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NOTIFIABLE AND OTHER DISEASES IN NEW ZEALAND 2009 ANNUAL SURVEILLANCE REPORT

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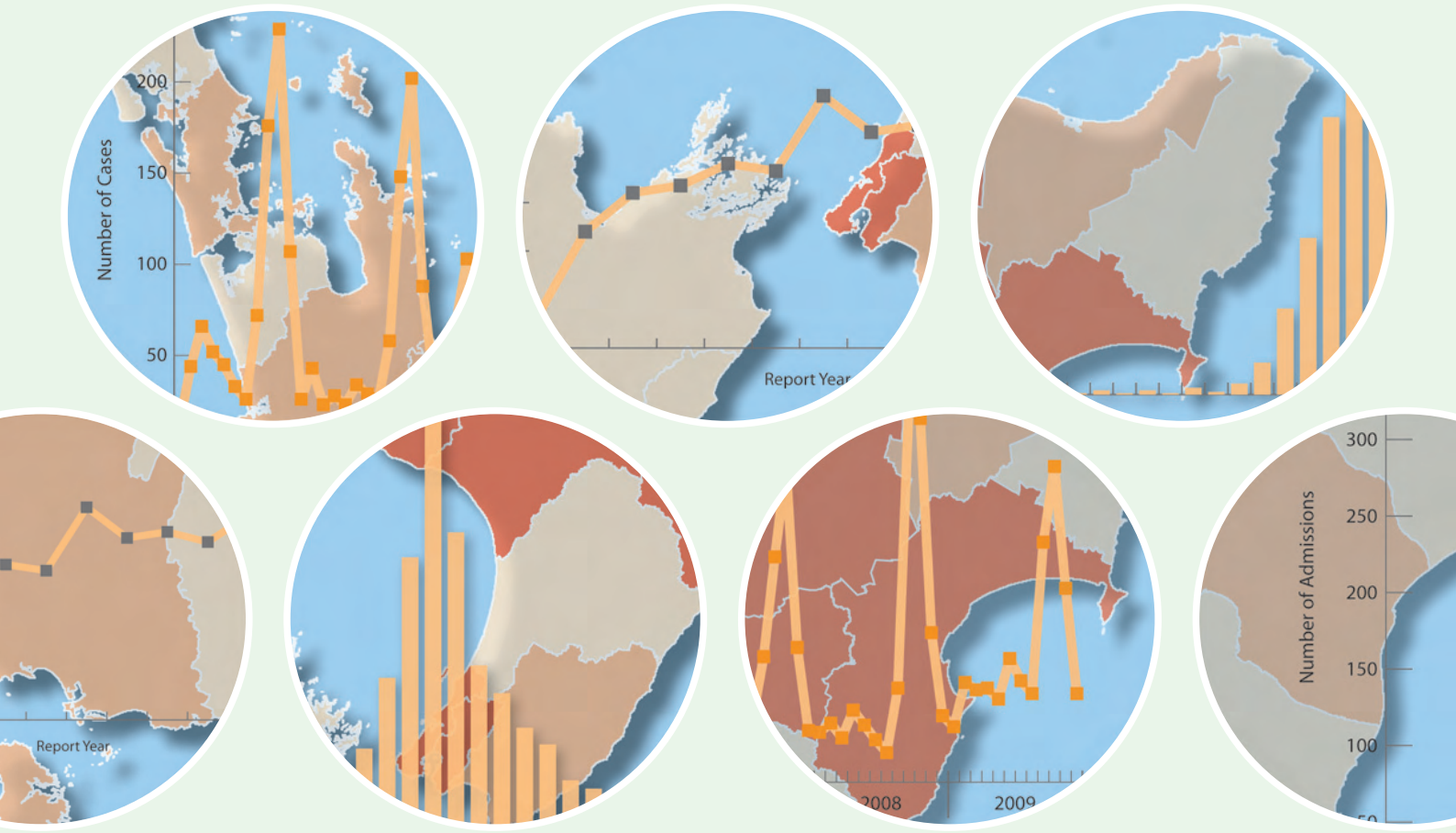

by

Population and Environmental Health Group

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This report is available on the Internet at www.surv.esr.cri.nz

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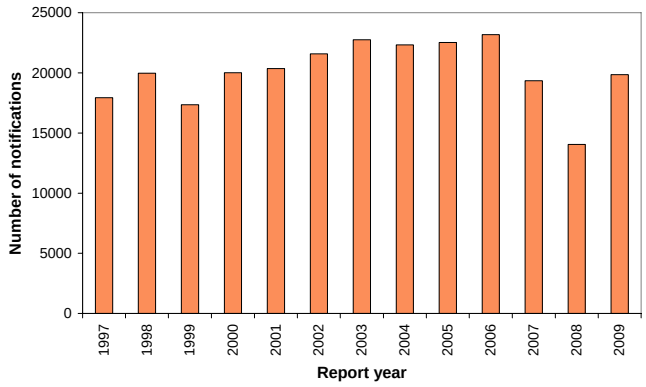
Notifiable Diseases

In 2009, 19 856 cases of notifiable diseases were reported through EpiSurv (Figure 1). This was higher than the previous two years, but lower than the seven years prior to 2007.

Figure 1. Total disease notifications by year, 1997–2009



Between 2008 and 2009 there were some significant changes in the number of cases reported for individual diseases. There was a statistically significant increase in reported cases of campylobacteriosis (6694 to 7176, 7%), cryptosporidiosis (764 to 854, 12%), measles (12 to 253, 2008%), and pertussis (417 to 1399, 235%).

There was a statistically significant decrease in reported cases of acquired immune deficiency syndrome (AIDS) (48 to 28, -42%), hepatitis A (89 to 44, -51%) leptospirosis (118 to 71, -40%), salmonellosis (1345 to 1129, -16%) and yersiniosis (508 to 431, -15%).

Other non-significant changes in case numbers and rates are listed in the Appendix.

Enteric Diseases

Enteric diseases continued to comprise the majority of disease notifications in 2009. In particular, at 7176 notifications, campylobacteriosis contributed 36.1% of all disease notifications. There were statistically significant increases in the notification rate of campylobacteriosis and cryptosporidiosis. In contrast, two enteric diseases, salmonellosis and yersiniosis had statistically significant rate decreases compared with 2008.

Exotic Diseases

From 2008 to 2009, there were no statistically significant changes in the number of reported cases of exotic diseases. There was no evidence of recent locally-acquired hydatid disease, and all dengue fever cases with travel histories recorded had travelled overseas. For rickettsial disease, none of the murine typhus cases had reported overseas travel during the incubation period.

Vaccine Preventable Diseases

In 2009, pertussis disease notification rates showed a significant increase compared with 2008. The pertussis rate per 100 000 in 2009 was 32.4, compared with 9.8 the previous year. The 2009 pertussis notification rate was below that seen in previous epidemics in 2000 (107.6 per 100 000) and in 2004 and 2005 (85.3 and 65.8 per 100 000, respectively).

The measles disease notification rate showed a significant increase in 2009, from 0.3 to 5.9 per 100 000.

Acute hepatitis A disease was the only other vaccine preventable disease to show a significant change in notification rate compared with 2008, with a significant decrease (2.1 to 1.0 per 100 000) returning to the same rate seen in 2007.

The meningococcal disease rate (3.3 per 100 000) was well down on the peak annual rate observed during the epidemic in 2001(16.7 per 100 000), but the rate remains higher than before the start of the epidemic in 1989–1990 (1.5 per 100 000).

Influenza

The average weekly influenza consultation rate was 77.9 per 100 000 patient population. This was the third highest rate since 1997. The peak weekly consultation rate of 284.0 per 100 000 practice patient population in July 2009 was the highest recorded by the sentinel surveillance system since 1997.

Cases of highly pathogenic avian influenza A(H5N1) continued to be reported in both humans and birds overseas, but no cases have been reported in New Zealand.

Sexually Transmitted Infections

In 2009, *Chlamydia trachomatis* infection was again the most commonly diagnosed sexually transmitted infection (STI) in New Zealand. The number of chlamydia cases reported by sexual health clinics (SHCs) and student and youth health clinics (SYHCs) decreased from 2008 levels by 6.5% (4770 to 4461) and 13.5% (1000 to 865), respectively. There was a small increase in chlamydia cases (3427 to 3456) reported by family planning clinics (FPCs). From laboratory-based surveillance in 2009, 8.0 cases of chlamydia per 1000 population were reported based on data from 16 district health boards (DHBs). The highest chlamydia population rate was reported for Tairawhiti DHB (11.9 per 1000 population) followed by Lakes (11.7 per 1000) and Hawke's Bay (11.0 per 1000) DHBs.

The number of gonorrhoea cases reported in 2009 decreased from 2008 for SHC and SYHC clinic types by 5.8% (864 to 814) and 22.6% (53 to 41), respectively, and increased by 13.6% in FPCs (176 to 200). For laboratory-based surveillance in 2009, 66 cases of gonorrhoea per 100 000 population were reported based on data from 18 DHBs. The highest rate of gonorrhoea was reported for Tairawhiti DHB (289 per 100 000) followed by Hawke's Bay (110 per 100 000) and Lakes (104 per 100 000) DHBs.

The number of syphilis cases reported by SHCs increased from 2008 to 2009 by 50.0% (92 to 138).

In 2009, 28 cases of AIDS were notified. The 2009 notification rate (0.6 per 100 000) was a significant decrease from the 2008 rate (1.1 per 100 000, 48 cases).

Outbreak Surveillance

In 2009, there were 638 reported outbreaks involving 10 734 cases. This represented an increase in the number of outbreaks and cases compared with 2008 figures (449 outbreaks with 6503 cases).

The most common pathogen implicated was norovirus with 270 of the outbreaks and 7116 of the cases, followed by *Giardia* spp. with 41 outbreaks and 131 cases.

The most common setting linked to an outbreak was rest/retirement homes (231 outbreaks, 6354 cases) followed by private homes (140 outbreaks, 797 cases).

Antibiotic Resistance

Methicillin resistance among *Staphylococcus aureus* has remained stable at 7–9% each year since 2000. A trend of declining prevalence of mupirocin resistance in *S. aureus* was evident since a peak in 2000, and there was a high prevalence of fusidic acid resistance among *S. aureus.*

Ciprofloxacin resistance is now more common than penicillin resistance in *Neisseria gonorrhoeae* in most parts of New Zealand.

There was a high prevalence of penicillin non-susceptibility among *Streptococcus pneumoniae*, and increasing non-susceptibility to third-generation cephalosporins, such as ceftriaxone.

An increasing prevalence of extended-spectrum β-lactamases (ESBLs) in Enterobacteriaceae has been reported in recent years.

Outbreaks of vancomycin-resistant enterococci (VRE) occurred in Auckland hospitals in 2007 and 2008, and Waikato Hospital in 2008.

INTRODUCTION

This report provides a summary of diseases currently notifiable under the Health Act 1956 or the Tuberculosis Act 1948. Other communicable diseases and organisms of public health importance under surveillance in New Zealand are also included.

The focus is on diseases reported in 2009 and where data are available, the trend since 1997, with the aim of supporting prevention and control measures.

Data on individual diseases are presented in alphabetical order.

Also presented in this report are data for influenza, STIs, antibiotic resistance and disease outbreaks.

PURPOSES OF SURVEILLANCE

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 for effective prevention and control activities [2].

Surveillance provides *information for action*.

Specific objectives for disease surveillance may include [3]:

- to identify cases of disease that require immediate public health control measures
- to monitor disease incidence and distribution, and alert health workers to changes of disease activity in their area
- to identify outbreaks and support their effective management
- to assess disease impact and help set priorities for prevention and control activities
- to identify risk factors for diseases 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
- to fulfil statutory and international reporting requirements.

SURVEILLANCE METHODS

INTERPRETING DATA

Data in this report, with the exception of the meningococcal data, are presented by date reported and not by onset date. Cases are allocated to geographic locale based on where the case first consulted a medical practitioner.

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

- the date of data extraction from EpiSurv
- the date used to aggregate data (e.g., date reported or date of onset of illness)
- whether laboratory-reported, 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, ethnicity and place of residence (DHB).

It should be noted that various factors influence disease notification and therefore the calculation of notifiable disease 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. Price sensitivity and availability of medical practitioners may also determine whether cases present to health care services for diagnosis.

The extent to which the data reflect the true incidence of the disease is affected by public awareness of the disease, use of diagnostic facilities, broad case definitions for some diseases (in particular viral communicable diseases), and the interest, resources and priorities of local health care services.

The number of cases reported for different ethnic groups are presented in this report. However, caution should be exercised in the interpretation of these numbers, as ethnicity is not always provided, different ethnic groups have different patterns of health care access and the numbers may not accurately reflect the true burden of disease in the population.

For different ethnic groups numbers are based on a prioritised classification of ethnicity, with the Māori ethnic group at the top of the hierarchy, followed by Pacific Peoples, Asian, Other and European ethnic groups. The Other ethnic group includes all ethnic groups except European, Asian, Pacific Peoples and Māori.

The small size of the New Zealand population and the low number of cases for some diseases means 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.

DATA SOURCES

The key sources of data used in this report are:

EpiSurv, the National Notifiable Disease Surveillance System

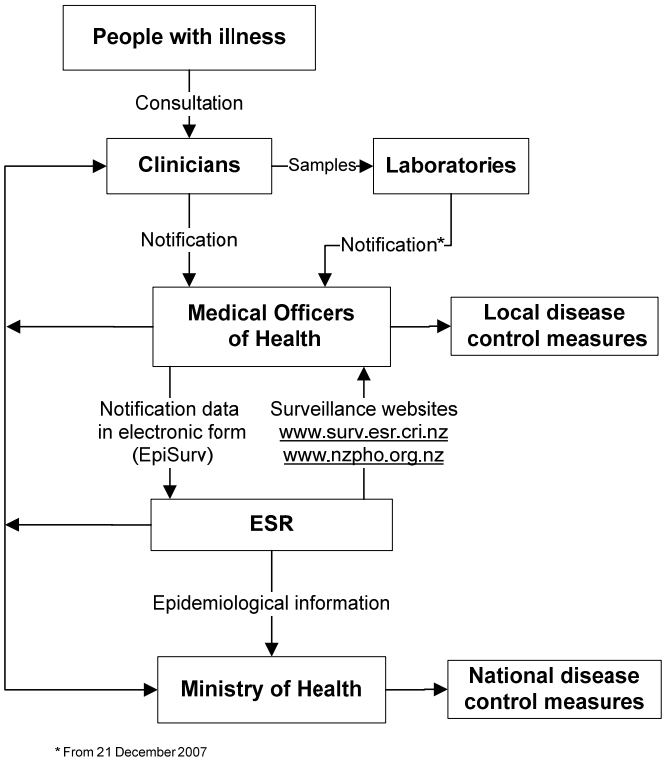
Under the Health Act 1956 and the Tuberculosis Act 1948, health professionals are required to inform their local medical officer of health of any notifiable disease that they suspect or diagnose. From 21 December 2007, laboratories are also required to report notifiable diseases to medical officers of health. These notifications provide the basis for surveillance and hence control of these diseases in New Zealand.

Notification data are entered at each public health unit (PHU) via a secure web-based portal onto a computerised database (EpiSurv). The real-time data are collated and analysed on behalf of the Ministry of Health by the Institute of Environmental Science and Research (ESR) Ltd. The data collected on each disease depend on the specific disease, but usually include demography, outcome, basis of diagnosis, risk factor and some clinical management information. Some of the diseases for example, measles and yersiniosis, only became notifiable with the revised schedule of notifiable diseases, which came into effect on 1 June 1996 [3].

This report includes sections on all of the diseases that are currently notifiable in New Zealand under the Health Act 1956 and the Tuberculosis Act 1948.

The major components and information flow of the notifiable disease surveillance system is shown in Figure 2.

Figure 2. Notifiable disease surveillance system



Laboratory-based Surveillance

Laboratory-based surveillance is the collection of laboratory data for public health purposes. Several of the communicable diseases diagnosed by clinical laboratories are either not covered adequately or not covered at all by the notifiable disease surveillance systems. Also, laboratory-based surveillance sometimes takes place to enhance surveillance data gathered by other methods. Examples of organisms covered by laboratory-based surveillance are antimicrobial-resistant organisms, legionellae, *Leptospira*, meningococci, respiratory syncytial virus (RSV), enteroviruses, adenoviruses, salmonellae and streptococci.

Surveillance of AIDS in New Zealand

Since 1989, the AIDS Epidemiology Group (AEG) in Dunedin has been contracted to collect information about people diagnosed with AIDS through notification to medical officers of health. Coding 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), University of Otago, was established in 1996 to monitor sporadic, familial, iatrogenic and variant CJD. Although CJD is notifiable to medical officers of health, in practice notification occurs directly from hospital clinicians to the Registry (personal communication, M Pollock, CJD Registry, 2005).

Sexually Transmitted Infection Surveillance System

In New Zealand, STIs are not notifiable, with the exception of AIDS, therefore surveillance efforts rely upon clinics and laboratories voluntarily providing data. Data on STIs of public health importance (chlamydia, gonorrhoea, genital herpes, genital warts, syphilis and non-specific urethritis) are submitted from SHCs, FPCs and SYHCs. This information is supplemented by data on chlamydia and gonorrhoea from 41 diagnostic laboratories in 19 DHBs throughout New Zealand.

Different denominators are used to calculate the rates in the clinical and the laboratory settings. Data from the clinics use the total number of clinic visits to calculate a clinic visit rate. In the case of FPCs and SYHCs, many visits are not related to STIs. For laboratory data the denominator is the mid-year population estimates published by Statistics New Zealand for the DHBs.

The number of cases of STIs reported through the clinic-based surveillance system underestimates the true burden of disease in New Zealand because a substantial percentage of STIs are diagnosed by other health providers, particularly general practitioners. Laboratories receive specimens from all health providers, and so they provide a useful, complementary source of STI incidence data. Comparison of data has shown that the number of cases reported by laboratories generally ranges from two- to seven- times the number of cases reported from the clinics.

Influenza Sentinel Surveillance System

An influenza sentinel surveillance system, which generally operates from May to September each year, gathers data on the incidence and distribution of influenza [4]. In 2009, this was based on a network of 101 general practices/practitioners from all health districts in New Zealand and operated from May to December. The number of practices is approximately proportional to the size of the population in each health district. Participating general practitioners are asked to record the number of consultations for influenza-like illness (ILI) (using a standardised case definition) each week and by age group. Each practice is also requested to collect swabs from up to three patients per week. The swabs are sent to laboratories for viral isolation and strain identification.

Ministry of Health

The Ministry of Health collates national data on patients admitted and discharged from publicly funded hospitals. These data are stored as part of the National Minimum Dataset. Cases are assigned disease codes using the tenth revision of the International Classification of Diseases (ICD10) coding system [5]. Up to 99 diagnostic, procedure and accident codes may be assigned to each admission. The first of these is the principal or primary diagnosis, which is the condition that led to admission. This may be different from the underlying diagnosis that caused the admission.

The Ministry of Health also maintains a Mortality Collection, which holds a classification for the underlying cause of death for all deaths registered in New Zealand

Anonymised data for selected diseases were extracted from Ministry of Health databases and sent to ESR for analysis and comparison with data from other surveillance systems.

Hospital admission data include repeated admissions for patients with chronic notifiable diseases, for example, tuberculosis, or for diseases which have long-term health impacts, for example, meningococcal disease. For some diseases the criteria for notification (clinical and laboratory or epidemiological evidence) do not match those required for diagnostic coding. For these reasons hospitalisation numbers and notifications may differ.

New Zealand Paediatric Surveillance Unit

The New Zealand Paediatric Surveillance Unit (NZPSU) [6] was established in 1997 to provide active surveillance of acute flaccid paralysis (AFP) to fulfil World Health Organization requirements for certification of polio eradication. Along with AFP, the conditions currently under surveillance by the NZPSU include haemolytic uraemic syndrome (HUS), congenital rubella syndrome (CRS), perinatal exposure to HIV, vitamin K deficiency bleeding and pneumococcal meningitis. Every month, participating paediatricians and other specialists in paediatric practice send a reply-paid card to the NZPSU on which they indicate whether in the previous month they have seen any cases of the conditions under surveillance. The data are then collated and analysed by the NZPSU Information from the NZPSU is used in this report to enhance notification data on polio, verocytotoxigenic *Escherichia coli* infection (VTEC)/shiga-toxigenic *Escherichia coli* infection (STEC) infection (HUS data) and rubella (CRS data).

Outbreak Surveillance

ESR introduced an outbreak surveillance system in July 1996 and has been systematically refining this system since then [7]. The surveillance system has operated electronically since mid-1997 as an additional module of EpiSurv. Unlike the other surveillance systems described above, this system collects data via PHUs on disease outbreaks, rather than individual cases.

Statistics New Zealand

Data used to calculate rates of disease are supplied by Statistics New Zealand. See the Analytical Methods section that follows for further details.

ANALYTICAL METHODS

Key analytical methods used include the following.

Dates

Notification data contained in this report are based on information recorded on EpiSurv as at 12 February 2010. Changes made to EpiSurv data by PHU staff after this date will not be reflected in this report. Consequently, future analyses of these data may produce revised results. Notification data for the years from 1997 to 2009 have been updated to reflect those in EpiSurv as at 12 February 2010.

Disease numbers are reported according to the date of notification, with the exception of meningococcal disease (which is reported according to the earliest date available among onset, hospitalisation, laboratory and notification dates). Laboratory results are reported according to the date the specimen was received.

Geographic Breakdown

This report provides rates for current DHBs where these are available and health districts where data cannot be presented by DHB.

The DHB populations used are shown in Table 1. These are estimated from the Statistics New Zealand mid-year population estimates for territorial authorities in New Zealand.

Table 2 shows the codes for health districts used in some graphs contained in this report.

Table 1. District health board populations, 2009

DHB	Population
Northland	155 750
Waitemata	528 400
Auckland	444 100
Counties Manukau	481 700
Waikato	360 022
Lakes	101 800
Bay of Plenty	207 730
Tairawhiti	46 200
Taranaki	108 240
Hawke's Bay	153 910
Whanganui	63 148
MidCentral	165 902
Hutt Valley	142 700
Capital and Coast	288 098
Wairarapa	39 970
Nelson-Marlborough	136 800
West Coast	32 590
Canterbury	501 980
South Canterbury	55 560
Otago	188 478
Southland	111 822
Total	4 314 900

Table 2. Health district codes and descriptions

Code	Health District
NL	Northland
NW	NorthWest Auckland
CA	Central Auckland
SA	South Auckland
WK	Waikato
TG	Tauranga
BE	Eastern Bay of Plenty
GS	Gisborne
RO	Rotorua
TP	Taupo
TK	Taranaki
RU	Ruapehu
HB	Hawke's Bay
WG	Wanganui
MW	Manawatu
WR	Wairarapa
WN	Wellington
HU	Hutt
NM	Nelson-Marlborough
WC	West Coast
CB	Canterbury
SC	South Canterbury
OT	Otago
SO	Southland

Map Classification Scheme

Quantiles have been used to group the disease rate values on the maps that is, the data have been divided into three groups containing equal numbers of DHBs. The darkest colour represents the highest rates and the lightest colour represents the lowest rates. The grey colour shows where there are insufficient data to calculate a rate (fewer than 5 cases).

Population Rates Calculations for Diseases

Denominator data used to determine all disease rates, except for ethnicity, have been derived from 2009 mid-year population estimates published by Statistics New Zealand. Denominator data used to determine ethnic groups disease rates are based on 2006 census data from Statistics New Zealand. Ethnicity is prioritised in the following order: Māori, Pacific peoples, Other, European and Unknown.

Rates have not been calculated where there are fewer than five notified cases in any category. Calculating rates from fewer than five cases produces unstable rates.

Risk Factors and Source of Infection

For many diseases an analysis of exposure to risk factors for the cases is reported. The risk factor questions on the EpiSurv case report forms are those that are currently known for that disease. Often more than one risk factor is reported for each case.

The reporting of exposure to a risk factor does not imply that this was the source of the infection.

Vaccination Data

For a number of diseases data on immunisation are reported. This represents the vaccination status of the case as reported in EpiSurv and has not been validated against the National Immunisation Register.

Statistical Tests

The Mantel-Haenszel chi-square test or, where necessary, Fisher's Exact tests were used to determine statistical significance. P-values less than 0.05 are considered to be significant at the 95% level of confidence.

LIMITATIONS OF SURVEILLANCE DATA

QUALITY

A report is prepared each year on the quality of selected EpiSurv fields to assist in the monitoring of a quality assurance programme. The latest report was published in 2009 [8].

Sensitivity

An assessment of sensitivity was made in 2003 using reporting on meningococcal disease [9]. This showed that the sensitivity of meningococcal disease surveillance is probably in excess of 87%.

An assessment of the ascertainment of under 1 year old pertussis cases in 2006 found that under-identification, estimated using capture-recapture analysis, was modest for both active surveillance (16%) and passive notification (19%) [10].

The sensitivity of surveillance for other diseases will often be less, particularly for common enteric diseases where only a small proportion of those infected will present to health care services. Due to long latency periods, the system is less sensitive for the surveillance of conditions resulting from longer-term environmental exposure.

Completeness

The completeness of data recorded in EpiSurv varies among diseases. Table 3 shows the percentage of notifications for which complete data were provided for selected key EpiSurv variables annually from 1999 to 2009.

The completeness of date of birth, age and sex data are generally very high, changing little over the last five years. The completeness of ethnicity has improved from a low of 63.2% in 2008 to 81.9% in 2009.

The National Health Index (NHI) is an important link between notifiable disease records and laboratory records. Significant progress has been made in the completeness of the NHI over the past five years and a very high percentage (91.1%) of EpiSurv records now have an NHI recorded.

Table 3. Data completeness by year and EpiSurv variable, 1999–2009

	Completeness of data				
Reporting year	Date of birth %	Age %	Sex %	Ethnicity %	NHI %
1999	94.6	99.4	98.9	82.8	7.6
2000	96.7	99.5	98.2	82.9	10.2
2001	98.3	99.1	98.2	82.5	18.2
2002	98.6	99.2	98.2	77.8	21.3
2003	98.8	99.3	98.6	80.9	30.3
2004	98.8	99.1	98.2	83.2	52.5
2005	98.7	99.0	98.2	82.9	65.1
2006	98.8	99.1	97.8	82.6	63.6
2007	98.7	99.1	98.9	74.6	72.5
2008	99.2	99.4	98.6	63.2	84.3
2009	99.2	99.3	98.9	81.9	91.1

Timeliness

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

Of the notifications with an onset date recorded (58.7% of notifications) in 2009, 63.2% were reported to a public health service within one week of the onset of symptoms and 82.3% were reported within two weeks of the onset of symptoms.

In 2008, 98.4% of disease notifications were entered into EpiSurv within one week of being reported to the public health service and 99.1% were entered within two weeks of being reported.

Accuracy

Reliable population denominator data are available, except in the case of STIs where the population covered by a particular laboratory may be an estimate.

Another limitation is the accuracy of diagnoses of infections made serologically.

NOTIFIABLE DISEASES

ACQUIRED IMMUNE DEFICIENCY SYNDROME

AIDS, but not human immunodeficiency virus (HIV) infection, is a notifiable disease in New Zealand. The AEG within the University of Otago carries out national AIDS/HIV surveillance and it is their data that are reported here. More detailed information is available from the AEG website

(http://dnmeds.otago.ac.nz/departments/psm/research/aids/newsletters.html).

In 2009, 28 cases of AIDS were reported to the AEG compared with 48 cases in 2008. The 2009 AIDS notification rate (0.6 per 100 000) was a significant decrease from the 2008 rate (1.1 per 100 000).

Fifteen cases (53.6%) were men infected through sex with other men, nine cases (32.1%) were infected through heterosexual contact (5 men and 4 women), two were children infected perinatally, one was infected through injecting drug use, and for one case the mode of infection was unknown.

The distribution of the 2009 AIDS cases according to ethnicity was: 10 (35.7%) European, seven (25.0%) Māori, four (14.3%) Pacific Peoples, two (7.1%) Asian, and five (17.9%) were of 'Other' ethnicity. The cases ranged from 3 to 58 years of age, with a mean age of 39.5 years.

Two deaths due to AIDS were reported to the AEG as having occurred in 2009.

ANTHRAX

The last fatal case of human anthrax in New Zealand was reported in 1903. Eleven cases have been notified since anthrax was first made a notifiable disease in 1919 with the last case reported in 1940. New Zealand has been considered free of anthrax since the last recorded outbreak among domestic livestock in 1954 [11].

ARBOVIRAL DISEASES

Please see individual disease sections for dengue fever and yellow fever.

Barmah Forest Virus

Two laboratory-confirmed cases of Barmah Forest virus infection were notified in 2009. Both cases were male, with one in the 40–49 age group and the other in the 60–69 years age group. Both cases had been in Australia during the incubation period of the disease.

