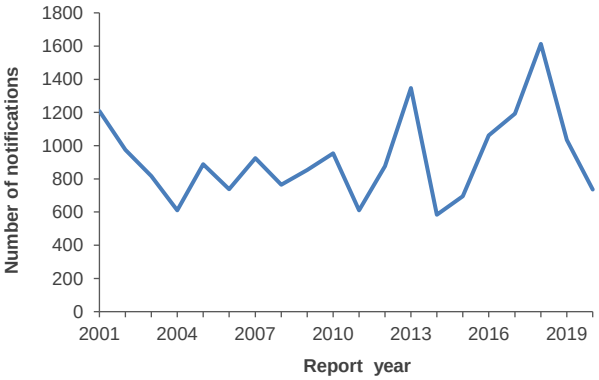
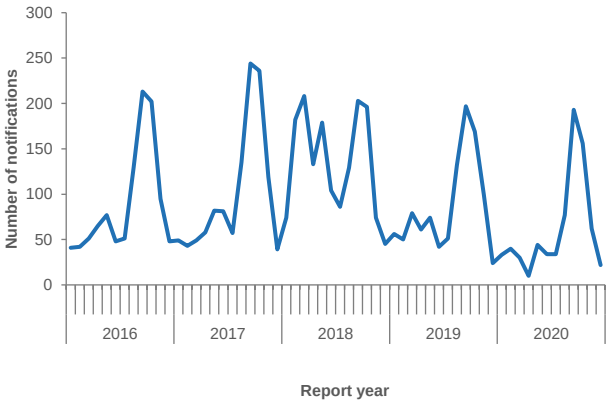


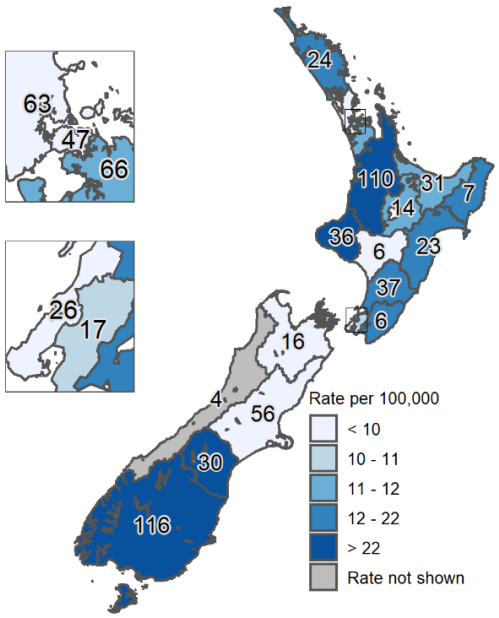
Figure 8 shows cryptosporidiosis cases by month since 2016. There is a distinct seasonal pattern, with the highest number of notifications generally reported during spring each year.

Figure 8. Cryptosporidiosis notifications by month, January 2016–December 2020



In 2020, the highest notification rates for cryptosporidiosis were reported from South Canterbury, Southern, Taranaki and Waikato DHBs (48.4, 33.2, 28.9 and 25.1 per 100,000 respectively (Figure 9).

Figure 9. Cryptosporidiosis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Children aged 1–4 years (71.1 per 100,000) had the highest notification rate followed by children aged 5–9 years (21.6 per 100,000) and adults aged 20–29 years (21.3 per 100,000).

Females (16.1 per 100,000) had a higher rate than males (12.8 per 100,000).

Ethnicity was recorded for 728 (99.0%) cases. The ethnic group with the highest notification rate for cryptosporidiosis was European or Other (19.3 per 100,000), followed by Māori (10.7 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 464 cases (63.1%), of which 49 (10.6%) were hospitalised.

Contact with farm animals, consuming untreated water and contact with faecal matter were the most common risk factors associated with cryptosporidiosis cases in 2020 (Table 7).

Table 7. Exposure to risk factors associated with cryptosporidiosis, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with farm animals	21	102	416	68.0
Consumed untreated water	94	158	483	37.3
Contact with faecal matter	70	194	471	26.5
Recreational water contact	62	214	459	22.5
Contact with other symptomatic people	54	220	461	19.7
Consumed food from retail premises	51	208	476	19.7
Contact with sick animals	51	212	472	19.4

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

In 2020, four outbreaks of cryptosporidiosis were reported, involving 29 cases (Table 29).

Cysticercosis

No cases of cysticercosis were notified in 2020. Since 1997, nine cases have been notified.

Decompression sickness

Two cases of decompression sickness were notified in 2020. Both were aged 50–59 years. One case was male and one was female.

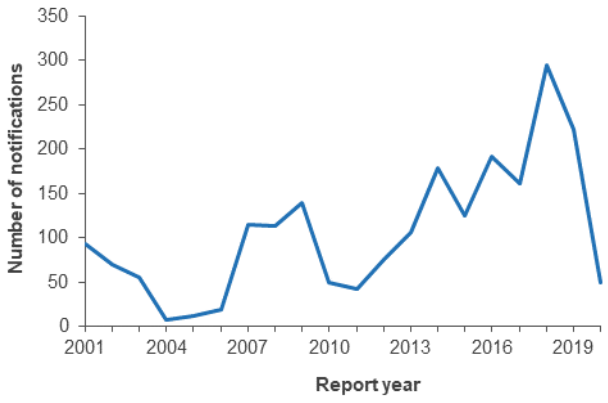
Ministry of Health hospital discharge data for 2020 included 30 cases where decompression sickness was the principal diagnosis (Table 33).

Over the last five years, the number of hospitalisations with decompression sickness as the principal diagnosis has ranged from 16 to 34 annually. This compares with only six notifications in EpiSurv during this time, indicating consistent under-notification of this condition.

Dengue fever

In 2020, 50 cases of dengue fever were notified, compared with 222 cases in 2019 (Figure 10). The 2020 notification rate (1.0 per 100,000) was a significant decrease from the 2019 rate (4.5 per 100,000), due to the dramatic reduction in overseas travel and the closure of the border for non-citizens from 20 March 2020. Of the 50 cases, 48 (96.0%) were laboratory confirmed.

Figure 10. Dengue fever notifications by year, 2001–2020



Adults aged 60–69 years (2.2 per 100,000) had the highest notification rate followed by those aged 20–29 (1.8 per 100,000) and 30–39 (1.4 per 100,000,) years.

Males (1.1 per 100,000) had a higher rate than females (0.8 per 100,000).

Ethnicity was recorded for 49 (98.0%) cases. The ethnic group with the highest notification rate was Pacific peoples (1.8 per 100,000) followed by Asian (1.3 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 42 (84.0%) cases, of which 20 (47.6%) were hospitalised.

Travel history was known for all cases. The countries most commonly visited or lived in were Cook Islands (17 cases, 82.1 per 100,000 traveller arrival[1]), followed by Fiji (11 cases, 31.8 per 100,000 traveller arrivals). Some cases reported travel to more than one country.

Diphtheria

No cases of toxigenic diphtheria were notified in 2020.

The last case of cutaneous toxigenic diphtheria was notified in 2019. The last case of toxigenic respiratory diphtheria was notified in 1998.[18]

In 2020, the Special Bacteriology Laboratory at ESR received isolates of *Corynebacterium diphtheriae* from 34 patients for toxin testing. Just over half (18 isolates, 52.9%) were from cutaneous sources, 12 (35.3%) were from the throat and four were from other sites. No isolates were found to be toxigenic.

Gastroenteritis (acute)

Not all cases of acute gastroenteritis are notifiable. Only 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 childhood service worker) are notifiable. Single cases of chemical, bacterial or toxic food poisoning are also notifiable under this category. Botulism and toxic shellfish poisoning (TSP) are reported in separate sections elsewhere in this report. Diseases and conditions that are notifiable separately (eg, campylobacteriosis, giardiasis, STEC infection and salmonellosis) are reported in their own sections.

[1] Traveller arrivals: overseas residents arriving in New Zealand for a stay of less than 12 months plus New Zealand residents arriving in New Zealand after an absence of less than 12 months.

In 2020, 362 cases of acute gastroenteritis (other than botulism and TSP) were notified. The 2020 notification rate of 7.1 per 100,000 was a significant decrease from the 2019 rate of 9.7 per 100,000 (484 cases).

A causal agent was reported for 201 (55.5%) cases (Table 8). The most common cause was histamine poisoning (25.1%, 91 cases), due to a single outbreak associated with consumption of fish from a meal kit service.

Table 8. Acute gastroenteritis cases by cause, 2020

Cause[a]	Cases	Percentage (%)
Cause identified	**201**	**55.5**
Histamine (scombroid) poisoning	91	25.1
Enterotoxigenic *Escherichia coli* (ETEC)	50	13.8
Vibrio parahaemolyticus	34	9.4
Norovirus	12	3.3
Ciguatera fish poisoning	4	1.1
Bacillus cereus	3	0.8
Rotavirus	3	0.8
Clostridium perfringens	1	0.3
Enteropathogenic *Escherichia coli* (EPEC)	2	0.6
Staphylococcal food intoxication	1	0.3
Cause not identified	**161**	**44.5**

[a] Does not include diseases that are notifiable separately.
Note: there may be more cases associated with specific causes through outbreak reporting, see Table 29.

The highest notification rates for acute gastroenteritis were reported from Bay of Plenty, Hutt Valley, Lakes, and West Coast DHBs (24.3, 19.5, 18.7 and 15.4 per 100,000 respectively).

Children aged 1–4 years had the highest notification rate (11.0 per 100,000), followed by adults aged 50–59 (8.7 per 100,000) and 40–49 years (8.4 per 100,000), and infants aged less than 1 year (8.4 per 100,000).

Females (8.0 per 100,000) had a higher rate than males (6.2 per 100,000).

The ethnic group with the highest notification rate was European or Other (8.5 per 100,000), followed by Māori (6.3 per 100,000).

Hospitalisation status was recorded for 339 (93.6%) cases, of which 31 (9.1%) were hospitalised.

The most common risk factor associated with acute gastroenteritis was consumption of food from retail premises (Table 9).

In 2020, 425 outbreaks of acute gastroenteritis were reported, involving 8152 cases (Table 29). The majority of outbreak cases were not notified.

Giardiasis

In 2020, 1141 cases of giardiasis were notified, compared with 1749 cases in 2019. The 2020 notification rate (22.4 per 100,000) was a significant decrease from the 2019 rate (35.1 per 100,000). Figure 11 shows giardiasis notifications by year from 2001 to 2020.

The highest notification rates for giardiasis were reported from Tairawhiti, Hawke's Bay, and Northland DHBs (53.3, 37.5 and 37.0 per 100,000 respectively) (Figure 12).

Table 9. Exposure to risk factors associated with acute gastroenteritis, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed food from retail premises	215	57	90	79.0
Contact with other symptomatic people	60	161	141	27.1
Consumed water other than regular supply	35	168	159	17.2
Contact with human faecal matter	34	175	153	16.3
Contact with farm animals	32	197	133	14.0
Recreational water contact	29	211	122	12.1
Travelled overseas during the incubation period	29	244	89	10.6
Consumed untreated water	18	175	169	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.

Figure 11. Giardiasis notifications by year, 2001–2020

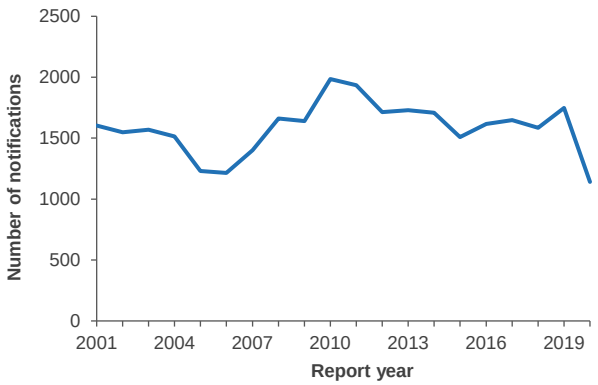
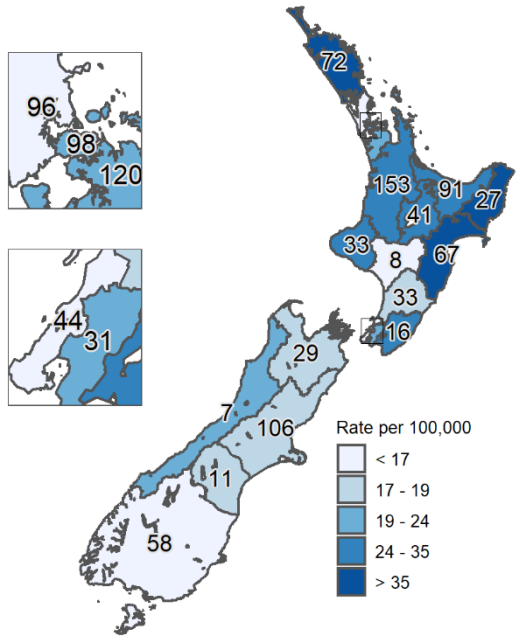


Figure 12. Giardiasis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Children aged 1–4 years (66.3 per 100,000) had the highest notification rate followed by infants aged less than 1 year (40.4 per 100,000) and adults aged 30–39 years (38.6 per 100,000).

Males (23.9 per 100,000) had a higher rate than females (20.9 per 100,000).

Ethnicity was recorded in 1135 (99.5%) cases. The ethnic group with the highest notification rate for giardiasis was European or Other (29.0 per 100,000), followed by MELAA (21.6 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 718 (62.9%) cases, of which 42 (5.8%) were hospitalised.

Contact with faecal matter, contact with other symptomatic people and consumption of untreated water were the most commonly reported risk factors for giardiasis (Table 10).

In 2020, 11 outbreaks of giardiasis were reported, involving 83 cases (Table 29).

Haemophilus influenzae serotype b disease

In 2020, three cases of *Haemophilus influenzae* serotype b (Hib) disease were notified, compared with two cases in 2019. All three cases were laboratory confirmed.

The cases were all males, two were aged less than 1 year and one was aged 5–9 years.

Two cases were of European or Other ethnicity, and one was Māori.

All three cases were hospitalised.

The two infants were unvaccinated and the 5–9 year old case was fully vaccinated.

In 2020, one outbreak of Hib disease was reported, involving five cases (Table 29).

A Hib vaccine was introduced in January 1994. The recommended vaccination schedule consists of a primary course of three doses of DTaP-IPV-HepB/Hib vaccine for infants when aged 6 weeks, 3 months and 5 months, and a booster of Hib vaccine when aged 15 months.[19]

Table 10. Exposure to risk factors associated with giardiasis, 2020

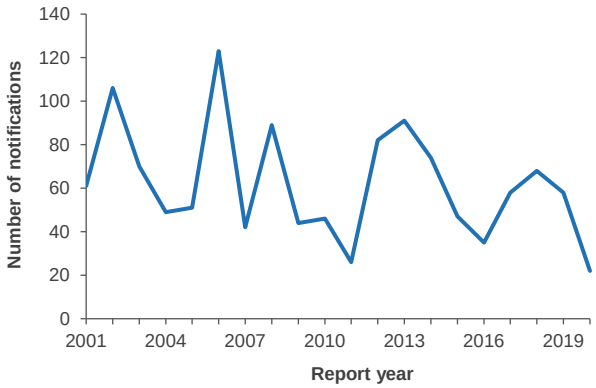
Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with faecal matter	183	309	649	37.2
Contact with other symptomatic people	174	328	639	34.7
Consumed untreated water	154	311	676	33.1
Contact with farm animals	172	357	612	32.5
Recreational water contact	135	341	612	28.4
Consumed food from retail premises	92	322	727	22.2
Travelled overseas during the incubation period	59	553	529	9.6

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

Hepatitis A

In 2020, 22 cases of hepatitis A were notified, compared with 58 cases in 2019. The 2020 notification rate (0.4 per 100,000) was a significant decrease from the 2019 rate (1.2 per 100,000). Since 2001, annual notification numbers have fluctuated, ranging from 26 cases in 2011 to 123 cases in 2006 (Figure 13).

Figure 13. Hepatitis A notifications by year, 2001–2020



Counties Manukau had the highest number of cases (6 cases), followed by Waitemata and Canterbury DHBs (4 cases each).

Adults aged 20–29 years (1.5 per 100,000, 11 cases) had the highest notification rate. No more than three cases were reported in any other age group, so rates were not calculated.

Males and females had similar rates (0.5 and 0.4 per 100,000, respectively).

Ethnicity was recorded for all 22 cases. The ethnic group with the highest notification rate for hepatitis A was Pacific peoples (1.8 per 100,000, 6 cases), followed by Asian (1.0 per 100,000, 8 cases).

Hospitalisation status was recorded for 21 cases (95.5%), of which 15 (71.4%) were hospitalised.

Travel information was recorded for 21 (95.5%) cases, with 15 cases (71.4%) having travelled overseas during the incubation period for the disease. The countries most commonly visited were Samoa (5 cases) and India (4 cases). One case reported travel to more than one country.

No outbreaks of hepatitis A were reported in 2020.

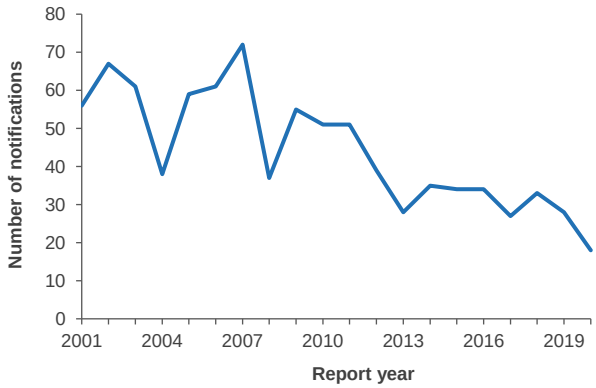
Hepatitis B

Hepatitis B vaccine was added to the national immunisation schedule in 1988. The current vaccination schedule consists of three doses of DTaP-IPV-HepB/Hib vaccine given to infants at age 6 weeks, 3 months and 5 months.[19]

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

In 2020, 18 cases of hepatitis B were notified, compared with 28 cases in 2019. The 2020 notification rate (0.4 per 100,000) was lower than the 2019 rate (0.6 per 100,000). The annual number of hepatitis B cases was variable between 2001 and 2013 then remained fairly stable between 2014 and 2019 (Figure 14).

Figure 14. Acute hepatitis B notifications by year, 2001–2020



Auckland and Nelson Marlborough DHBs had the highest number of cases (3 cases), followed by Waikato and Hawke's Bay (2 cases).

Adults aged 50–59 years (1.1 per 100,000, 7 cases) had the highest notification rate. No more than four cases were reported in any other age group, so rates were not calculated.

Males (0.5 per 100,000) had a higher rate than females (0.2 per 100,000).

Ethnicity was recorded for all 18 cases. The ethnic group with the highest notification rate for hepatitis B was Pacific peoples (1.5 per 100,000, 5 cases), followed by Māori (0.7 per 100,000, 6 cases).

Hospitalisation status was recorded for all 18 cases, of which 11 (61.1%) were hospitalised.

The most commonly reported risk factors for hepatitis B were overseas travel, a history of injecting drug use and sexual contact with a confirmed case or carrier (Table 11).

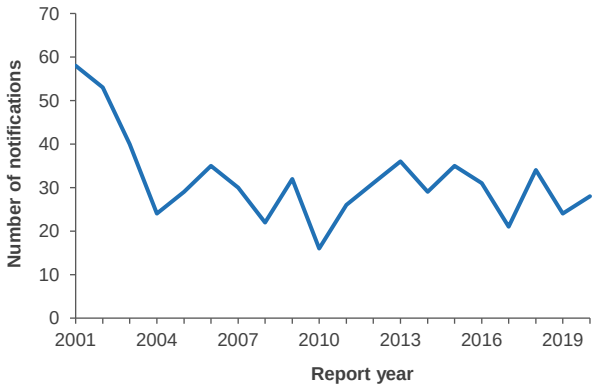
Hepatitis C

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

In 2020, 28 cases of hepatitis C were notified, compared with 24 cases in 2019. The 2020 notification rate (0.6 per 100,000) was similar to the 2019 rate (0.5 per 100,000).

Since 2004, the annual number of notifications has ranged from 16 to 36 (Figure 15).

Figure 15. Acute hepatitis C notifications by year, 2001–2020



Southern (2.3 per 100,000, 8 cases) DHB had the highest rate followed by Canterbury DHB (1.4 per100,000, 8 cases). No more than three cases were reported in any other DHB, so rates were not calculated.

Adults aged 30–39 years (1.4 per 100,000, 10 cases) and 40–49 years (1.2 per 100,000, 8 cases) had the highest notification rates.

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

Ethnicity was recorded for all 28 cases. The ethnic group with the highest notification rate for hepatitis C was Māori (1.8 per 100,000, 15 cases), followed by European or Other (0.4 per 100,000, 13 cases).

Hospitalisation status was recorded for all 28 cases, of which five (17.9%) were hospitalised.

The most commonly reported risk factor for hepatitis C was a history of injecting drug use (Table 12).

Hepatitis (viral) not otherwise specified

In 2020, 11 cases of hepatitis (viral) not otherwise specified (NOS) were notified, compared with nine cases in 2019. Four cases were hepatitis D, and seven were hepatitis E.

Hepatitis D

The four hepatitis D cases were aged 20–29 years (1 case), 50–59 years (1 case) and 60–69 years (2 cases). Two cases were male and two were female.

Three cases were Pacific peoples and one was Māori.

Hospitalisation status was known for three cases; none were hospitalised.

All four cases had co-infection with hepatitis B.

Table 11. Exposure to risk factors associated with acute hepatitis B, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Travelled overseas during incubation period	6	11	1	35.3
History of injecting drug use	3	13	2	18.8
Sexual contact with confirmed case or carrier	2	10	6	16.7
Body piercing/tattooing in last 12 months	1	15	2	6.3
Case is a blood product or tissue recipient	1	15	2	6.3
Travelled overseas during incubation period	6	11	1	35.3

[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 12. Exposure to risk factors associated with acute hepatitis C, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
History of injecting drug use	26	1	1	96.3
Sexual contact with confirmed case or carrier	4	13	11	23.5
Household contact with confirmed case or carrier	4	14	10	22.2
Body piercing/tattooing in the last 12 months	4	15	9	21.1

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

Hepatitis E

The seven hepatitis E cases were aged 30–39 years (3 cases), 40–49, and 60–69 years (2 cases each). Six cases were male, and one was female.

Four cases were of Asian ethnicity and three were European or Other.

The hospitalisation status was known for all seven cases, and all were hospitalised.

Four cases had travelled overseas during the incubation period and three had not.

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 to date and no highly pathogenic avian influenza A(H5N1) has been reported in New Zealand animals.[20]

Hydatid disease

No cases of hydatid disease (*Echinococcus granulosus*) were notified in 2020, compared with one case in 2019. Since 1997, 72 cases of hydatid disease have been notified.

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

Invasive pneumococcal disease

In 2020, 352 cases of invasive pneumococcal disease (IPD) were notified, compared with 495 cases in 2019. The 2020 notification rate of 6.9 per 100,000 was a significant decrease from the 2019 rate of 9.9 per 100,000.

There is a distinct seasonal pattern for IPD, with the highest number of notifications reported during winter, and particularly in July, each year (Figure 16).

In 2020, the highest notification rates for IPD were reported from Wairarapa, Northland, Lakes, Tairawhiti and South Canterbury DHBs (14.3, 12.3, 11.9, 11.8 and 11.3 per 100,000 respectively) (Figure 17).

Figure 16. Invasive pneumococcal disease notifications by month, January 2016–December 2020

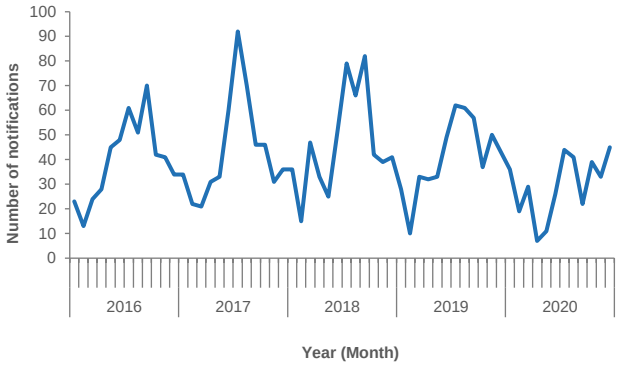
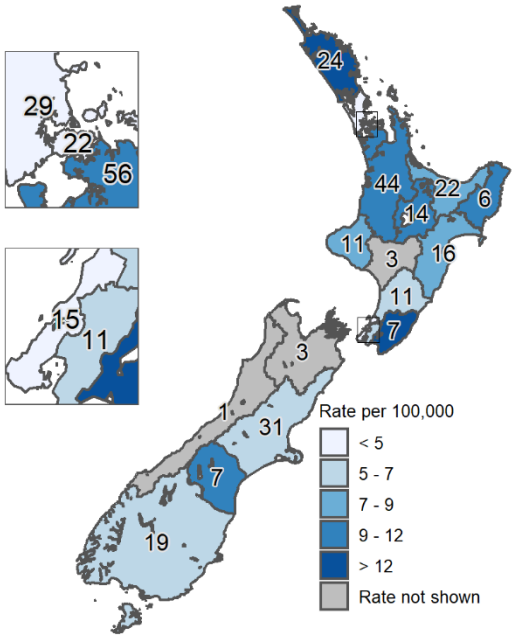


Figure 17. Invasive pneumococcal disease notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Adults aged 70 years and over (19.3 per 100,000) had the highest rates of IPD, followed by infants aged less than 1 year (16.8 per 100,000) and adults aged 60–69 years (12.8 per 100,000).

Males and females had similar rates (7.1 and 6.8 per 100,000 respectively).

Ethnicity was recorded for 351 (99.7%) cases. The ethnic group with the highest rate of IPD was Pacific peoples (17.8 per 100,000), followed by Māori (13.6 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 337 (95.7%) cases, of which 321 (95.3%) were hospitalised.

There were nine deaths due to IPD reported in 2020. One death was in a child aged 1–4 years, and eight were in adults aged 50 years and over. The death in the child was due to serotype 23B.

The risk factors recorded for IPD are shown in Table 13 and Table 14. The most commonly reported risk factors for children aged less than 5 years were attending childcare and smoking in the household. Having a chronic illness was the most common risk factor for cases aged 5 years and over.

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

The childhood immunisation schedule was changed in mid-2020. The recommended schedule for PCV is now three doses given at age 6 weeks, 5 months and 12 months. For defined groups of high-risk children and adults, the immunisation schedule also includes PCV13 and 23-valent pneumococcal polysaccharide vaccine (23PPV).[19]

The Invasive Pathogens Laboratory at ESR received a viable *Streptococcus pneumoniae* isolate from a normally sterile site for serotyping for 338 (96.0%) notified cases in 2020, of which 335 were able to be serotyped. Table 15 shows the breakdown by serotype and age group.

All 36 cases aged less than 5 years with a known serotype were due to serotypes not covered by PCV10, compared with 94.0% (158/168) and 93.9% (123/131) of cases aged 5–64 years and 65 years and over, respectively.

Serotype 19A was the most prevalent serotype (71 cases). In children aged less than 5 years the most prevalent serotype was also 19A (18 cases), followed by the non-PCV serotypes 10A, 12F and 23B (3 cases each). Twenty of the 36 (55.6%) cases aged less than 5 years had a serotype that would be covered by PCV13 but not by PCV10.

Serotype 8 was the most prevalent serotype in those aged 5–64 years (40 cases) and serotype 19A was the most prevalent serotype (26 cases) in adults aged 65 years and over, followed by serotype 8 (17 cases).

Table 13. Exposure to risk factors associated with invasive pneumococcal disease for cases aged less than 5 years, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Attends childcare	4	6	27	40.0
Smoking in the household	4	11	22	26.7
Premature (<37 weeks gestation) [b]	1	16	20	5.9
Immunocompromised	1	27	9	3.6
Congenital or chromosomal abnormality	2	24	11	7.7
Chronic illness	2	23	12	8.0

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

Table 14. Exposure to risk factors associated with invasive pneumococcal disease for cases aged 5 years and over, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Chronic illness	152	68	95	69.1
Current smoker[b]	71	128	116	35.7
Chronic lung disease or cystic fibrosis	56	164	95	25.5
Immunocompromised	46	160	109	22.3
Resident in long-term or other chronic-care facility	12	198	105	5.7

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

Table 15. Invasive pneumococcal disease notifications by serotype and age group, 2020

Serotype	<5 years	5–64 years	65+ years	Total
PCV7	**0**	**4**	**7**	**11**
4	0	2	1	3
6B	0	0	1	1
9V	0	0	0	0
14	0	1	0	1
18C	0	0	0	0
19F	0	1	4	5
23F	0	0	1	1
PCV10	**0**	**6**	**1**	**7**
1	0	1	0	1
5	0	0	0	0
7F	0	5	1	6
PCV13	**20**	**37**	**39**	**96**
3	2	10	13	25
6A	0	0	0	0
19A	18	27	26	71
Other (non-PCV13)	**16**	**121**	**84**	**224**
Total[a]	**36**	**168**	**131**	**335**

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

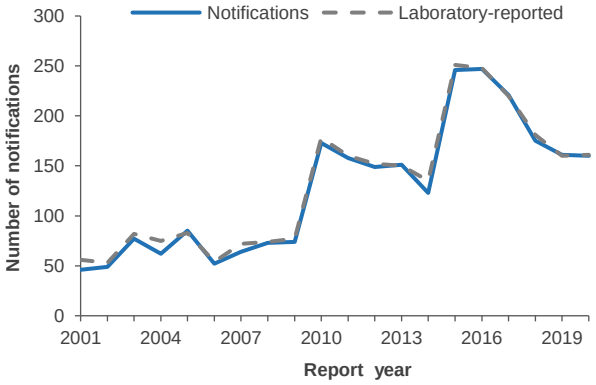
Legionellosis

In 2020, 160 cases of legionellosis were notified, compared with 161 cases in 2019. The 2020 notification rate of 3.1 per 100,000 was similar to the 2019 rate of 3.2 per 100,000.

The annual number of cases was relatively stable between 2000 and 2009, but increased in 2010 and has remained high since (Figure 18). The increase in legionellosis cases in 2015 and 2016 is likely due to the LegiNZ study [21] which involved testing hospitalised patients with suspected pneumonia for *Legionella* spp. using PCR. The study ran from May 2015 to May 2016.

In 2020, the highest notification rates for legionellosis were reported from Canterbury and Nelson Marlborough DHBs (7.6 and 7.4 per 100,000 respectively), followed by Bay of Plenty, Southern and Northland DHBs (4.5, 4.3 and 4.1 per 100,000 respectively).

Figure 18. Legionellosis notifications and laboratory-reported cases by year, 2001–2020



Adults aged 70 years and over (12.7 per 100,000) and 60–69 years (8.4 per 100,000) had the highest notification rates for legionellosis.

Males (4.1 per 100,000) had a higher rate than females (2.2 per 100,000).

Ethnicity was recorded for 159 (99.4%) cases. The ethnic group with the highest notification rate was European or Other (4.0 per 100,000), followed by Māori (2.2 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 151 (94.4%) cases, of which 136 (90.1%) were hospitalised.

One death due to legionellosis were reported in 2020. The case was aged 70 years and over.

Table 16 provides a summary of risk factors for which data was available. A total of 110 (93.2%) cases reported exposure to known environmental risk factors during the incubation period for the disease. Further details of the environmental exposures were recorded for all 110 cases as follows: compost, potting mix or soil (98), shower or hot water system (11), spa or pool (10), sprinkler, fountain or garden hose (6), air conditioning or cooling towers (4), water blasting (4), dust suppression (2), and medical respiratory devices (1). Some cases reported more than one exposure to known environmental risk factors.

Table 16. Exposure to risk factors associated with legionellosis, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Exposure to known environmental source	110	8	42	93.2
Pre-existing immunosuppressive or debilitating condition	57	65	38	46.7
Smokes cigarettes	18	105	37	14.6

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

In 2020, two outbreaks of legionellosis were reported, involving five cases (Table 29).

The Legionella Reference Laboratory at ESR confirmed 161 cases of legionellosis in 2020. As in previous years, the most common *Legionella* species identified were *L. longbeachae* (65.8%, 106 cases) and *L. pneumophila* (27.3%, 44 cases) (Table 17).

Table 17. *Legionella* strains for laboratory-reported cases, 2020

Legionella species and serogroup	Cases	Percentage (%)
L. longbeachae	**106**	**65.8**
L. longbeachae sg 1	43	26.7
L. longbeachae sg 1/ *L. bozemanae* sg 1	2	1.2
L. longbeachae sg not determined	61	37.9
L. pneumophila	**44**	**27.3**
L. pneumophila sg 1	29	18.0
L. pneumophila sg 5	1	0.6
L. pneumophila sg 6	1	0.6
L. pneumophila sg 13	1	0.6
L. pneumophila sg 14	1	0.6
L. pneumophila sg not determined	11	6.8
Other *Legionella* species	**11**	**6.8**
L. sainthelensi	3	1.9
L. micdadei	2	1.2
L. bozemanae sg 1	1	0.6
L. jordanis	1	0.6
Legionella species unidentified	4	2.5
Total	**161**	**100.0**

Leprosy

Three cases of leprosy were notified in 2020, compared with six cases in 2019.

Two cases were male, and one was female. The cases were aged 20–29 years (2 cases) and 60–69 years (1 case). All three cases were of Pacific ethnicity.