Chikungunya Fever

One laboratory-confirmed case of Chikungunya fever was notified in 2009. The case was a female aged 40–49 years who had travelled overseas to Thailand during the incubation period of the disease. Ministry of Health hospitalisation data for 2009 reports one admission with the primary reason for admission as Chikungunya fever. This patient has the same demographics as the notified case.

Ross River Virus

Four cases of Ross River virus infection were reported in 2009. Three cases were laboratory confirmed and one was still under investigation. All of the laboratory-confirmed cases were female, one case was aged 30–39 years and the other two cases were aged 60–69 years. All cases were overseas during the incubation period of the disease, one in Fiji and the other two in Australia.

BOTULISM

There have been no notifications of botulism in humans in New Zealand since two cases were reported in 1985 [12].

BRUCELLOSIS

No cases of brucellosis were notified in New Zealand in 2009. Since 1997, 12 cases of brucellosis have been notified. There has been no evidence of locally-acquired brucellosis in humans since the declaration of freedom in cattle in New Zealand in 1998.

Brucellosis is a common bacterial disease of domesticated animals in many countries, including some Pacific Island Countries and territories. Brucellosis should be considered in the differential diagnosis of Pacific Peoples presenting with a febrile illness and a history of animal exposure or consumption of unpasteurised milk. *Brucella* species are notifiable organisms under the Biosecurity Act 1993. As such, all cases of brucellosis are reported to the Ministry of Agriculture and Forestry for investigation of possible disease reservoirs in New Zealand animals.

CAMPYLOBACTERIOSIS

There were 7176 cases of campylobacteriosis notified in 2009. The 2009 rate of 166.3 per 100 000 population was a significant increase from the 2008 rate of 156.8 per 100 000 (6694 cases). Since 2008, there has been a significant decrease in the number of cases reported compared with the preceding decade (Figure 3). Campylobacteriosis continues to be the most commonly notified disease comprising 36.1% of all notifications in 2009.

Figure 3. Campylobacteriosis notifications by year, 1997–2009

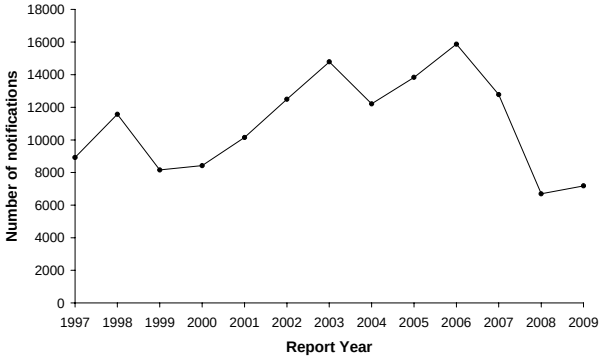
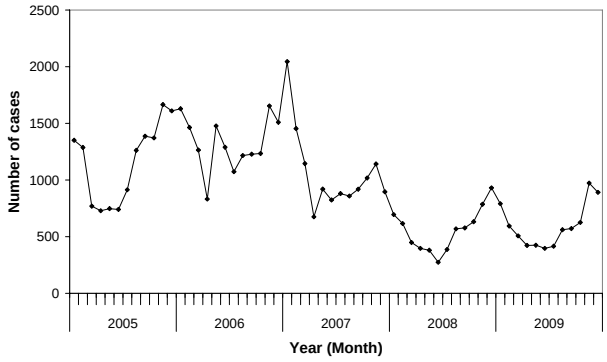


Figure 4 shows the number of cases notified each month since 2005.

Figure 4. Campylobacteriosis notifications by month, January 2005–December 2009



The pattern in 2009 was similar to previous years, highly seasonal with a summer peak and a winter trough (Figure 4). The lowest monthly campylobacteriosis total for 2009 was in June with 397 notifications. The highest monthly campylobacteriosis total for 2009 was in November when 973 cases were notified.

Campylobacteriosis rates varied throughout the country as demonstrated in Figure 5. The highest rates were reported by Hutt Valley (248.8 per 100 000 population, 355 cases) and Capital and Coast (240.2 per 100 000, 692 cases) DHBs. The lowest rates were reported in Tairawhiti (77.9 per 100 000, 36 cases) and Canterbury (108.6 per 100 000, 545 cases) DHBs.

Age information was available for 7153 (99.7%) of cases. The highest age-specific rate occurred in the 1–4 years age group (337.4 per 100 000 population, 818 cases) and those aged less than 1 year (247.3 per 100 000, 156 cases).

Sex was recorded for 98.9% (7095/7176) of the cases. Similar to previous years, the sex-specific notification rate was higher for males (187.8 per 100 000 population, 3976 cases) compared with females (141.9 per 100 000, 3119 cases).

Ethnicity was recorded for 6459 (90.0%) of the cases. The highest disease notification rates were for those of European ethnicity (200.0 per 100 000 population, 5389 cases), followed by Asian (116.8 per 100 000, 398 cases) and Other (115.1 per 100 000, 39 cases) ethnicities. The lowest rates were reported for Pacific Peoples (76.0 per 100 000, 172 cases) and Māori (81.5 per 100 000, 461 cases) ethnicities.

Hospitalisation status was recorded for 3324 (46.3%) of cases, of which 376 cases (11.3%) were hospitalised.

The risk factors recorded for campylobacteriosis are shown in Table 4. The most common risk factors were consumption of food from retail premises and contact with farm animals. Note that for a high number of cases the risk factors were not completed.

In 2009, 12 outbreaks of campylobacteriosis were reported involving 65 cases, of which five were hospitalised.

Figure 5. Campylobacteriosis notifications by DHB, 2009

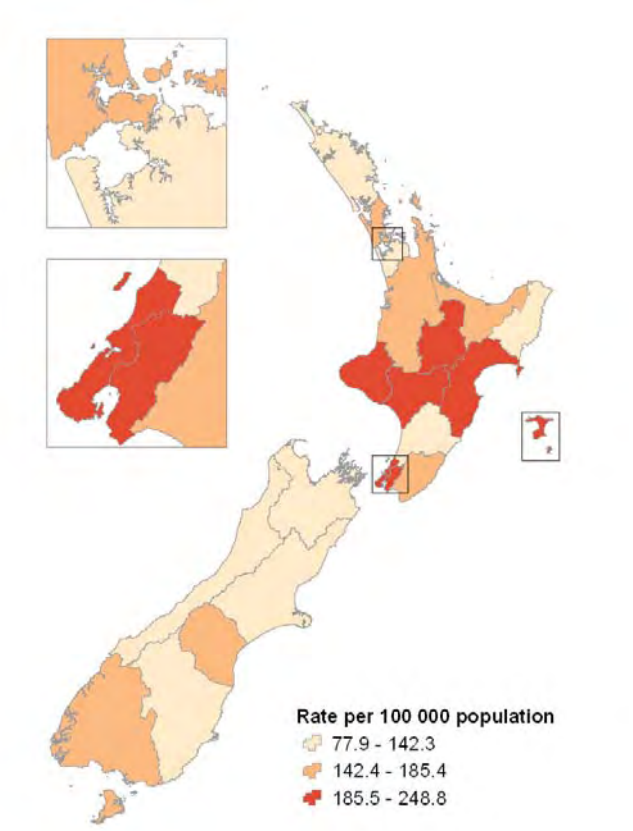


Table 4. Exposure to risk factors associated with campylobacteriosis, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed food from retail premises	822	1031	5323	44.4
Contact with farm animals	842	1107	5227	43.2
Consumed untreated water	420	1173	5583	26.4
Contact with faecal matter	255	1467	5454	14.8
Recreational water contact	234	1484	5458	13.6
Contact with other symptomatic people	220	1559	5397	12.4
Travelled overseas during the incubation period	154	2035	4987	7.0
Contact with sick animals	112	1541	5523	6.8

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

CHEMICAL POISONING FROM THE ENVIRONMENT

In 2009, six cases were notified as chemical poisoning from the environment. This was higher than the number notified in 2008 (1 case) and less than the number notified in 2007 (13 cases).

A Māori male aged 5–9 years from Waikato DHB was reported with mercury poisoning and had a blood-mercury level of 51 nmol/L. His grandparents were also tested and showed elevated mercury levels, however, they were not notified as cases. A range of environmental sampling and investigative techniques were employed but no definite mercury source could be established.

A Māori male aged over 70 years from Waikato DHB died from accidental exposure to carbon monoxide from an unflued gas heater used inside without adequate ventilation. Note the exposure occurred in July 2007 with a coroner's inquest hearing date in May 2009.

Two Māori adults, aged 40–49 years, one male and one female, died in their Waikato home from carbon monoxide poisoning due to the use of an unflued gas heater inside. A coroner's inquest hearing was pending.

A European male aged 40–49 years was suspected of being exposed to cyanide while possum trapping by the Bay of Plenty DHB. He was working in an area previously baited with cyanide and it was possible that he unknowingly contaminated his hands and subsequently ingested the cyanide as he consumed some food. His symptoms were consistent with either cyanide poisoning or fatigue and dehydration. Blood samples taken could not be analysed for confirmation. The case was hospitalised.

A European female aged 5–9 years from Wairarapa DHB was suspected of having an illness related to cyanobacteria toxin exposure. She developed abdominal pains 30 minutes after swimming in the Waipoua River. The river was subsequently sampled and was positive for elevated levels of homoanatoxin-a.

At present, only poisonings arising from chemical contamination are required to be notified under the Health Act 1956; in addition, hazardous substance injuries are required to be notified under the Hazardous Substances and New Organisms Act 1996. In 2007, ESR introduced a new case report form to capture hazardous substance injury notifications to PHUs (of which there were 11 in 2009).

CHOLERA

No cases of cholera were notified in New Zealand in 2009. Since 1996, there have been 10 reported cholera cases with the most recent case reported in 2007. Each of these cases reported a history of overseas travel during the incubation period. The countries visited included India (5 cases), Fiji (2 cases), Thailand (2 cases) and China, Indonesia, and Singapore (1 case each). Note that cases may have visited more than one country. According to the Ministry of Health's hospitalisation data for 2009, there were no hospitalisations with the primary reason for admission being cholera.

CREUTZFELDT-JAKOB DISEASE

The CJD Registry was established in 1996 to monitor sporadic, familial, iatrogenic and variant CJD. This section is based on the thirteenth annual report of the Registry [13].

In 2009, 11 cases of possible CJD were referred to the Registry. Three of these were excluded on the basis of more likely alternative diagnoses.

Two cases were classified as definite after their diagnoses were confirmed on post-mortem examination. One was a female in the 60–69 year age group, and the other a male in the 70–79 year age group.

The remaining six cases were classified as probable sporadic CJD based on clinical, cerebrospinal fluid, electroencephalogram, and/or magnetic resonance imaging findings. The age distribution of the probable cases was as follows: 40–49 years (1 case), 50–59 years (1 case), 60–69 years (3 cases), and 80–89 years (1 case). Three of the cases were female and three were male. All six cases died with no autopsy performed.

Since 1997, 49 cases of CJD were documented by the Registry, 16 definite and 33 probable. No cases of variant CJD, the form linked with bovine spongiform encephalopathy, have ever been identified in New Zealand.

CRYPTOSPORIDIOSIS

During 2009, 854 cases of cryptosporidiosis were notified (19.8 per 100 000 population), which was a significant increase from the number notified in 2008 (17.9 per 100 000, 764 cases) (Figure 6).

Figure 6. Cryptosporidiosis notifications by year, 1997–2009

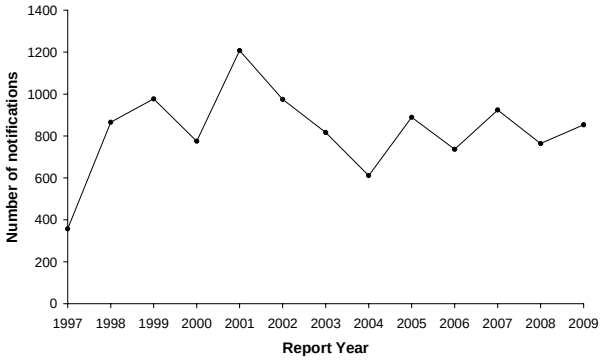
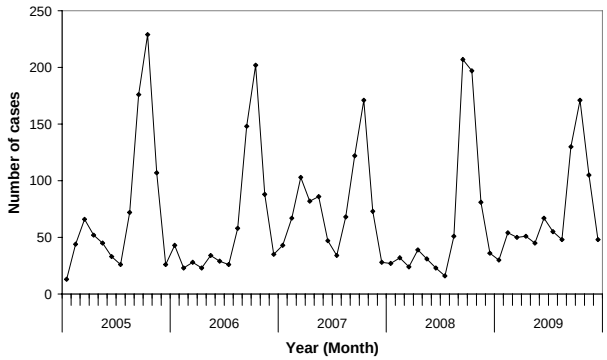


Figure 7 shows cryptosporidiosis cases by month since 2005. There was a distinct seasonal pattern with the highest number of notifications reported during the spring of each year

Figure 7. Cryptosporidiosis notifications by month, January 2005–December 2009



Cryptosporidiosis notification rates varied throughout the country as illustrated in Figure 8. The highest rates were reported in West Coast (55.2 per 100 000 population, 18 cases) and South Canterbury (50.4 per 100 000, 28 cases) DHBs, and the lowest rate was reported in Counties Manukau DHB (10.6 per 100 000, 51 cases).

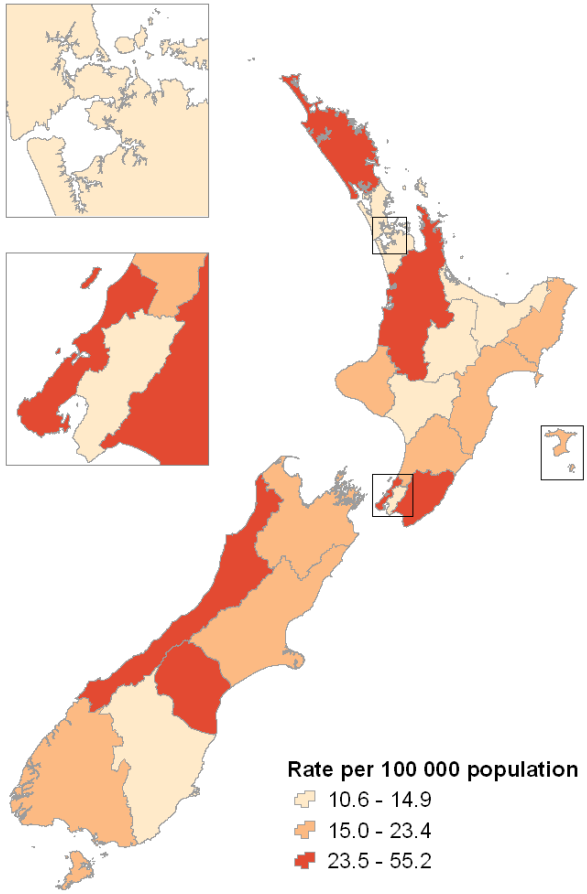
Age was recorded for 851 (99.6%) of the cases reported. Of these, 54.9% were children aged less than 15 years (467 cases). The highest age-specific rate was in the 1–4 years age group (110.1 per 100 000 population, 267 cases) followed by the less than 1 year age group (46 per 100 000, 29 cases). The lowest rate was in the 70 years and over age group (3.4 per 100 000, 13 cases).

Sex was recorded for 847 (99.2%) of the cases reported. Sex-specific notification rates for cryptosporidiosis were higher for females (21.1 per 100 000 population, 463 cases) compared with males (18.1 per 100 000, 384 cases).

Of the 815 (95.4%) cases where ethnicity information was recorded, the highest notification rates were for those of European ethnicity (26.2 per 100 000, 705 cases) followed by Māori (11.5 per 100 000, 65 cases), Pacific Peoples (8.0 per 100 000, 18 cases) and Asian (6.7 per 100 000, 23 cases) ethnicities.

Hospitalisation status was recorded for 549 cases (64.3%), of which 34 (6.2%) cases were hospitalised.

Figure 8. Cryptosporidiosis notifications by DHB, 2009



In 2009, 20 cryptosporidiosis outbreaks were recorded, involving 68 cases.

The risk factors for cryptosporidiosis are shown in Table 5. Similar to previous years, contact with farm animals was the most common risk factor associated with cryptosporidiosis cases in 2009.

Table 5. Exposure to risk factors associated with cryptosporidiosis, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with farm animals	241	196	417	55.1
Contact with faecal matter	123	242	489	33.7
Consumed untreated water	108	233	513	31.7
Recreational water contact	124	306	424	28.8
Contact with other symptomatic people	75	312	467	19.4
Contact with sick animals	70	304	480	18.7
Consumed food from retail premises	66	300	488	18.0
Travelled overseas during the incubation period	40	423	391	8.6

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

CYSTICERCOSIS

No cases of cysticercosis were notified in New Zealand in 2009. Since 1997, three cases were reported in 2005 and two cases in 2007. Human infection with *Taenia solium*, the species of tapeworm that causes cysticercosis, is prevalent in parts of Latin America, South and South-Eastern Asia, Africa and Eastern Europe. The risk is higher when beef and pork are eaten raw or undercooked and where livestock are in contact with human faecal matter [14]. Ministry of Health hospitalisation data for 2009 record three hospitalisations with the primary or secondary reason for admission being cysticercosis. The age group, sex, ethnicity and DHB were the same for all three hospitalisations so it is possible that these relate to a single case.

DECOMPRESSION SICKNESS

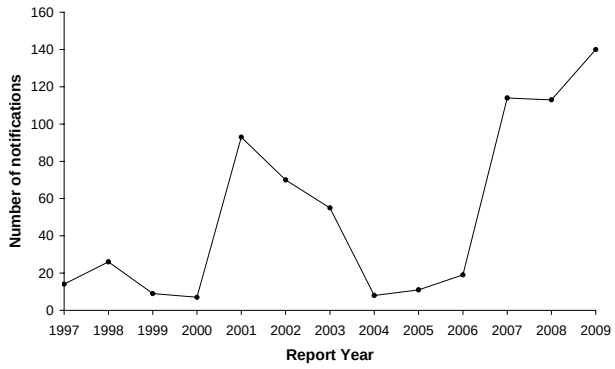
There were no cases of decompression sickness notified in 2009. In the last five years only two cases of decompression sickness have been notified, one case each in 2005 and 2006.

Ministry of Health hospitalisation data for 2009 recorded 24 cases with decompression sickness as the primary reason for admission. Over the last five years the number of hospitalisations has ranged from eight (in 2005 and 2006) to 24 cases (in 2009). The number of hospitalisations recorded consistently exceeds the annual number of notifications recorded in EpiSurv, indicating continued under-reporting of this condition.

DENGUE FEVER

In 2009, 140 cases of dengue fever were notified. The numbers of cases reported in 2009 (140 cases), 2008 (113 cases) and in 2007 (114 cases) were a significant increase on the number notified in recent years (19 cases in 2006, 11 in 2005, and 8 in 2004). Between 2001 and 2003 an average of 73 cases per year were notified, with a peak of 93 cases in 2001 (Figure 9). The 2009 notification rate (3.2 per 100 000 population) was not a significant increase from the 2008 rate (2.6 per 100 000).

Figure 9. Dengue fever notifications, 1997–2009



The majority of cases were aged between 20 and 69 years of age (127 cases, 90.7%). The age-specific rates were highest in the following age groups: 50–59 years (5.6 per 100 000 population, 30 cases), followed by the 60–69 years (4.8 per 100 000 population, 19 cases), and the 40–49 years (4.7 per 100 000 population, 30 cases) age groups.

Sex was recorded for all the reported dengue cases. The notification rate was higher in females (3.8 per 100 000 population, 83 cases) than in males (2.7 per 100 000 population, 57 cases).

Ethnicity was recorded for 94.3% (132/140) of the cases. Of the 132 cases, the highest notification rate occurred among those of Pacific Peoples ethnicity (21.7 per 100 000 population, 49 cases) followed by those of Asian ethnicity (4.7 per 100 000, 16 cases).

Hospitalisation status was recorded for 70.7% (99/140) of the cases. Of the 99 cases, 29.3% (29 cases) were hospitalised. Of the 140 notified cases, 131 cases (93.6%) were laboratory confirmed.

Travel history was recorded for 97.9% (137/140) of the cases. All of the 137 cases had travelled overseas during the incubation period for this disease. The most commonly visited countries were the Cook Islands (29.9%, 41 cases), Tonga (24.8%, 34 cases), Fiji (13.1%, 18 cases) and Samoa (8.8%, 12 cases). Note that cases may have travelled to more than one country.

Fifty-two (37.1%) cases reported taking some protective measures for example, use of insect repellent, bed nets, protective clothing and staying in screened/air conditioned accommodation. Eleven (7.9%) cases undertook no protective measures, and for 77 (55.0%) cases no information was recorded.

Ministry of Health hospitalisation data for 2009 recorded 22 cases where dengue fever was the primary diagnosis on admission. Of these, 20 cases were dengue fever (classical dengue) and two cases were dengue haemorrhagic fever.

DIPHTHERIA

No cases of toxigenic respiratory diphtheria were notified in New Zealand in 2009.

In 2009, 32 cultures of *Corynebacterium diphtheriae* were received by the ESR Special Bacteriology Laboratory for toxigenicity testing, typing and surveillance purposes. The majority (28, 87.5%) were from cutaneous sources with two cultures from blood and two from respiratory sources. The patients ranged in age from 9 months to 73 years.

Three of the cutaneous isolates were positive for the diphtheria toxin gene when tested using the polymerase chain reaction (PCR). Two of the cases with toxigenic isolates were related, one was the index case who acquired a tattoo in Samoa, and the other was from a household member detected in contact tracing. The public health service staff supplied prophylaxis and vaccinations as appropriate.

The remaining isolates were determined to be non-toxigenic by PCR examination for the toxin gene. Twenty-five (78.1%) of the isolates were biovar *mitis*, and seven (21.9%) were biovar *gravis* including the three toxigenic cutaneous isolates and one of the blood isolates.

In 2008, the ESR laboratory received 53 isolates from cases, including one toxigenic cutaneous isolate. Of these isolates, 35 (66.0%) were biovar *mitis*, and 18 (34.0%) were biovar *gravis,* including both of the blood isolates received.

ENTEROBACTER SAKAZAKII INVASIVE DISEASE

Enterobacter sakazakii (*E. sakazakii)* is naturally present in the environment and has been known to cause disease in people of all ages. However, most international concern has resulted from severe disease (including meningitis, necrotising enterocolitis and sepsis) and death in premature infants associated with low-level contamination in powdered infant formula.

In New Zealand *E. sakazakii* invasive disease became notifiable on 21 July 2005. This followed a recommendation from the investigation into the death of a premature infant in a neonatal unit from this disease in 2004 who had been receiving powdered infant formula [15].

One case of *E. sakazakii* invasive disease was notified in 2005 following the addition of this disease to the notifiable diseases schedule. The case was an elderly male with peritonitis who was on a renal ward. There have been no notified cases since 2005.

GASTROENTERITIS

Gastroenteritis comprises a variety of communicable diseases and infections. Included in this section are infections by the following pathogens: norovirus, rotavirus, ciguatera fish poisoning and histamine fish poisoning. Diseases and conditions that are notifiable in their own right (for example salmonellosis, campylobacteriosis, VTEC/STEC infection) are reported separately.

From July 2000, PHUs have also been encouraged to record all cases of gastroenteritis caused by non-notifiable or unknown foodborne intoxicants, including those self-reported by the public.

In 2009, 714 cases of gastroenteritis (16.5 per 100 000 population) were notified. This was a slight increase from 2008 (16.1 per 100 000, 687 cases). A casual agent was reported for 372 cases (52.1%). Where the agent was identified, the most common pathogen was norovirus (67.2%, 250 cases) (Table 6).

Gastroenteritis notifications were highest in West Coast (276.2 per 100 000 population, 90 cases), followed by MidCentral (65.1 per 100 000, 108 cases), and Hutt Valley (37.1 per 100 000, 53 cases) DHBs.

Table 6. Gastroenteritis cases where organism was identified, 2009

Organism	Cases	Percentage (%)
Norovirus infection	250	67.2
Rotavirus infection	100	26.9
Ciguatera fish poisoning	8	2.2
Histamine (scromboid) poisoning	4	1.1
Aeromonas spp.	2	0.5
Vibrio parahaemolyticus infection	2	0.5
Clostridium difficile	1	0.3
Clostridium perfringens	1	0.3
Entamoeba histolytica	1	0.3
Escherichia coli	1	0.3
Staphylococcal food intoxication	1	0.3
Vibrio mimicus	1	0.3
Total	372	100.0

Age was recorded for 677 (94.8%) cases. Age-specific rates were highest in the less than one year age group (49.2 per 100 000 population, 31 cases) followed by those over 70 years (44.9 per 100 000, 171 cases). The lowest age-specific rates were in the 5–9 years (2.4 per 100 000, 7 cases) and 10–14 years (4.0 per 100 000, 12 cases) age groups.

Of the 683 cases (95.7%) where sex was recorded, rates were higher for females (18.5 per 100 000 population, 407 cases) compared with males (13.0 per 100 000, 276 cases).

Ethnicity was recorded for 83.5% (596/714) of cases. The highest notification rate occurred among those of European (18.7 per 100 000 population, 505 cases), Other (17.7 per 100 000, 6 cases) and Asian (10.6 per 100 000, 36 cases) ethnicities.

Hospitalisation status was recorded for 65.8% (470/714) cases. Of these, 44 cases (9.4%) were hospitalised.

In 2009, 178 gastroenteritis (type unspecified) outbreaks occurred, involving 2115 cases, of which 243 cases were included as individual case reports.

The risk factors recorded for gastroenteritis cases are shown in Table 7. The most common risk factors associated with gastroenteritis were consumption of food from retail premises and contact with other symptomatic people.

Table 7. Exposure to risk factors associated with gastroenteritis, 2009

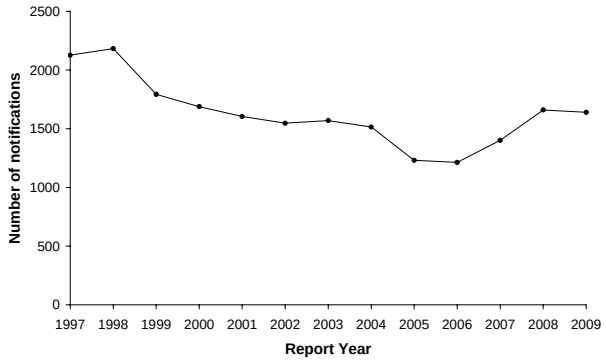
Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed food from retail premises	209	101	404	67.4
Contact with other symptomatic people	208	153	353	57.6
Contact with faecal matter	142	155	417	47.8
Consumed untreated water	17	217	480	7.3
Contact with farm animals	17	264	433	6.0
Recreational water contact	11	258	445	4.1
Contact with sick animals	5	263	446	1.9
Travelled overseas during the incubation period	4	281	429	1.4

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

GIARDIASIS

There were 1640 cases of giardiasis notified in 2009. The 2009 rate (38.0 per 100 000 population) was similar to the 2008 rate (38.9 per 100 000, 1660 cases). Figure 10 shows giardiasis notifications by year from 1997–2009.

Figure 10. Giardiasis notifications by year, 1997–2009



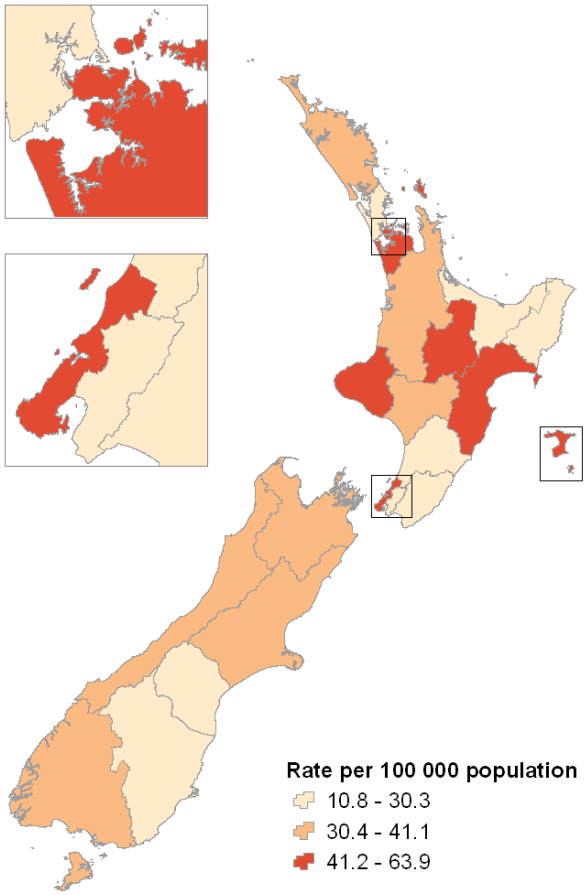
Rates varied throughout the country as illustrated in Figure 11. The highest rates were recorded in Lakes DHB (63.9 per 100 000 population, 65 cases), followed by Capital and Coast (58.0 per 100 000, 167 cases) and Auckland (47.7 per 100 000, 212 cases) DHBs. The lowest rate was recorded in MidCentral DHB (10.8 per 100 000, 18 cases).

Age was recorded for 1631 (99.5%) of cases. Age-specific notification rates were highest in the 1–4 years age group (136.5 per 100 000 population, 331 cases), followed by the 30–39 years age group (64.7 per 100 000, 373 cases), and those aged less than 1 year (57.1 per 100 000, 36 cases). This pattern has remained consistent since 1996 when the disease became notifiable in New Zealand.

Of the 1619 (98.7%) of cases where sex was recorded, sex-specific notification rates were higher for males (39.6 per 100 000 population, 838 cases) compared with females (35.5 per 100 000, 781 cases).

Ethnicity was recorded for 1502 (91.6%) giardiasis cases. Of these, the highest notification rate was for those of Other ethnicity (162.4 per 100 000 population, 55 cases), followed by European (47.0 per 100 000, 1265 cases), Asian (22.3 per 100 000, 76 cases) and Māori (16.6 per 100 000, 94 cases) ethnicities.

Figure 11. Giardiasis notifications by DHB, 2009



Hospitalisation status was recorded for 864 (52.7%) cases, of which 21 (2.4%) were hospitalised.

There were 41 giardiasis outbreaks reported in 2009, involving 131 cases.

The risk factors recorded for giardiasis are shown in Table 8.

Table 8. Exposure to risk factors associated with giardiasis, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed untreated water	172	294	1174	36.9
Contact with other symptomatic people	204	354	1082	36.6
Contact with faecal matter	171	313	1156	35.3
Recreational water contact	163	365	1112	30.9
Contact with farm animals	177	398	1065	30.8
Consumed food from retail premises	127	346	1167	26.8
Travelled overseas during the incubation period	114	519	1007	18.0
Contact with sick animals	24	508	1108	4.5

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

HAEMOPHILUS INFLUENZAE SEROTYPE B DISEASE

Eleven cases of *Haemophilus influenzae* serotype b (Hib) were notified in 2009, of which eight (72.7%) were laboratory confirmed.

Four laboratory-confirmed cases in 2009 were aged less than five years, the same as in 2008, but less than 2007 (8 cases).

Of the laboratory-confirmed cases aged less than five years, three were male and one was female. The cases were of Māori (2 cases), Pacific Peoples (1 case), and Asian (1 case) ethnicities, and were from Waikato (2 cases), Waitemata (1 case) and MidCentral (1 case) DHBs.

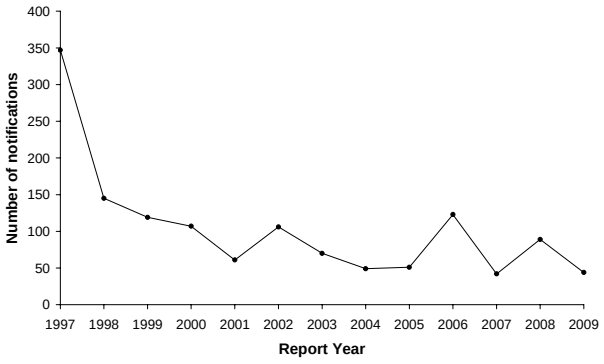
A Hib vaccine was introduced in January 1994. The current schedule introduced in mid-August 2000 recommends three doses of Hib vaccine at six weeks, three months and 15 months of age [16].

The vaccination history was recorded for three of the four laboratory-confirmed cases aged less than five years. None of these cases were immunised. All of the laboratory-confirmed cases aged less than five years were hospitalised (one child with meningitis, pneumonia and septicaemia, one child with meningitis and septicaemia, one child with pneumonia and septicaemia, and one child with septicaemia). No deaths due to Hib were reported in 2009.

HEPATITIS A

In 2009, a total of 44 cases of hepatitis A were notified, compared with 89 notifications in 2008. Since a peak of notifications in 1997 (347 cases), there has been an overall downward trend in the number of hepatitis A notifications, although an increase in notifications was observed in 2002, 2006 and again in 2008 (Figure 12).

Figure 12. Hepatitis A notifications by year, 1997–2009



The national hepatitis A notification rate for 2009 was 1.0 per 100 000 population, which was a significant decrease from the 2008 rate of 2.1 per 100 000 population. Auckland (2.0 per 100 000 population, 9 cases), Counties Manukau (1.2 per 100 000 population, 6 cases) and Canterbury (1.2 per 100 000 population, 6 cases) DHBs were the only three DHBs where more than five notifications were reported in 2009.

Age was recorded for all cases. The highest age-specific rates occurred in the 10–14 years (2.0 per 100 000 population, 6 cases), followed by the 40–49 years (1.4 per 100 000 population, 9 cases), and 50–59 years (1.1 per 100 000 population, 6 cases) age groups.

Sex was recorded for all cases. Males (1.2 per 100 000 population, 26 cases) had a higher notification rate than females (0.8 per 100 000 population, 18 cases).

Ethnicity was recorded for 42 (95.5%) hepatitis A cases. The highest notification rates were reported for those of Asian (4.4 per 100 000, 15 cases) ethnicity followed by those of Māori (1.1 per 100 000, 6 cases) and European (0.7 per 100 000, 18 cases) ethnicities.

Hospitalisation status was recorded for all cases, 14 cases (31.8%) were hospitalised. No deaths due to hepatitis A were reported in 2009.

Three-quarters (33/44) of cases had travelled overseas during the incubation period of the disease. Countries most frequently visited included: Fiji (6 cases), Vanuatu (6 cases), and India (5 cases).

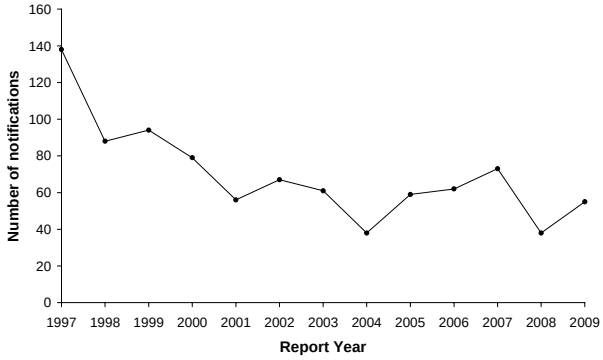
One hepatitis A outbreak was reported in 2009 involving two cases.

HEPATITIS B

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

In 2009, 55 cases of hepatitis B were notified, compared with 38 notifications in 2008 (Figure 13). There has been a general downward trend in the number of hepatitis B notifications reported between 1984 (over 600 notifications) and 2004 (38 notifications) with numbers of notifications fluctuating between 38 and 73 in recent years. The general decrease since 1984 is primarily attributed to the introduction of the hepatitis B vaccine to the immunisation schedule between 1985 and 1988.

Figure 13. Hepatitis B notifications by year, 1997–2009



The national hepatitis B notification rate for 2009 was 1.3 per 100 000 population, this was higher than the 2008 rate of 0.9 per 100 000. The highest rate was observed in Auckland DHB (2.9 per 100 000, 13 cases) followed by Counties Manukau DHB (1.7 per 100 000, 8 cases).

Age-specific rates were highest in the 40–49 years age group (2.7 per 100 000 population, 17 cases) followed by 20–29 years age group (2.6 per 100 000, 15 cases).

Sex was recorded for all cases. Males (2.0 per 100 000 population, 42 cases) had a higher notification rate than females (0.6 per 100 000, 13 cases).

Ethnicity was recorded for 52 (94.5%) hepatitis B cases. The highest notification rates were for those of Pacific Peoples (4.9 per 100 000, 11 cases) ethnicity followed by those of

Māori (1.6 per 100 000, 9 cases), Asian (1.5 per 100 000, 5 cases) and European (0.9 per 100 000, 25 cases) ethnicities.

Of the 52 cases (94.5%) for which hospitalisation status were recorded, 18 (34.6%) were hospitalised. No deaths due to hepatitis B were recorded in 2009.

The risk factors for hepatitis B are shown in Table 9. The most commonly associated risk factors were overseas travel (24.4%), sexual contact (22.2%) and household contact with a confirmed case or carrier (15.8%).

Table 9. Exposure to risk factors associated with hepatitis B, 2009

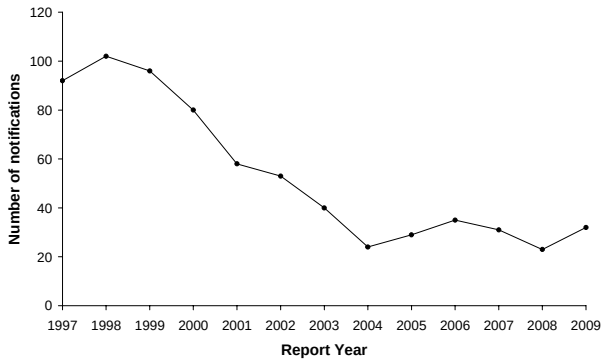
Risk factor	Yes	No	Unknown	Percentage (%)[a]
Overseas during incubation period	11	34	10	24.4
Sexual contact	6	21	28	22.2
Household contact with confirmed case	6	32	17	15.8
Case was child of seropositive mother	2	38	15	5.0
Case blood product or tissue recipient	2	40	13	4.8
Body piercing/ tattooing in last 12 months	2	44	9	4.3
Occupational exposure to blood	1	42	12	2.3
History of injecting drug use	1	45	9	2.2

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

HEPATITIS C

In 2009, a total of 32 cases of hepatitis C were notified, compared with 23 notifications in 2008. After a peak number of notifications in 1998 (102 cases) there has been a steady decline in notifications up until 2004. Numbers of notifications have fluctuated in recent years from 23 to 35 cases per year (Figure 14).

Figure 14. Hepatitis C notifications by year, 1997–2009



The national hepatitis C notification rate for 2009 was 0.7 per 100 000 population which was similar to the rate for 2008 (0.5 per 100 000). Taranaki (4.6 per 100 000 population, 5 cases) and Canterbury (1.6 per 100 000, 8 cases) DHBs were the only DHBs with five or more notifications.

Age-specific rates were highest in the 30–39 years age group (2.1 per 100 000 population, 12 cases) followed by 20–29 years age group (1.5 per 100 000, 9 cases).

Sex was recorded for 96.9% (31/32) of the cases. The notification rate was slightly higher for females (0.9 per 100 000 population, 19 cases) than males (0.6 per 100 000, 12 cases).

Ethnicity was recorded for 96.9% (31/32) of the cases. Of these, the majority were European (74.2%, 23 cases), followed by Māori (12.9%, 4 cases), Pacific Peoples (6.5%, 2 cases) and Asian (6.5%, 2 cases) ethnicities.

Of the 29 cases (90.6%) for which hospitalisation status was recorded, seven (24.1%) were hospitalised. No deaths due to hepatitis C were recorded in 2009.

The risk factors for hepatitis C are shown in Table 10. The most commonly reported risk factors were a history of injecting drug use (79.3%, 23 cases), followed by household contact with a confirmed case or carrier (52.2%, 12 cases) and sexual contact with a confirmed case or carrier (52.2%, 12 cases).

Table 10. Exposure to risk factors associated with hepatitis C, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
History of injecting drug use	23	6	3	79.3
Household contact with confirmed case	12	11	9	52.2
Sexual contact	12	11	9	52.2
Body piercing/ tattooing in last 12 months	2	18	12	10.0
Case blood product or tissue recipient	2	21	9	8.7
Overseas during incubation period	1	23	8	4.2
Occupational exposure to blood	1	24	7	4.0
Case child of seropositive mother	0	26	6	0.0

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

Hepatitis (Viral) Not Otherwise Specified

Two cases of hepatitis (viral) not otherwise specified (NOS) were notified in 2009. Both cases were hospitalised following infection with hepatitis E. One case, a European male in the 60–69 age group from Auckland DHB, had recently returned from travel to South Africa. The other case, an Indian male in his 20s from Counties Manukau DHB, had recently returned from India and was a blood or tissue recipient in the past.

Since 1997, 36 cases of hepatitis NOS have been notified in New Zealand.

Highly Pathogenic Avian Influenza

Highly pathogenic avian influenza (HPAI) became a notifiable disease in New Zealand in February 2004. No human cases have been reported in New Zealand and no highly pathogenic avian influenza A(H5N1) has been reported in New Zealand animals [17].

During 2009, 73 laboratory-confirmed A(H5N1) cases resulting in 32 fatalities occurred worldwide in Egypt (39 cases, 4 deaths), Indonesia (21 cases, 19 deaths), China (7 cases, 4 deaths), Vietnam (5 cases, 5 deaths) and Cambodia (1 case, 0 deaths) [18]

Hydatid Disease

Hydatid disease is caused by the larval stage of the tapeworm *Echinococcus granulosus*. Two confirmed cases and one probable case of hydatid disease were notified in 2009. Since 1997, 43 cases of hydatid disease have been notified.

Of the three 2009 cases, one was in the 15–19 years age group, one in the 60–69 years age group and one in the 70 years and over age group. Two cases were male and one female. All had an ethnicity recorded, two cases were European and one was Asian. One case was hospitalised.

The two confirmed cases reported past occupational risk factors, one case worked on a water pipeline in the vicinity of dog hydatid dosing strips in the 1970s, and one case worked as a digger contractor in a rural area. The probable case was born in Asia and while having had farm exposure in New Zealand, had also travelled to Asia on a number of occasions.

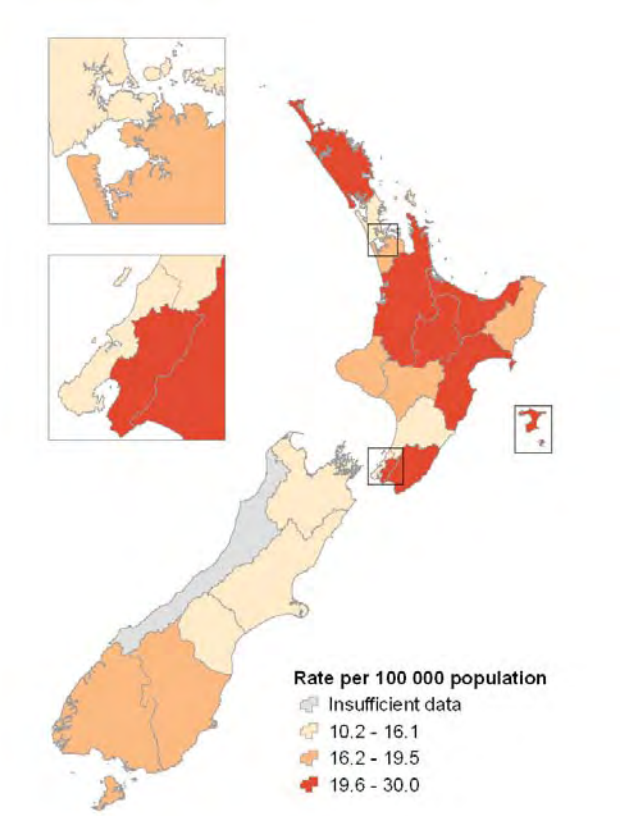
Echinococcus species are notifiable organisms under the Biosecurity Act 1993. All cases of hydatid disease are reported to the Ministry of Agriculture and Forestry for investigation of possible disease reservoirs in New Zealand animals. In September 2002, New Zealand was declared provisionally free of hydatids. However, hydatids are notoriously difficult to eradicate and a thorough investigation and a high level of vigilance around human cases remains appropriate. Given the natural history of the disease, cases may occur for some years yet.

Invasive Pneumococcal Disease

Invasive pneumococcal disease (IPD) was added to the list of notifiable diseases on 17 October 2008. A full description of the epidemiology of IPD in 2009 based on laboratory data is contained in a separate report [19].

A total of 704 cases of IPD was notified in 2009, a rate of 16.3 per 100 000 population. Rates varied throughout the country as illustrated in Figure 15. The highest rate was recorded in Wairarapa (30.0 per 100 000 population, 12 cases) followed by Lakes (28.5 per 100 000, 29 cases) and Bay of Plenty (24.1 per 100 000, 50 cases) DHBs.

Figure 15. Invasive pneumococcal disease notifications by DHB, 2009



Age and sex were recorded for all cases. Age-specific rates were highest in the less than 1 year age group (57.1 per 100 000 population, 36 cases) followed by the 70 years and over (49.9 per 100 000, 190 cases), and 1–4 years (27.2 per 100 000, 66 cases) age groups.

The 2009 IPD notification rate was higher for males (17.4 per 100 000 population, 369 cases) compared with females (15.2 per 100 000 population, 335 cases).

Ethnicity was recorded for 97.6% (687/704) notifications. The highest notification rate in 2009 was for those of Pacific Peoples (41.1 per 100 000, 93 cases) ethnicity followed by those of Māori (32.0 per 100 000, 181 cases), European (14.4 per 100 000, 387 cases) and Asian (7.0 per 100 000, 24 cases) ethnicities.

Of the 648 (92.0%) cases for which hospitalisation status was recorded, 624 (96.3%) were hospitalised. Thirty-four deaths were reported: less than 1 year age group (1 death), 30–69 years age group (10 deaths), and 70 and over years age group (23 deaths).

In June 2008, IPD became a vaccine-preventable disease in New Zealand with the addition of the 7-valent pneumococcal conjugate vaccine (PCV-7) to the New Zealand childhood immunisation schedule.

The recommended immunisation schedule for IPD in 2009 was four doses of vaccine, the first given at 6 weeks, followed by further doses at 3 months, 5 months and 15

months of age. Table 11 shows vaccination status by age group.

The risk factors recorded for IPD are shown in Table 12. The most common risk factor was chronic illness (42.5%, 249/586).

Table 11. Age group of invasive pneumococcal disease notifications and vaccinations received, 2009

Age group	Total cases	One dose	Two doses	Three doses	Four doses	Five doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<1 yr	36	5	5	6	0	0	0	11	9
1–2 yrs	48	1	0	5	0	0	0	28	14
3–4 yrs	18	0	0	0	0	0	0	13	5
5–9 yrs	34	1	0	0	0	0	0	21	12
10–19 yrs	55	0	0	0	0	0	0	39	16
20+ yrs	513	0	0	0	0	0	2	297	214
Total	704	7	5	11	0	0	2	409	270

Table 12. Exposure to risk factors associated with invasive pneumococcal disease, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Chronic illness	249	337	118	42.5
Current smoker	99	349	256	22.1
Immunocompromised	89	481	134	15.6
Resident in long term or other chronic care facility	44	542	118	7.5
Smoking in the household (cases <5 years of age)	14	228	462	5.8
Premature <37 weeks gestation (cases <1 year of age)	11	250	443	4.2
Attends childcare (cases <5 years of age)	7	366	331	1.9
Congenital or chromosomal abnormality	8	550	146	1.4
Anatomical or functional asplenia	6	543	155	1.1

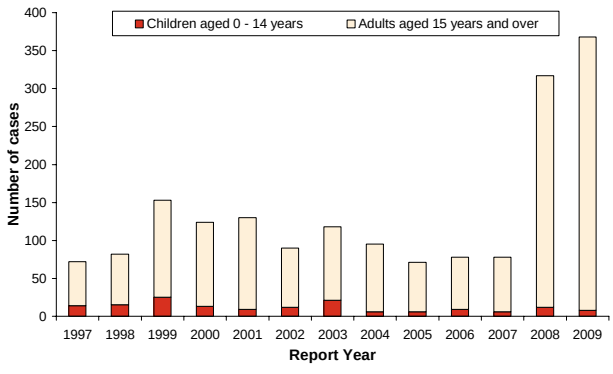
[a] Percentage refers to the number of cases that answered "yes" out of the total number of cases for which this information was supplied. Several cases had more than one risk factor recorded.

LEAD ABSORPTION

There were 368 cases of lead absorption notified in 2009 (8.5 per 100 000 population) compared with 317 in 2008 (7.4 per 100 000). Figure 16 shows that between 1997 and 2007 the number of lead absorption notifications has varied with a significant increase in the number of notifications in 2008 and 2009. This increase in notifications coincided with enhanced routine occupational screening in the Auckland region, lowering of the non-occupational notifiable blood-lead level from 0.72 to 0.48 µmol/l in September 2007 and the introduction of direct laboratory notification in December 2007.

Of the 368 cases notified in 2009, eight (2.2%) were aged less than 15 years; five were aged 1–4 years, two were aged 5–9 years and one was aged 10–14 years. The highest number of notifications in children was recorded in 1999 (25 cases) and the lowest in 2004, 2005 and 2007 (6 cases each). Of the adult cases, the highest age-specific rate was recorded for the 40–49 years age group (15.1 per 100 000 population, 96 cases) followed by the 30–39 years age group (13.4 per 100 000, 77 cases).

Figure 16. Lead absorption notifications in children and adults by year, 1997–2009



Sex was recorded for 95.7% (352/368) of the cases. Males had a higher rate (14.9 per 100 000 population, 316 cases) than females (1.6 per 100 000, 36 cases).

Ethnicity was recorded for 78.3% (288/368) of the cases. The high notification rates were reported for European ethnicity (8.6 per 100 000, 233 cases), followed by Pacific Peoples (6.6 per 100 000, 15 cases), Māori (3.9 per 100 000, 22 cases) and Asian (3.8 per 100 000, 13 cases) ethnicities.

Of the 175 (47.6%) cases for which hospitalisation status was recorded, seven (4.0%) were hospitalised.

Table 13 and Table 14 summarise risk factor information for lead absorption cases. Several cases had more than one risk factor recorded. For children, the most common risk factor was living in, or regularly visiting, a building built prior to 1970 that had paint chalking or flaking and/or had recently undergone alteration or refurbishment. For adults, the most common risk factor was exposure to an occupation with a high risk of lead exposure.

Blood-lead levels were recorded for all notifications. For child notifications, blood-lead level concentrations ranged from 0.48 to 1.49 μmol/L with a median of 0.89 μmol/L. For adult notifications, blood-lead level concentrations ranged from 0.48 to 5.30 μmol/L, with a median of 0.70 μmol/L.

Ten cases were linked to an ongoing lead poisoning cluster from 2008 associated with occupational exposure to lead during the removal of paint from the Auckland Harbour Bridge.

Table 13. Exposure to risk factors associated with lead absorption for children (cases aged less than 15 years), 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Case lived in or regularly visited a building built prior to 1970 that had paint chalking/flaking, and/or had recently undergone alterations or refurbishment	6	0	2	100.0
Pica behaviour	3	3	2	50.0
Case played in soil containing paint debris	2	3	3	40.0
Close contact of case was occupationally exposed to lead	2	5	1	28.6
Case lived near an industry that was likely to release lead	0	6	2	0.0

Table 14. Exposure to risk factors associated with lead absorption for adults (cases aged 15 years and over), 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Case had exposure to high-risk occupation[b]	222	83	55	72.8
Case lived in or regularly visited a building built prior to 1970[c]	90	88	182	50.6
Case had exposure to lead through hobbies[d]	66	115	179	36.5
Close contact of case was occupationally exposed to lead	6	160	194	3.6

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

[b] Occupations included painter (41), builder/labourer (18), radiator fitter/repairer (13), foundry worker (11), scrap metal worker/dealer (10), metal worker (5), factory process worker (3), lead lighter/glass worker (3), plumber (3), automotive electrician (1), engineer (1), gunsmith (1) , laboratory technician (1), policeman (1), and unspecified (110).

[c] Of these, 61 lived in or regularly visited a building that had chalking/flaking paint, and/or recently undergone alterations or refurbishment

[d] Hobbies were reported as shooting (50), home renovations (4), making sinkers (5), lead lighting (3), boat building (2), and other (including ceramics maker, circuit board repairer, metal casting)

LEGIONELLOSIS

In 2009, a total of 78 cases of legionellosis were notified. This represents a rate of 1.8 per 100 000 population, which was similar to 2008 (1.7 per 100 000, 73 cases) and that reported in other recent years (Figure 17).

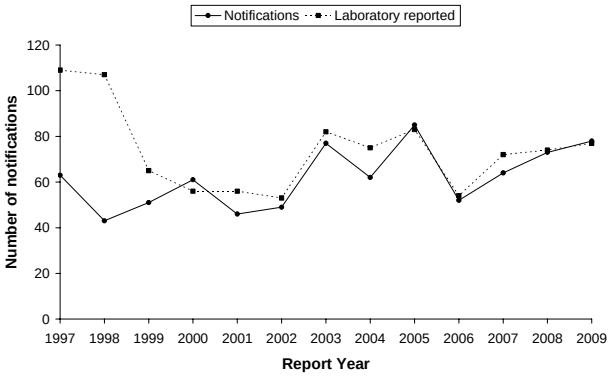
The highest rates in 2009 were reported from the Bay of Plenty (4.3 per 100 000 population, 9 cases) and Hawke's Bay (3.2 per 100 000, 5 cases) DHBs.

The highest age-specific rate was reported in cases aged 70 years and over (6.3 per 100 000 population, 24 cases) followed by those aged 60–69 years (5.6 per 100 000, 22 cases) and those aged 50–59 years (2.3 per 100 000, 12 cases).

Sex was recorded for all cases. The 2009 legionellosis rate was higher for males (2.4 per 100 000 population, 50 cases) than for females (1.3 per 100 000, 28 cases).

Of the 74 cases in 2009 for which hospitalisation status was recorded, 65 (87.8%) were hospitalised.

Figure 17. Legionellosis notifications and laboratory-reported cases by year, 1997–2009



There were two deaths reported from legionellosis in 2009. Both were males, one was in the 50–59 years age group and the other in the 60–69 years age group.

Table 15 provides a summary of the risk factors for which data were available. Of the 45 cases with a definite or suspected environmental source of infection recorded, 33 (73.3%) reported contact with compost/potting mix/soil, six reported exposure to showers/hot water systems, three

reported exposure to an air conditioning unit, two reported exposure to a spa/indoor pool and one reported exposure to pond water. Four cases had reported overseas travel during the incubation period.

Seventy-seven cases of legionellosis were laboratory diagnosed during 2009. Table 16 shows the strains identified for the laboratory-reported cases in 2009.

There were no legionellosis outbreaks reported in 2009.

Table 15. Risk factors associated with legionellosis, 2009

Risk factor	Yes	No	Unknown	Percentage (%) [a]
Contact with definite or suspected environmental source of infection	45	9	24	83.3
Pre-existing immunosuppressive or debilitating condition	22	38	18	36.7
Smokers or ex-smokers	16	46	16	25.8

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

Table 16. Legionellosis strains for laboratory cases, 2009

Legionella species and serogroup	Number	Percentage (%)
L. pneumophila cases	34	44.2
L. pneumophila sg 1	25	32.5
L. pneumophila sg 4	3	3.9
L. pneumophila sg 2	2	2.6
L. pneumophila sg 6	1	1.3
L. pneumophila sg 13	1	1.3
L. longbeachae cases	32	41.6
L. longbeachae sg 1	23	29.9
L. longbeachae sg 2	4	5.2
L. longbeachae sg unknown	5	6.5
L. dumoffii	5	6.5
L. gormanii	2	2.6
L. micdadei	2	2.6
L. bozemanae sg 1	1	1.3
L. sainthelensi	1	1.3
Legionella species not identified[b]	2	2.6
Total	77	100

[a] Percentage refers to the number of laboratory cases with that strain out of the total number of cases for which strains were identified.

[b] Non-*L. pneumophila* strain

LEPROSY

Three cases of leprosy were notified in 2009 compared with five cases in 2008. The cases were aged in the 15–19 years (1 case), 20–29 years (1 case) and 40–49 years (1 case) age groups. Two cases were female and one case was male. Two cases had ethnicity recorded as Asian and one as Pacific Peoples.

Two of the cases were laboratory confirmed and one case was probable. Both confirmed cases had the acid-fast status recorded as multibacillary. The clinical form of leprosy was recorded for two of the three cases, one borderline and the other lepromatous. All cases were overseas during the incubation period in Nepal (1 case), Philippines (1 case) and Samoa (1 case).