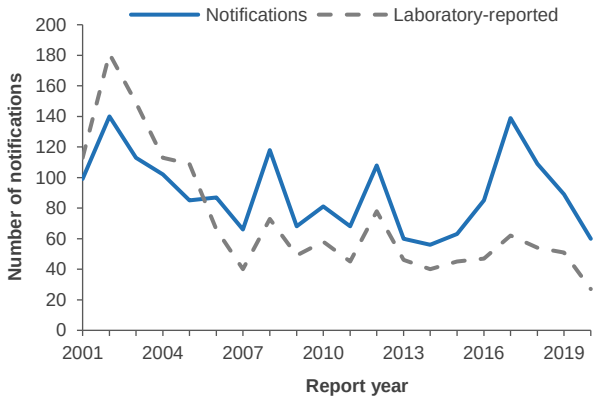
The cases had been in Samoa (2 cases) and Kiribati (1 case).

Leptospirosis

In 2020, a total of 60 cases of leptospirosis were notified, compared with 89 cases in 2019. The 2020 notification rate of 1.2 cases per 100,000 was a significant decrease from the 2019 rate of 1.8 per 100,000. Of the 60 notified cases, 58 were laboratory confirmed by microscopic agglutination titre (MAT) (25 cases), or nucleic acid testing (NAAT) (29 cases) or both MAT and NAAT (4 cases). Two cases were not laboratory confirmed.

Figure 19 shows the number of notified cases of leptospirosis and those confirmed by the Leptospira Reference Laboratory at ESR each year since 2001.

Figure 19. Leptospirosis notifications by year, 2001–2020



The highest notification rates for leptospirosis were reported from Waikato and Hawke's Bay DHBs (4.3 and 3.9 per 100,000 respectively).

Adults aged 50–59 years (3.1 per 100,000), had the highest notification rates followed by those aged 60–69 years (2.2 per 100,000).

Males (1.7 per 100,000) had a much higher rate than females (0.6 per 100,000).

Ethnicity was recorded for all cases. The ethnic group with the highest notification rate was European or Other (1.6 per 100,000), followed by Māori (0.9 per 100,000).

Hospitalisation status was recorded for 57 (95.0%) cases, of which more than three-quarters (77.2%, 44/57) were hospitalised.

Occupation was recorded for 53 (88.3%) cases. Of these, 35 (66.0%) were engaged in occupations considered high risk for exposure to *Leptospira* spp. in New Zealand.[22] Of the 35 cases with a high-risk occupation, 30 (85.7%) were farmers, farm workers or livestock transporters and five (14.3%) worked in the meat processing industry. An additional four cases (7.5%) worked in an occupation that involved contact with animals or their environment (forestry worker, gardener and orchardist).

Other risk factors reported included animal/outdoor exposure (48 cases), exposure to lakes, rivers or streams (9 cases), and overseas travel (1 case).

No outbreaks of leptospirosis were reported in 2020.

The Leptospira Reference Laboratory at ESR confirmed 27 cases of infection with *Leptospira* in 2020. The most common *Leptospira* serovars reported were *L. borgpetersenii* sv Ballum, (40.7%, 11 cases) and *L. borgpetersenii* sv Hardjo (37.0%, 10 cases) (Table 18).

Table 18. *Leptospira* species and serovars for laboratory-reported cases, 2020

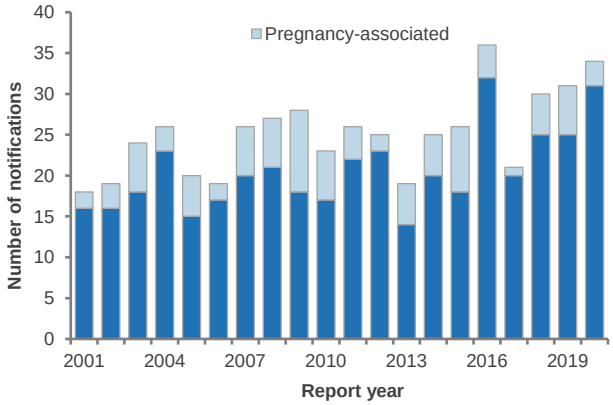
Leptospira species and serovar	Cases	Percentage (%)
L. borgpetersenii	**21**	**77.8**
L. borgpetersenii sv Ballum	11	40.7
L. borgpetersenii sv Hardjo	10	37.0
L. interrogans	**2**	**7.4**
L. interrogans sv Copenhageni	1	3.7
L. interrogans sv Pomona	1	3.7
Serovar not identified	**4**	**14.8**
Total	**27**	**100.0**

Listeriosis

In 2020, 34 cases of listeriosis were notified (including three pregnancy-associated cases) compared with 31 cases (six pregnancy-associated) in 2019. The 2020 notification rate of 0.7 cases per 100,000 was similar to the 2019 rate of 0.6 per 100,000.

Figure 20 shows listeriosis notifications for each year since 2001.

Figure 20. Listeriosis notifications by year, 2001–2020



No outbreaks of listeriosis were reported in 2020.

The Special Bacteriology Laboratory at ESR serotyped 32 isolates of *Listeria monocytogenes* in 2020. The serotypes identified were O4 (18 isolates, 56.3%) and O1/2 (14 isolates, 43.8%). Two cases were confirmed by PCR only, with no culture available for typing.

Listeriosis not associated with pregnancy

The 31 notified listeriosis cases not associated with pregnancy were from 12 DHBs, with the highest number of notifications reported from Counties Manukau (6 cases) DHB.

Adults aged 70 years (2.9 per 100,000) had the highest rates of listeriosis and accounted for just over half (16 cases, 51.6%) of the cases.

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

Ethnicity was recorded for all 31 cases. The ethnic group with the highest notification rate was European or Other (0.8 per 100,000, 24 cases), followed by Asian (0.6 per 100,000, 5 cases).

All 31 cases were hospitalised for listeriosis and 18 were also hospitalised for the treatment of another illness.

One death due to listeriosis in a case aged 70 years and over was reported in 2020.

Information on underlying illness was recorded for 30 cases, of which 24 (80.0%) had an underlying illness such as cancer, renal failure, diabetes, pneumonia, heart disease, or another chronic illness. Nine cases were reported to be receiving immunosuppressive drugs.

Pregnancy-associated listeriosis

Three cases of pregnancy-associated listeriosis were notified in 2020. The length of gestation of cases ranged from 9 to 35 weeks. The cases were all aged 30–39 years. Two cases were of Asian ethnicity, one was European or Other.

One perinatal death from listeriosis occurred in 2020.

Malaria

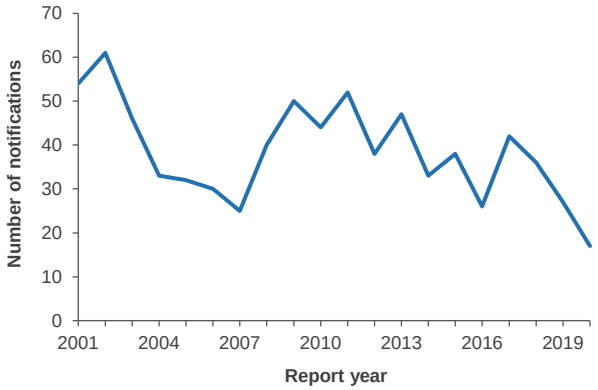
In 2020, 17 cases of malaria were notified, compared with 27 cases in 2019 (Figure 21). The 2020 notification rate of 0.3 per 100,000 was lower than the 2019 rate of 0.6 per 100,000.

Adults aged 20–29 years had the highest number of cases (5 cases), followed by those aged 40–49 years (4 cases) and 30–39 years (3 cases).

Twelve cases were male and five were female.

Ethnicity was recorded for all 17 cases. The ethnic groups with the highest number of cases were Asian, MELAA and European or Other (4 cases each).

Figure 21. Malaria notifications by year, 2001–2020



Hospitalisation status was recorded for all 17 cases, of which 14 (82.4%) were hospitalised.

Table 19 shows the region and country of overseas travel and *Plasmodium* species identified for the 17 cases. As in previous years, Sub-Saharan Africa was the most commonly reported region for *P. falciparum* (7 cases), while Southern and Central Asia was the most commonly reported region for *P. vivax* (4 cases).

The countries most commonly visited or lived in were Uganda (4 cases) and India (3 cases). Some cases reported travel to more than one country.

Information on prophylaxis was available for 12 cases, of which five (41.7%) were offered prophylaxis. None of the five cases were recorded as taking prophylaxis as prescribed.

Measles

Measles vaccination was introduced in 1969 [19] and measles has been a notifiable disease since June 1996.[3] The recommended schedule for measles, mumps and rubella (MMR) vaccine is two doses. In October 2020 the recommended ages for MMR vaccine doses changed from 15 months and 4 years to 12 months and 15 months of age.[19] In October 2017, New Zealand was verified by the WHO as having eliminated endemic measles.[23]

In 2020, nine cases of measles (all laboratory confirmed) were notified, compared with 2190 cases in 2019 (including 2022 laboratory-confirmed cases). The 2020 notification rate (0.2 per 100,000) was a significant decrease from the 2019 notification rate (44.0 per 100,000). All nine cases were notified in January.

Figure 22 shows notifications and laboratory-confirmed cases from 2001 to 2020.

Figure 22. Measles notifications and laboratory-confirmed cases by year, 2001–2020

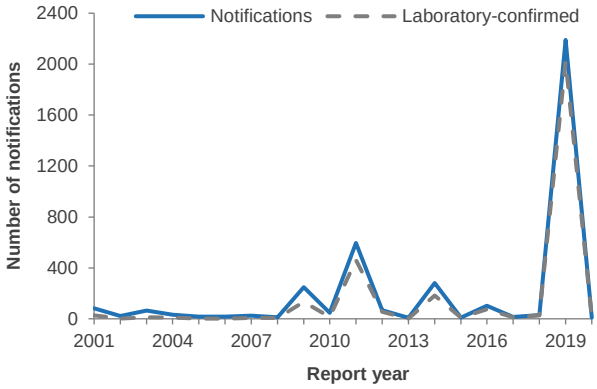


Table 19. Region and country of overseas travel and *Plasmodium* species for malaria notifications, 2020

Region	Country resided in or visited	*Plasmodium* species			
		P. falciparum	*P. malariae*	*P. vivax*	Indeterminate
Sub-Saharan Africa	Eritrea			1	
	Ethiopia			1	
	Ghana	1			
	Kenya	1			
	Mozambique	1			
	Rwanda	1			
	Sudan	1			
	Uganda	4			
Southern and Central Asia	Afghanistan			1	
	India			3	
South-East Asia	Indonesia		1	1	
Oceania	Papua New Guinea			1	1
	Solomon Islands			1	

Note: Some cases reported travel to more than one country.

Cases were reported from Counties Manukau (4 cases), Waitemata (2 cases), Auckland, Taranaki and Capital & Coast (1 case each) DHBs.

Cases ranged in age from 14 months to 52 years, with 77.8% of the cases aged 11 years and over.

Six cases were female and three were male.

Ethnicity was recorded for all cases. Five cases were Pacific peoples, three were Māori and one was Asian.

Hospitalisation status was recorded for all nine cases, of which two (22.2%) were hospitalised.

Vaccination status was known for eight (88.9%) cases, and none were vaccinated.

The source of the virus was recorded for five cases; one was imported from the Philippines and four were import-related.

One measles outbreak was reported in 2020, involving two cases (Table 29).

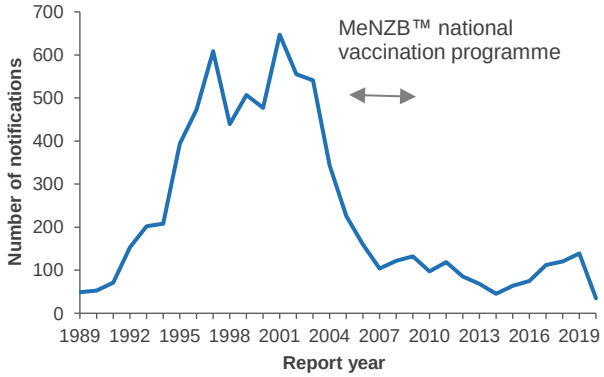
Ministry of Health hospital discharge data for 2020 included six hospitalisations where measles was the principal diagnosis (Table 33).

Meningococcal disease

In 2020, 35 cases of meningococcal disease were notified, compared with 139 cases in 2019. The notification rate (0.7 per 100,000) was a significant decrease from the 2019 rate (2.8 per 100,000).

Figure 23 shows the number of meningococcal disease notifications from 1989 to 2020. The highest annual number of cases was 647 reported in 2001 during the New Zealand meningococcal disease epidemic driven by the B:P1.7-2,4 strain.

Figure 23. Meningococcal disease notifications by year, 1989–2020



Cases were reported from 14 DHBs. Canterbury had the highest number of cases (6 cases) followed by Waitemata, Auckland, Counties Manukau and Waikato (4 cases each) DHBs.

The highest rate was for infants aged less than 1 year (8.4 per 100,000), followed by children aged 1–4 years (3.7 per 100,000).

Males (0.8 per 100,000) had a higher rate than females (0.6 per 100,000).

Ethnicity was recorded for all cases. The ethnic group with the highest notification rate for meningococcal disease was Māori (1.2 per 100,000), followed by European or Other (0.7 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

All 35 cases were hospitalised. Pre-hospital management information was recorded for 33 (94.3%) hospitalised cases. Of these, 11 (33.3%) cases were seen by a doctor prior to hospital admission, and two (18.2%) of these were given intravenous or intramuscular antibiotics before admission.

Three deaths were reported during 2020, giving a case fatality rate of 8.6%. Two deaths were due to group W and one was due to B:P1.7-2,4. One death was in a child aged 1–4 years, one was in a young adult aged 15–19 years and one was in an adult aged 60–69 years. All of the cases that died had been admitted to hospital and one had been seen by a doctor prior to admission and given antibiotics.

Of the 35 cases, 33 (94.3%) were laboratory confirmed and the group was determined for 32 cases. Over half (56.3%, 18 cases) were group B, 11 (34.4%) were group W, two (6.3%) were group Y, and one (3.1%) was group C (Table 20). For children aged less than 5 years, 14 cases were laboratory confirmed and all had a group determined: 10 (71.4%) were group B strains (five were B:P1.7-2,4), two (14.3%) were group W, one (7.1%) was group C, and one (7.1%) was group Y.

The proportion of cases with a group confirmed that were due to group W increased from 7.5% in 2016 to 34.4% in 2020 (Table 20).

One outbreak of meningococcal disease was reported in 2020, involving two cases.

Table 20. Meningococcal disease strain group distribution by year, 2016–2020

	2016	2017	2018	2019	2020
Group B	**47**	**70**	**51**	**62**	**18**
B:P1.72,4	23	27	16	19	9
Other group B	24	43	35	43	9
Group W	**5**	**12**	**33**	**36**	**11**
W:P1.5,2	3	12	32	34	11
Other group W	2	0	1	2	0
Group Y	**7**	**11**	**16**	**16**	**2**
Group C	**8**	**11**	**10**	**7**	**1**
Group X	**0**	**0**	**1**	**0**	**0**
Group E	**0**	**0**	**0**	**1**	**0**
Total*	**67**	**104**	**111**	**122**	**32**

*Total number of laboratory-confirmed cases where the strain was determined.

The antimicrobial susceptibilities of 26 viable meningococcal isolates received by ESR from cases of invasive disease in 2020 were tested. All isolates were susceptible to ceftriaxone, rifampicin and ciprofloxacin. Ten isolates (38.5%) were penicillin resistant with minimum inhibitory concentrations (MICs) ≥0.5 mg/L. A further three (11.5%) isolates had intermediate resistance to penicillin (MICs 0.12–0.25 mg/L). Seven (63.6%) of the 11 group W isolates were penicillin resistant and one (9.1%) had intermediate resistance to penicillin.