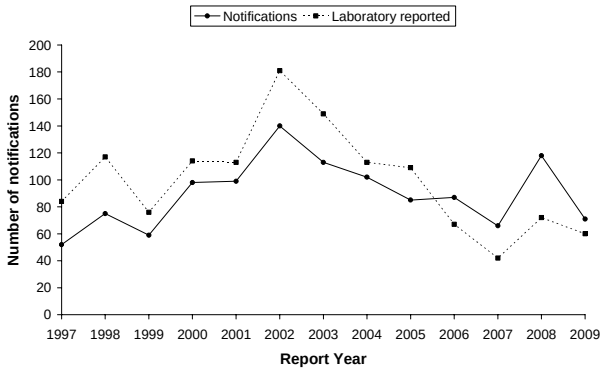
LEPTOSPIROSIS

In 2009, a total of 71 cases of leptospirosis were notified. The rate of 1.6 cases per 100 000 population was a significant decrease from the notification rate in 2008 (2.8 per 100 000, 118 cases). Of the 71 notified cases, 64 (90.1%) were laboratory confirmed.

Figure 18 shows the number of notified- and laboratory-reported cases of leptospirosis each year since 1997.

The highest age-specific rates were reported in the 40–49 years age group (3.6 per 100 000 population, 23 cases), followed by the 30–39 years age group (2.9 per 100 000, 17 cases). Sex was recorded for all cases, where the majority were male (90.1%, 64 cases). Ethnicity was recorded for all cases. The disease notification rate for those of European ethnicity (2.3 per 100 000, 62 cases) was higher than for those of Māori ethnicity (1.6 per 100 000, 9 cases).

Figure 18. Leptospirosis notifications and laboratory-reported cases by year, 1997–2009



Occupation was recorded for 66 (93.0%) of the 71 notified cases. Of these, 55 cases (83.3%) were recorded as engaged in occupations previously identified as high risk for exposure to *Leptospira spp.* in New Zealand [20]. The proportion of leptospirosis cases in high-risk occupations was higher than that in the previous year (2008, 72.9%), and similar to the proportion of cases in high-risk occupations in the two years prior (82.8% in 2007 and 82.7% in 2006). Of the 66 cases with occupation recorded, 40 (60.6%) were farmers or farm workers, 12 (18.2%) worked in the meat-processing industry (as freezing workers, butchers, or slaughterers), and three (4.5%) had other occupations that involved direct animal contact (stock truck driver, park ranger). Of the 16 cases that either did not report a high-risk occupation or did not have an occupation recorded, eight reported animal/outdoor exposures as a risk factor.

Leptospira species and serovars (sv) were recorded for 60 of the 71 notified cases: *L. borgpetersenii* sv Hardjo (28 cases), *L. borgpetersenii* sv Ballum (17), *L. interrogans* sv Pomona (5), *L. borgpetersenii* sv Tarassovi (3), *L. interrogans* sv Copenhageni (2), *L. interrogans* sv Australis (1) and *L. interrogans* sv Canicola (1). Two cases had mixed serovars: *L. borgpetersenii* sv Hardjo and Ballum (1), and *L. borgpetersenii* sv Ballum *and L. interrogans sv* Canicola (1). One case with recent travel history to Asia had a serovar exotic to New Zealand, *L. Celledoni sv* Mengdeng. This was isolated in New Zealand then sent to Australia for further identification.

No outbreaks of leptospirosis were reported in 2009.

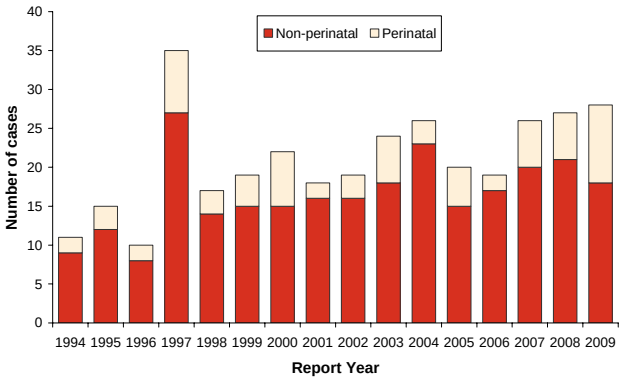
LISTERIOSIS

In 2009, 28 cases of listeriosis were notified, a rate of 0.6 per 100 000 population. Figure 19 shows listeriosis notifications (perinatal and non-perinatal) each year for the last 15 years. Over the preceding five years (2004–2008) the average number of cases per year was 24, peaking with 27 cases (0.6 per 100 000 population) in 2008, the highest since 1997 (35 cases).

Ten (35.7%) of the 2009 cases were recorded as perinatal, the highest since 1997 (8 cases) and an increase from 2007 and 2008 (6 cases each). Weeks of gestation were known for all cases, with a range of 20 to 40 weeks. Two foetuses of 20 and 31 weeks gestation died. One mother was of Māori ethnicity in the 15–19 years age group and the other was European and in the 20–29 years age group.

The 18 non-perinatal cases were from 10 DHBs, with the greatest number from Auckland (3 cases) and Otago (3 cases). Three of the non-perinatal cases were aged less than 30 years, with 15 cases aged over 50 years, and 10 of these were aged over 70 years. Sex was recorded for all cases, of which 12 were female and six were male. Ethnicity was recorded for all cases, of which 12 cases were European, two were Māori, two Pacific Peoples and two of Other ethnicity.

Figure 19. Listeriosis notifications (perinatal and non-perinatal) by year, 1994–2009



Hospitalisation status was recorded for 17 of the 18 non-perinatal cases. Of these 17 cases, six were hospitalised for treatment of another illness and five were receiving immunosuppressive drugs (note that a case may have more than one risk factor). Information on underlying illness was recorded for 17 (94.4%) of the non-perinatal cases, of which 13 had an underlying illness such as cancer, autoimmune disease, diabetes renal failure, and other chronic illnesses. Two non-perinatal deaths were reported in 2009, both aged 70 years and over.

Twenty-nine cultures were received for typing by the ESR Special Bacteriology Laboratory. Twenty-five (86.2%) were serotype 4, the remaining four (13.8 %) were serotype 1/2.

Serotype 4 strains have steadily become predominant over serotype 1/2 strains in recent years. The percentage of serotype 4 strains (86.2%) found in cases in 2009 was higher than that in any of the previous five years (between 61.5% and 75.0% from 2004 to 2008).

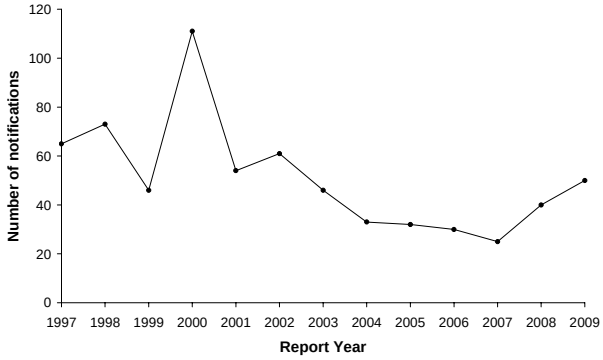
Twelve of the cultures, in two separate clusters of cases, were also examined using DNA macrorestriction analysis by pulsed-field gel electrophoresis (PFGE) to determine any links. A common food source related to the cases has not been identified in either of the clusters.

There were no outbreaks of listeriosis reported in 2009.

MALARIA

There were 50 cases of malaria notified in 2009 compared with 40 cases in 2008 (Figure 20). The 2009 notification rate (1.2 per 100 000 population) was higher than that for 2008 (0.9 per 100 000).

Figure 20. Malaria notifications by year, 1997–2009



Age was recorded for all the reported malaria cases. The highest age-specific rates were reported in the 20–29 years age group (2.9 per 100 000 population, 17 cases), followed by the 5–9 years and 10–14 years age groups (both with 1.7 per 100 000 population, 5 cases).

Sex was recorded for all the reported malaria cases. The notification rate was higher for males than females (1.5 per 100 000 population, 32 cases; 0.8 per 100 000 population, 18 cases, respectively).

Ethnicity was recorded for 88.0% (44/50) of the cases. Of the 44 cases, the highest number of notifications occurred among those of Asian ethnicity (17 cases, 38.6%), followed by European (10 cases, 22.7%), Other (10 cases, 22.7%), Pacific Peoples (6 cases, 13.6%) and Māori (1 case, 2.3%) ethnicities.

Hospitalisation status was recorded for 90.0% (45/50) of the cases. Of the 45 cases, 53.3% (24 cases) were hospitalised. All 50 notified cases were laboratory confirmed.

Travel history was recorded for all the reported malaria cases. Forty-three (86.0%) cases had resided overseas or travelled overseas during the incubation period of the disease. Seven cases (14.0%) had not been overseas recently, but did have a prior history of travel to malaria endemic areas. The most common countries visited or resided in were India (17 cases, 36.0%), followed by Papua New Guinea (10 cases, 20.0%) and Uganda (seven cases, 14.0%). Note that cases may have travelled to more than one country. The areas travelled to or

resided in and the *Plasmodium* species identified are listed in Table 17. The most common species identified was *P. vivax* (34 cases), followed by *P. falciparum* (17 cases), *P. malarie* (1 case) and one indeterminate species. Note that cases may have had more than one species identified.

Malaria prophylaxis was taken as prescribed by six cases. Eight cases did not use any prophylaxis, and prophylaxis use was unknown for 36 cases.

Ministry of Health hospitalisation data for 2009 recorded 34 cases with the primary reason for admission being malaria.

Table 17. Species of malaria and area of overseas travel, 2009

Area resided in or visited	*P. vivax*	*P. falciparum*	*P. malarie*	*P. ovale*	Indeterminate
Australia		1			
Cambodia		1			
Cameroon		1			
Congo		2			
Germany	1				
Hong Kong (Special Administrative Region)	1	1			
India	17				1
Indonesia	1				
Israel	1	1			
Japan	1				
Kenya		1			
Korea, Republic of	1				
Malawi	1				
Malaysia	1				
Netherlands	1				
Nigeria	1	3			
Pakistan	1				
Papua New Guinea	6	3	1		
Solomon Islands	1				
South Africa		1			
Sudan		1			
Timor-Leste	1				
Uganda	1	6			
Vanuatu	2				
Total[a]	39	22	1	0	1

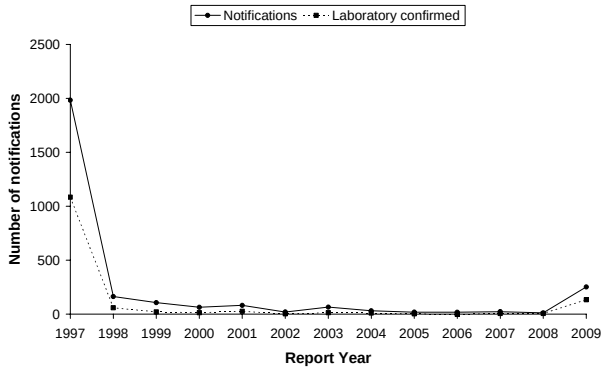
[a] Cases may have travelled to more than one country during the incubation period and may have had more than one species identified.

MEASLES

In New Zealand, measles immunisation was introduced in 1969 and measles has been a notifiable disease since June 1996. In 2009, there were 253 measles notifications, of which 134 were laboratory-confirmed cases. This was a significant increase from 2008 when there were 12 notifications with seven laboratory-confirmed cases. This was the second highest number of notifications since a peak of 1984 cases in 1997 (Figure 21).

The 2009 increase was primarily attributed to three outbreaks involving 205 cases, the largest of these was a community-based outbreak that involved cases from the West Coast, Canterbury and South Canterbury Health Districts (170 cases). See the Outbreak Surveillance Section for more details.

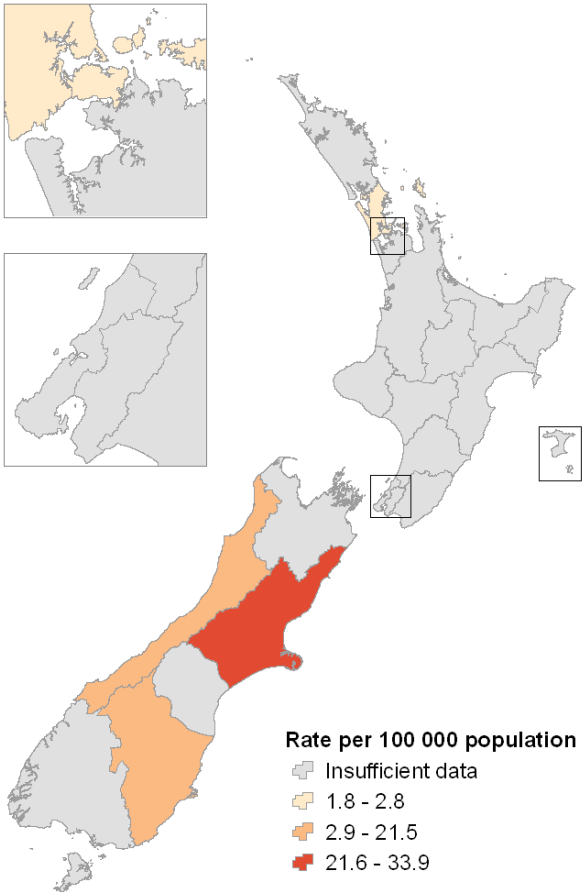
Figure 21. Measles notifications and laboratory confirmed cases by year, 1997–2009



The 2009 measles notification rate was 5.9 per 100 000 population, this was a significant increase compared with

the rate for 2008 (0.3 per 100 000). The highest rate was reported from Canterbury DHB (33.9 per 100 000 population, 170 cases), followed by West Coast (21.5 per 100 000, 7 cases) and Otago (18.6 per 100 000, 35 cases) DHBs. Figure 22 illustrates the geographic variability in rates of measles by DHB

Figure 22. Measles notifications by DHB, 2009



The highest age-specific rate was seen in the less than one years age group (46.0 per 100 000 population, 29 cases), followed by the 1–4 years (31.3 per 100 000, 76 cases) and the 10–14 years (17.8 per 100 000, 53 cases) age groups.

The notification rate was higher for males (6.4 per 100 000 population, 136 cases) than females (5.3 per 100 000, 117 cases).

Of the 250 (98.8%) cases for which ethnicity was recorded, the highest notification rate was for those of European ethnicity (7.9 per 100 000, 212 cases), followed by Māori (3.9 per 100 000, 22 cases), Pacific Peoples (3.5 per 100 000, 8 cases) and Asian (2.3 per 100 000, 8 cases) ethnicities.

Hospitalisation status was recorded for 249 (98.4%) cases. Of the 249 cases, 8.0% (20 cases) were hospitalised. No deaths due to measles were recorded in 2009.

Of the cases for which the information was recorded, 66.5% (155/233) attended school, pre-school or childcare, 57.2% (103/180) had contact with another case of the disease in the previous three weeks and 6.2% (14/227) reported overseas travel during the incubation period.

The recommended measles, mumps and rubella vaccine MMR immunisation schedule since January 2001 has been to give the first vaccine dose at 15 months and the second at four years of age. However, following the increase in cases in 2009, the Ministry of Health recommended in August 2009 that the first dose be given from 12 months of age and, if measles was prevalent in the local community, to give the second dose one month later [21].

Of the 253 measles cases, 243 (96.0%) had a known vaccination status. Of these 243 cases, 143 were not vaccinated, including 35 cases aged less than 15 months and therefore not eligible for vaccination. Fifty-nine cases had received one dose of vaccine including five cases aged less than 15 months who had received their first dose (due at 15 months) early and 38 cases aged 15 months to 3 years who were only eligible for one dose of vaccine. Twenty-eight cases reported having completed the measles vaccination. Table 18 shows vaccination status by age group.

Table 18. Age group and vaccination status of measles notifications, 2009

Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 mths	40	5	0	0	35	0
15 mths–3 yrs	60	38	5	2	14	1
4–9 yrs	36	3	3	0	29	1
10–19 yrs	89	7	17	4	58	3
20+ yrs	28	6	3	7	7	5
Total	253	59	28	13	143	10

MENINGOCOCCAL DISEASE

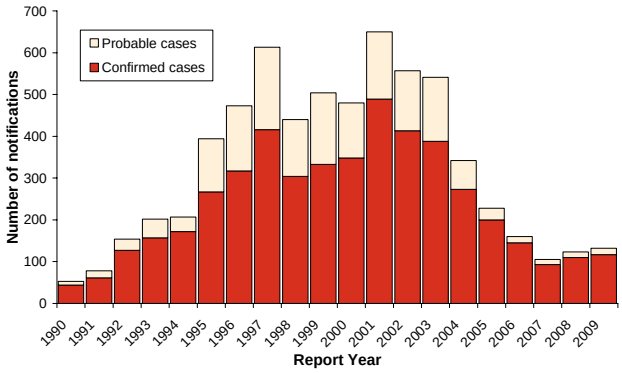
A full description of the epidemiology of meningococcal disease in 2009 is contained in a separate report [22].

The surveillance of meningococcal disease in New Zealand is based upon rigorously matching and following up all laboratory and notification data. A total of 132 cases of meningococcal disease was notified in 2009, giving a rate of 3.3 per 100 000 population. This rate was a significant decrease from 2004 (8.5 per 100 000, 342 cases) yet was still 2.2-times higher than the rate of 1.5 per 100 000 that occurred in the immediate pre-epidemic years (1989–1990). Figure 23 shows the number of confirmed and probable cases of meningococcal disease since 1990.

Of the 132 cases for 2009, 117 (88.6%) were laboratory confirmed by either culture (78) or DNA testing alone (39).

These figures are based on the combined laboratory and notification database, which uses the earliest date for the case (onset or hospitalisation data rather than report date, if available). The population used to calculate rates in this section was the 2006 census to allow comparison with earlier years. All tables in the appendix of this report are based on report dates and population estimates hence figures may differ slightly.

Figure 23. Meningococcal disease notifications by year, 1990–2009



Of the DHBs with more than five cases reported in 2009, the highest rates were recorded in Tairawhiti (13.5 per 100 000 population, 6 cases) and MidCentral (6.3 per 100 000, 10 cases) DHBs. The lowest rates were from Waitemata (1.2 per 100 000, 6 cases) and Canterbury (2.6 per 100 000, 12 cases) DHBs. No cases were reported from Nelson-Marlborough and South Canterbury DHBs. Figure 24 illustrates the rates of meningococcal disease by DHB.

As in previous years, the highest age-specific rates occurred in the less than 1 year age group (47.7 per 100 000 population, 27 cases) followed by the 1–4 years age group (16.0 per 100 000, 35 cases).

Ethnicity was recorded for 98.5% (130/132) of the cases reported in 2009. The highest disease rates were for those of Māori ethnicity (8.5 per 100 000 population, 48 cases), followed by those of Pacific Peoples (7.5 per 100 000, 17 cases) and European (2.2 per 100 000, 59 cases) ethnicities.

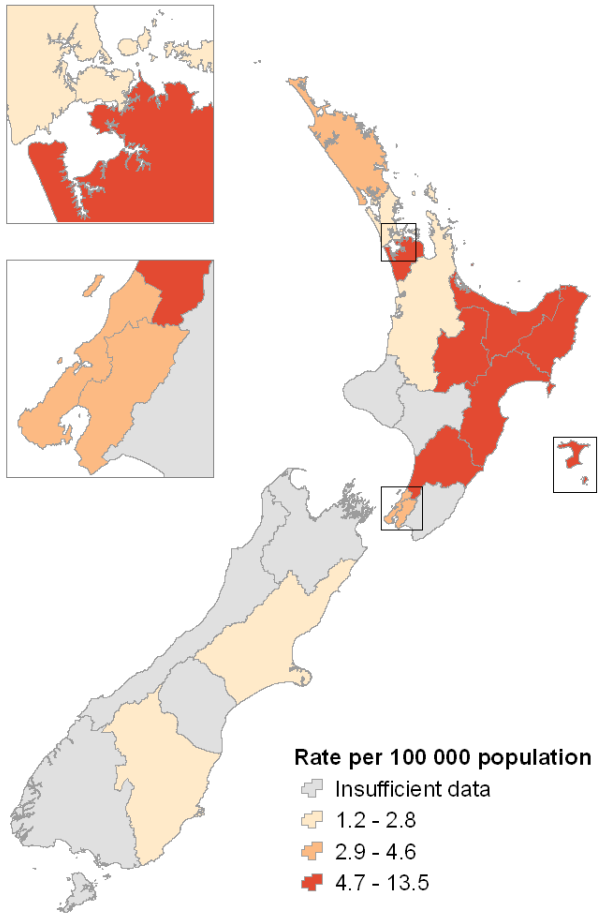
Five deaths were reported during 2009 with the associated case fatality rate of 3.8%. This brings the number of deaths since 1991 to 265, with an average case fatality rate of 4.2%.

Data on pre-hospital management were recorded for 95.5% (126/132) of cases. These data show that only 15.9% (20/126) of cases received antibiotic treatment prior to hospital admission. In 2009, there was one fatality among cases seen by a doctor prior to hospital admission and given antibiotics. In comparison there were three fatalities in those cases seen by a doctor prior to admission and not given pre-hospital antibiotics. One case was not seen by a doctor or given antibiotics.

Serogroup B disease and particularly that caused by the epidemic strain, has continued to cause disease in 2009. However, the number of epidemic strain cases in 2009 was less than one-sixth of that in the peak year of 2001 (40 cases compared with 262 cases). Of the 40 epidemic strain cases, 31 were less than 20 years of age.

The antimicrobial susceptibility of 76 viable meningococcal isolates received by ESR from cases of invasive disease in 2009 was tested. All isolates were susceptible to ceftriaxone and ciprofloxacin, 22.4% (17/76) of the isolates had reduced susceptibility to penicillin, with MICs of 0.12–0.5 mg/L and 2.6% (2/76) were rifampicin resistant.

Figure 24. Meningococcal disease notifications by DHB, 2009



MUMPS

In 2009, a total of 63 cases of mumps were notified, of which 21 cases were laboratory confirmed. In comparison, 76 cases of mumps were notified in 2008, of which 42 were laboratory confirmed.

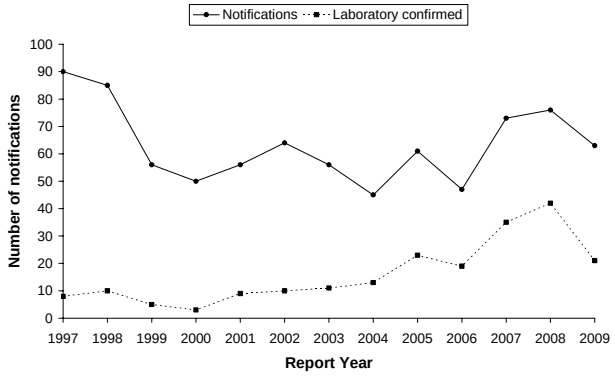
Immunisation against mumps was introduced to the New Zealand Immunisation Schedule in 1990 as part of the MMR vaccine and mumps became notifiable in June 1996. The last epidemic occurred in 1994. Figure 25 shows notified and laboratory-reported cases from 1997 to 2009.

The 2009 mumps notification rate was 1.5 per 100 000 population. This was lower than the rate for 2008 (1.8 per 100 000). The highest rate was recorded in Capital and Coast (2.8 per 100 000, 8 cases) and Canterbury (2.8 per 100 000, 14 cases) DHBs, followed by Bay of Plenty DHB (2.4 per 100 000, 5 cases).

The highest age-specific rate was in the 1–4 years age group (7.4 per 100 000 population, 18 cases) followed by the 5–9 years age group (5.9 per 100 000, 17 cases).

The mumps notification rate was slightly higher for males (1.7 per 100 000 population, 35 cases) compared with females (1.3 per 100 000, 28 cases).

Figure 25. Mumps notifications and laboratory-confirmed cases by year, 1997–2009



Of the 60 (95.2%) cases for which ethnicity was recorded, similar rates were reported for those of Māori (1.8 per 100 000, 10 cases), European (1.6 per 100 000, 44 cases) and Asian (1.5 per 100 000, 5 cases) ethnicities.

Hospitalisation status was recorded for 84.1% (53/63) of mumps cases. Of these, 3.8% (2 cases) were hospitalised. No deaths due to mumps were recorded in 2009.

Of the cases for which the information was recorded, 75.0% (39/52) attended school, pre-school or childcare during the incubation period, 12.5% (4/32) had contact with another case of the disease in the previous three weeks, and 4.0% (2/50) reported overseas travel. One mumps outbreak was reported in 2009, involving three cases

The recommended immunisation schedule for mumps in 2009 was two doses of MMR vaccine, the first given at 15 months of age and the second given at four years of age. Of the 63 mumps cases, 49 (77.8%) had a known vaccination status. Of these, 21 (42.9%) were not vaccinated including one case aged less than 15 months that was ineligible for vaccination. Twelve cases had received one dose of vaccine and 10 cases reported having completed the mumps vaccination. Table 19 shows the number of doses of MMR vaccine given to mumps cases in each relevant age group.

Table 19. Age group of mumps notifications and vaccination received, 2009

Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 mths	1	0	0	0	1	0
15 mths–3 yrs	13	7	2	0	4	0
4–9 yrs	22	2	5	2	7	6
10–19 yrs	11	3	3	1	2	2
20+ yrs	16	0	0	3	7	6
Total	63	12	10	6	21	14

NON-SEASONAL INFLUENZA

Non-seasonal influenza (capable of being transmitted between human beings) became a notifiable and quarantineable disease in New Zealand on 30 April 2009. This was in response to the arrival of symptomatic individuals from Mexico where a significant influenza outbreak was in progress involving a novel swine influenza A/H1N1 virus. This novel influenza virus was affecting otherwise healthy adults and had spread into California [23]. Ultimately, on 11 June 2009, the World Health Organization declared that the criteria for an influenza pandemic had been met [24] after the virus, later called pandemic influenza (H1N1) 09, had spread across more than 70 countries [25].

In New Zealand during 2009, a total of 3668 cases of non-seasonal influenza was reported, corresponding to a rate of 85.0 cases per 100 000 population. Among the 3668 cases, 3211 were confirmed, 69 probable, 371 suspect and 17 remained under investigation. Note that the suspect status category was removed from the case definition in June 2009 following confirmation of community transmission of pandemic influenza (H1N1) 09 virus within New Zealand.

The notification rate for non-seasonal influenza varied by geographic region. The highest rates were reported in the West Coast DHB (199.4 per 100 000 population, 65 cases), followed by Capital and Coast (178.8 per 100 000, 515 cases), Hutt Valley (149.3 per 100 000, 213 cases), South Canterbury (138.6 per 100 000, 77 cases) and Wairarapa (135.1 per 100 000, 54 cases) DHBs (Figure 26). Taranaki DHB had both the lowest rate and case count of all the DHBs (30.5 per 100 000, 33 cases) followed by Southland DHB (41.4 per 100 000, 46 cases).

Age was recorded for 3607 (98.3%) of cases. The highest age-specific rates were for cases aged less than one year (242.6 per 100 000 population, 153 cases), followed by cases aged 15–19 years (137.7 per 100 000, 445 cases) and 20–29 years (134.5 per 100 000, 787 cases).

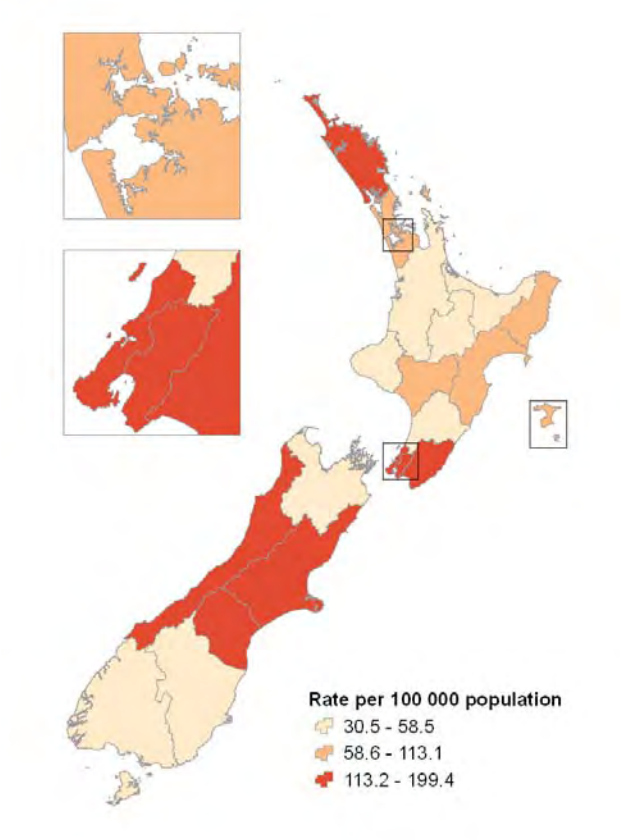
Sex was reported for 3611 (98.4%) cases, of which 1944 (53.8%) were female and 1667 (46.2%) were male. The female rate (88.4 per 100 000 population) was higher than the male rate (78.7 per 100 000).

Ethnicity was recorded for 3402 (92.7%) cases. The highest rates were reported for those of Pacific Peoples (273.1 per 100 000, 618 cases) ethnicity followed by those of Other (191.9 per 100 000, 65 cases) and Māori (146.1 per 100 000, 826 cases) ethnicities. The lowest rates were reported among those of European (58.7 per 100 000, 1581 cases) and Asian (91.5 per 100 000, 312 cases) ethnicities.

Hospitalisation status was recorded for 2330 cases (63.5%), of which 1014 (43.5%) were hospitalised. Twenty fatal cases were reported in 2009 where non-seasonal influenza was considered to be the primary cause of death.

Seven outbreaks due to influenza A H1N1 were reported in 2009. A total of 76 cases were involved and included two hospitalisations and two deaths. See the Outbreak Surveillance section for more details.

Figure 26. Non-seasonal influenza notifications by DHB, 2009

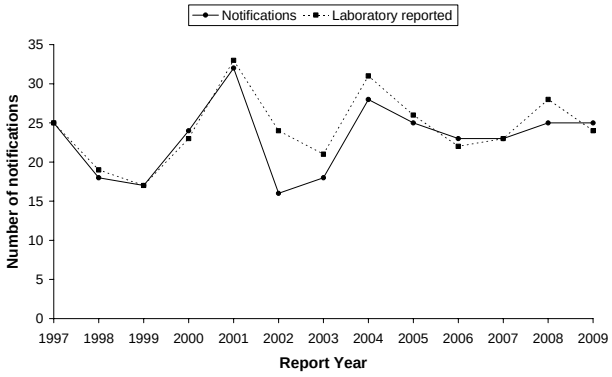


PARATYPHOID FEVER

Twenty-five cases of paratyphoid fever were notified in 2009. The 2009 rate (0.6 per 100 000 population) was the same as in 2008.

Figure 27 shows the number of notified and laboratory reported cases of paratyphoid each year since 1997.

Figure 27. Paratyphoid fever notifications and laboratory-reported cases by year, 1997–2009



Age was recorded for all cases. The highest age-specific rate was in the 20–29 years age group (1.4 per 100 000 population, 8 cases).

Sex was recorded for all cases. The sex-specific rate for males (0.8 per 100 000 population, 16 cases) was higher than females (0.4 per 100 000, 9 cases).

Of the 24 (96.0%) cases for which ethnicity was recorded, the notification rate was higher in those of Asian ethnicity (3.2 per 100 000, 11 cases) than European ethnicity (0.5 per 100 000, 13 cases).

Of the 21 (84.0%) cases for which hospitalisation status was recorded, nine (42.9%) were hospitalised.

Overseas travel information was recorded for all cases, 18 cases (72.0%) were recorded as having travelled overseas during the incubation period. The countries visited were India (6 cases), Thailand (6 cases), and China, Hong Kong, Malaysia, Nepal, Pakistan and Sri Lanka (1 case each).

The Enteric Reference Laboratory at ESR received 24 *Salmonella* Paratyphi isolates in 2009. The isolates were identified as *S.* Paratyphi B var. Java (16) and *S.* Paratyphi A (8).

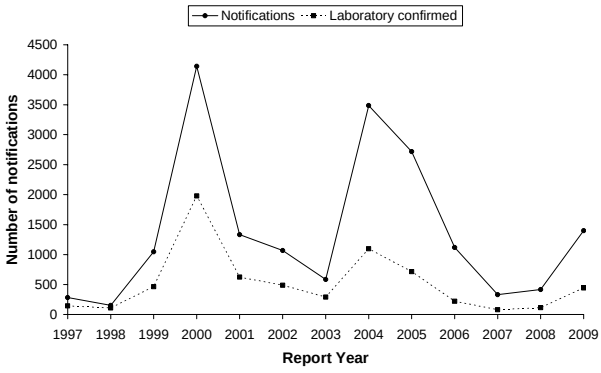
One paratyphoid fever outbreak was reported in 2009 involving two cases.

PERTUSSIS (WHOOPING COUGH)

Pertussis is a vaccine-preventable disease caused by the bacterial agent *Bordetella pertussis*. Epidemics occur in young children every three to four years with periodicity unchanged by mass immunisation [16]. Childhood vaccination has been routine in New Zealand since 1960, and the disease has been notifiable since 1996.

In 2009, 1399 pertussis cases were notified, of which 444 were laboratory confirmed by isolation of *B. pertussis* from the nasopharynx. The 2009 notification rate (32.4 cases per 100 000 population) was a significant increase from 2008 (9.8 per 100 000, 417 cases, 115 laboratory confirmed). However, notifications were still well below the levels experienced in previous epidemics of pertussis, which peaked at 4140 and 3485 cases annually in 2000 and 2004, respectively (Figure 28).

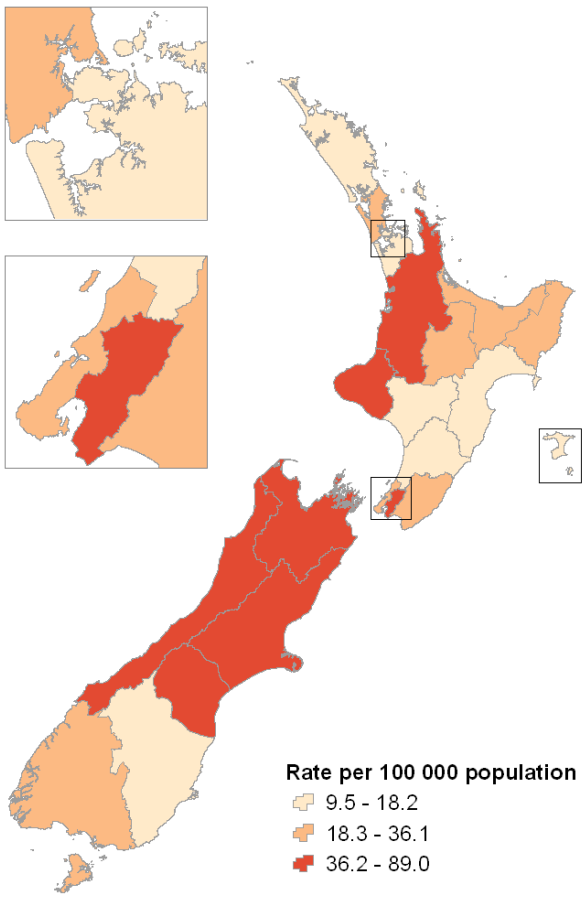
Figure 28. Pertussis notifications and laboratory-confirmed cases by year, 1997–2009



In 2009, the rate of pertussis varied by geographic region. The highest rates were reported in West Coast DHB (89.0 per 100 000 population, 29 cases) followed by Nelson-Marlborough (68.0 per 100 000, 93 cases), Waikato (64.7 per 100 000, 233 cases) and Canterbury (63.1 per 100 000, 317 cases) DHBs (Figure 29). Whanganui DHB had both the lowest rate and case count of all the DHBs (9.5 per 100 000, 6 cases).

Age was recorded for all cases. The highest age-specific rates were for cases aged less than one year (183.9 per 100 000 population, 116 cases), followed by cases aged 1–4 years (58.6 per 100 000, 142 cases) and 5–9 years (51.0 per 100 000, 147 cases).

Figure 29. Pertussis notifications by DHB, 2009



Sex and ethnicity were recorded for 99.6% (1394/1399) and 97.7% (1367/1399) of all pertussis cases, respectively. In 2009, females (36.3 per 100 000 population, 798 cases) had a higher notification rate than males (28.1 per 100 000, 596 cases). The highest rate by ethnicity occurred among those of European ethnicity (40.4 per 100 000 population, 1089 cases), followed by Māori (30.2 per 100 000, 171 cases), Pacific Peoples (27.0 per 100 000, 61 cases), Other (20.7 per 100 000, 7 cases) and Asian (11. 4 per 100 000, 39 cases) ethnicities.

Hospitalisation status was recorded for 1271 cases (90.9%) notified in 2009, of which 93 (7.3%) were hospitalised. Of those hospitalised, 73 (78.5%) had a known vaccination status. Of these, 42 were not vaccinated and five were reported to have received three or more pertussis vaccine doses. There were no deaths due to pertussis reported in 2009.

Since February 2006, the recommended immunisation schedule for pertussis has been a primary course of DTaP-IPV at six weeks, three months and five months of age, followed by booster doses at both four (DTaP-IPV) and 11 (DTaP) years of age [16].

Vaccination status was known for 789 (56.4%) cases notified during 2009 (Table 20). Of these, 317 (40.2%) were not vaccinated including 13 cases aged less than six weeks and therefore not eligible for vaccination. A total of 203 cases (25.7%) had received three or more doses of pertussis vaccine.

Of the 986 (70.5%) cases for which the relevant information was recorded, 368 (37.3%) attended school, pre-school or childcare. There were 27 outbreaks due to *B. pertussis* involving 104 cases reported in 2009 (see the Outbreak Surveillance section for more details).

PLAGUE

The last case of *Yersinia pestis* infection in New Zealand was reported in 1911 during the last plague pandemic, which originated in Hong Kong in 1894. Between 1900 and 1911, 21 cases of plague were recorded in New Zealand, nine of which were fatal [11].

POLIOMYELITIS (POLIO)

There were no polio notifications in 2009. The NZPSU carries out active surveillance of AFP. In 2009, nine cases of AFP were notified to the unit. Eight cases have been reviewed by the National Certification Committee for the Eradication of Polio (NCCEP) and have been classified as non-polio. The outcome of the review for the remaining case was still pending.

Since the mass oral polio vaccine immunisation campaigns in New Zealand in 1961 and 1962, six polio cases have been reported. These cases were either laboratory confirmed as vaccine-associated (4 cases) or classified as probable vaccine-associated cases (2 cases). In 1976, an unwell child with a wild poliovirus infection arrived in New Zealand from Tonga. This imported case was managed in New Zealand [16]. The most recent case of vaccine associated poliomyelitis occurred in 1999 [26].

Table 20. Age group and vaccination status of pertussis notifications, 2009

Age group	Total cases	One dose	Two doses	Three doses	Four doses	Five doses	Vaccinated (no dose info)	Not vaccinated	Unknown
0–5 wks	16	0	0	0	0	0	0	13	3
6 wks–2 mths	49	22	0	0	0	0	5	17	5
3–4 mths	25	7	5	0	0	0	2	7	4
5–14 mths	32	1	3	10	0	0	3	9	6
15 mths–3 yrs	102	3	2	37	5	1	2	45	7
4+ years	1175	25	4	34	71	45	185	226	585
Total	1399	58	14	81	76	46	197	317	610

PRIMARY AMOEBIC MENINGOENCEPHALITIS

Primary amoebic meningoencephalitis is a rare communicable disease caused by the amoeboflagellate *Naegleria fowleri*. The last notified case of primary amoebic meningoencephalitis in New Zealand occurred in 2000. There were five prior cases in New Zealand, four of which were part of the same outbreak in 1968. All cases were fatal and were linked to swimming in geothermal pools in the central North Island [27].

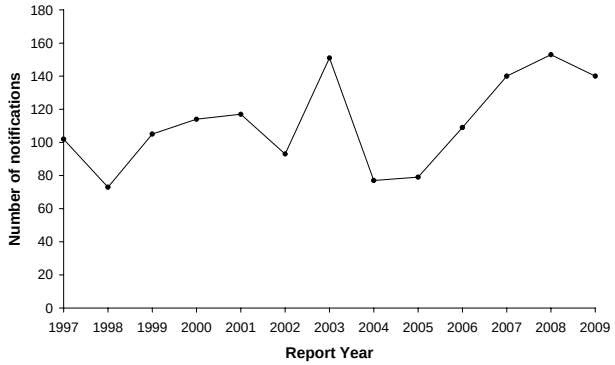
RABIES

New Zealand is classified as a rabies-free country [28]. There have been no cases of rabies reported in New Zealand since the disease became notifiable in 1966.

RHEUMATIC FEVER

In 2009, 123 initial attack cases and 17 recurrent cases of rheumatic fever were notified. This represents a population rate of 2.8 per 100 000 for initial attack cases, slightly lower than the rate of 3.2 per 100 000 observed in 2008 (138 cases). The population rate in 2009 for recurrent cases was 0.4 per 100 000 (0.4 per 100 000, 15 cases in 2007). Figure 30 shows the number of initial attack cases of rheumatic fever reported each year since 1997.

Figure 30. Rheumatic fever (initial attack cases) by year, 1997–2009



The following analysis is for initial attack cases of rheumatic fever. The highest rates of initial attack rheumatic fever were reported in Tairawhiti (21.6 per 100 000 population, 10 cases) and Northland (9.0 per 100 000, 14 cases) DHBs.

Age was recorded for all of the cases. Ninety-nine cases were aged less than 15 years (80.5%) and the highest age-specific rate was in the 10–14 years age group (21.2 per 100 000 population, 63 cases).

Sex was recorded for all of the initial attack cases. The notification rate for initial attack cases was 3.3 per 100 000 population for males (70 cases) and 2.4 per 100 000 for females (53 cases).

Of the initial attack cases where ethnicity was recorded (122/123, 99.2%), the highest rates occurred amongst those of Pacific Peoples (21.2 per 100 000, 48 cases) ethnicity followed by those of Māori ethnicity (12.4 per 100 000, 70 cases).

Of the 121 initial attack rheumatic fever cases for which a final case status was recorded, 92 (76.0%) were reported as a confirmed case, indicating that the case had a laboratory-confirmed diagnosis for streptococcal infection.

The following analysis is for the recurrent rheumatic fever cases. All 17 of the recurrent rheumatic fever cases were within the 5–29 years age group. Thirteen cases were male and four were female. Eleven cases were of Māori ethnicity, five were of Pacific Peoples ethnicity and one was of Asian ethnicity.

For all rheumatic fever cases (initial and recurrent attack), hospitalisation data were recorded for 127 cases, of which 118 (92.9%) were hospitalised. No deaths due to rheumatic fever were reported in 2009.

RICKETTSIAL DISEASE

Six cases of rickettsial disease were notified in 2009 compared with 10 cases in 2008. Three notifications were for murine typhus and three were for rickettsial disease that was not further specified.

All three murine typhus cases were laboratory confirmed and hospitalised. Two of the cases were from Waitemata DHB and one from Waikato DHB. Two cases were male and one was female. The cases were aged in the 15–19 years (1 case) and 40–49 years (2 cases) age groups. Two cases were of European ethnicity and one was Māori. None of the murine typhus cases travelled overseas during their disease incubation period and are assumed to have acquired their infection in New Zealand.

Two of the three cases of the unspecified rickettsial disease were laboratory confirmed (one was still under investigation). One laboratory-confirmed case was a male of European ethnicity in the 40–49 years age group who was hospitalised. This case was from Waikato DHB and had not travelled overseas during the incubation period of the disease. The other laboratory-confirmed case was a female of European ethnicity in the 1–4 years age group and had travelled overseas during the incubation period of the disease. Hospitalisation status was not recorded for this case.

Ministry of Health hospitalisation data for 2009 recorded six hospitalisations where rickettsial disease was the primary reason for the admission. Of these, four cases were for typhus fever, and two cases were for rickettsiosis. Note that the Ministry of Health data may include repeat admissions.

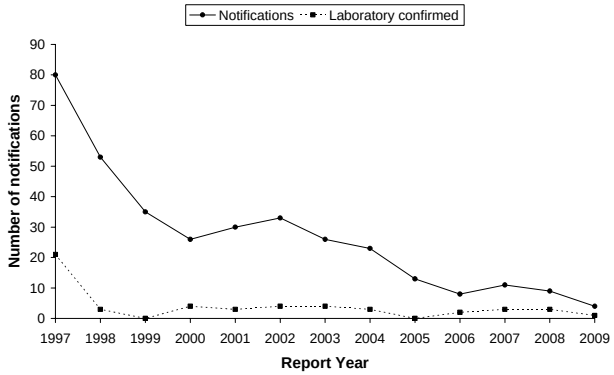
RUBELLA (GERMAN MEASLES)

In New Zealand, rubella immunisation was introduced in 1970 and it has been a notifiable disease since June 1996.

Four cases of rubella were notified in 2009, of which one case was laboratory confirmed. In comparison, nine cases of rubella were notified in 2008, of which three were laboratory confirmed. There were no cases of congenital rubella reported in 2009. The last reported case of congenital rubella was reported to the NZPSU in 1998. Since the last national outbreak in 1995 there has been a steady decrease in the number of rubella cases notified each year [16] (Figure 31).

The four cases of rubella in 2009 were from the Auckland, Bay of Plenty, Capital and Coast and Canterbury DHBs. Age was recorded for all cases, three cases were aged 1–4 years and one case was aged 20–29 years. Two of the cases were male, one case was female and sex was unknown for the remaining case. Three cases were of European ethnicity, and one case was of Asian ethnicity.

Figure 31. Rubella notifications and laboratory confirmed cases by year, 1997–2009



No hospitalisations or deaths due to rubella were reported in 2009. Risk factor information was recorded for all cases. Three cases reported attending school, pre-school or childcare during the incubation period, and one case had contact with another case of the disease in the previous three weeks.

The recommended vaccination schedule for rubella is a primary dose at 15 months and a second dose at four years of age. Of the three cases for which vaccination status was recorded, two cases were in the 15 months to three years age group and had received one dose of vaccine and one case was not vaccinated (aged less than 15 months and therefore not eligible for vaccination). Table 21 shows the number of doses of MMR vaccine given to rubella cases in each relevant age group.

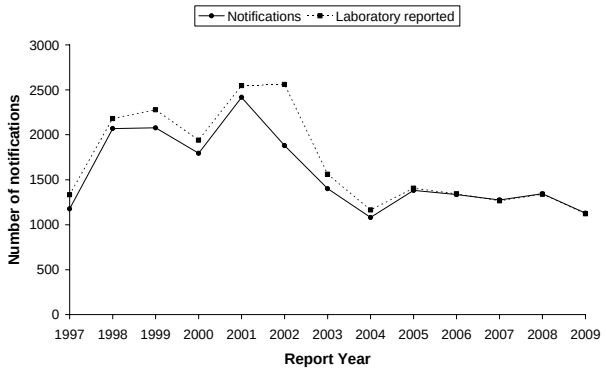
Table 21. Age group of rubella notifications and vaccination received, 2009

Age group	Total cases	One dose	Two doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15 mths	1	0	0	0	1	0
15 mths–3 yrs	2	2	0	0	0	0
4–9 yrs	0	0	0	0	0	0
10–19 yrs	0	0	0	0	0	0
20+ yrs	1	0	0	0	0	1
Total	4	2	0	0	1	1

SALMONELLOSIS

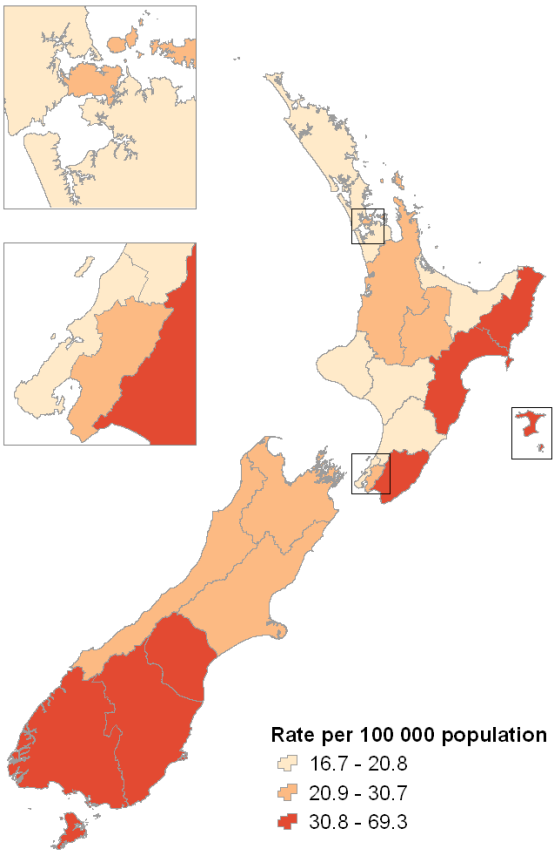
A total of 1129 cases of salmonellosis was notified in 2009. The Enteric Reference Laboratory at ESR received 1122 *Salmonella* isolates (exclusive of *S.* Paratyphi and *S.* Typhi reported elsewhere). The 2009 notification rate (26.2 per 100 000 population) was a significant decrease from the 2008 notification rate of 31.5 per 100 000 population (1345 cases) (see Figure 32).

Figure 32. Salmonellosis notifications and laboratory-reported cases by year, 1997–2009



Rates varied throughout the country as illustrated in Figure 33. The highest rates were reported in Tairawhiti DHB (69.3 per 100 000 population, 32 cases), followed by South Canterbury DHB (61.2 per 100 000, 34 cases). The lowest rates were reported in Waitemata (16.7 per 100 000, 88 cases) and Taranaki (18.5 per 100 000, 20 cases) DHBs.

Figure 33. Salmonellosis notifications by DHB, 2009



Age was recorded for 1125 (99.6%) of the reported salmonellosis cases. As in previous years, the age-specific rates were highest in the less than 1 year age group (123.7 per 100 000 population, 78 cases), followed by the 1–4 years age group (89.9 per 100 000, 218 cases). The lowest rate was in the 10–14 years age group (12.8 per 100 000, 38 cases).

Sex was recorded for 99.1% of the cases (1119/1129). Similar to previous years, rates were slightly higher for males (26.2 per 100 000 population, 555 cases) than females (25.7 per 100 000, 564 cases).

Ethnicity was recorded for 1062 (94.1%) cases. The highest notification rates were reported for those of European ethnicity (30.2 per 100 000, 814 cases), followed by those of Other (23.6 per 100 000, 8 cases), Asian (22.6 per 100 000, 77 cases) and Māori (22.3 per 100 000, 126 cases) ethnicities.

Of the 716 (63.4%) cases for which hospitalisation status was recorded, 134 (18.7%) were hospitalised. One death from salmonellosis was reported in 2009.

The risk factors recorded for salmonellosis are shown in Table 22. The most common risk factors were consumption of food from retail premises and contact with farm animals.

Table 22. Exposure to risk factors associated with salmonellosis, 2009

Risk factor	Yes	No	Unknown	Percentage[a] (%)
Consumed food from retail premises	200	277	652	41.9
Contact with farm animals	186	351	592	34.6
Consumed untreated water	116	291	722	28.5
Contact with faecal matter	94	362	673	20.6
Recreational water contact	88	400	641	18.0
Travelled overseas during the incubation period	98	498	533	16.4
Contact with other symptomatic people	66	419	644	13.6
Contact with sick animals	43	436	650	9.0

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

In 2009, 12 outbreaks of salmonellosis were reported involving 76 cases, of which 17 cases were hospitalised.

Table 23 shows the number of cases of selected *Salmonella* types reported by the Enteric Reference Laboratory at ESR. *S.* Typhimurium definitive type (DT) 160 remained the most common isolate received.

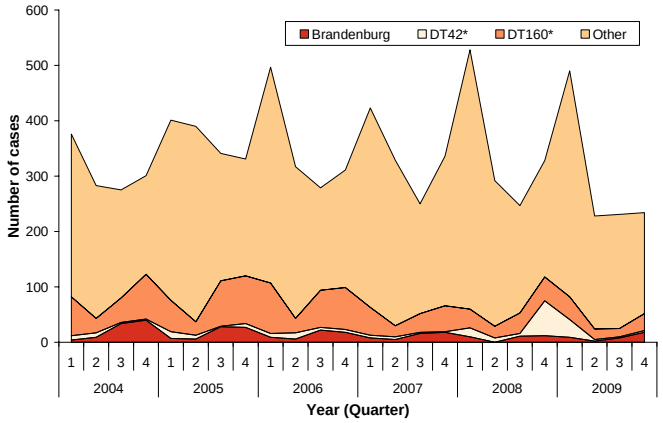
Table 23. Selected *Salmonella* serotypes and subtypes of laboratory-confirmed salmonellosis, 2006–2009

Subtype [a]	2006	2007	2008	2009
S. Typhimurium	733	596	729	661
DT160	260	152	135	106
DT1	72	91	72	94
DT101	71	43	72	56
DT156	87	73	67	54
DT42	28	15	93	40
RDNC-May06	16	51	55	43
Other or unknown	199	171	235	268
S. Enteritidis	107	151	124	95
DT9a	53	60	45	39
DT1b	9	18	19	4
DT26	7	17	10	2
Other or unknown	38	56	50	50
S. Infantis	58	86	86	71
S. Brandenburg	55	47	33	36
S. Saintpaul	35	25	35	26
S. Virchow	13	34	14	12
S. Agona	24	13	10	10
S. Mississippi	13	11	10	14
Other or unknown serotypes	305	304	298	197
Total	1343	1267	1339	1122

[a] Excludes *S.* Paratyphi and *S.* Typhi already noted elsewhere

Figure 34 illustrates examples of *Salmonella* types that have emerged in recent years and their contribution to the overall *Salmonella* burden in New Zealand.

Figure 34. Laboratory-reported cases of *S.* Brandenburg, DT42 and DT160 by quarter, 2004–2009



* *Salmonella* Typhimurium definitive type (DT)

SEVERE ACUTE RESPIRATORY SYNDROME

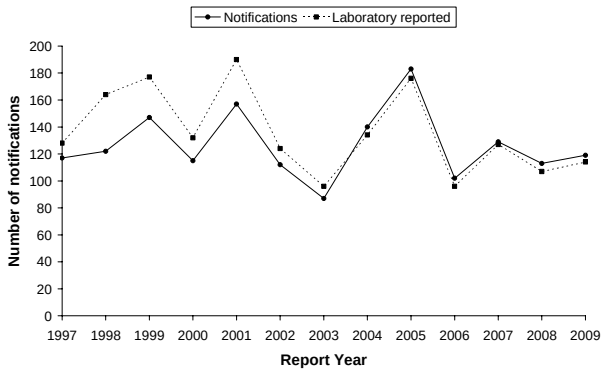
No cases of severe acute respiratory syndrome (SARS) have ever been confirmed in New Zealand. During the international outbreak of SARS in 2003, 13 notifications of suspected SARS cases were made in New Zealand, however, all of these cases subsequently tested negative for the SARS coronavirus [29].

SHIGELLOSIS

A total of 119 cases of shigellosis was notified in 2009. The 2009 notification rate (2.8 per 100 000 population) was slightly higher than the 2008 rate (2.6 per 100 000, 113 cases) and below the annualised rate for the 10-year period 1999–2008 (3.2 per 100 000).

Figure 35 shows the number of notified and laboratory-reported cases of shigellosis each year since 1997.

Figure 35. Shigellosis notifications and laboratory-reported cases by year, 1997–2009



More than half of the shigellosis cases were reported from the Auckland region. The highest rates of shigellosis were reported in Counties Manukau (5.4 per 100 000 population, 26 cases), Waitemata (4.4 per 100 000, 23 cases), and Auckland (4.3 per 100 000, 19 cases) DHBs.

Age was recorded for all cases. The highest age-specific rate was in the 1–4 years age group (4.5 per 100 000 population, 11 cases), followed by the 20–29 years age group (4.3 per 100 000, 25 cases).

Of the 118 (99.2%) cases where sex was recorded, 61 cases were female (2.8 per 100 000 population) and 57 cases were male (2.7 per 100 000).

Ethnicity was recorded for 109 (91.6%) of the 119 cases reported in 2009. The highest notification rate was for Pacific Peoples (12.4 per 100 000, 28 cases), followed by Asian (5.3 per 100 000, 18 cases) and European (2.1 per 100 000, 56 cases) ethnicities.

Of the 81 notified cases (68.1%) for which hospitalisation information was recorded, 23 cases (28.4%) were hospitalised.

The risk factors recorded for shigellosis are shown in Table 24. The most common risk factor was overseas travel during the incubation period (64.9%, 50 cases). The most frequent overseas destinations were India (16 cases), Fiji (6 cases), Samoa (4 cases), Vanuatu (4 cases), Australia (3 cases) and South Africa (3 cases).

Three shigellosis outbreaks were reported in 2009, involving eight cases.

The Enteric Reference Laboratory at ESR received 114 *Shigella* isolates during 2009. The predominant serogroups identified were *S. sonnei* biotype g (36 cases, 31.6%), *S. sonnei* biotype a (33 cases, 28.9%), *S. flexneri* 2a (13 cases, 11.4%), and *S. flexneri* 3a (6 cases, 5.3%).

Table 24. Exposure to risk factors associated with shigellosis, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Travelled overseas during the incubation period	50	27	42	64.9
Consumed food from retail premises	19	26	74	42.2
Recreational water contact	6	34	79	15.0
Consumed untreated water	4	23	92	14.8
Contact with other symptomatic people	6	36	77	14.3
Contact with farm animals	4	44	71	8.3
Contact with faecal matter	3	40	76	7.0
Contact with sick animals	0	38	81	0.0

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

TAENIASIS

Three cases of taeniasis were notified in 2009, bringing the number of cases notified since 1997 to 14. All three cases were overseas (Ethiopia, India and Romania) during the incubation period. All cases that have been notified in New Zealand since 1997 have reported a history of overseas travel.