Middle East Respiratory Syndrome (MERS)

MERS became notifiable on 6 September 2013. Although no cases have been reported in New Zealand, worldwide 2566 laboratory-confirmed cases of human infection with MERS Coronavirus (MERS-CoV), including 882 related deaths, were reported to WHO from September 2012 to December 2020.[24]

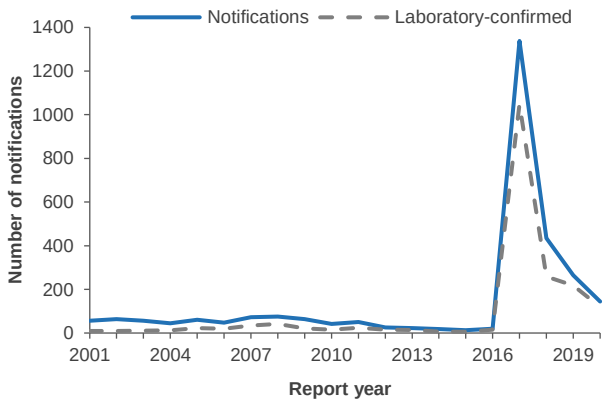
Mumps

Vaccination against mumps was introduced to the national immunisation schedule in 1990 as part of the MMR vaccine [19] and mumps became notifiable in June 1996.[3] The recommended schedule for measles, mumps and rubella (MMR) vaccine is two doses. In October 2020 the recommended ages for MMR vaccine doses changed from 15 months and 4 years to 12 months and 15 months of age.[19] Prior to 2017, the last mumps epidemic occurred in 1994.[19]

In 2020, 144 cases of mumps (including 119 laboratory-confirmed cases) were notified, compared with 264 cases in 2019 (including 218 laboratory-confirmed cases). The 2020 notification rate of 2.8 per 100,000 was a significant decrease from the 2019 rate of 5.3 per 100,000.

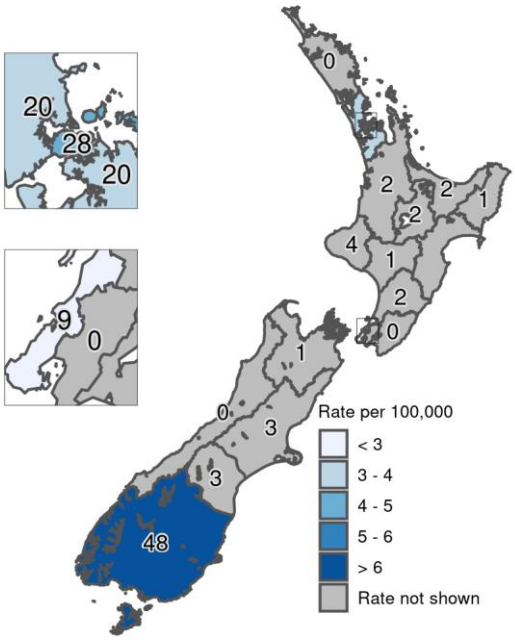
Figure 24 shows notifications and laboratory-confirmed cases from 2001 to 2020.

Figure 24. Mumps notifications and laboratory-confirmed cases by year, 2001–2020



The highest notification rate for mumps was reported from Southern DHB (13.7 per 100,000), followed by Auckland (5.5 per 100,000), Counties Manukau (3.4 per 100,000) and Waitemata (3.1 per 100,000) DHBs (Figure 25).

Figure 25. Mumps notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Adults aged 20–29 years (12.1 per 100,000) had the highest notification rate, followed by those aged 15–19 years (7.2 per 100,000).

Males (3.1 per 100,000) had a higher rate than females (2.5 per 100,000).

Ethnicity was recorded for all cases. The ethnic group with the highest notification rate was Pacific peoples (8.8 per 100,000).

Hospitalisation status was recorded for 142 (98.6%) cases, of which eight (5.6%) were hospitalised.

Vaccination status was known for 81 (56.3%) cases (Table 21). Of these, 20 (24.7%) cases were not vaccinated, 19 (23.5%) had received one dose of vaccine, and 34 (42.0%) had received two doses. Dose information was unknown for the remaining eight vaccinated cases.

Of the cases with risk factor information recorded, 43/116 (37.1%) had contact with another case, 12/135 (8.9%) attended school and 4/135 (3.0%) had travelled overseas during the incubation period for the disease.

Three mumps outbreaks were reported in 2020, involving 58 cases (Table 29).

Ministry of Health hospital discharge data for 2020 included 12 hospitalisations where mumps was the principal diagnosis (Table 33).

Non-seasonal influenza

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

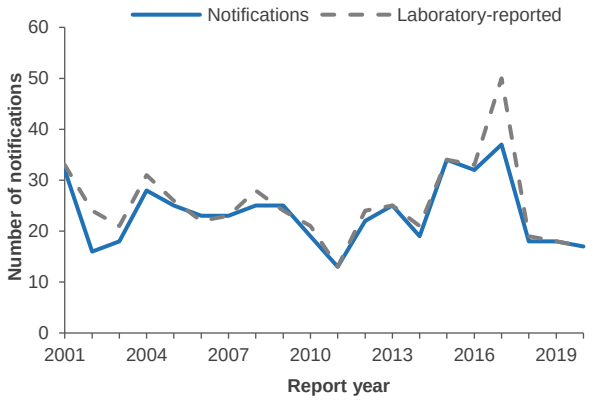
In August 2013, influenza A(H7N9) became notifiable as non-seasonal influenza. No cases have been notified to date.

Paratyphoid fever

In 2020, 17 cases of paratyphoid fever were notified, compared with 18 cases in 2019. The 2020 notification rate (0.3 per 100,000) was similar the 2019 notification rate (0.4 per 100,000). The case definition for paratyphoid was changed at the end of 2017 to exclude cases of *Salmonella* Paratyphi B var. Java.[25]

Figure 26 shows the number of notifications and laboratory-reported cases of paratyphoid fever each year since 2001.

Figure 26. Paratyphoid fever notifications and laboratory-reported cases by year, 2001–2020



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

Adults aged 20–29 years had the highest number of cases (5 cases).

Males (0.4 per 100,000) had a higher rate than females (0.2 per 100,000).

Ethnicity was recorded for all 17 cases. Fifteen cases were of Asian ethnicity, two were European or Other.

Hospitalisation status was known for 16 (94.1%) cases, of which 14 (87.5%) were hospitalised.

Table 21. Age group and vaccination status of mumps notifications, 2020

Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 months[a]	1	0	0	0	0	1
15 months–3 years	1	1	0	0	1	0
4–9 years	5	1	1	2	1	0
10–19 years	30	2	12	1	5	10
20+ years	108	16	21	5	14	52
Total	**144**	**19**	**34**	**8**	**20**	**63**

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

Overseas travel information was recorded for all 17 cases. Fifteen5 (88.2%) had travelled overseas during the incubation period for the disease. The countries visited were India (14 cases), Cambodia, Macau and Thailand (1 case each). Some cases reported travel to more than one country.

No outbreaks of paratyphoid fever were reported in 2020.

The Enteric Reference Laboratory at ESR confirmed 17 isolates as *Salmonella* Paratyphi A during 2020. The 7-gene MLST types identified were ST85 (12 isolates) and ST129 (5 isolates).

Pertussis

Pertussis is a vaccine-preventable disease caused by the bacterium *Bordetella pertussis*. Epidemics occur every 2–5 years, predominantly in young children, with a periodicity that is less affected by mass vaccination than other childhood vaccine-preventable diseases.[19] The most recent national outbreak of pertussis began in October 2017 and continued throughout 2018. Pertussis vaccination has been part of the national immunisation schedule in New Zealand since 1960. Pertussis has been notifiable since June 1996.[3]

The recommended vaccination schedule for pertussis is a primary course of DTaP-IPV-HepB/Hib at ages 6 weeks, 3 months and 5 months, followed by booster doses at ages 4 years (DTaP-IPV) and 11 years (Tdap). Vaccination with Tdap is also recommended for pregnant women from 16 weeks' gestation.[19]

In 2020, 171 pertussis cases were notified, of which 90 (52.6%) were laboratory confirmed (89 by PCR only and one by both isolation and PCR). The 2020 notification rate (3.4 per 100,000) was a significant decrease from the 2019 rate (24.2 per 100,000, 1206 cases) (Figure 27).

The highest rate of pertussis was reported from Whanganui DHB (8.8 per 100,000), followed by MidCentral (8.0 per 100,000), and Capital & Coast (7.4 per 100,000) DHBs (Figure 28).

The highest notification rate was for infants aged less than 1 year (26.9 per 100,000) followed by children aged 1–4 (11.8 per 100,000), 10–14 (4.8 per 100,000) and 5–9 (4.6 per 100,000) years.

Figure 27. Pertussis notifications and laboratory-confirmed cases by year, 2001–2020

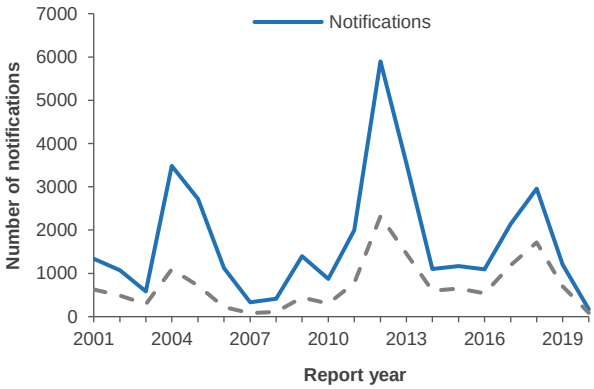
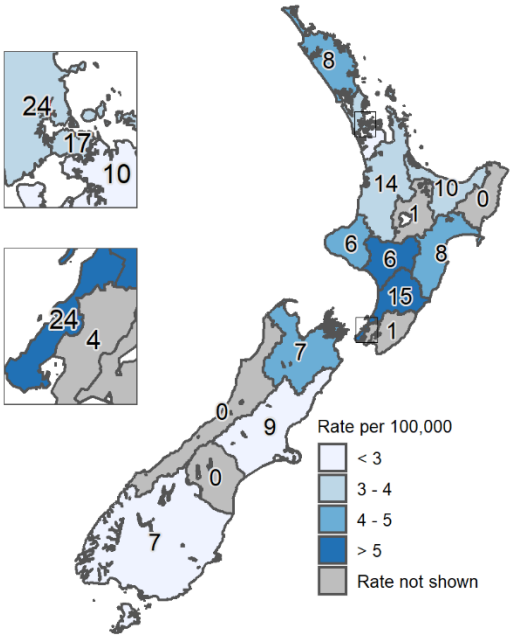


Figure 28. Pertussis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Males and females had similar rates (3.3 and 3.4 per 100,000, respectively).

Ethnicity was recorded for 170 (99.4%) cases. The ethnic group with the highest notification rate for pertussis was Māori (5.9 per 100,000) followed by Pacific peoples (3.5 per 100,000), and European or Other (3.3 per 100,000).

Hospitalisation status was recorded for all 171 cases, of which 29 (17.0%) were hospitalised. Over half (62.5%, 10/16) of the cases aged less than 1 year were hospitalised. For Pacific peoples 50.0% (6/12) of cases were hospitalised and for Māori 28.0% (14/50) of cases were hospitalised.

Vaccination status was known for 116 (67.8%) cases (Table 22). Of these, 43 (37.1%) cases were not vaccinated, including one infant aged less than 6 weeks who was ineligible for vaccination. Twenty (17.2%) cases had received one dose of pertussis vaccine, two (1.7%) had received two doses and 40 (34.5%) had received three or more doses. A further 11 (9.5%) cases were reported as being vaccinated, but no dose information was available.

Vaccination status was known for 22 (75.9%) of the hospitalised cases. Of these, seven (31.8%) cases had not been vaccinated, 10 (45.5%) had received one dose of pertussis vaccine and three (13.6%) had received three or more doses. A further two (9.1%) hospitalised cases were reported as being vaccinated, but no dose information was available.

In 2020, 31.7% (33/104) of cases reported contact with a laboratory-confirmed case of pertussis.

Three outbreaks of pertussis were reported in 2020, involving 25 cases (Table 27).

Ministry of Health hospital discharge data for 2020 included 25 hospitalisations where pertussis was the principal diagnosis (Table 33).

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.[26]

Poliomyelitis (polio)

There were no polio notifications in 2020.

The New Zealand Paediatric Surveillance Unit carries out active surveillance of acute flaccid paralysis (AFP) to demonstrate the absence of wild poliovirus. In 2020, nine cases of AFP were notified to the unit. All nine cases were reviewed by the National Certification Committee for the Eradication of Poliomyelitis (NCCEP) and classified as non-polio.

Since the mass oral polio vaccine (OPV) vaccination campaigns in New Zealand in 1961 and 1962, six polio cases have been reported. All were either laboratory confirmed as vaccine associated (4 cases) or classified as probable vaccine-associated cases (2 cases).[19] The most recent vaccine-associated case occurred in 1999.[27]

No cases have been reported since the inactivated polio vaccine (IPV) replaced OPV in 2002.[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, four of which were part of the same outbreak in 1968. All six cases were fatal and were linked to swimming in geothermal pools in the central North Island.[28]

Q fever

No cases of Q fever (*Coxiella burnetii*) were notified in 2020. Only four cases of Q fever have been notified in New Zealand since 1997, one case each year in 2004, 2010, 2011 and 2019. All four cases reported overseas travel during the incubation period for the disease.

Table 22. Age group and vaccination status of pertussis notifications, 2020

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]	1	0	0	0	0	0	0	1	0
6 weeks–2 months	4	3	0	0	0	0	0	1	0
3–4 months	6	4	0	0	0	0	0	2	0
5 months–3 years	30	1	1	13	0	0	2	12	1
4–10 years	24	0	0	2	7	0	1	14	0
11+ years	106	12	1	4	7	7	8	13	54
Total	**171**	**20**	**2**	**19**	**14**	**7**	**11**	**43**	**55**

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

Rabies and other lyssaviruses

New Zealand is classified as a rabies-free country.[29] No cases of rabies or other lyssavirus have been reported in New Zealand.

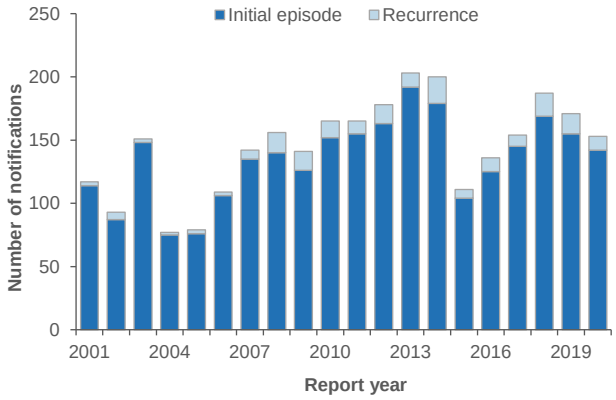
Rheumatic fever

In 2020, 153 cases of rheumatic fever were notified, compared with 171 cases in 2019. The 2020 notification rate (3.0 per 100,000) was similar to the 2019 rate (3.4 per 100,000).

Of the 153 cases of rheumatic fever, 142 cases were initial episodes and 11 were recurrences. This is a rate of 2.8 per 100,000 for initial episodes and 0.2 per 100,000 for recurrences.

Figure 29 shows the number of initial episodes and recurrent cases of rheumatic fever reported each year since 2001.

Figure 29. Rheumatic fever notifications by year, 2001–2020



Ministry of Health hospital discharge data for 2020 included 223 hospitalisations where rheumatic fever was the principal diagnosis (Table 33).

Initial episodes

Of the 142 initial episode cases notified, 104 were confirmed, 26 were probable and 12 were suspect cases.

Counties Manukau (6.2 per 100,000) DHB had the highest rate followed by Lakes (5.1 per 100,000) and Hutt Valley (5.0 per 100,000).

Children aged 10–14 years (17.2 per 100,000) had the highest rate, followed those aged 5–9 years (13.4 per 100,000).

Males (3.5 per 100,000) had a higher rate than females (2.1 per 100,000).

The ethnic group with the highest rate was Pacific peoples (19.5 per 100,000), followed by Māori (8.0 per 100,000). These two ethnic groups accounted for 95.7% of initial episode cases.

Hospitalisation status was recorded for 141 cases, of which 140 (99.3%) were hospitalised.

Recurrences

In 2020, 11 recurrent cases were notified, from Counties Manukau (5 cases), Auckland and Waikato (2 cases each), Hawke's Bay, and MidCentral (1 case each) DHBs.

The cases ranged in age from 9 to 40 years. Seven were female and four were male. Six cases were Pacific peoples and five were Māori.

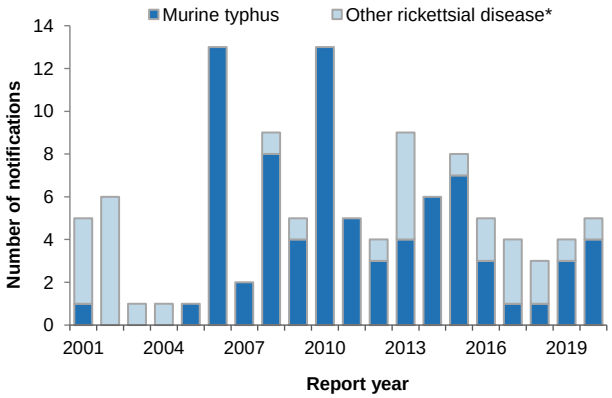
Ten (90.9%) recurrent cases were hospitalised.

Rickettsial disease

This section includes murine typhus (*Rickettsia typhi)*, typhus (*Rickettsia prowazekii*) and other rickettsial diseases caused by organisms of the *Rickettsia* genus.

Five cases of rickettsial disease were notified in 2020, compared with four cases in 2019 (Figure 30).

Figure 30. Rickettsial disease notifications by year, 2001–2020



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

Murine typhus (*Rickettsia typhi*)

Three confirmed and one probable case of murine typhus were notified from Waikato (3 cases) and Auckland (1 case) DHBs.

Two cases were male and two were female. Two cases were of European or Other ethnicity and two were MELAA. Three cases were aged 30–39 years and one was 60–69 years. All four cases were hospitalised.

Two cases had travelled overseas during the incubation period for the disease, one to Indonesia and one to Mexico. For the cases that had not travelled, one reported exposure to mice and rats, and no source was identified for the other case.

Typhus (*Rickettsia prowazekii*)

No cases of typhus have been reported from 1997 to 2020.

Other rickettsial diseases

A probable case of rickettsial disease due to *Rickettsia australis* (spotted fever) was notified in 2020. The case was a male, aged 60–69 years, and of European or Other ethnicity. The case's travel history was unknown.

Rubella

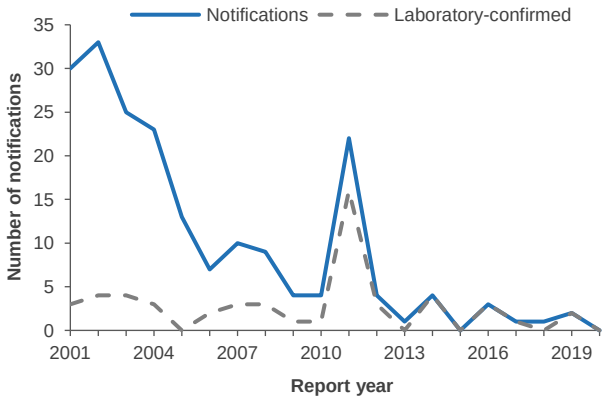
Rubella vaccination was introduced in 1970 for all children at age 4 years. In 1979 it was limited to girls at age 11 years and then extended to all children again when MMR was introduced in 1990. The recommended schedule for measles, mumps and rubella (MMR) vaccine is two doses. In October 2020 the recommended ages for MMR vaccine doses changed from 15 months and 4 years to 12 months and 15 months of age.[19] Rubella has been a notifiable disease since June 1996.[19]

No cases of rubella were notified in 2020 compared with two cases in 2019.

The last national rubella outbreak occurred in 1995.[19] There have been no reported cases of congenital rubella in New Zealand since 1998.

The number of rubella cases since 2001 is shown in Figure 31. The most recent peak in notifications was in 2011.

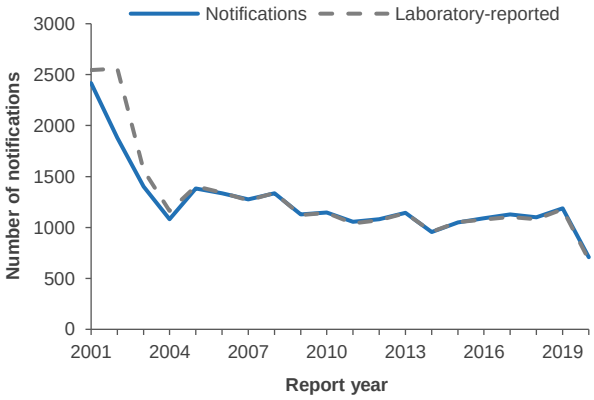
Figure 31. Rubella notifications and laboratory-confirmed cases by year, 2001–2020



Salmonellosis

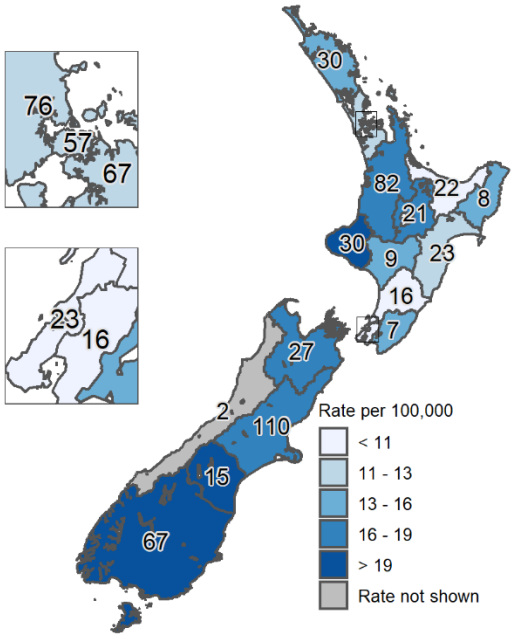
In 2020, 708 cases of salmonellosis were notified, compared with 1188 cases in 2019. The notification rate in 2020 (13.9 per 100,000) was a significant decrease from the 2019 rate (23.9 per 100,000). A large decrease in salmonellosis notifications occurred between 2001 and 2004, and numbers have remained relatively stable since 2005 (Figure 32).

Figure 32. Salmonellosis notifications and laboratory-reported cases by year, 2001–2020



The highest rates of salmonellosis were reported from South Canterbury, Taranaki, Southern, Canterbury, and Waikato DHBs (24.2, 24.1, 19.2, 18.9 and 18.7 per 100,000 respectively) (Figure 33).

Figure 33. Salmonellosis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Notification rates were highest for infants aged less than 1 year (85.9 per 100,000), followed by children aged 1–4 years (48.4 per 100,000).

Males (14.5 per 100,000) had a higher rate than females (13.3 per 100,000).

Ethnicity was recorded for 706 (99.7%) cases. The ethnic group with the highest notification rate was European or other (15.6 per 100,000), followed by Māori (13.3 per 100,000) and MELAA (12.2 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 628 (88.7%) cases, of which 178 (28.3%) were hospitalised.

The most common risk factors reported for salmonellosis in 2020 were consumption of food from retail premises, contact with farm animals, and consumption of untreated water (Table 23).

In 2020, seven outbreaks of salmonellosis were reported, involving 36 cases (Table 29).

The Enteric Reference Laboratory at ESR confirmed the identity of *Salmonella* isolated from 683 cases of salmonellosis from humans in 2020 (excludes isolates of S. Paratyphi A, B and C, and *S*. Typhi). Phage typing was discontinued in 2019. Whole genome sequencing is now used to subtype within the common serotypes. The most common serotypes identified were *S*. Typhimurium (334 cases), *S*. Enteritidis (72 cases), and *S*. Bovismorbificans (58 cases). The most common *S.* Typhimurium 7-gene MLST types were ST19 (167 isolates), ST568 (95 isolates) and ST2297 (68 isolates); and the most common *S.* Enteritidis 7-gene MLST types were ST11 (50 isolates) and ST183 (20 isolates).

Severe acute respiratory syndrome (SARS)

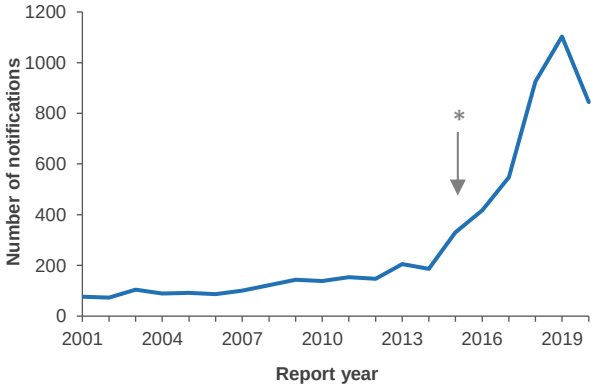
No cases of SARS have been diagnosed in New Zealand since SARS emerged in Southern China in 2003.[6]

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

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

In 2020, 844 cases of STEC infection were notified, compared with 1103 cases in 2019. The 2020 notification rate (16.6 per 100,000) was a significant decrease from the 2019 rate (22.2 per 100,000). The introduction of culture independent diagnostic testing (CIDT), which is particularly sensitive to detecting non-O157 serotypes, is the main contributor to the increase since mid-2015 (Figure 34).

Figure 34. STEC infection notifications by year, 2001–2020



* Screening of faecal specimens using PCR begins in some laboratories

Table 23. Exposure to risk factors associated with salmonellosis, 2020

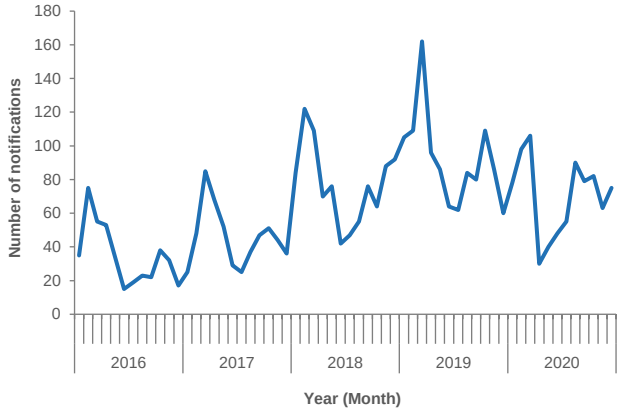
Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	126	262	320	32.5
Contact with farm animals	125	303	280	29.2
Consumed untreated water	83	276	349	23.1
Recreational water contact	72	335	301	17.7
Contact with other symptomatic people	49	348	311	12.3
Contact with faecal matter	48	351	309	12.0
Travelled overseas during the incubation period	49	472	187	9.4
Contact with sick animals	30	350	328	7.9

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

Seventeen paediatric cases of haemolytic uraemic syndrome (HUS) were reported to the New Zealand Paediatric Surveillance Unit (NZPSU) in 2020. Sixteen paediatric HUS cases presented with diarrhoea, and eight were confirmed with STEC infection.

STEC infection notifications follow a seasonal pattern, with peaks occurring during autumn and spring each year (Figure 35).

Figure 35. STEC infection notifications by month, January 2016–December 2020



The highest rate of STEC infection notifications was from Southern (41.8 cases per 100,000) DHB, followed by Wairarapa (40.9 per 100,000), Taranaki (36.9 per 100,000) and Northland (33.9 per 100,000) DHBs (Figure 36).

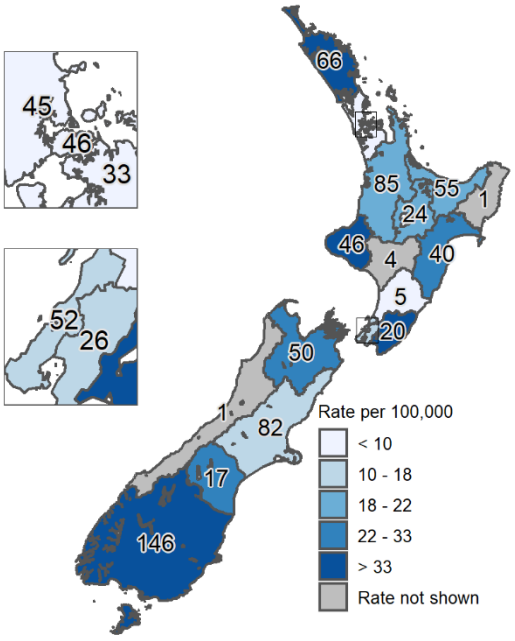
Infants aged less than 1 year had the highest notification rate (74.1 per 100,000), followed by children aged 1–4 years (54.5 per 100,000).

Males and females had the same rate (16.6 per 100,000).

Ethnicity was recorded for 843 (99.9%) cases. The ethnic group with the highest notification rate was MELAA (24.3 per 100,000), followed by European or Other (21.1 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Figure 36. STEC infection notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Hospitalisation status was recorded for 757 (89.7%) cases, of which 180 (23.8%) were hospitalised. Of the 126 (70.0%) hospitalised cases that were serotyped, 54 (42.9%) were due to *E. coli* O157:H7 and 29 (23.0%) to *E. coli* O26:H11. HUS was confirmed in 13 hospitalised cases and a serotype was determined in 12 of these (*E. coli* O157:H7, 6 cases; *E. coli* O26:H11, 4 cases; *E. coli* O153/O178:H23 and *E. coli* O88:H8 1 case each).

No deaths due to STEC infection were reported in 2020.

The most common risk factors reported for STEC infection cases in 2020 were contact with pets, farm animals and animal manure (Table 24).

Table 24. Exposure to risk factors associated with STEC infection, 2020

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with pets	335	55	454	85.9
Contact with farm animals	225	144	475	61.0
Contact with animal manure	106	182	556	36.8
Contact with recreational water	109	461	274	19.1
Contact with children in nappies	98	495	251	16.5
Contact with other animals	48	256	540	15.8
Contact with a person with similar symptoms	94	516	234	15.4

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

The most commonly consumed foods among STEC infection cases were raw fruit or vegetables, chicken or poultry products, dairy products, and beef or beef products (Table 25).

In 2020, eight outbreaks of STEC infection were reported involving 49 cases (Table 29).

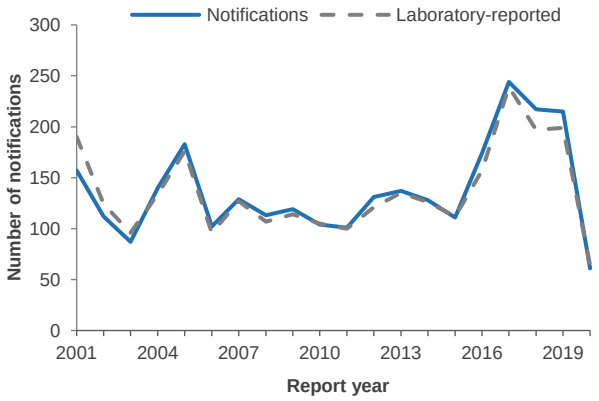
Ministry of Health hospital discharge data for 2020 included 17 hospitalisations where STEC infection was the principal diagnosis (Table 33).

The Enteric Reference Laboratory at ESR typed 629 isolates of STEC in 2020. Of these, 167 (26.6%) were identified as *E. coli* O157:H7 and 462 (73.4%) as *E. coli* non-O157 serotypes. The most common non-O157 serotypes identified were *E. coli* O26:H11 (19.2%, 121 isolates) and *E. coli* O128:H2 (12.6%, 79 isolates).

Shigellosis

In 2020, 61 cases of shigellosis were notified, compared with 215 cases in 2019. The 2020 notification rate of 1.2 per 100,000 was a significant decrease from the 2019 rate of 4.3 per 100,000. Figure 37 shows total cases by year between 2001 and 2020.

Figure 37. Shigellosis notifications and laboratory-reported cases by year, 2001–2020



Auckland, Counties Manukau and Waitemata DHBs had the highest notification rates (2.8, 2.7 and 1.6 per 100,000 respectively).

The highest notification rate was in children aged 1–4 years (4.5 per 100,000), followed by children aged 5–9 years and adults aged 30–39 years (both 1.8 per 100,000).

Males (1.4 per 100,000) had a higher rate than females (1.0 per 100,000).

Ethnicity was recorded for all 61 cases. The ethnic group with the highest notification rate was Pacific peoples (3.2 per 100,000), followed by Asian (1.9 per 100,000).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 59 (96.7%) cases, of which 10 (16.9%) were hospitalised.

The most commonly reported risk factor for shigellosis was overseas travel, followed by contact with other symptomatic people (Table 26).

The Enteric Reference Laboratory at ESR confirmed 64 isolates as *Shigella* in 2020. The most common species identified were *S. flexneri* (34 isolates, 53.1%) and *S. sonnei* (28 isolates, 43.8%). The most common *S. flexneri* biotype identified was 2a (12 isolates, 35.3%) and the most common *S. sonnei* biotype was g (17 isolates, 60.7%).

Table 25. Foods consumed by STEC infection cases, 2020

Foods consumed	Yes	No	Unknown	Percentage (%)[a]
Raw fruit or vegetables	427	107	310	80.0
Chicken or poultry products	409	124	311	76.7
Dairy products	407	125	312	76.5
Beef or beef products	370	176	298	67.8
Processed meat	244	291	309	45.6
Fruit or vegetable juice	192	304	348	38.7
Lamb or hogget or mutton	177	344	323	34.0
Home kill meat	148	421	275	26.0
Pink or undercooked meat	73	472	299	13.4
Unpasteurised milk or milk products	28	571	245	4.7

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

Table 26. Exposure to risk factors associated with shigellosis, 2020

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Travelled overseas during the incubation period	26	24	11	52.0
Contact with other symptomatic people	10	33	18	23.3
Consumed food from retail premises	6	24	31	20.0
Consumed untreated water	4	19	38	17.4
Contact with farm animals	5	25	31	16.7
Contact with faecal matter	5	26	30	16.1
Recreational water contact	4	28	29	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.

Taeniasis

Three cases of taeniasis were notified in 2020, compared with five cases in 2019.

The cases were aged 1–4 years, 15–19 years, and 30–39 years (1 case each). All three cases were female. Two cases were of European or Other ethnicity and one was MELAA.