TETANUS

One case of tetanus was notified in New Zealand in 2009. The non-fatal case was male and in the 70 years and over age group. His vaccination status was reported as unknown. Since 1997 there has been 21 reported tetanus cases, two of which were children, one each in the 1–4 and 5–9 years age groups. Neither was vaccinated.

The only reported death from tetanus since 1997 occurred in 2007. This case was a female in the 70 years and over age group.

Ministry of Health hospitalisation data for 2009 record one case with the primary reason for admission being tetanus. This case was male and aged 70 years and over, and was from the same DHB as the notified case.

TOXIC SHELLFISH POISONING

There was one case of suspected toxic shellfish poisoning in 2009. The 60–69 year old Māori male from Bay of Plenty DHB collected and consumed boiled tuatuas from Motiti Reserve, Papamoa Beach. He suffered from a number of neurological and gastrointestinal symptoms. The case was hospitalised with suspected paralytic shellfish poisoning.

TRICHINELLOSIS

No cases of trichinellosis were notified in 2009. Trichinellosis is an infection caused by nematode worms of the genus *Trichinella*, which was added to the notifiable disease schedule in 1988. Since then there have been four notifications. The first case was reported in 1992 and an overseas source of infection was suspected. The other three cases were linked to the consumption of infected pork meat in 2001.

TUBERCULOSIS

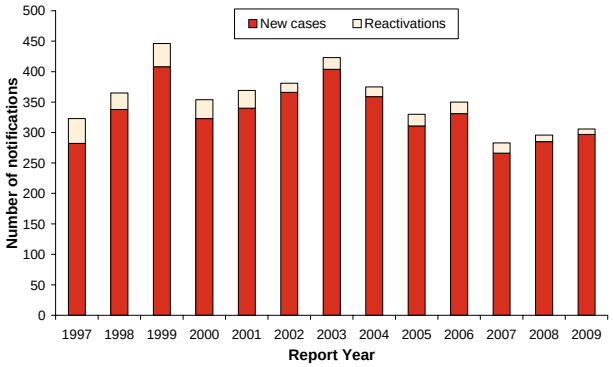
Tuberculosis infection is one of the most common causes of death from communicable disease worldwide. Infection is usually curable with early diagnosis and a combination of specific antibiotics, but this relies upon full compliance with medication.

A more detailed account of tuberculosis in New Zealand in 2009 will be available at www.surv.esr.nz in September 2010.

In 2009, 306 cases of tuberculosis disease (new and reactivations) were notified, of which nine (2.9%) were reactivations (note that the term reactivation used in this context means cases with second or subsequent episodes of symptomatic tuberculosis disease). The tuberculosis (new and reactivations) rate of 7.1 per 100 000 population in 2009 was higher than that reported in 2008 (6.9 per 100 000, 296 total cases including 11 reactivations). In 2009, 236 (77.1%) cases were reported as laboratory confirmed.

Figure 36 shows the total number of new tuberculosis cases and reactivations reported since 1997.

Figure 36. Tuberculosis notifications (new cases and reactivations) by year, 1997–2009



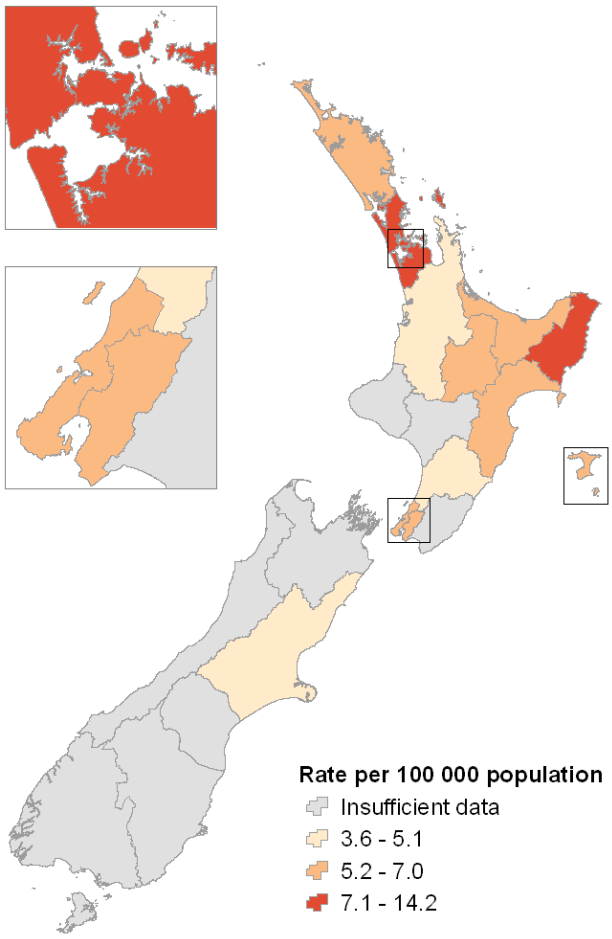
Reports of new tuberculosis cases

In 2009, the rates of new tuberculosis notifications per 100 000 population differed by geographical region (Figure 37Figure 37). Auckland DHB had the highest rate (14.2 per 100 000 population, 63 cases) followed by Counties Manukau (13.7 per 100 000, 66 cases) and Tairawhiti (13.0 per 100 000, 6 cases) DHBs.

For the 297 new cases of tuberculosis, age and sex were recorded for all cases. There were 12 cases aged less than five years with another 10 cases aged between five and 14 years. The highest age-specific rates were reported for persons aged 20–29 years (10.8 per 100 000 population, 63 cases), females aged 20–29 years (12.4 per 100 000, 36 cases) and males aged 70 years and over (10.2 per 100 000, 17 cases). Overall, for new tuberculosis cases, 151 cases were male and 146 were female.

Ethnicity was recorded for 98.7% (293/297) of cases. The highest notification rates were reported in those of Asian (45.8 per 100 000, 156 cases) and Other (44.3 per 100 000, 15 cases) ethnicities, followed by those of Pacific Peoples (14.1 per 100 000, 32 cases) and Māori (9.0 per 100 000, 51 cases) ethnicities and the lowest rate was for those of European ethnicity (1.4 per 100 000, 39 cases).

Figure 37. Tuberculosis notifications (new cases) by DHB, 2009



Of the 282 (94.9%) new tuberculosis cases in 2009 for which hospitalisation data were recorded, 175 (62.1%) were hospitalised. Three deaths due to tuberculosis were reported in 2009 and related to two cases aged 70 years and over and one case aged 60–69 years. Bacillus Calmette-Guérin (BCG) vaccination status was recorded for 143 cases and vaccination was confirmed for 98 (68.5%) of those cases. A further four (2.8%) cases had an unconfirmed history of vaccination.

Of the 292 (98.3%) new cases for which place of birth was recorded in 2009, 217 (74.3%) were born outside New Zealand. Of the 75 cases that were born in New Zealand, 14.5% (8/55 where information was recorded) had been or were presently residing with a person born outside New Zealand. Of the 212 cases for which these data were recorded, 63 (29.7%) reported contact with a confirmed case of tuberculosis.

Reactivations of tuberculosis

The nine tuberculosis reactivation cases were from seven DHBs: Waitemata (2 cases), Waikato (2 cases), Northland, MidCentral, Capital and Coast, Nelson-Marlborough, and Canterbury (1 case each). Four cases were aged between 20–49 years and five cases (55.6%) were aged over 50 years. There were more male (7) than female (2) tuberculosis reactivations. They were of European, Māori and Asian ethnicities (3 cases each).

In 2009, information on the place where the diagnosis was made and country of birth was recorded for seven of the nine reactivation cases (Table 25 and Table 26). The first diagnosis of tuberculosis was made in New Zealand for five cases and overseas for two cases.

Table 25 shows the place of original diagnosis for cases stratified by whether the case was treated for tuberculosis disease.

Table 25. Place of original tuberculosis disease diagnosis and treatment (for reactivations), 2009

Place of TB disease diagnosis	Case treated for TB disease			
	Yes	No	Unknown	Total
Overseas	2	0	0	2
New Zealand	5	0	0	5
Unknown	1	0	1	2
Total	8	0	1	9

Table 26 shows the location where the original tuberculosis disease diagnosis was made, stratified by the place of birth.

Table 26. Place of birth and place of original tuberculosis disease diagnosis (for reactivations), 2009

Place of TB disease diagnosis	Place of birth of case			
	New Zealand	Overseas	Unknown	Total
Overseas	0	2	0	2
New Zealand	4	1	0	5
Unknown	1	1	0	2
Total	5	4	0	9

Hospitalisation data were recorded for eight of the nine reactivations, and seven (87.5%) cases were hospitalised. There were no deaths reported amongst the reactivation cases. Vaccination status was recorded for three cases, of which vaccination was confirmed for two cases, and unknown for the remaining case.

Three outbreaks due to *Mycobacterium tuberculosis* were reported in 2009 involving 20 cases.

Antimicrobial drug-resistant tuberculosis

Data on antimicrobial drug-resistant tuberculosis are published on the www.surv.esr.cri.nz website at www.surv.esr.cri.nz/antimicrobial/tuberculosis.php

TYPHOID FEVER

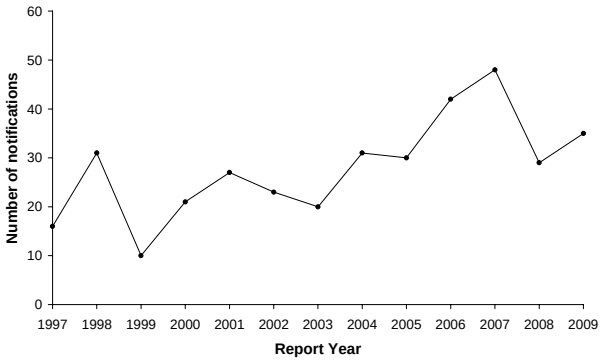
Thirty-five cases of typhoid fever were notified in 2009. The 2009 rate (0.8 per 100 000 population) was similar to the 2008 rate (0.7 per 100 000, 29 cases).

The Enteric Reference Laboratory at ESR received 30 *S.* Typhi isolates in 2009. Since 1999 the annual number of typhoid notifications has generally increased reaching a peak (48 cases) in 2007 (Figure 38).

Most cases (74.3%, 26/35) were reported from the Auckland region, which consists of Waitemata, Auckland and Counties Manukau DHBs. The highest rates were reported by Counties Manukau (2.7 per 100 000 population, 13 cases) and Capital and Coast (2.1 per 100 000, 6 cases) DHBs.

Age was recorded for all cases. Age-specific notification rates were highest in the 15–19 years age group (1.9 per 100 000 population, 6 cases) and the 20–29 years age group (1.9 per 100 000, 11 cases), followed by the 30–39 years age group (1.0 per 100 000, 6 cases).

Figure 38. Typhoid notifications by year, 1997–2009



Of the 34 cases (97.1%) where sex was recorded, 19 cases were female (0.9 per 100 000 population) and 15 cases were male (0.7 per 100 000).

Ethnicity was recorded for all cases. The highest notification rate was for those of Pacific Peoples ethnicity (8.0 per 100 000, 18 cases), followed by Asian ethnicity (3.8 per 100 000, 13 cases).

Hospitalisation status was recorded for 88.6% (31/35) of cases, of which 22 (71.0%) were hospitalised.

Overseas travel information was recorded for 97.1% (34/35) of cases. Of the 34 cases, 28 (82.4%) were recorded as having travelled overseas during the incubation period. The countries most commonly visited included Samoa (13 cases), India (12 cases), Fiji (2 cases), Malaysia (2 cases) and Tokelau (2 cases).

VEROTOXIN- OR SHIGA TOXIN- PRODUCING *ESCHERICHIA COLI*

There were 143 cases of VTEC, also known as STEC, notified in 2009. The 2009 notification rate (3.3 per 100 000 population) was slightly higher than the 2008 rate (2.9 per 100 000, 124 cases). Four cases of VTEC/STEC-associated HUS were reported to the NZPSU in 2009.

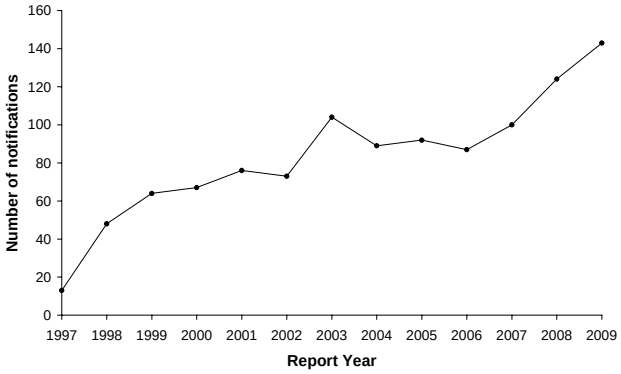
Figure 39 shows the number of notified cases of VTEC/STEC infection each year since 1997.

Disease rates for VTEC/STEC varied throughout the country. The highest rates were recorded in Taranaki (12.9 per 100 000 population, 14 cases), Waikato (7.5 per 100 000, 27 cases) and Lakes (4.9 per 100 000, 5 cases) DHBs.

Age was recorded for all cases. The highest rates were reported in the 1–4 years age group (21.9 per 100 000 population, 53 cases), followed by the less than one year age group (14.3 per 100 000, 9 cases) and the 5–9 years age group (5.2 per 100 000, 15 cases).

Sex was recorded for 98.6% (141/143) of the cases. The rate was higher in females (3.7 per 100 000 population, 82 cases) than in males (2.8 per 100 000, 59 cases).

Figure 39. VTEC/STEC notifications by year, 1997–2009



Ethnicity was recorded for 95.8% (137/143) of cases. Of these, the highest notification rate was reported for those of European ethnicity (4.1 per 100 000, 111 cases), followed by those of Māori ethnicity (3.5 per 100 000, 20 cases).

Of the 118 (82.5%) notified cases for which hospitalisation status was recorded, 38 (32.2%) were hospitalised. There was one death due to VTEC reported in 2009.

The risk factors recorded for VTEC/STEC cases reported in 2009 are shown in Table 27. The foods consumed by cases are shown in Table 28.

The Enteric Reference Laboratory at ESR received 145 VTEC/STEC isolates in 2009. Of these, 137 (94.5%) were identified as serotype O157:H7, and eight as non-O157:H7.

Four outbreaks of VTEC/STEC were reported in 2009, involving 15 cases. The largest outbreak involved eight cases. See the Outbreak Surveillance section for further details.

Table 27. Exposure to risk factors associated with VTEC/STEC, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Contact with pets	53	7	83	88.3
Contact with farm animals	36	19	88	65.5
Contact with animal manure	22	23	98	48.9
Contact with children in nappies	25	57	61	30.5
Contact with recreational water	26	66	51	28.3
Contact with other animals	12	32	99	27.3
Contact with a person with similar symptoms	19	70	54	21.3
Travelled overseas during the incubation period	5	92	46	5.2

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

Table 28. Foods consumed by VTEC/STEC cases, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed dairy products	64	14	65	82.1
Consumed raw fruit or vegetables	56	16	71	77.8
Consumed chicken or poultry	47	25	71	65.3
Consumed beef or beef products	47	29	67	61.8
Consumed processed meat	36	36	71	50.0
Consumed fruit or vegetable juice	28	37	78	43.1
Consumed home kill meat	20	56	67	26.3
Consumed lamb or hogget or mutton	14	53	76	20.9
Consumed pink or undercooked meat	4	64	75	5.9
Consumed unpasteurised milk or milk products	4	70	69	5.4

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

YELLOW FEVER

No cases of yellow fever have been reported in New Zealand since 1902 when the disease became notifiable.

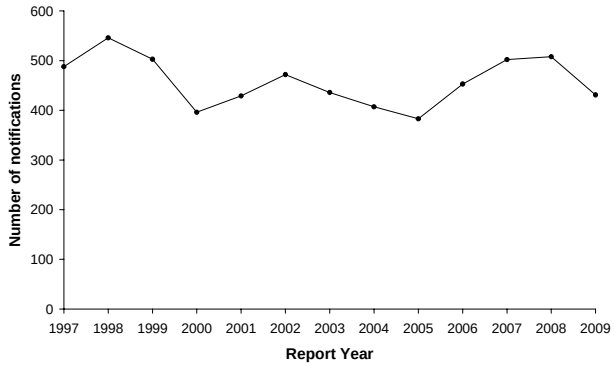
YERSINIOSIS

In 2009 a total of 431 cases of yersiniosis were notified. The 2009 rate (10.0 per 100 000 population) was a significant decrease from the 2008 rate (11.9 per 100 000, 508 cases).

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

Rates varied throughout the country as illustrated in Figure 41. The highest rates were recorded in the West Coast (36.8 per 100 000 population, 12 cases), South Canterbury (18.0 per 100 000, 10 cases) and Hutt Valley (17.5 per 100 000, 25 cases) DHBs.

Figure 40. Yersiniosis notifications by year, 1997–2009



Age was recorded for 99.8% (430/431) of the cases. Age-specific rates were highest in the less than 1 year age group (65.0 per 100 000 population, 41 cases), followed by the 1–4 years age group (38.8 per 100 000, 94 cases).

Sex was recorded for 99.1% (427/431) of the cases. Of these, males had a higher rate (10.4 per 100 000 population, 220 cases) than females (9.4 per 100 000, 207 cases).

Ethnicity was recorded for 91.9% (396/431) of the cases. The highest notification rate was for those of Asian ethnicity (28.8 per 100 000, 98 cases) followed by European (9.2 per 100 000, 247 cases), Māori (6.5 per 100 000, 37 cases) and Pacific Peoples (5.3 per 100 000, 12 cases) ethnicities.

Of the 214 (49.7%) notified cases for which hospitalisation status was recorded, 38 (17.8%) were hospitalised.

The risk factors recorded for yersiniosis cases reported in 2009 are shown in Table 29.

Two outbreaks of yersiniosis were reported in 2009 involving 15 cases.

Figure 41. Yersiniosis notifications by DHB, 2009

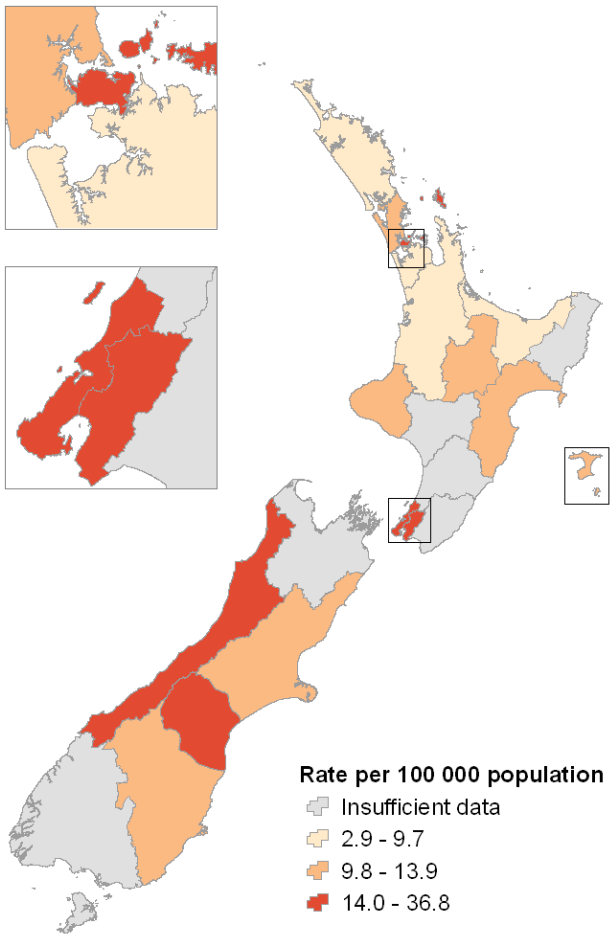


Table 29. Exposure to risk factors associated with yersiniosis, 2009

Risk factor	Yes	No	Unknown	Percentage (%)[a]
Consumed food from retail premises	47	68	316	40.9
Contact with farm animals	52	90	289	36.6
Consumed untreated water	29	79	323	26.9
Recreational water contact	24	91	316	20.9
Contact with faecal matter	21	96	314	17.9
Contact with other symptomatic people	17	114	300	13.0
Travelled overseas during the incubation period	11	147	273	7.0
Contact with sick animals	6	114	311	5.0

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

NON-NOTIFIABLE DISEASES

INFLUENZA

National influenza surveillance in 2009 was undertaken between May and December using a sentinel network of 101 general practices/practitioners. On average, 86 practices, with a total patient roll of 402 884, participated each week. It is estimated that ILI resulting in a visit to a general practitioner affected over 116 335 New Zealanders (an annual cumulative incidence rate of 2695.6 per 100 000 population).

During the surveillance period, 10 860 consultations for ILI were reported. The peak weekly consultation rate of 284.0 per 100 000 practice patient population was the highest recorded by the sentinel surveillance system since 1997.

The average weekly consultation rate was 77.9 per 100 000 patient population. This was the third highest rate since 1997. The previous highest rates were in 1997 (163.7 per 100 000) and 1999 (112.3). The lowest rate was recorded in 2000 (32.5 per 100 000). Overall, influenza activity in 2009 was high. Influenza consultation activity remained at the baseline level from weeks 18 to 23, and then increased to a peak at week 29 (13–19 July) with a consultation rate of 284.0 per 100 000 patient population, three-to-four-times higher than the peaks in 2007–2008.

Hospitalisations peaked in week 28 corresponding to the peak of the sentinel and non-sentinel influenza virus detection, and a week earlier than the ILI consultation peak (week 29). Figure 42 compares the weekly consultation rates for ILI in 2009 with 2008 and 2007.

Figure 42. Weekly sentinel surveillance consultation rates for influenza-like illness, 2007–2009

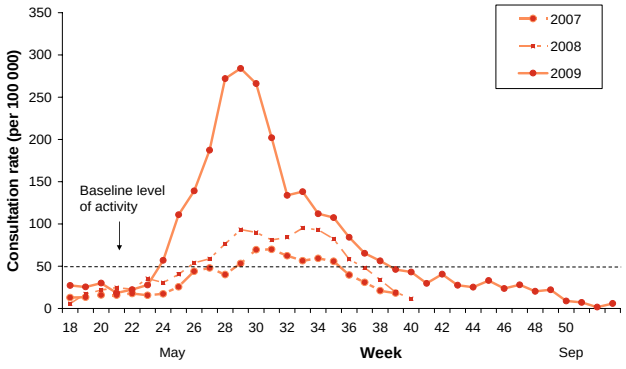
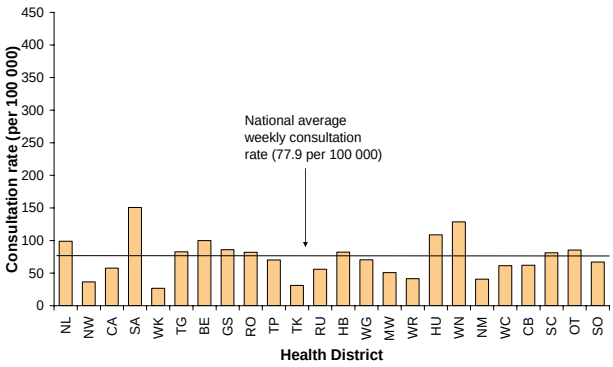


Figure 43 shows the average weekly consultation rates by health district for the influenza season.

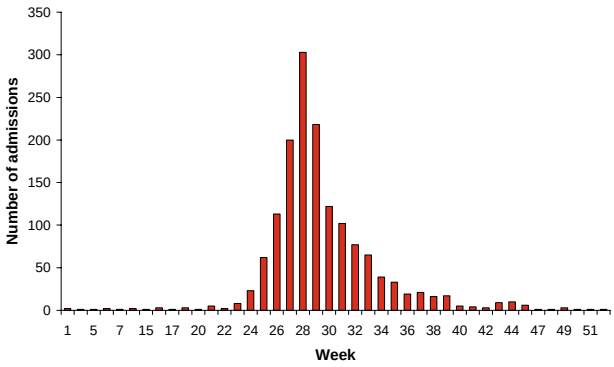
Consultation rates varied among health districts, with rates above the national average in 11 of the 24 health districts that participated, and rates almost double the national average reported in South Auckland (150.8 per 100 000) followed by Wellington (128.7 per 100 000), and Hutt (108.8 per 100 000).

Figure 43. Sentinel average weekly consultation rates for influenza-like illness by health district, 2009



In 2009, 1508 hospitalisations occurred for influenza. This was higher than the 2008 and 2007 hospitalisations of 365 and 316, respectively. Figure 44 shows these hospitalisations by week, of which 95.6% (1141) occurred during June to September. The highest number of hospitalisations (857) occurred in July.

Figure 44. Influenza hospitalisation by week discharged, 2009



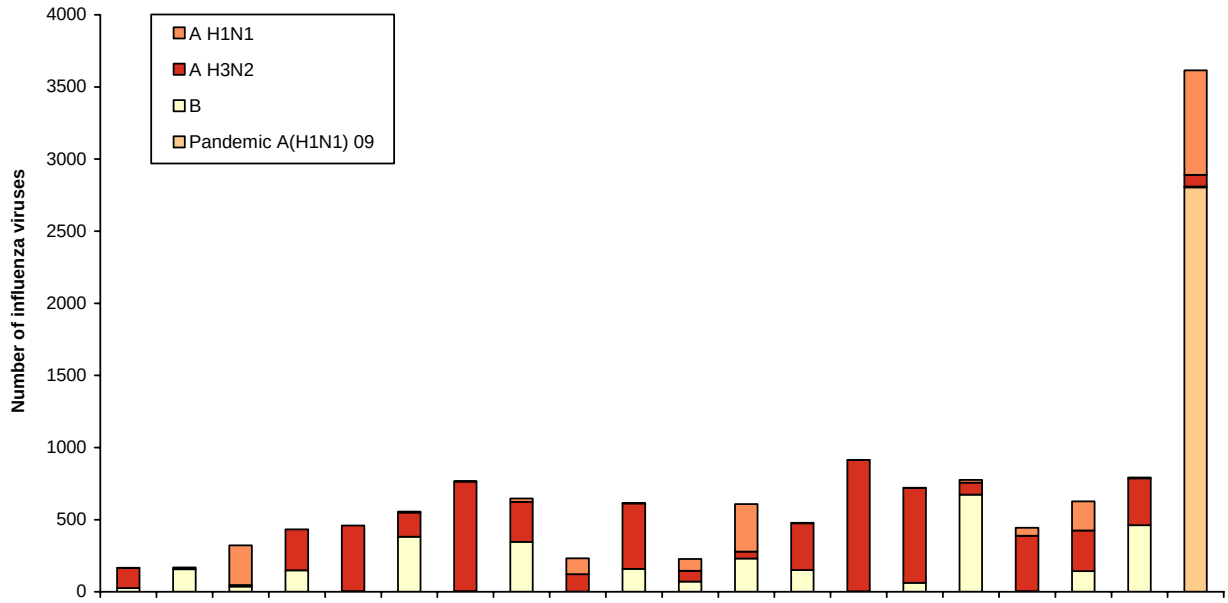
A total of 4900 influenza viruses was identified in 2009, higher than in 2008 (1054) and 2007 (744). Of the 4900 viruses, 624 came from sentinel practice surveillance during May to December. There were 4276 non-sentinel isolates identified in 2009 compared with 588 in 2008 and 505 in 2007.

Figure 45 shows the number and percentage of typed and subtyped influenza viruses from 1990 to 2009. There are noticeable changes in terms of predominant patterns.

- The pandemic A(H1N1) 09 strain became the predominant strain in 2009.
- The seasonal influenza A(H1N1) strain predominated in three seasons (1992, 2000 and 2001) with associated relatively low hospitalisations (193 in 1992, 222 in 2000 and 343 in 2001).
- The seasonal influenza A(H3N2) strain predominated for 11 seasons (1990, 1993, 1994, 1996, 1998, 1999, 2002, 2003, 2004, 2006, and 2007). A/Fujian/411/02 (H3N2)-like strain predominated in 2003 with the highest recorded hospitalisations during 1990–2008. A/Wuhan/359/95 (H3N2)-like strain predominated in 1996 with 94 associated deaths (93 out 94 deaths occurred for people aged 65 years and over).

- Influenza B strains predominated for five seasons (1991, 1995, 1997, 2005 and 2008). B/HongKong/330/2001-like strain (B-Victoria lineage) predominated in 2005, and the disease burden was high in children aged 5–19 years with associated deaths in three children.