One case was hospitalised.

All three cases were overseas during the incubation period for the disease. Countries visited or lived in were Kenya, South Africa, and Vietnam (1 case each).

A total of 68 cases of taeniasis have been notified since 1997, of which 67 (98.5%) reported a history of overseas travel. One case had an unknown travel history.

Tetanus

No cases of tetanus were notified in 2020. The most recent case was reported in 2016.

Between 1997 and 2019, 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).

Toxic shellfish poisoning

Toxic shellfish poisoning is notifiable under the category of acute gastroenteritis. There are four main types of shellfish poisoning in New Zealand: paralytic shellfish poisoning, neurotoxic shellfish poisoning, amnesic shellfish poisoning, and diarrhetic shellfish poisoning.[30]

No cases of toxic shellfish poisoning were notified in 2020, compared with one case (paralytic shellfish poisoning) in 2019.

Trichinellosis

No cases of trichinellosis were notified in 2020.

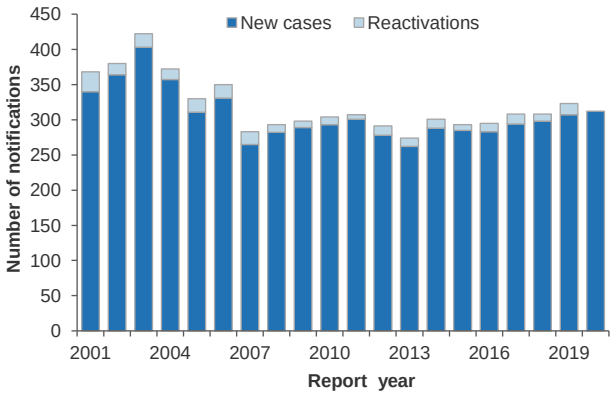
Trichinellosis was added to the notifiable diseases schedule in 1988. Since then four cases have been reported, including two cases reported in 2001.[31]

Tuberculosis disease

In 2020, 321 cases of tuberculosis were notified compared with 319 cases in 2019. The 2020 notification rate (6.3 per 100,000) was similar to the 2019 (6.4 per 100,000). There was a total of 312 (97.2%) new cases and nine (2.8%) reactivations.

Figure 38 shows the total number of new and reactivation tuberculosis cases reported since 2001. The number of cases has remained fairly stable since 2007.

Figure 38. Tuberculosis notifications by year, 2001–2020



Laboratory information was available for 320 (99.7%) tuberculosis cases. Of these, 293 (91.6%) cases were reported as laboratory confirmed.

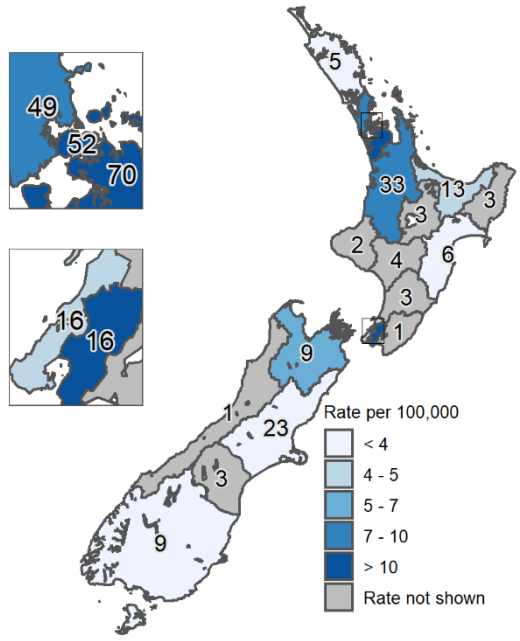
Information on tuberculosis disease cases by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Ministry of Health hospitalisation discharge data for 2020 included 263 hospitalisations where tuberculosis was the principal diagnosis (Table 33).

Tuberculosis disease – new cases

The highest notification rate for new tuberculosis cases was reported from Counties Manukau DHB (11.6 per 100,000), followed by Hutt Valley (10.1 per 100,000) and Auckland (9.7 per 100,000) DHBs (Figure 39).

Figure 39. Tuberculosis notifications (new cases) by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Adults aged 20–29 years (11.1 per 100,000) had the highest notification rate for new tuberculosis followed by those aged 30–39 years (9.7 per 100,000) and 70 years and over (7.4 per 100,000). Three cases were in children aged less than 5 years.

Males (6.4 per 100,000) had a higher rate than females (5.9 per 100,000).

Ethnicity was recorded for 310 (99.4%) cases. The ethnic group with the highest notification rate for new tuberculosis cases was Asian (27.6 per 100,000), followed by Pacific peoples (10.8 per 100,000) and MELAA (9.5 per 100,000).

Hospitalisation status was recorded for all 312 new tuberculosis cases, of which 188 (60.3%) were hospitalised.

Four deaths were reported among new tuberculosis cases, three were aged 70 years and over and one was 60–69 years.

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

The majority of new tuberculosis cases (257/312, 82.4%) were born overseas. Among the 55 cases born in New Zealand, 14 had been, or were presently, living with a person born outside New Zealand.

A total of 59 (24.1%) new tuberculosis cases reported contact with a confirmed case of tuberculosis.

Tuberculosis disease–reactivations/relapses

The nine reactivation tuberculosis cases reported in 2020 were from five DHBs: Waitemata, Auckland (3 cases each), Counties Manukau, Capital & Coast and South Canterbury (1 case each).

The reactivation tuberculosis cases were all aged 40 years and over, with the highest numbers of cases aged 70 years and over (5 cases).

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

All nine reactivation cases were born overseas, and eight were diagnosed with previous tuberculosis disease overseas. The place of diagnosis was not recorded for one case. Treatment status was recorded for five of the nine cases, all of which had previously been treated for the disease.

Hospitalisation status was recorded for all nine reactivation cases, and four were hospitalised.

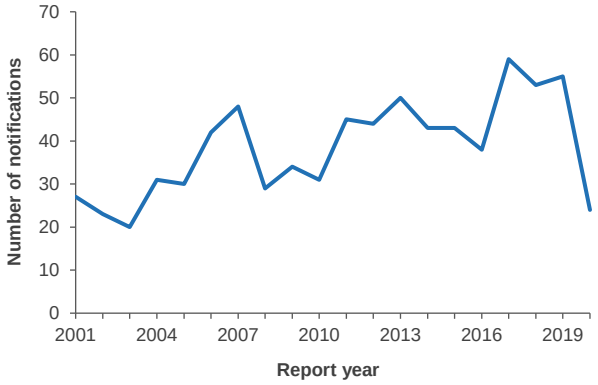
No deaths were reported among the reactivation tuberculosis cases.

Typhoid fever

In 2020, 24 cases of typhoid fever were notified compared with 55 cases in 2019. The 2020 notification rate (0.5 per 100,000) was a significant decrease from the 2019 rate (1.1 per 100,000).

Figure 40 shows an increasing trend in the number of typhoid fever notifications from 2001 to 2019. The number of cases reported in 2020 was similar to the numbers seen in 2001–2003.

Figure 40. Typhoid fever notifications by year, 2001–2020



The highest notification rates for typhoid fever were reported from Auckland and Counties Manukau DHBs (1.6 and 1.3 per 100,000, 8 cases each).

Notification rates were highest for adults aged 20–29 and 30–39 years (0.8 per 100,000 each).

Males (0.6 per 100,000) had a higher rate than females (0.4 per 100,000).

Hospitalisation status was recorded for all 24 cases, of which 19 (79.2%) were hospitalised.

Of the 24 cases notified in 2020, 20 (83.3%) had travelled overseas during the incubation period for the disease. The countries most visited were India (15 cases) and Pakistan (4 cases). Some cases reported travel to more than one country. All 20 cases who had travelled overseas arrived in New Zealand before the border closed on 20 March 2020.

One outbreak of typhoid fever involving two cases was reported in 2020 (Table 29).

The Enteric Reference Laboratory at ESR confirmed 26 isolates as *Salmonella* Typhi during 2020. The most common 7-gene MLST type was *S*. Typhi ST1 (15 isolates, 57.7%).

Viral haemorrhagic fevers

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

Yellow fever

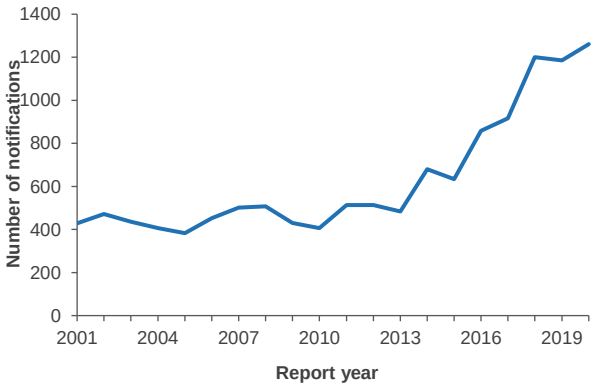
No cases of yellow fever have been notified in New Zealand since at least 1996.

Yersiniosis

In 2020, 1261 cases of yersiniosis were notified, compared with 1185 cases in 2019. The 2020 notification rate (24.8 per 100,000) was similar to the 2019 rate (23.8 per 100,000).

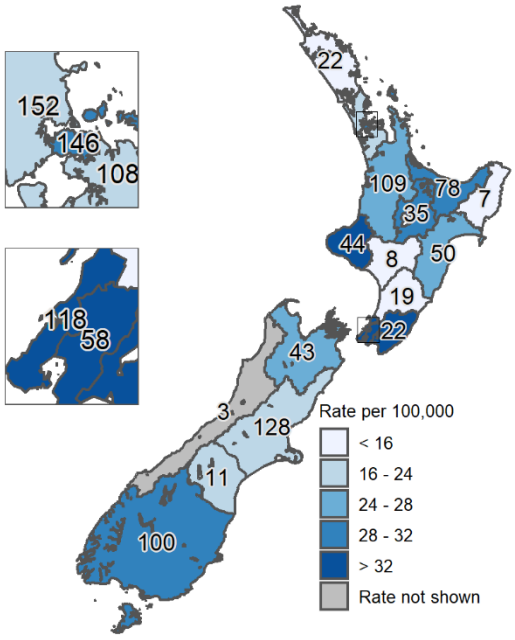
The number of notifications of yersiniosis has been steadily increasing since 2014, before the introduction of PCR tests for *Yersinia* in 2017 (Figure 41).

Figure 41. Yersiniosis notifications by year, 2001–2020



Wairarapa (45.0 per 100,000), Hutt Valley (36.5 per 100,000), Capital & Coast (36.4 per 100,000) and Taranaki (35.3 per 100,000) DHBs had the highest notification rates for yersiniosis (Figure 42).

Figure 42. Yersiniosis notifications by DHB, 2020



Numbers represent notification count in DHB region.
Where fewer than five rates are not shown.

Infants aged less than 1 year had the highest notification rate (121.2 per 100,000), followed by children aged 1–4 years (68.3 per 100,000).

Females (25.4 per 100,000) had a slightly higher rate than males (24.2 per 100,000).

Ethnicity was recorded for 1256 (99.6%) cases. The ethnic group with the highest notification rate was Asian (38.1 per 100,000), followed by MELAA and European or Other (25.7 and 25.6 per 100,000, respectively).

Further information by DHB, sex, age and ethnic group is in Table 34 to Table 37 in the Appendix.

Hospitalisation status was recorded for 774 (61.4%) cases, of which 127 (16.4%) were hospitalised. The most commonly reported risk factors were consumption of food from retail premises and contact with farm animals (Table 27).

Two outbreaks of yersiniosis were reported in 2020, involving four cases (Table 29).

The Enteric Reference Laboratory at ESR confirmed 889 isolates as *Yersinia enterocolitica* and 13 as *Y. pseudotuberculosis* during 2020. The most common *Y. enterocolitica* biotypes identified were biotype 2/3 serotype O:9 (496 isolates, 55.8%), biotype 1A (all serotypes, 214 isolates, 24.1%) and biotype 4 serotype O:3 (136 isolates, 15.3%). Diagnostic laboratories in the upper half of the North Island no longer test for *Y. pseudotuberculosis* in faecal specimens, so this species is likely to be under detected.

Table 27. Exposure to risk factors associated with yersiniosis, 2020

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Consumed food from retail premises	175	273	813	39.1
Contact with farm animals	141	344	776	29.1
Contact with faecal matter	93	368	800	20.2
Consumed untreated water	78	367	816	17.5
Recreational water contact	62	414	785	13.0
Contact with other symptomatic people	47	410	804	10.3
Contact with sick animals	16	430	815	3.6
Travelled overseas during the incubation period	11	578	672	1.9

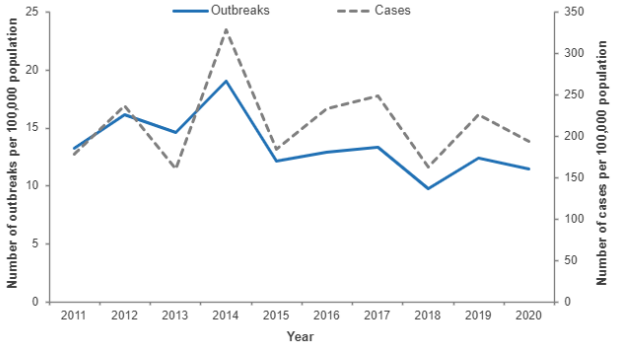
[a] Percentage refers to the number of cases that answered “yes” out of the total number of cases for which this information was known. Some cases had more than one risk factor recorded.

OUTBREAKS

This section summarises outbreaks that were recorded in EpiSurv in 2020. There were 583 reported outbreaks in 2020, a decrease from the 620 reported in 2019. A total of 9891 cases were associated with outbreaks in 2020, compared with 11,263 cases in 2019.

The outbreak rate in 2020 (11.5 per 100,000 population) was lower than the rate reported in 2019 (12.5 per 100,000) (Figure 43). The outbreak case rate was also lower in 2020 (194.3 cases per 100,000 population) than in 2019 (226.2 cases per 100,000 population).

Figure 43. Outbreak rate and outbreak case rate by year, 2011–2020



Causal agents

A causal agent or condition was identified in 49.9% (291/583) of outbreaks, involving 54.6% (5405/9891) of all outbreak-associated cases (Table 28). No specific pathogen was identified in 292 outbreaks, which were recorded as gastroenteritis (252 outbreaks), acute respiratory infection (22 outbreaks) or influenza-like illness (18 outbreaks).

Enteric agents were implicated in the majority of outbreaks (79.8%, 465/583) and accounted for the majority of associated cases (83.0%, 8208/9891) (Table 29). Norovirus (26.2%, 153/583) was the most common causal agent implicated in outbreaks in 2020 and accounted for 36.3% of outbreak cases.

Non-enteric agents accounted for 20.2% (118/583) of outbreaks. This is an increase compared with 2018 and 2019 when 6.3% and 16.6% of outbreaks were non-enteric. The increase in non-enteric outbreaks was due to an increase in reporting of acute respiratory illness/influenza and SARS-Cov-2 outbreaks.

Outbreak settings

Most (80.8%, 471/583) outbreaks were set in institutions, with childcare centres (37.0%, 216/583) and long-term care facilities (35.8%, 209/583) accounting for over two-thirds of the reported outbreaks (Table 30). Outbreaks in childcare centres also had the highest number of associated cases (4363).

Modes of transmission

The most commonly reported mode of transmission in 2020 was person-to-person (90.7%, 529/583 outbreaks) (Table 28). Person-to-person transmission also accounted for the highest percentage of associated cases (93.1%, 9212/9891).

Table 28. Outbreaks and associated cases by mode of transmission, 2020

Mode of transmission	Outbreaks				Cases	
	Primary mode	Secondary mode	Total	Percentage of outbreaks (n=583)[a]	Total	Percentage of cases (n=9891)[a]
Person-to-person	501	28	529	90.7	9,212	93.1
Environmental	10	56	66	11.3	1,116	11.3
Foodborne	35	11	46	7.9	562	5.7
Waterborne	11	6	17	2.9	124	1.3
Zoonotic	7	6	13	2.2	42	0.4
Sexual contact	1	0	1	0.2	3	0.0
Other	1	3	3	0.5	41	0.4
Unknown	-	-	5	0.9	122	1.2

[a] More than one mode of transmission was recorded for 84 outbreaks therefore the totals add up to more than 100%.
Note: No outbreaks with parenteral transmission were reported in 2020.