Figure 45. Influenza viruses by type, 1990–2009



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A H1N1	0.6%	7.7%	85.7%	0.0%	0.2%	1.1%	0.3%	3.6%	47.4%	0.3%	36.0%	54.4%	0.4%	0.1%	0.1%	2.3%	12.6%	32.1%	0.8%	20.0%
A H3N2	83.2%	0.0%	2.8%	65.7%	98.7%	30.1%	99.1%	43.0%	51.7%	73.7%	32.9%	7.9%	68.0%	99.6%	91.3%	10.7%	86.3%	45.0%	41.0%	2.2%
B	16.2%	92.3%	11.5%	34.3%	1.1%	68.8%	0.7%	53.5%	0.9%	26.0%	31.1%	37.8%	31.6%	0.3%	8.6%	87.0%	1.1%	23.0%	58.3%	0.2%
Pandemic A(H1N1) 09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	77.6%

The noticeable changes in predominant patterns are described below.

Influenza A(H1N1)

In 2009, influenza A(H1N1) viruses predominated with 97.8% of the subtyped isolates. Of these, 77.7% were pandemic (H1N1) 09 viruses. The epidemiological data from the New Zealand 2009 influenza season and worldwide indicate that the pandemic A(H1N1) 09 virus became the predominant circulating strain. The antigenic data from New Zealand isolates indicate that the current circulating pandemic (H1N1) 09 viruses are homogeneous, closely matching the vaccine candidate strain A/California/7/2009 (H1N1). Sequence analysis of the pandemic A(H1N1) 09 virus also indicated that they were genetically homogeneous. The limited serological study for New Zealanders conducted by the WHO Coordinating Centre in Melbourne and the National Influenza Centre at ESR indicated that the pandemic (H1N1) 09 virus does not cross-react with seasonal A(H1N1) viruses. The epidemiological, virological and serological data clearly suggest a need to have the pandemic A(H1N1) 09 strain included in the seasonal influenza vaccines. On the other hand, seasonal influenza A(H1N1) viruses were associated with outbreaks during the early winter season in New Zealand and the numbers of viruses diminished significantly by August. The majority of recent viruses were antigenically and genetically similar to the vaccine virus A/Brisbane/59/2007.

Influenza A(H3N2)

Influenza A(H3N2) viruses have often been associated with more severe disease and with excess pneumonia and influenza mortality. From 1990–2008, influenza A(H3N2) viruses predominated for 11 seasons in 1990 (83.2%), 1993 (65.7%), 1994 (98.7%), 1996 (99.1%),1998 (51.7%),1999 (73.7%), 2002 (68.0%), 2003 (99.6%), 2004 (91.3%), 2006 (86.3%) and 2007 (45.0%). The highest number of deaths (94) in 1996 in New Zealand was recorded during an A(H3N2) epidemic. The highest hospitalisations (552) were recorded in 2003 due to an A(H3N2) predominant season. In 2009, only 2.2% of the subtyped viruses were A(H3N2). They had antigenically drifted away from the 2009 vaccine strain A/Brisbane/10/2007 (H3N2)-like strain.

Influenza B

From 1990 to 2008, influenza B viruses predominated for five years in 1991 (92.3%), 1995 (68.8%), 1997 (53.5%), 2005 (87.0%) and 2008 (58.3%). Two antigenically distinct lineages of influenza B have co-circulated in many countries since the late 1980s. The B/Yamagata/16/88 lineage (most recently representative strain-B/Florida/4/2006) circulated worldwide whereas the B/Victoria/2/87 lineage viruses only circulated in Asia and subsequently underwent independent evolution as an antigenically distinct lineage (most recent representative strain-B/Brisbane/60/2008). For reasons not wholly understood, the B/Victoria/2/87 lineage viruses remained geographically restricted to Asia until 2001. During 1990–2001, B/Yamagata lineage viruses circulated exclusively in New Zealand. For the first time in 2002, the B/Victoria lineage viruses spread to New Zealand and

completely replaced the B/Yamagata lineage viruses. Since 2003, the two virus lineages have been co-circulating in New Zealand with the B/Victoria lineage predominating in 2005 and 2008. The influenza B viruses had been associated with high disease burden in young children and the B/Victoria lineage viruses have been associated with more explosive school outbreaks than the B/Yamagata lineage viruses in New Zealand. In 2009, there were only six influenza B viruses. Most of influenza B viruses in southern hemisphere were antigenically closely related to B/Brisbane/60/2008-like strain.

Summary

Characterisation of the influenza viruses isolated during the 2009 winter indicated a need for changes to three components of the vaccine for the 2010 winter. Accordingly, the 2010 southern hemisphere winter influenza vaccine has the following composition:

- A(H1N1) an A/California/7/2009 (H1N1)-like strain
- A(H3N2) an A/Perth/16/2009 (H3N2)-like strain
- B a B/Brisbane/60/2008-like strain.

Note: A/California/7/2009 (H1N1)-like strain is a pandemic A(H1N1) 09 strain.

Influenza immunisation is recommended for those at increased risk of complications from influenza due to either age or medical condition. Influenza vaccination has been free for people aged 65 years and over since 1997. Since 1999, it has been extended to younger people with chronic illnesses who are at risk of developing complications from influenza.

A full report on influenza in New Zealand for 2009 can be found at www.surv.esr.cri.nz

SEXUALLY TRANSMITTED INFECTIONS

This brief report summarises the epidemiology of STIs for the year 2009, and examines trends since 2005 for clinic-based surveillance, and 2006 for laboratory-based surveillance. A more detailed account is to be found in the Sexually Transmitted Infections in New Zealand, Annual Surveillance Report 2009 available at www.surv.esr.nz

The AEG within the University of Otago carries out national AIDS/HIV surveillance and a summary of the AIDS figures for 2009 can be found in the AIDS section under notifiable diseases in this report.

CLINIC-BASED SURVEILLANCE

Chlamydia

In 2009, genital *Chlamydia trachomatis* infection was the most commonly reported STI in New Zealand.

Between 2008 and 2009, the number of cases of chlamydia decreased by 6.5% in SHCs (4770 to 4461) and 13.5% in SYHCs (1000 to 865). There was a very small increase of 0.8% in FPCs (3427 to 3456).

While there was a decrease in chlamydia cases reported by clinics between 2008 and 2009, from 2005 to 2009 the number of cases of chlamydia has increased by 3.3% in SHCs (4317 to 4461), 51.2% in FPCs (2285 to 3456) and 63.5% in SYHCs (529 to 865).

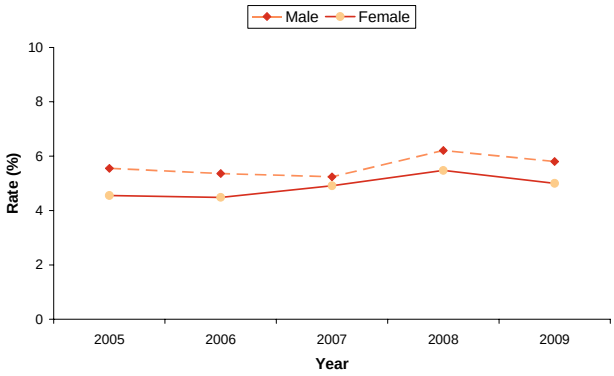
In 2009, SHCs, FPCs and SYHCs reported chlamydia clinic visit rates of 5.3%, 1.8% and 0.4%, respectively (Table 30). From 2005 to 2009, the clinic visit rate of chlamydia reported at SHCs has increased by 4.5% in males and 9.9% in females (Figure 46). These trends may reflect changes in sexual behaviour, but may also be accounted for by advances in the sensitivity and specificity of new diagnostic techniques.

Table 30. Number and clinic visit rate of chlamydia cases by sex and health care setting, 2009

		Clinic type		
	Sex	SHC	FPC	SYHC
No. of cases	Female	2418	2937	649
	Male	2043	515	216
	Total	4461	3456	865
Clinic visit rate (%)[a]	Female	5.0	1.6	0.4
	Male	5.8	5.2	0.3
	Total	5.3	1.8	0.4

[a] Cases/ total number of clinic visits

Figure 46. Rates of chlamydia reported at SHCs, 2005–2009



Note: Denominator is the number of clinic visits

Genital Herpes (first presentation)

The number of cases of genital herpes (first presentation) and clinic visit rate by sex and health care setting for 2009 is shown in Table 31.

Between 2008 and 2009, the number of cases of genital herpes increased by 5.6% in SHCs (827 to 873), by 41.1% in FPCs (141 to 199), and by 32.1% in SYHCs (78 to 103).

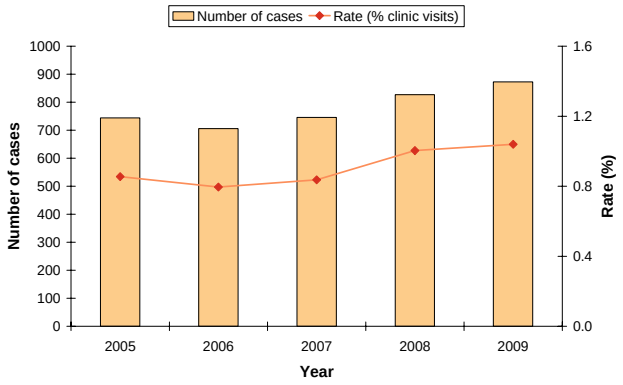
Table 31. Number and clinic visit rate of genital herpes (first presentation) cases by sex and health care setting, 2009

		Clinic type		
	Sex	SHC	FPC	SYHC
No. of cases	Female	476	164	79
	Male	397	35	24
	Total	873	199	103
Clinic visit rate (%)[a]	Female	1.0	0.09	0.05
	Male	1.1	0.35	0.03
	Total	1.0	0.10	0.04

[a] Cases/ total number of clinic visits

From 2005 to 2009, the number of genital herpes cases reported by SHCs has shown a slight increasing trend (Figure 47). However, the clinic visit rate for genital herpes has remained between 0.8% and 1.0%. Routine clinic surveillance methods in New Zealand do not facilitate the collection of data on the type of herpes simplex virus (HSV) infection, and so it is not possible to determine if the trends in genital herpes differ by type of viral infection.

Figure 47. Number of cases and rates of genital herpes (first presentation) reported at SHCs, 2005–2009



Note: Denominator is the number of clinic visits

Genital Warts (first presentation)

The number of cases of genital warts (first presentation) and clinic visit rate by sex and health care setting for 2009 is shown in Table 32.

Between 2008 and 2009, the number of cases of genital warts decreased by 11.7% in SHCs (3726 to 3290). In contrast, there was an increase of 1.3% in FPCs (539 to 546) and 3.4 % in SYHCs (237 to 245).

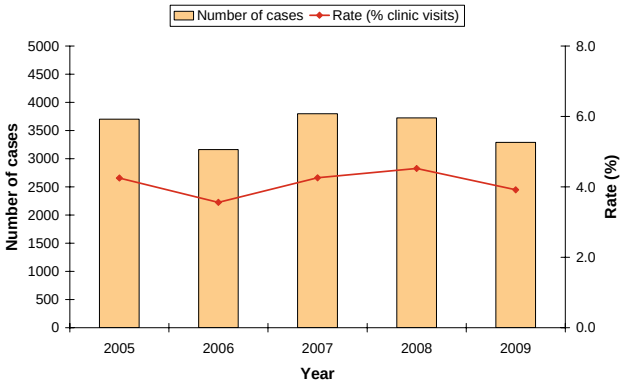
Table 32. Number and rate of genital warts (first presentation) cases by sex and health care setting, 2009

		Clinic type		
	Sex	SHC	FPC	SYHC
No. of cases	Female	1657	405	156
	Male	1633	140	89
	Total	3290	546	245
Clinic visit rate (%)[a]	Female	3.4	0.2	0.09
	Male	4.6	1.4	0.12
	Total	3.9	0.3	0.10

[a] Cases/ total number of clinic visits

From 2005 to 2009, the number of cases of genital warts reported by SHCs has fluctuated. However the clinic visit rate has decreased slightly from 4.3% to 3.9% (Figure 48)

Figure 48. Number of cases and rates of genital warts (first presentation) reported at SHCs, 2005–2009



Note : Denominator is the number of clinic visits

Gonorrhoea

Between 2008 and 2009, the number of cases of gonorrhoea decreased by 5.8% in SHCs (864 to 814) and 22.6% in SYHCs (53 to 41). In contrast, there was an increase of 13.6% in FPCs (176 to 200).

While there was an overall decrease in the number of gonorrhoea cases from 2008 to 2009, from 2005 to 2009 the number of cases of gonorrhoea reported increased by 17.5% in SHCs (693 to 814), 53.8% in FPCs (130 to 200) and 78.3% in SYHCs (23 to 41).

In 2009, SHCs, FPCs and SYHCs reported gonorrhoea clinic visit rates of 1.0%, 0.1% and 0.02%, respectively (Table 33). From 2005 to 2009, the clinic visit rate for gonorrhoea reported by SHCs has increased by 12.9% in males and 23.1% in females (Figure 49).

Table 33. Number and clinic visit rate of gonorrhoea cases by sex and health care setting, 2009

		Clinic type		
	Sex	SHC	FPC	SYHC
No. of cases	Female	312	163	20
	Male	502	37	21
	Total	814	200	41
Clinic visit rate (%)[a]	Female	0.6	0.09	0.01
	Male	1.4	0.37	0.03
	Total	1.0	0.10	0.02

[a] Cases/ total number of clinic visits

Figure 49. Rates of gonorrhoea reported at SHCs, 2005–2009

Note: Denominator is the number of clinic visits

Infectious Syphilis

The number of cases of infectious syphilis and clinic visit rate by sex and health care setting for 2009 is shown in Table 34.

Between 2008 and 2009, there was a significant increase in the number of cases of infectious syphilis in SHCs (92 to 138).

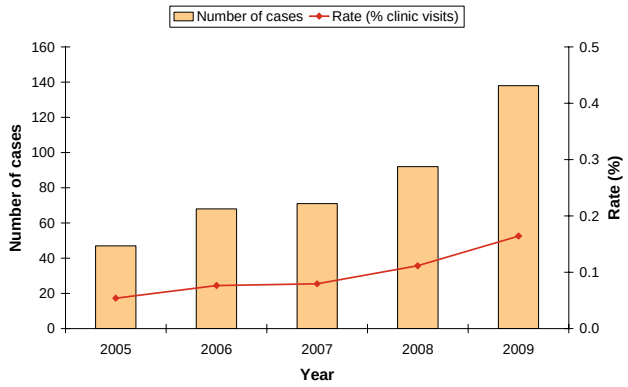
Table 34. Number and rate of infectious syphilis cases by sex and health care setting, 2009

		Clinic type		
	Sex	SHC	FPC	SYHC
No. of cases	Female	26	1	1
	Male	112	1	3
	Total	138	2	4
Clinic visit rate (%)[a]	Female	0.05	-	-
	Male	0.32	-	-
	Total	0.16	-	-

[a] Cases/ total number of clinic visits

Between 2005 and 2009, the number of infectious syphilis cases reported by SHCs has shown a steady increase, and the rate of infectious syphilis cases has doubled (Figure 50). No infectious syphilis cases were reported from SYHCs between 2005 and 2008.

Figure 50. Number of cases and rates of infectious syphilis reported at SHCs, 2005–2009



Note: Denominator is the number of clinic visits

Of the 144 cases of syphilis reported in 2009, 116 (80.6%) were male and 28 (19.4%) were female. The mean age of infectious syphilis cases was 40 years (range 17 to 81 years).

Non-specific Urethritis (males only)

For surveillance purposes, non-specific urethritis (NSU) is reported in males only, and is defined as the presence of a urethral discharge where a laboratory-confirmed or probable diagnosis of chlamydia or gonorrhoea has been excluded.

In 2009, there were 733 reported cases of NSU in SHCs, six cases in FPCs and 17 cases in SYHCs. The clinic visit rate of NSU reported by SHCs showed a decreasing trend between 2004 and 2006, but has remained constant at 2.1% since 2007.

LABORATORY SURVEILLANCE

Improvements to the reporting of laboratory surveillance data were implemented during 2009. Population-based rates of chlamydia and gonorrhoea for many District Health Boards (DHBs) and estimates of national rates based on the data from these DHBs are now being reported. This is the first time since STI surveillance began that comprehensive regional and national population estimates of STI incidence have been produced.

This section is based on chlamydia and gonorrhoea data provided voluntarily from 41 participating laboratories across 19 DHBs in New Zealand. As laboratories commenced supplying data at different times and some gaps in data supply occurred, rates of chlamydia and gonorrhoea for each analysis type were calculated using data from laboratories that met specific selection criteria.

For a DHB to be included in the analyses, all laboratories servicing that DHB must have participated in the surveillance programme (unless the non-participating laboratory(ies) was a hospital laboratory undertaking a small proportion of the DHB's STI testing).

In addition the following participation criteria must be met for each analysis type.

1. Annual analysis

   Each laboratory in the DHB must have provided data for all 12 months of 2009.

2. Restricted national rates

   These rates enable comparison of national rates between years. For a DHB to be included in the restricted national rate trend analysis, all laboratories in the selected DHB must have provided data for all 12 months of each of the last four years.

3. Individual DHB trend analysis.

   For a DHB to be included in this analysis, all laboratories in the selected DHB must have provided data for all 12 months of each year for at least three of the last four years.

In some cases, where a community laboratory carried out testing for more than one DHB, these DHBs have been combined for reporting purposes, and include, Auckland, Waitemata and Counties Manukau DHBs (Diagnostic Medlab and Labtests), and Hutt Valley and Capital and Coast DHBs (Aotea Pathology).

Chlamydia

Annual 2009 Analysis

In 2009, 16 DHBs met the selection criteria. Table 35 presents the percentage of specimens tested for chlamydia that were positive, number of test-positive chlamydia cases and chlamydia population rates by DHB and sex for 2009. Laboratories in these DHBs tested 294 355 specimens for chlamydia, of which 27 488 (9.3%) specimens tested positive from 25 614 patients. This represents a national rate of 8.0 per 1000 population.

The national rate of chlamydia for females (11.9 per 1000 population) was almost three-times the rate for males (4.1 per 1000 population). The highest rate of chlamydia was reported for Tairawhiti DHB (11.9 per 1000 population) followed by Lakes (11.7 per 1000 population) and Hawke's Bay (11.0 per 1000 population) DHBs.

Table 35: Percentage of specimens tested for chlamydia that were positive, number of test positive chlamydia cases and chlamydia rates by DHB and sex, 2009

District Health Board	Specimens tested positive (%)	Number of test-positive cases				Rate per 1000		
		Male	Female	Unknown	Total	Male	Female	Total
Northland	13.0	359	1131	3	1493	4.7	14.3	9.6
AK-WA-CM	7.3	2563	7451	10	10024	3.6	10.1	6.9
Waikato	10.6	869	2220	1	3090	4.9	12.1	8.6
Lakes	11.5	245	963	3	1211	4.8	18.3	11.7
Bay of Plenty	9.9	357	1636	16	2009	3.5	15.4	9.7
Tairawhiti	12.3	117	431	0	548	5.2	18.2	11.9
Taranaki	10.1	238	565	1	804	4.5	10.3	7.4
Hawke's Bay	13.4	407	1272	2	1681	5.5	16.2	11.0
Whanganui	13.1	73	235	22	330	2.1	7.5	5.3
MidCentral	17.9	419	1199	5	1623	5.2	14.1	9.8
Wairarapa	12.6	45	195	23	263	2.3	9.5	6.6
West Coast	10.3	50	118	0	168	3.0	7.4	5.2
Otago	7.3	419	974	10	1403	4.5	10.1	7.4
Southland	10.2	219	745	3	967	3.9	13.4	8.7
Other[1]	13.1	567	1224	2	1793	-	-	-
Total[2]	9.3	6380	19135	99	25614	4.1	11.8	8.0

AK-WA-CM: Auckland / Waitemata / Counties Manukau

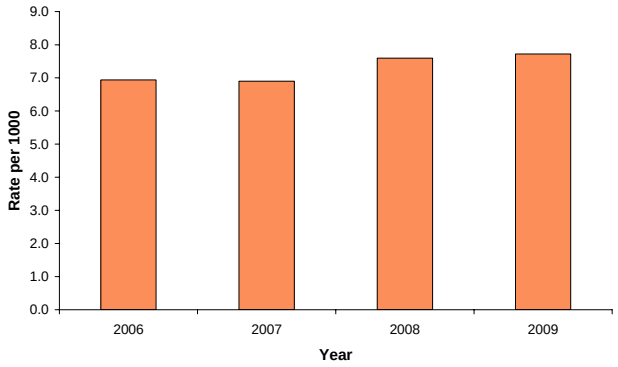
[1] Data from DHBs where selection criteria were not met

[2] Total and rate calculations include only cases and population for DHBs meeting the selection criteria

Restricted National Rate Trend Analysis

Nine DHBs met the selection criteria for the restricted national rate trend analysis for chlamydia. Between 2008 and 2009, the chlamydia restricted national rate increased by 1.7% (from 7.6 to 7.7 per 1000 population). From 2006 to 2009, the chlamydia restricted national rate increased by 11.3% (from 6.9 to 7.7 per 1000 population). The chlamydia restricted national rate for 2006 to 2009 are shown in Figure 51.

Figure 51. Chlamydia restricted national rate, 2006–2009

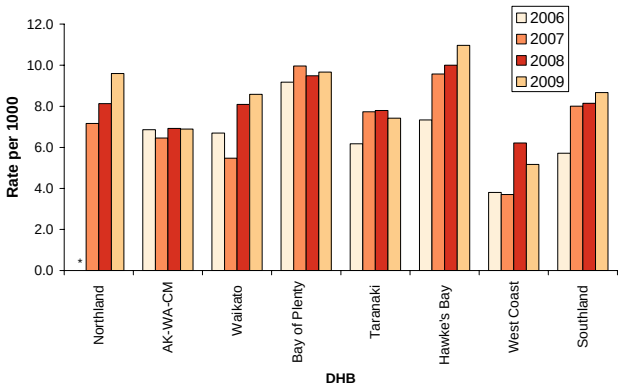


Individual DHB Trend Analysis

Ten DHBs met the selection criteria for the individual DHB trend analysis. From 2006 to 2009, the chlamydia rate increased in all DHBs, although the percentage increase for the combined Auckland region DHBs was very small (0.5%). The highest percentage increase in rate was reported for Southland DHB (which rose from 5.7 to 8.7 per 1000 population) followed by Hawke's Bay DHB (7.3 to 11.0 per 1000 population).

Chlamydia rates by DHB for 2006 to 2009 are shown in Figure 52.

Figure 52. Chlamydia rates by DHB, 2006–2009



AK-WA-CM: Auckland / Waitemata / Counties Manukau

* Data incomplete

Gonorrhoea

Annual 2009 Analysis

In 2009, 18 DHBs met the selection criteria for the annual analysis. Laboratories in these DHBs tested 365 188 specimens for gonorrhoea, of which 3285 (0.9%) specimens tested positive from 2387 patients. This represents a national rate of 66 per 100 000 population.

Table 36 presents the percentage of specimens tested for gonorrhoea that were positive, number of test-positive gonorrhoea cases and gonorrhoea population rates by DHB and sex for 2009.

Table 36: Percentage of specimens tested for gonorrhoea that were positive, number of test positive gonorrhoea cases and gonorrhoea rates by DHB and sex, 2009

District Health Board	Specimens tested positive (%)	Number of test-positive cases				Rate per 100 000		
		Male	Female	Unknown	Total	Male	Female	Total
Northland	0.2	18	4	0	22	24	-	14
AK-WA-CM	0.8	549	371	1	921	77	50	63
Waikato	0.9	115	95	1	211	65	52	59
Lakes	1.6	63	43	1	107	124	82	104
Bay of Plenty	1.0	60	61	1	122	59	57	59
Tairawhiti	2.3	65	63	5	133	289	267	289
Taranaki	0.9	9	40	0	49	17	73	45
Hawke's Bay	3.1	85	83	0	168	114	106	110
Whanganui	0.8	25	11	0	36	82	35	58
MidCentral	0.5	71	56	0	127	88	66	77
HV-CC	1.2	189	120	3	312	90	54	73
Wairarapa	0.7	14	10	0	24	72	49	60
West Coast	0.4	4	6	0	10	-	38	31
Otago	0.6	31	33	1	65	34	34	34
Southland	2.1	39	40	1	80	70	72	72
Other[1]	2.1	89	63	0	152	-	-	-
Total[2]	0.9	1337	1036	14	2387	75	56	66

AK-WA-CM: Auckland / Waitemata / Counties Manukau HV-CC: Hutt Valley / Capital & Coast

[1] Data from DHBs where selection criteria were not met

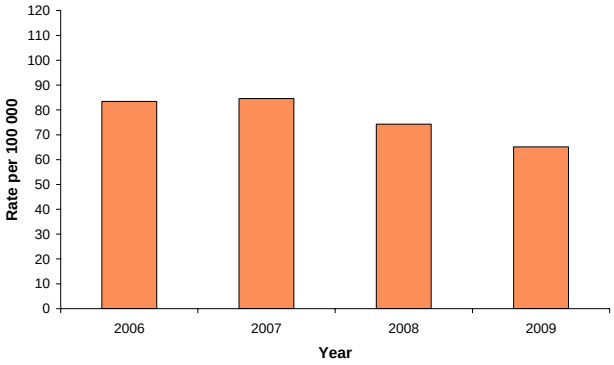
[2] Total and rate calculations include only cases and population for DHBs meeting the selection criteria

The national rate for males (75 per 100 000 population) was almost one and a half-times the national rate for females (56 per 100 000 population). The highest rate of gonorrhoea was reported for Tairawhiti DHB (289 per 100 000 population) followed by Hawke's Bay (110 per 100 000 population) and Lakes (104 per 100 000 population) DHBs.

Restricted National Rate Trend Analysis

Ten DHBs met the selection criteria for the restricted national rate trend analysis for gonorrhoea. Between 2008 and 2009, the gonorrhoea restricted national rate decreased by 12.4% (from 75 to 65 per 100 000 population). From 2006 to 2009, the gonorrhoea restricted national rate decreased by 22.0% (from 83 to 65 per 100 000 population). The gonorrhoea restricted national rate for 2006 to 2009 is shown in Figure 53.

Figure 53. Gonorrhoea restricted national rate, 2006–2009

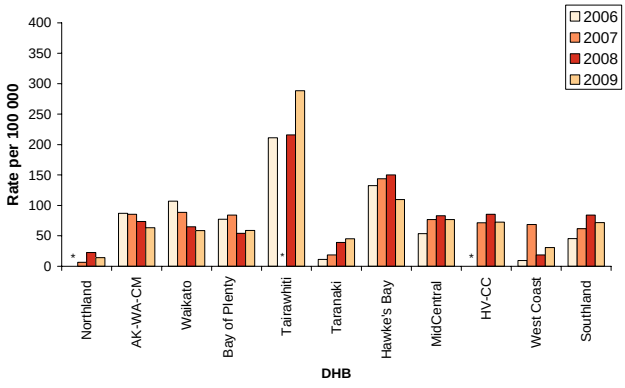


Individual DHB Analysis

Fourteen DHBs met the selection criteria for the individual DHB trend analysis. From 2006 to 2009, the change in rates of gonorrhoea varied across the DHBs with some DHBs experiencing an increase and other DHBs a decrease in rates. The highest percentage increase in rate was reported for Taranaki DHB (which rose from 11 to 45 per 100 000 population). The largest percentage decrease in rate was reported for Waikato DHB (which decreased from 107 to 59 per 100 000 population).

Gonorrhoea rates by DHB for 2006 to 2009 are shown in Figure 54

Figure 54. Gonorrhoea rates by DHB, 2006–2009



AK-WA-CM: Auckland / Waitemata / Counties Manukau
HV-CC: Hutt Valley / Capital & Coast
* Data incomplete

OUTBREAK SURVEILLANCE

Introduction

The following is a summary of surveillance data for outbreaks reported in 2009. A full report on outbreaks can be found in the Annual Summary of Outbreaks in New Zealand 2009 available at www.surv.esr.cri.nz

This summary presents outbreak data by PHU, agent type, mode of transmission and setting. It is important to note that a single outbreak may have multiple modes of transmission or settings recorded.

Outbreak definition

The Manual for Public Health Surveillance in New Zealand [30] states that the following types of outbreaks should be reported:

1) two or more cases linked to a common source

2) a community-wide or person-to-person outbreak (except when the source has become well established as a national epidemic)

3) any other situation where outbreak investigation or control measures are undertaken or considered.

Outbreak reporting is not required for single cases due to a specific contaminated source, and secondary cases, with the exception of secondary cases in an institution.

Characteristics

There were 638 outbreaks reported by the PHUs in 2009 involving 10 734 cases. Table 37 outlines the number of outbreaks and associated cases reported by each PHU in 2009.