Table 29. Outbreaks and associated cases by pathogen, 2020

Pathogen or condition	Outbreaks[a]			Cases[a]	
	Total	% of outbreaks (n=583)	Median cases per outbreak	Total	% of cases (n=9891)
Enteric	**465**	**79.8**	**13**	**8208**	**83.0**
Norovirus	153	26.2	21	3594	36.3
Campylobacter	19	3.3	3	119	1.2
Giardia	11	1.9	5	83	0.8
STEC infection	8	1.4	4	49	0.5
Salmonella[b]	7	1.2	6	36	0.4
Adenovirus	5	0.9	21	101	1.0
Shigella	5	0.9	2	15	0.2
Sapovirus	4	0.7	9.5	52	0.5
Cryptosporidium	4	0.7	4.5	29	0.3
Staphylococcus aureus	2	0.3	26.5	53	0.5
Rotavirus	2	0.3	26	52	0.5
Yersinia	2	0.3	2	4	0.0
Histamine (scombroid) fish poisoning	1	0.2	93	93	0.9
Aeromonas	1	0.2	28	28	0.3
Vibrio parahaemolyticus	1	0.2	16	16	0.2
Clostridium perfringens	1	0.2	14	14	0.1
Astrovirus	1	0.2	7	7	0.1
Ciguatera fish poisoning	1	0.2	5	5	0.1
Clostridium botulinum	1	0.2	4	4	0.0
Typhoid	1	0.2	2	2	0.0
Gastroenteritis[c]	252	43.2	13	4133	41.8
Non-enteric	**118**	**20.2**	**7**	**1683**	**17.0**
Influenza[d]	61	10.5	8	647	6.5
SARS-CoV-2	40	6.9	7	900	9.1
Mycobacterium tuberculosis	4	0.7	3	19	0.2
Mumps virus	3	0.5	24	58	0.6
Seasonal coronavirus	3	0.5	9	37	0.4
Bordetella pertussis	3	0.5	7	25	0.3
Legionella	2	0.3	2.5	5	0.1
Haemophilus influenzae type b	1	0.2	5	5	0.1
Measles virus	1	0.2	2	2	0.0

[a] More than one agent was reported in 18 outbreaks, therefore the numbers don't add up to the group totals.
[b] Includes non-typhoidal *Salmonella* species only. Outbreaks of *S.* Typhi are reported separately.
[c] All enteric outbreaks with no identified pathogen were recorded as gastroenteritis.
[d] Includes outbreaks of acute respiratory infection (22 outbreaks, 206 cases), influenza A (1 outbreak, 45 cases), influenza-like illness (18 outbreaks, 147 cases), rhinovirus (18 outbreaks, 215 cases) and rhinovirus/enterovirus (1 outbreak, 17 cases).

Table 30. Outbreaks and associated cases by setting of exposure, 2020

Outbreak setting	Outbreaks[a]		Cases[a]	
	Total	% of outbreaks (n=583)	Total	% of cases (n=9891)
Institution	**471**	**80.8**	**8531**	**86.3**
Childcare centre	216	37.0	4363	44.1
Long term care facility	209	35.8	3355	33.9
School	11	1.9	433	4.4
Hospital (acute care)	10	1.7	73	0.7
Hotel / motel	8	1.4	97	1.0
Camp	5	0.9	110	1.1
Hostel / boarding house	4	0.7	103	1.0
Prison	2	0.3	38	0.4
Other institution	8	1.4	76	0.8
Commercial food operators	**28**	**4.8**	**394**	**4.0**
Restaurant / café / bakery	10	1.7	201	2.0
Takeaway	8	1.4	22	0.2
Caterers	2	0.3	40	0.4
Fast food restaurant	1	0.2	4	0.0
Supermarket / delicatessen	1	0.2	3	0.0
Other food outlet	7	1.2	128	1.3
Workplace / Community / Other	**93**	**16.0**	**1086**	**11.0**
Home	57	9.8	374	3.8
Workplace	14	2.1	254	2.2
Community, church, sports gathering	8	1.4	276	2.8
Cruise ship, airline, tour bus, train	7	1.2	96	1.0
Farm	3	0.5	54	0.5
Other setting	8	1.4	88	0.9
Unknown setting	**6**	**1.0**	**75**	**0.8**

[a] More than one setting was recorded in 23 outbreaks, therefore the numbers don't add up to the group totals

APPENDIX: NATIONAL DATA AND TRENDS

Table 31. Number of cases for rare notifiable diseases in New Zealand, 2019 and 2020

Disease[a]	2019	2020
Botulism	0	4
Brucellosis	2	2
Chikungunya fever	11	4
Creutzfeldt-Jakob disease[b]	6	5
Decompression sickness	3	2
Diphtheria	1	0
Haemophilus influenzae type b	2	3
Hydatid disease	1	0
Leprosy	6	3
Q fever	1	0
Rickettsial disease	4	5
Ross River virus infection	5	3
Rubella	2	0
Taeniasis	5	3
Toxic shellfish poisoning	1	0
Zika virus infection	7	0

[a] No cases of the following notifiable diseases were reported in 2019 or 2020: anthrax, Barmah Forest virus infection, cholera, *Cronobacter* species invasive disease, cysticercosis, highly pathogenic avian influenza, Japanese encephalitis, Middle East respiratory syndrome (MERS), non-seasonal influenza, plague, poliomyelitis, primary amoebic meningoencephalitis, rabies, severe acute respiratory syndrome (SARS), tetanus, trichinellosis, viral haemorrhagic fever and yellow fever.

[b] Creutzfeldt-Jakob disease data is provided by the National CJD Registry, University of Otago. [15]

Table 32. Deaths due to notifiable diseases, as recorded in EpiSurv, 2001–2020

Disease	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AIDS [a]	14	11	10	14	15	15	11	8	9	15	5	9	8	8	6	4	12	7	2	2
Campylobacteriosis	1	1	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0
COVID-19																				25
Creutzfeldt-Jakob disease[b]	1	3	4	6	3	5	5	4	7	3	4	10	4	9	6	4	13	4	6	5
Gastroenteritis[c]	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0
Giardiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Hepatitis B	1	0	0	0	1	0	1	0	0	0	0	1	0	1	1	0	0	1	0	0
Hydatid disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Invasive pneumococcal disease[d]								7	33	25	30	29	18	23	27	22	27	25	12	9
Legionellosis[e]	2	3	1	1	4	2	1	4	2	5	4	6	3	1	4	1	5	3	2	1
Listeriosis – non-pregnancy associated	1	0	2	3	1	0	2	3	2	3	1	4	2	3	1	0	0	2	0	1
Listeriosis – pregnancy associated	1	2	2	2	4	1	1	2	2	4	0	2	3	1	3	2	0	0	4	1
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Meningococcal disease	26	18	13	8	14	7	7	8	5	6	13	6	4	3	4	2	9	10	10	3
Non seasonal influenza A (H1N1)[f]									36	17	0	0	0	0	0	0	0	0	0	0
Pertussis	0	1	1	1	1	0	0	0	0	0	1	2	1	0	0	0	0	0	0	1
Primary amoebic meningoencephalitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatic fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	2	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0
Shigellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
STEC infection	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	0
Tetanus	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Tuberculosis disease	2	6	6	6	4	6	3	4	4	9	3	4	3	5	6	5	1	4	3	4
Typhoid fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Yersiniosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

[a] Data source: AIDS Epidemiology Group.

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

[c] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg, food handler or childcare worker) 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 when it occurs close to the time of notification and investigation.

Table 33. Hospital admissions for selected notifiable diseases, 2018–2020

Disease	ICD 10 codes	2018		2019		2020	
		Prin [a]	Oth [b]	Prin [a]	Oth [b]	Prin [a]	Oth [b]
AIDS	B20-B24	7	283	7	236	5	203
Arboviral diseases	A83, A84, A85.2, A92, A93, A94, B33.1	3	1	2			
Brucellosis	A23	1	3	1	1		1
Campylobacteriosis	A04.5	631	151	588	123	609	109
Cholera	A00	2	3			4	2
Creutzfeldt-Jakob disease	A81.0	3		6	2	6	1
Cryptosporidiosis	A07.2	82	53	43	24	49	15
Cysticercosis	B69	4	1	4	3	5	2
Decompression sickness	T70.3	16	1	34	1	30	2
Dengue fever	A90, A91	153	15	62	2	21	2
Diphtheria	A36	1	1	2	2	1	
Giardiasis	A07.1	38	26	42	46	39	27
Hepatitis A	B15	47	49	31	44	17	40
Hepatitis B	B16	22	17	12	12	22	13
Hepatitis C	B17.1	10	11	7	8	7	10
Hydatid disease	B67.0-B67.4	2	1		1		
Legionellosis	A48.1	72	75	113	34	133	20
Leprosy	A30	2		1	1	2	1
Leptospirosis	A27	84	17	64	11	55	16
Listeriosis	A32	17	24	22	24	19	19
Malaria	B50-B54	24	2	25		16	
Measles	B05	9	2	679	109	6	2
Meningococcal disease	A39	118	50	155	49	38	17
Mumps	B26	23	7	29	4	12	3
Paratyphoid	A01.1-A01.4	12		6	2	10	1
Pertussis	A37	194	64	111	38	25	8
Poliomyelitis	A80				1		
Q fever	A78	2			1		
Rheumatic fever	I00, I01, I02	227	38	237	35	223	24
Rickettsial diseases	A75, A77, A79	4	1	5	3	5	3
Rubella	B06		2	1			
Salmonellosis	A02	200	61	235	54	151	43
Shigellosis	A03	37	22	45	21	15	24
STEC infection	A04.3	19	22	28	23	17	22
Taeniasis	B68				1	1	
Tetanus	A33-A35		1				2
Tuberculosis	A15-A19, P37.0	263	135	251	155	263	160
Typhoid	A01.0	60	8	49		26	4
Viral haemorrhagic fevers	A95, A98, A99						
Yellow fever	A95						
Yersiniosis	A04.6	86	67	69	70	98	66

[a] Principal diagnosis.
[b] Other relevant diagnosis.
Note: Hospital admission data may include multiple admissions (to the same or different hospitals) for the same case, and admissions may relate to cases first diagnosed in previous years.

Table 34. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2020

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	207	106.4	594	92.9	389	77.0	420	70.6	596	136.0	136	115.8	262	99.3	63	124.3	194	155.6	232	130.0
COVID-19	28	14.4	298	46.6	391	77.4	380	63.9	194	44.3	16	13.6	50	18.9	4		16	12.8	44	24.6
Cryptosporidiosis	24	12.3	63	9.9	47	9.3	66	11.1	110	25.1	14	11.9	31	11.7	7	13.8	36	28.9	23	12.9
Dengue fever	3		6	0.9	14	2.8	4		3				2						3	
Gastroenteritis[b]	14	7.2	23	3.6	20	4.0	16	2.7	39	8.9	22	18.7	64	24.3	6	11.8	1		2	
Giardiasis	72	37.0	96	15.0	98	19.4	120	20.2	153	34.9	41	34.9	91	34.5	27	53.3	33	26.5	67	37.5
Hepatitis A			4		2		6	1.0	1										1	
Hepatitis B[c]			1		3		1		2		1		1		1				2	
Hepatitis C[c]			1										1		1				2	
Invasive pneumococcal disease	24	12.3	29	4.5	22	4.4	56	9.4	44	10.0	14	11.9	22	8.3	6	11.8	11	8.8	16	9.0
Legionellosis	8	4.1	9	1.4	6	1.2	21	3.5	7	1.6	4		12	4.5					4	
Leptospirosis	5	2.6	2				3		19	4.3	3		4		2		2		7	3.9
Listeriosis			3		5	1.0	6	1.0	3				5	1.9						
Malaria	1		3		4		2		1		1		2						1	
Measles			2		1		4										1			
Meningococcal disease	1		4		4		4		4		3		2				1		1	
Mumps			20	3.1	28	5.5	20	3.4	2		2		2		1		4		1	
Paratyphoid fever			4		2		3						5	1.9						
Pertussis	8	4.1	24	3.8	17	3.4	10	1.7	14	3.2	1		10	3.8			6	4.8	8	4.5
Rheumatic fever[d]	5	2.6	17	2.7	16	3.2	42	7.1	21	4.8	6	5.1	9	3.4	2				7	3.9
Salmonellosis	30	15.4	76	11.9	57	11.3	67	11.3	82	18.7	21	17.9	22	8.3	8	15.8	30	24.1	23	12.9
Shigellosis			10	1.6	14	2.8	16	2.7	3				3				2			
STEC infection	66	33.9	45	7.0	46	9.1	33	5.5	85	19.4	24	20.4	55	20.8	1		46	36.9	40	22.4
Tuberculosis disease	5	2.6	49	7.7	52	10.3	70	11.8	33	7.5	3		13	4.9	3		2		6	3.4
Typhoid fever			1		8	1.6	8	1.3			2									
Yersiniosis	22	11.3	152	23.8	146	28.9	108	18.1	109	24.9	35	29.8	78	29.6	7	13.8	44	35.3	50	28.0

[a] Table is continued on the following page.
[b] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg, food handler or childcare worker) or foodborne intoxication, eg, staphylococcal intoxication.
[c] Only acute cases of this disease are notifiable.
[d] Includes rheumatic fever initial episodes and recurrent cases.
Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

Table 34. Number of cases and rate per 100,000 population of notifiable diseases by DHB, 2020 (continued)

Disease	District Health Board [a]																			
	Whanganui		MidCentral		Hutt Valley		Capital & Coast		Wairarapa		Nelson Marlborough		West Coast		Canterbury		South Canterbury		Southern	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	81	118.2	249	132.9	116	73.0	241	74.3	85	173.8	174	107.9	54	166.7	548	94.0	129	208.1	519	148.4
COVID-19	9	13.1	32	17.1	24	15.1	99	30.5	8	16.4	50	31.0	5	15.4	294	50.5	18	29.0	216	61.8
Cryptosporidiosis	6	8.8	37	19.8	17	10.7	26	8.0	6	12.3	16	9.9	4		56	9.6	30	48.4	116	33.2
Dengue fever	1		2		1		3				2				5	0.9			1	
Gastroenteritis[b]	6	8.8	5	2.7	31	19.5	41	12.6	2		8	5.0	5	15.4	46	7.9	2		9	2.6
Giardiasis	8	11.7	33	17.6	31	19.5	44	13.6	16	32.7	29	18.0	7	21.6	106	18.2	11	17.7	58	16.6
Hepatitis A					2		2								4					
Hepatitis B[c]			1								3						1		1	
Hepatitis C[c]					2		1				3				8	1.4	1		8	2.3
Invasive pneumococcal disease	3		11	5.9	11	6.9	15	4.6	7	14.3	3		1		31	5.3	7	11.3	19	5.4
Legionellosis	1		3		2		3		1		12	7.4	4		44	7.6	4		15	4.3
Leptospirosis	1		3						1						3				5	1.4
Listeriosis			1				3		1		3		1		1				2	
Malaria					1										1					
Measles							1													
Meningococcal disease			1		2		1						1		6	1.0				
Mumps	1		2				9	2.8			1				3				48	13.7
Paratyphoid fever															3					
Pertussis	6	8.8	15	8.0	4		24	7.4	1		7	4.3			9	1.5			7	2.0
Rheumatic fever[d]			6	3.2	8	5.0	8	2.5							4				2	
Salmonellosis	9	13.1	16	8.5	16	10.1	23	7.1	7	14.3	27	16.7	2		110	18.9	15	24.2	67	19.2
Shigellosis			1				4				1				2		2		3	
STEC infection	4		5	2.7	26	16.4	52	16.0	20	40.9	50	31.0	1		82	14.1	17	27.4	146	41.8
Tuberculosis disease	4		3		16	10.1	16	4.9	1		9	5.6	1		23	3.9	3		9	2.6
Typhoid fever			1		1		2								1					
Yersiniosis	8	11.7	19	10.1	58	36.5	118	36.4	22	45.0	43	26.7	3		128	22.0	11	17.7	100	28.6

[a] Table is continued from the previous page.

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

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

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

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

Table 35. Number of cases and rate per 100,000 population of notifiable diseases by sex, 2020

Disease	Sex					
	Male		Female		Total [a]	
	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	2980	118.0	2305	90.1	5289	104.0
COVID-19	1032	40.9	1144	44.7	2176	42.8
Cryptosporidiosis	323	12.8	412	16.1	735	14.5
Dengue fever	29	1.1	21	0.8	50	1.0
Gastroenteritis (acute)[b]	156	6.2	205	8.0	362	7.1
Giardiasis	604	23.9	536	20.9	1141	22.4
Hepatitis A	12	0.5	10	0.4	22	0.4
Hepatitis B[c]	12	0.5	6	0.2	18	0.4
Hepatitis C[c]	20	0.8	8	0.3	28	0.6
Invasive pneumococcal disease	179	7.1	173	6.8	352	6.9
Legionellosis	104	4.1	56	2.2	160	3.1
Leptospirosis	44	1.7	16	0.6	60	1.2
Listeriosis	17	0.7	17	0.7	34	0.7
Malaria	12	0.5	5	0.2	17	0.3
Measles	3	0.1	6	0.2	9	0.2
Meningococcal disease	20	0.8	15	0.6	35	0.7
Mumps	79	3.1	65	2.5	144	2.8
Paratyphoid fever	11	0.4	5	0.2	17	0.3
Pertussis	84	3.3	87	3.4	171	3.4
Rheumatic fever[d]	92	3.6	60	2.3	153	3.0
Salmonellosis	367	14.5	341	13.3	708	13.9
Shigellosis	36	1.4	25	1.0	61	1.2
STEC infection	419	16.6	425	16.6	844	16.6
Tuberculosis disease	169	6.7	152	5.9	321	6.3
Typhoid fever	15	0.6	9	0.4	24	0.5
Yersiniosis	610	24.2	651	25.4	1261	24.8

[a] Total includes cases where sex was unknown.
[b] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg, food handler or childcare worker) or foodborne intoxication, eg, staphylococcal intoxication.
[c] Only acute cases of this disease are notifiable.
[d] Includes rheumatic fever initial episodes and recurrent cases.

Table 36. Number of cases and rate per 100,000 population of notifiable diseases by age group, 2020

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	135	227.3	537	218.3	225	68.4	179	53.9	285	89.7	790	109.9	568	80.2	526	82.1	660	101.3	656	122.1	722	132.8	5289	104.0
COVID-19	10	16.8	40	16.3	39	11.9	85	25.6	110	34.6	513	71.4	395	55.8	310	48.4	319	49.0	222	41.3	133	24.5	2176	42.8
Cryptosporidiosis	10	16.8	175	71.1	71	21.6	41	12.3	59	18.6	153	21.3	97	13.7	56	8.7	32	4.9	24	4.5	17	3.1	735	14.5
Dengue fever							1		2		13	1.8	10	1.4	4		5	0.8	12	2.2	3		50	1.0
Gastroenteritis[b]	5	8.4	27	11.0	13	4.0	8	2.4	15	4.7	47	6.5	53	7.5	54	8.4	57	8.7	35	6.5	40	7.4	362	7.1
Giardiasis	24	40.4	163	66.3	71	21.6	27	8.1	18	5.7	140	19.5	273	38.6	151	23.6	105	16.1	112	20.8	55	10.1	1141	22.4
Hepatitis A					1		1		1		11	1.5	3		2				1		2		22	0.4
Hepatitis B[c]											1		4		2		7	1.1	4				18	0.4
Hepatitis C[c]											6	0.8	10	1.4	8	1.2	2		2				28	0.6
Invasive pneumococcal disease	10	16.8	27	11.0	5	1.5	4		3		14	1.9	33	4.7	23	3.6	59	9.1	69	12.8	105	19.3	352	6.9
Legionellosis			1						1		1				12	1.9	31	4.8	45	8.4	69	12.7	160	3.1
Leptospirosis									3		6	0.8	9	1.3	9	1.4	20	3.1	12	2.2	1		60	1.2
Listeriosis											3		3		3		5	0.8	4		16	2.9	34	0.7
Malaria			1		1		1				5	0.7	3		4		1		1				17	0.3
Measles			2				2		2		1		1				1						9	0.2
Meningococcal disease	5	8.4	9	3.7	2				5	1.6	1		1		1		6	0.9	1		4		35	0.7
Mumps	1		2		3		7	2.1	23	7.2	87	12.1	10	1.4	5	0.8	4		1		1		144	2.8
Paratyphoid fever			1		2		3		1		5	0.7	3		1								17	0.3
Pertussis	16	26.9	29	11.8	15	4.6	16	4.8	5	1.6	19	2.6	16	2.3	17	2.7	24	3.7	9	1.7	5	0.9	171	3.4
Rheumatic fever[d]			5	2.0	45	13.7	57	17.2	18	5.7	15	2.1	10	1.4	3								153	3.0
Salmonellosis	51	85.9	119	48.4	47	14.3	30	9.0	39	12.3	75	10.4	58	8.2	75	11.7	95	14.6	60	11.2	58	10.7	708	13.9
Shigellosis	1		11	4.5	6	1.8	2		2		7	1.0	13	1.8	6	0.9	5	0.8	2		6	1.1	61	1.2
STEC infection	44	74.1	134	54.5	53	16.1	34	10.2	39	12.3	89	12.4	72	10.2	67	10.5	85	13.0	101	18.8	126	23.2	844	16.6
Tuberculosis disease	1		2		1		1		17	5.3	80	11.1	69	9.7	35	5.5	34	5.2	36	6.7	45	8.3	321	6.3
Typhoid fever	1		3		1		3		1		6	0.8	6	0.8	1				2				24	0.5
Yersiniosis	72	121.2	168	68.3	43	13.1	44	13.2	43	13.5	154	21.4	174	24.6	129	20.1	140	21.5	137	25.5	157	28.9	1261	24.8

[a] Total includes cases where age was unknown.
[b] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg, food handler or childcare worker) or foodborne intoxication, eg, staphylococcal intoxication
[c] Only acute cases of this disease are notifiable.
[d] Includes rheumatic fever initial episodes and recurrent cases.
Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

Table 37. Number of cases and rate per 100,000 population of notifiable diseases by ethnic group, 2020

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	557	65.8	135	39.4	361	46.7	47	63.5	4146	136.0	5289	104.0
COVID-19	191	22.5	184	53.7	392	50.7	77	104.0	1322	43.4	2176	42.8
Cryptosporidiosis	91	10.7	16	4.7	28	3.6	4		589	19.3	735	14.5
Dengue fever	2		6	1.8	10	1.3			31	1.0	50	1.0
Gastroenteritis[c]	53	6.3	10	2.9	31	4.0	3		260	8.5	362	7.1
Giardiasis	149	17.6	15	4.4	71	9.2	16	21.6	884	29.0	1141	22.4
Hepatitis A			6	1.8	8	1.0	2		6	0.2	22	0.4
Hepatitis B[d]	6	0.7	5	1.5					7	0.2	18	0.4
Hepatitis C[d]	15	1.8							13	0.4	28	0.6
Invasive pneumococcal disease	115	13.6	61	17.8	25	3.2	2		148	4.9	352	6.9
Legionellosis	19	2.2	5	1.5	12	1.6			123	4.0	160	3.1
Leptospirosis	8	0.9	1		1				50	1.6	60	1.2
Listeriosis	1		1		7	0.9			25	0.8	34	0.7
Malaria	2		3		4		4		4		17	0.3
Measles	3		5	1.5	1						9	0.2
Meningococcal disease	10	1.2	3		2				20	0.7	35	0.7
Mumps	18	2.1	30	8.8	17	2.2	4		75	2.5	144	2.8
Paratyphoid fever					15	1.9			2		17	0.3
Pertussis	50	5.9	12	3.5	8	1.0			100	3.3	171	3.4
Rheumatic fever[e]	73	8.6	73	21.3	3		1		2		153	3.0
Salmonellosis	113	13.3	38	11.1	70	9.1	9	12.2	476	15.6	708	13.9
Shigellosis	5	0.6	11	3.2	15	1.9	2		28	0.9	61	1.2
STEC infection	113	13.3	17	5.0	51	6.6	18	24.3	644	21.1	844	16.6
Tuberculosis disease	31	3.7	37	10.8	220	28.5	8	10.8	23	0.8	321	6.3
Typhoid fever			3		20	2.6			1		24	0.5
Yersiniosis	112	13.2	52	15.2	294	38.1	19	25.7	779	25.6	1261	24.8

[a] Middle Eastern/Latin American/African.

[b] Total includes cases where ethnicity was unknown.

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

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

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

Note: Denominator data are based on the proportion of people in each ethnic group from the estimated resident 2018 census population applied to the 2020 mid-year population estimates. Ethnicity is prioritised in the following order: Māori, Pacific Peoples, Asian, MELAA and European or Other ethnic groups. Where fewer than five cases have been notified a rate has not been calculated.

Table 38. Number of cases of notifiable diseases by year, 2011–2020

Disease	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AIDS	22	21	20	12	11	21	17	20	19	17
Campylobacteriosis	6686	7016	6837	6782	6218	7457	6482	6957	6203	5289
COVID-19										2176
Cholera	0	0	0	0	0	0	0	1	0	0
Creutzfeldt-Jakob disease	4	10	4	9	6	4	13	4	6	5
Cryptosporidiosis	610	877	1348	584	696	1062	1192	1613	1035	735
Dengue fever	42	76	106	178	125	191	161	294	222	50
Gastroenteritis [a]	570	765	558	774	506	513	324	231	484	362
Giardiasis	1934	1714	1729	1709	1510	1616	1648	1585	1749	1141
Haemophilus influenzae type b	8	4	2	5	3	2	4	3	2	3
Hepatitis A	26	82	91	74	47	35	58	68	58	22
Hepatitis B [b]	51	39	28	35	34	34	27	33	28	18
Hepatitis C [b]	26	31	36	29	35	31	21	34	24	28
Hydatid disease	6	1	7	4	4	2	1	0	1	0
Invasive pneumococcal disease	539	478	472	488	446	480	521	557	495	352
Legionellosis	158	149	151	123	246	247	221	175	161	160
Leprosy	1	2	7	4	5	0	3	3	6	3
Leptospirosis	68	108	60	56	63	85	139	109	89	60
Listeriosis	26	25	19	25	26	36	21	30	31	34
Malaria	52	38	47	33	38	26	42	36	27	17
Measles	596	68	8	280	10	103	15	30	2190	9
Meningococcal disease	119	85	68	45	64	75	112	120	139	35
Mumps	51	26	23	18	13	20	1338	435	264	144
Paratyphoid fever	13	22	25	19	34	32	37	18	18	17
Pertussis	1996	5897	3540	1099	1168	1093	2142	2956	1206	171
Rheumatic fever - initial episode	155	163	192	179	104	125	145	169	155	142
Rubella	22	4	1	4	0	3	1	1	2	0
Salmonellosis	1055	1081	1143	955	1051	1091	1127	1100	1188	708
Shigellosis	101	131	137	128	111	174	244	217	215	61
STEC infection	153	147	205	187	330	417	547	925	1103	844
Tetanus	0	2	1	0	1	1	0	0	0	0
Tuberculosis disease	307	291	274	301	293	295	308	308	319	321
Typhoid fever	45	44	50	43	43	38	59	53	55	24
Yersiniosis	513	514	483	680	634	858	917	1201	1185	1261
Zika virus				57	9	100	11	2	7	0

[a] Cases of acute gastroenteritis from a common source or person in a high-risk category (eg, food handler or childcare worker) or foodborne intoxication, eg, staphylococcal intoxication.
[b] Only acute cases of this disease are notifiable.

REFERENCES

1. Thacker SB, Berkelman RL. Public Health Surveillance in the United States. *Epidemiologic Reviews* 1988;10:164-90.
2. Thacker SB. 2000. Historical Development, in Principles and Practice of Public Health Surveillance. Teutsch SM, Churchill RE (eds). New York: Oxford University Press.
3. Baker M, Roberts A. A new schedule of notifiable diseases for New Zealand. *New Zealand Public Health Report* 1996;3(5):33–7.
4. Perera S, Adlam B. 2007. *Acute Gastrointestinal Illness (AGI) Study: General Practice Study.* Wellington: Institute of Environmental Science and Research Ltd (ESR).
5. Scott K, Marwick J, Crampton P. Utilization of general practitioner services in New Zealand and its relationship with income, ethnicity and government subsidy. *Health Services Management Research* 2003;16(1):45.
6. Ministry of Health. 2012. *Communicable Disease Control Manual.* Wellington: Ministry of Health.
7. Ministry of Health. 2007. *Direct Laboratory Notification of Communicable Diseases: National Guidelines.* Wellington: Ministry of Health.
8. National Casemix & Classification Centre. 2013. *International statistical classification of diseases and related health problems, 10th revision, Australian modification (ICD-10-AM), 8th edition.* Wollongong, Australia: National Casemix & Classification Centre, Australian Health Services Research Institute.
9. Dow N, Dickson N, Taylor B. The New Zealand Paediatric Surveillance Unit: Establishment and first year of operation. *New Zealand Public Health Report* 1999;6(6):41–4.
10. Lake R, Adlam B, Perera S. 2009. *Acute Gastrointestinal Illness (AGI) Study: Final Study Report.* Christchurch: Institute of Environmental Science and Research Ltd (ESR).
11. Sneyd E, Baker M. 2003. *Infectious Diseases in New Zealand: 2002 Annual Surveillance Summary.* Wellington: Institute of Environmental Science and Research Ltd (ESR).
12. Khan R, Baker M, Thornley C. Intentional release of biologic agents. *New Zealand Public Health Report* 2001;8(11):84–5.
13. Smyth D DE, Balm M, Nesdale A, Rosemergy. A case of Botulism in New Zealand. *NZ Medical Journal* 2015;128(1425):97-100.
14. O'Neill B. New Zealand declares itself free from bovine brucellosis. *Bulletin, Office International des Epizooties* 1996;108:264–5.
15. Cutfield N, Priest P, Chancellor A. 2021. *Twenty-fourth Annual Report, Creutzfeldt-Jakob Disease Surveillance in New Zealand, 1 January 2020–31 December 2020.* Dunedin: NZ Creutzfeldt-Jakob Registry, University of Otago.
16. New Zealand Government. 2020. *Infectious and Notifiable Diseases Order 2020.* Available from: https://www.legislation.govt.nz/regulation/public/2020/0001/latest/LMS306890.html. Accessed 23 November 2021.
17. New Zaland Government. 2020. *History of the COVID-19 Alert System.* Available from: https://covid19.govt.nz/about-our-covid-19-response/history-of-the-covid-19-alert-system/ Accessed 23 November 2021.
18. Baker M, Taylor P, Wilson E, et al. A case of diphtheria in Auckland - implications for disease control. *New Zealand Public Health Report* 1998;5(10):73–5.
19. Ministry of Health. 2020. *Immunisation Handbook 2020.* Wellington: Ministry of Health.
20. Biosecurity New Zealand. 2020. *Absence of specified animal diseases from New Zealand.* Available from: http://www.mpi.govt.nz/protection-and-response/finding-and-reporting-pests-and-diseases/registers-and-lists/. Accessed 30 July 2021.
21. Priest PC, Slow S, Chambers ST, et al. The burden of Legionnaires' disease in New Zealand (LegiNZ): a national surveillance study. *Lancet Infectious Dis.* 2019;19(7):770-7.
22. Thornley C, Baker M, Weinstein P, et al. Changing epidemiology of human leptospirosis in New Zealand. *Epidemiology and Infection* 2002;128:29–36.
23. World Health Organization. 2017. *Regional health leaders target elimination of: measles and rubella; HIV, hepatitis B and syphilis in babies [Press release].* Available from: https://www.who.int/westernpacific/news/detail/10-10-2017-regional-health-leaders-target-elimination-of-measles-and-rubella-hiv-hepatitis-b-and-syphilis-in-babies. Accessed 30 July 2021.
24. World Health Organization. 2020. *MERS situation update, December 2020.* Available from: https://applications.emro.who.int/docs/WHOEMCSR326E-eng.pdf?ua=1 Accessed 30 July 2021.
25. Chart H. The pathogenicity of strains of *Salmonella* Paratyphi B and *Salmonella* Java. *Journal of Applied Microbiology* 2003;94:340–8.
26. Maclean FS. 1964. *Challenge for Health. A history of public health in New Zealand.* Wellington: Government Print.

27. Kieft C, Perks M, Baker M, et al. 2000. *Annual Surveillance Summary 1999.* Wellington: Institute of Environmental Science and Research Ltd (ESR).
28. Hill P, Calder L. First case of primary amoebic meningoencephalitis in over 20 years. *New Zealand Public Health Report* 2000;7:43.
29. World Health Organization. 2002. *World Survey for Rabies No. 35 for the Year 1999.* Geneva: World Health Organization.
30. Ministry for Primary Industries. Available from: https://www.mpi.govt.nz/fishing-aquaculture/recreational-fishing/where-unsafe-to-collect-shellfish/what-toxic-shellfish-poisoning/ Accessed 17 August 2021.
31. Lush D, Stone M, Hood D. Trichinellosis and homekill pork. *New Zealand Public Health Report* 2002;9(2):11–13.

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
COVID-19	Coronavirus Disease
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
IgM	Immunoglobulin M
IPD	Invasive pneumococcal disease
IPV	Inactivated polio vaccine
MELAA	Middle Eastern/Latin American/African
MeNZB™	Meningococcal B outer membrane vesicle vaccine
MERS	Middle East Respiratory Syndrome
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
RDNC	Reacts but does not conform to a known phage type pattern
SARS	Severe acute respiratory syndrome
sv	Serovar
STEC	Shiga toxin-producing *Escherichia coli*
Tdap	Tetanus, diphtheria and acellular pertussis vaccine
VTEC	Verocytotoxin-producing *Escherichia coli*
WHO	World Health Organization
23PPV	23-valent pneumococcal polysaccharide vaccine

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