Table 37. Outbreaks and associated cases reported by each public health service (PHS)/ public health unit (PHU) in 2009

PHS/PHU	Outbreaks	Cases
Northland	3	42
Auckland	237	2215
Waikato	49	777
Bay of Plenty	35	521
Rotorua	9	187
Taranaki	19	340
Hawke's Bay	16	385
Gisborne	4	59
Wanganui	4	140
Manawatu	50	1547
Wellington[a]	81	1441
Nelson	4	148
West Coast	16	175
Canterbury	44	1412
South Canterbury	10	362
Otago	36	662
Southland	21	321
Total	638	10 734

[a] Wairarapa data are included with Wellington.

Note that outbreaks are reported by one PHU but the distribution of cases may be more widespread than the geographic boundaries of that PHU.

Of these reported outbreaks, 636 were final reports involving 10 718 cases, and two were interim reports (final details not yet available) involving 16 cases. According to the case definition for each outbreak, there were 2582 (24.1%) confirmed cases and 8152 probable cases (75.9%).

There were 337 hospitalisations and 21 deaths that resulted from outbreaks reported in 2009. Seventeen deaths were related to norovirus outbreaks in Bay of Plenty (8), Hawke's Bay (6), Wellington (2) and Canterbury (1). Two deaths were related to an influenza A (H1N1) outbreak in Taranaki (1) and Wellington (1) and two deaths to a carbon monoxide outbreak in Waikato.

Pathogens/Agents

A summary of outbreaks and associated cases by agent type is shown in Table 38.

Enteric Bacteria

During 2009, enteric bacteria were implicated in 6.0% (38/638) of all reported outbreaks and 1.8% (194/10734) of all cases. Approximately 32% of these outbreaks and 39% of all cases attributed to enteric bacteria were linked to *Salmonella* species (12/38 and 76/194, respectively). Of the 12 *Campylobacter* outbreaks, seven were attributed to foodborne transmission and four to person-to-person transmission. The most common settings were in the home (3 outbreaks) or in rest homes or farms (2 outbreaks each).

Of the 12 *Salmonella* outbreaks, the most common modes of transmission were person-to-person (7 outbreaks), foodborne (6 outbreaks) and environmental (3 outbreaks). The most common setting was in the home which was linked to eight outbreaks and 37 cases.

One outbreak of paratyphoid fever due to *S.* paratyphi B associated with overseas travel was reported, most likely acquired from Indonesia. Modes of transmission included foodborne, waterborne, person-to-person and environmental.

In 2009, there were two outbreaks of typhoid fever due *S.* typhi. One outbreak involved person-to-person spread in the home setting and one outbreak of *S.* typhi phage type E1a involved travel to Samoa with an unknown mode of transmission.

There were three *Shigella* outbreaks reported in 2009, all were associated with person-to-person transmission and were set in the home. One of the outbreaks occurred following overseas travel to India.

Vibrio parahaemolyticus was identified in two outbreaks, both of which occurred in the home setting and were associated with food imported from Tonga. One foodborne outbreak was associated with consumption of raw seafood including clams, cockle shells and fish marinated in coconut cream. A further outbreak, that involved person-to-person and foodborne transmission, was associated with consumption of cooked crabs and raw coconut juice.

Table 38. Outbreaks and associated cases by agent type, 2009

Agent type	Outbreaks	Cases
Enteric bacteria		
Campylobacter spp.	12	65
Salmonella spp.	12	76
Salmonella Paratyphi B	1	2
Salmonella Typhi	2	6
Shigella spp.	3	8
Vibrio parahaemolyticus	2	7
VTEC/STEC (*Escherichia coli* O157)	4	15
Yersinia spp.	2	15
Total	**38**	**194**
Enteric protozoa		
Giardia spp.	41	131
Cryptosporidium spp.	20	68
Total	**61**	**199**
Enteric viruses		
Hepatitis A	1	2
Norovirus	270	7116
Rotavirus	32	424
Sapovirus	1	29
Total	**304**	**7571**
Enteric (unspecified)		
Gastroenteritis	178	2115
Total	**178**	**2115**
Respiratory bacteria		
Bordetella pertussis	27	104
Mycobacterium tuberculosis	3	20
Neisseria meningitidis	1	2
Total	**31**	**126**
Respiratory viruses		
Influenza	1	11
Influenza A H1N1	7	76
Influenza-like illness	6	119
Upper Respiratory Illness	1	4
Total	**15**	**210**
Toxins		
Ciguatera fish poisoning	1	6
Clostridium spp.	3	88
Histamine (scombroid) fish poisoning	1	3
Total	**5**	**97**
Poison		
Carbon monoxide	1	2
Total	**1**	**2**
Other Illness		
Conjunctivitis	1	12
Total	**1**	**12**
Other viruses		
Measles	3	205
Mumps	1	3
Total	**4**	**208**
Total	**638**	**10734**

VTEC/STEC was associated with four outbreaks in 2009. The modes of transmission were reported as person-to-person (3) and person-to-person and zoonotic (1). Three outbreaks occurred at a home setting, and one outbreak occurred both at a home and a farm.

There were two outbreaks due to *Yersinia* species. One outbreak was associated with overseas travel and it was suspected they contracted the illness from eating contaminated pork and chicken at a restaurant or from contact with wild pork during their tour. *Y. enterocolitica* biotype 4 was identified as the infectious agent in an outbreak involving 13 people of unknown mode of transmission and unknown setting. It was suspected that the outbreak was associated with contaminated pork or pork products.

Enteric Protozoa

Enteric protozoa accounted for 9.6% (61/638) of all outbreaks and 1.9% (199/10734) of all cases reported in 2009.

Giardia spp. was identified as the infectious agent in 41 outbreaks, 38 of which involved person-to-person transmission, 13 involved waterborne transmissions, nine involved environmental transmission and one zoonotic transmission. The most commonly identified setting for *Giardia* outbreaks was the home, which was associated with 35 outbreaks.

Twenty outbreaks involving *Cryptosporidium parvum* occurred in 2009, 17 of which occurred in the greater Auckland region. The modes of transmission were reported as person-to-person transmission (15), zoonotic (6), waterborne (5), environmental (3) and unknown (1). The most common setting was the home (15), followed by farms (4), swimming/spa pools (3), other settings (2), school (1) and hotel/motel (1).

Enteric Viruses

Enteric viruses were the infectious agent in 47.6% (304/638) of all outbreaks and 70.5% (7571/10734) of all associated cases in 2009.

Hepatitis A was associated with one outbreak involving person-to-person transmission in the home environment.

The vast majority of outbreaks due to enteric viruses were caused by norovirus (270/304), which resulted in 7116 associated cases. The median number of cases per norovirus outbreak was 20 (range 2 to 320 cases). Person-to-person transmission was ascertained in 252 outbreaks, 103 of which also involved other modes of transmission. Environmental transmission was established in 84 outbreaks and foodborne transmission in 29 outbreaks. An institution was identified as the setting for 224 outbreaks, including rest homes (164), continuing care hospitals (77), acute care hospitals (28), child care (11), hotel/motel (3) school (3), camp (1), prison (1) and hostel (1). The home was identified as the setting for 21 outbreaks and restaurants or cafés were implicated in 21 outbreaks.

In 2009, a total of 32 outbreaks of rotavirus occurred resulting in 424 cases reported. All of these outbreaks involved person-to-person transmission although three outbreaks also involved environmental transmission. The outbreak settings were childcare centres (25), rest homes (3), in the home (2), hospital (acute care) (1) or another setting (1).

One sapovirus outbreak in a rest home was associated with 29 cases. Environmental and person-to-person transmissions were identified.

Enteric (unspecified)

During 2009, outbreaks of gastroenteritis (where no organism was isolated) accounted for 27.9% (178/638) of all outbreaks and 19.7% (2115/10734) of all associated cases.

Respiratory Bacteria

Respiratory bacteria resulted in 4.9% (31/638) of all outbreaks and 1.2% (126/10734) of all associated cases.

There were 27 outbreaks due to *B. pertussis* involving 104 cases reported in 2009. Person-to-person was identified as the only mode of transmission in 26 outbreaks. One outbreak had person-to-person and environmental modes of transmission. Thirteen of the outbreaks occurred in the home, four of which recorded other setting: two at a school, one at a workplace, and both at school and at a childcare centre. Five outbreaks occurred in a childcare centre, three at school, one at a community gathering and three in other settings. Two outbreaks occurred in unknown settings.

Three outbreaks due to *M. tuberculosis* infection, involving 20 cases were reported in 2009. All of the outbreaks had multiple settings, home and school and workplace, home and hostel, home and community/church gathering.

Neisseria meningitidis caused one reported outbreak in 2009. The outbreak occurred at a sporting event and involved two cases.

Respiratory Viruses

Respiratory viruses resulted in 2.4% (15/638) of all outbreaks and 2.0% (210/10734) of all associated cases.

Seven outbreaks due to influenza A H1N1 involving 76 cases were reported in 2009. Person-to-person was identified as the only mode of transmission in six outbreaks. One outbreak had person-to-person and environmental modes of transmission. Three outbreaks occurred at a hospital (continuing care) facility; two recorded other settings (airplane and care home), one at a hostel and one at both home and at a tangi.

Six ILI outbreaks involving 119 cases were reported in 2009. Person-to-person and environmental modes of transmission were identified in five of the outbreaks. One outbreak had only the person-to-person mode of transmission. Four outbreaks occurred at a childcare centre, one at school and one on a plane.

One influenza outbreak was reported in 2009 involving 11 cases with person-to-person mode of transmission at a rest home. One upper respiratory illness outbreak was reported involving four cases and the person-to-person mode of transmission at a rest home.

Toxins

Toxins were involved in 0.8% (5/638) of all outbreaks and 0.9% (97/10734) of all associated cases reported in 2009. The most commonly implicated agent was *Clostridium* spp., which accounted for three outbreaks and 88 cases. The other two implicated agents were ciguatera and histamine fish poisoning. Of the five toxin-related outbreaks, all involved foodborne transmission and four of these related to commercial food operators.

Poison

Two adults, one male and one female aged 40–49 years, died in their Waikato home when they succumbed to carbon monoxide poisoning from the indoor use of an unflued gas heater. Further details are awaiting a coroner's inquest hearing.

Other Illness

One outbreak due to conjunctivitis involving 12 cases was reported in 2009, involving person-to-person transmission at a rest home.

Other Viruses

Other viruses resulted in 0.6% (4/638) of all outbreaks and 1.9% (208/10734) of all associated cases. Measles caused three reported outbreaks in 2009, involving 205 cases in total. All three outbreaks involved person-to-person transmission. The largest outbreak involving 170 cases had multiple settings: home, community/church gathering, childcare and school in three PHSs (West Coast, Canterbury and South Canterbury). There was one outbreak due to mumps reported in 2009. The person-to-person outbreak occurred at a childcare centre, but only involved three cases.

Modes of Transmission

The modes of transmission recorded for outbreaks are detailed in Table 39.

Table 39. Outbreaks of infectious disease and associated cases by mode of transmission, 2009

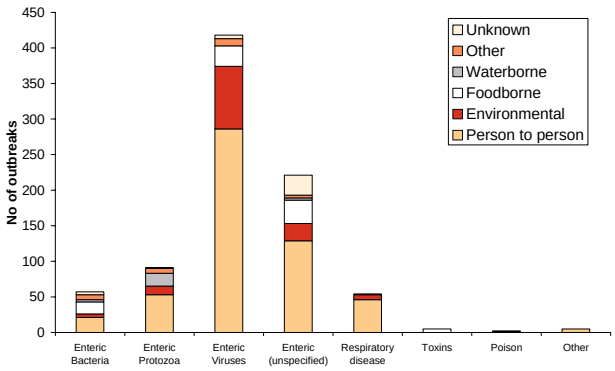
Transmission mode	Outbreaks[a]	Cases[a]
Person-to-person	540	10 020
Environmental	137	3731
Foodborne	84	651
Waterborne	24	87
Zoonotic	14	67
Parenteral	0	0
Sexual contact	0	0
Vectorborne	0	0
Other	16	287
Unknown	38	328

[a] Note: more than one mode of transmission was reported for some outbreaks

The primary modes of transmission were person-to-person transmission, recorded in 540 outbreaks, environmental transmission recorded in 137 outbreaks, and foodborne transmission recorded in 84 outbreaks. Person-to-person transmission was associated with over two and a half-times as many cases as environmental transmission (10 020 versus 3731), and over 15-times as many cases as foodborne transmission (10 020 versus 651). The mode of transmission was unknown in 6.0% (38/638) of outbreaks and more than one mode of transmission was identified in 30.6% (195/638) of all outbreaks reported in 2009.

Person-to-person transmission was the most common mode of transmission for enteric bacteria (55.3%, 21/38), enteric protozoa (86.9%, 53/61), enteric viruses (94.1%, 286/304), unspecified enteric pathogens (72.5%, 129/178), respiratory bacteria (100.0%, 31/31) respiratory viruses (100.0%, 15/15) and other viruses (100.0%, 4/4). While foodborne transmission was the principal mode of transmission for toxins (100.0%, 5/5), it also contributed substantially to outbreaks due to enteric bacteria (44.7%, 17/38) and unspecified enteric pathogens (18.5%, 33/178) (Figure 55).

Figure 55. Number of outbreaks by agent type and mode of transmission, 2009



Environmental transmission was an important contributing factor in poison (100.0%, 1/1), respiratory viruses (40.0%, 6/15), enteric viruses (28.9%, 88/304) and enteric protozoa (19.7%, 12/61) outbreaks.

Settings

Outbreaks reported in 2009 were most commonly linked to rest homes (36.2%, 231/638), homes (21.9%, 140/638) and hospitals (continuing care) (16.6%, 106/638) (Table 40).

Table 40. Number of cases associated with outbreaks of infectious disease by location, 2009

Outbreak setting	Outbreaks[a]	Cases[a]
Commercial Food Operators		
Restaurant/café	68	284
Takeaway	15	45
Other food outlet	2	32
Supermarket/delicatessen	2	19
Caterers	1	17
Institutions		
Rest home	231	6354
Hospital (continuing care)	106	3043
Childcare centre	62	954
Hospital (acute care)	43	1189
School	16	442
Hotel/motel	7	60
Hostel/boarding house	6	69
Camp	6	54
Prison	2	14
Community		
Community/church gathering	5	200
Swimming/spa pool	5	98
Tangi/hui	1	13
Workplace		
Workplace	10	277
Farm	10	45
Home	140	797
Other setting	40	714

ANTIBIOTIC RESISTANCE

ANTIMICROBIAL RESISTANCE

The prevalence of resistance among common, important clinical pathogens between 1994 and 2008, is shown in Table 50 in the Appendix. Most antimicrobial resistance data are only available in a complete analysed form up to the end of 2008. Data from ESR's national surveillance of antimicrobial resistance are available at http://www.surv.esr.cri.nz/antimicrobial/antimicrobial_resistance.php

The following trends are of particular note.

- Methicillin resistance among *Staphylococcus aureus* has remained relatively stable at 7–9% each year since 2000.
- A trend of declining mupirocin resistance in *S. aureus* is evident since a peak of 21.5% in 2000. Mupirocin resistance is lower among methicillin-resistant (MRSA) than methicillin-susceptible *S. aureus* (MSSA), as the most common MRSA strains in New Zealand are mupirocin susceptible.
- A high prevalence of fusidic acid resistance among *S. aureus* is evident. As for mupirocin, fusidic acid resistance is more common among MSSA than MRSA.
- There is a high prevalence of penicillin non-susceptibility among *Streptococcus pneumoniae* and increasing non-susceptibility to third-generation cephalosporins, such as ceftriaxone.
- Outbreaks of vancomycin-resistant enterococci (VRE) occurred in Auckland hospitals in 2007 and 2008, and Waikato Hospital in 2008.
- Levels of trimethoprim and co-amoxiclav resistance are stable among urinary *E. coli,* low levels of nitrofurantoin resistance continue, but a trend of increasing fluoroquinolone resistance is evident.
- Extended-spectrum β-lactamases (ESBLs) in Enterobacteriaceae are increasingly prevalent.
- Ciprofloxacin resistance in *Neisseria gonorrhoeae* is now more common than penicillin resistance in most parts of New Zealand.
- Multidrug-resistant tuberculosis (MDR-TB) remains uncommon and there does not appear to have been any transmission of MDR-TB within New Zealand. No extensively drug-resistant TB (XDR-TB) has been identified in New Zealand. XDR-TB is MDR-TB with additional resistance to any fluoroquinolone and at least one of the following second-line drugs: capreomycin, kanamycin or amikacin.

APPENDIX: NATIONAL SURVEILLANCE DATA AND TRENDS

COMPARISON OF NOTIFIABLE DISEASE CASES AND RATES FOR 2008 AND 2009

Table 41. Number of cases and rates per 100 000 population of notifiable diseases in New Zealand, 2008–2009

Disease[a,b,c]	2008		2009		Change[f,g]
	Cases	Rates	Cases	Rates	
AIDS	48	1.1	28	0.6	↞
Barmah Forest virus infection	0	0.0	2	0.0	→
Brucellosis	3	0.1	0	0.0	←
Campylobacteriosis	6694	156.8	7176	166.3	↠
Chemical poisoning from the environment	1	0.0	6	0.1	→
Chikungunya fever	1	0.0	1	0.0	–
Cryptosporidiosis	764	17.9	854	19.8	↠
Dengue fever	113	2.6	140	3.2	→
Gastroenteritis[d]	687	16.1	714	16.5	→
Giardiasis	1660	38.9	1640	38.0	←
Haemophilus influenzae type b	9	0.2	11	0.3	→
Hepatitis A	89	2.1	44	1.0	↞
Hepatitis B[e]	38	0.9	55	1.3	→
Hepatitis C[e]	23	0.5	32	0.7	→
Hepatitis NOS	2	0.0	2	0.0	–
Hydatid disease	7	0.2	3	0.1	←
Lead absorption	317	7.4	368	8.5	→
Legionellosis	73	1.7	78	1.8	→
Leprosy	5	0.1	3	0.1	←
Leptospirosis	118	2.8	71	1.6	↞
Listeriosis	27	0.6	28	0.6	→
Malaria	40	0.9	50	1.2	→
Measles	12	0.3	253	5.9	↠
Meningococcal disease	122	2.9	133	3.1	→
Mumps	76	1.8	63	1.5	←
Paralytic shellfish poisoning	0	0.0	1	0.0	→
Paratyphoid fever	25	0.6	25	0.6	–
Pertussis	417	9.8	1399	32.4	↠
Rheumatic fever	153	3.6	140	3.2	←
Rickettsial disease	10	0.0	6	0.1	←
Ross River virus infection	1	0.0	3	0.1	→
Rubella	9	0.2	4	0.1	←
Salmonellosis	1345	31.5	1129	26.2	↞
Shigellosis	113	2.6	119	2.8	→
Taeniasis	5	0.1	3	0.1	←
Tetanus	0	0.0	1	0.0	→
Toxic shellfish poisoning	1	0.0	0	0.0	←
Tuberculosis disease	296	6.9	306	7.1	→
Typhoid fever	29	0.7	35	0.8	→
VTEC/STEC infection	124	2.9	143	3.3	→
Yersiniosis	508	11.9	431	10.0	↞

[a] No cases of the following notifiable diseases were reported in 2008 & 2009: anthrax, botulism, cysticercosis, decompression sickness, diphtheria, *E. sakazakii*, HPAI, plague, poliomyelitis, primary amoebic meningo-encephalitis, rabies, SARS, trichinosis, yellow fever.
[b] Invasive pneumococcal disease became notifiable on 17 October 2008 and is therefore not included in this table.
[c] Non seasonal influenza became notifiable on 29 April 2009 and is therefore not included in this table
[d] Cases of gastroenteritis from a common source or foodborne intoxication e.g. staphylococcal intoxication.
[e] Only acute cases of this disease are notifiable.
[f] ↞= Significant decrease, ↠ = Significant increase, -- = No change, ← = Not significant decrease, → = not significant increase
[g] The Mantel-Haenszel chi-square test or where necessary Fisher's Exact test were used to determine statistical significance. P-values less than 0.05 are considered to be significant at the 95% level of confidence.

DEATHS FROM NOTIFIABLE DISEASES RECORDED IN EPISURV, 1997–2009

Table 42. Deaths due to notifiable diseases recorded in EpiSurv, 1997–2009

Disease	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AIDS[a]	34	19	18	19	14	11	10	13	15	14	5	2	2
Campylobacteriosis	2	2	1	3	1	1	0	0	1	1	1	0	0
Chemical poisoning from the environment	0	0	0	0	0	0	0	0	0	0	0	0	1
Creutzfeldt-Jakob disease[b]	3	0	2	3	1	3	4	3	0	5	0	0	0
Gastroenteritis	0	0	0	0	0	1	0	0	0	0	0	0	0
Giardiasis	1	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type b	1	0	0	0	1	1	2	0	0	0	0	0	0
Hepatitis B	2	0	0	0	1	0	0	0	1	0	1	0	0
Hydatid disease	0	0	0	1	0	0	0	0	0	0	0	0	0
Invasive pneumococcal disease[c]												8	34
Legionellosis[d]	4	1	1	5	2	3	1	1	4	3	1	4	2
Listeriosis - non perinatal	2	0	1	2	1	0	2	3	1	0	2	3	2
Listeriosis - perinatal	6	0	2	4	1	3	2	2	0	1	2	2	2
Malaria	1	0	0	0	0	0	0	0	0	0	0	0	0
Meningococcal disease	24	23	23	17	26	18	13	8	14	7	7	8	5
Non seasonal influenza A (H1N1)[e]													20
Pertussis	0	0	0	0	1	1	1	1	0	0	0	0	0
Primary amoebic meningoencephalitis	0	0	0	1	0	0	0	0	0	0	0	0	0
Rheumatic fever[f]	1	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	2	2	1	7	2	1	0	0	1	1	1	1	1
Shigellosis	0	0	1	0	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	1	0	0	0	0	0	1	0	0
Tuberculosis	15	8	14	8	2	6	6	6	4	5	3	4	3
VTEC infection	1	1	0	0	0	0	0	0	0	0	0	0	1
Yersiniosis	0	2	0	0	0	0	0	1	0	0	0	0	0

[a] Data source [31]

[b] Data source [13]

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

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

[e] Non seasonal influenza became notifiable on 29 April 2009

[f] The death was a rheumatic fever recurrence

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

MINISTRY OF HEALTH MORTALITY DATA FOR SELECTED NOTIFIABLE DISEASES, 2005–2007

Table 43. Reported deaths from selected notifiable diseases, 2005–2007

		2005		2006		2007[a]	
Disease	ICD 10 codes	Underlying[b]	Contributory[c]	Underlying[b]	Contributory[c]	Underlying[b]	Contributory[c]
AIDS	B20-B24	13	7	17	5	10	8
Campylobacteriosis	A04.5		3	3		1	
Creutzfeldt-Jakob Disease	A81.0	4		3		7	
Hepatitis A	B15						2
Hepatitis B	B16	3	5		5	2	3
Hepatitis C	B17.1		1		1		
Legionellosis	A48.1	2	1	1		1	
Listeriosis	A32				1	2	
Meningococcal Disease	A39	13		6		7	
Pertussis	A37	1					
Salmonellosis	A02		1	1			
Tetanus	A33-A35					1	
Tuberculosis	A15-A19, P37.0	5	14	11	8	7	8

[a] Latest year that data are available.

[b] Underlying – main cause of death

[c] Contributory – selected contributory cause of death (not main cause of death)

MINISTRY OF HEALTH MORBIDITY DATA FOR SELECTED NOTIFIABLE DISEASES, 2007–2009

Table 44. Hospital admissions for selected notifiable diseases, 2007–2009

Disease	ICD 10 codes	2007		2008		2009	
		Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis
AIDS	B20-B24	28	261	26	266	16	285
Arboviral diseases	A83, A84, A85.2, A92, A93, A94, B33.1		2	1		1	
Brucellosis	A23		2	2			
Campylobacteriosis	A04.5	752	185	388	97	473	101
Cholera	A00	1					
Creutzfeldt-Jakob Disease	A81.0	2	5	5	9	4	
Cryptosporidiosis	A07.2	26	14	19	13	19	4
Cysticercosis	B69	4	2	2		1	2
Decompression sickness	T70.3	12	1	12	2	24	3
Dengue fever	A90, A91	45	9	35	5	22	3
Diphtheria	A36		3				
Giardiasis	A07.1	20	14	18	21	21	13
Hepatitis A	B15	17	18	19	18	17	7
Hepatitis B	B16	41	90	33	81	27	27
Hepatitis C	B17.1	12	19	12	21	15	29
Lead absorption	T56.0	12		2		5	
Legionellosis	A48.1	18	7	37	6	33	9
Leprosy	A30	4	6	5	4		1
Leptospirosis	A27	41	2	57	7	46	3
Listeriosis	A32	12	17	13	13	11	17
Malaria	B50-B54	37	5	30		34	2
Measles	B05	5	1	3		29	1
Meningococcal disease	A39	120	21	125	21	167	23
Mumps	B26	13	2	16	4	9	3
Paratyphoid fever	A01.1-A01.4	13		4		3	
Pertussis	A37	51	10	72	11	124	19
Poliomyelitis	A80				1		
Rheumatic fever	I00, I01, I02	206	34	227	46	230	35
Rickettsial diseases	A75, A77, A78, A79	4		7	1	6	3
Rubella	B06		1		1		1
Salmonellosis	A02	123	27	118	40	130	28
Shigellosis	A03	27	1	15	4	14	5
Taeniasis	B689		2		1		
Tetanus	A33-A35	1		1		1	
Tuberculosis	A15-A19, P37.0	229	154	205	121	237	146
Typhoid fever	A01.0	42	2	19	1	25	1
VTEC/STEC Infection	A04.0-A04.4	22	24	26	20	24	11
Yersiniosis	A04.6	19	31	23	30	24	22

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

NOTIFIABLE DISEASE CASES AND RATES BY ETHNIC GROUP, 2009

Table 45. Number of cases and rates per 100 000 population of notifiable diseases by ethnic group, 2009

	Ethnicity													
	European		Māori		Pacific Peoples		Asian		Other Ethnicity		Unknown		Total	
Disease	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	5389	200.0	461	81.5	172	76.0	398	116.8	39	115.1	717		7176	178.2
Cryptosporidiosis	705	26.2	65	11.5	18	8.0	23	6.7	4		39		854	21.2
Dengue fever	61	2.3	3		49	21.7	16	4.7	3		8		140	3.5
Gastroenteritis	505	18.7	39	6.9	10	4.4	36	10.6	6	17.7	118		714	17.7
Giardiasis	1265	47.0	94	16.6	12	5.3	76	22.3	55	162.4	138		1640	40.7
Haemophilus influenzae type b	3		6	1.1	1		1						11	0.3
Hepatitis A	18	0.7	6	1.1	1		15	4.4	2		2		44	1.1
Hepatitis B	25	0.9	9	1.6	11	4.9	5	1.5	2		3		55	1.4
Hepatitis C	23	0.9	4		2		2				1		32	0.8
Invasive pneumococcal disease	387	14.4	181	32.0	93	41.1	24	7.0	2		17		704	17.5
Lead absorption	233	8.6	22	3.9	15	6.6	13	3.8	5	14.8	80		368	9.1
Legionellosis	70	2.6	3		2		1		2				78	1.9
Leptospirosis	62	2.3	9	1.6									71	1.8
Listeriosis	15	0.6	5	0.9	3		1		4				28	0.7
Malaria	10	0.4	1		6	2.7	17	5.0	10	29.5	6		50	1.2
Measles	212	7.9	22	3.9	8	3.5	8	2.3			3		253	6.3
Meningococcal disease	59	2.2	49	8.7	17	7.5	4		2		2		133	3.3
Mumps	44	1.6	10	1.8	1		5	1.5			3		63	1.6
Non seasonal influenza A (H1N1)	1581	58.7	826	146.1	618	273.1	312	91.5	65	191.9	266		3668	91.1
Paratyphoid fever	13	0.5					11	3.2			1		25	0.6
Pertussis	1089	40.4	171	30.2	61	27.0	39	11.4	7	20.7	32		1399	34.7
Rheumatic fever	4		81	14.3	53	23.4	1				1		140	3.5
Salmonellosis	814	30.2	126	22.3	37	16.4	77	22.6	8	23.6	67		1129	28.0
Shigellosis	56	2.1	5	0.9	28	12.4	18	5.3	2		10		119	3.0
Tuberculosis disease	42	1.6	54	9.6	32	14.1	159	46.7	15	44.3	4		306	7.6
Typhoid fever	2				18	8.0	13	3.8	2				35	0.9
VTEC/STEC infection	111	4.1	20	3.5	3		2		1		6		143	3.6
Yersiniosis	247	9.2	37	6.5	12	5.3	98	28.8	2		35		431	10.7

Note: Disease rates for ethnic groups and total cases are based on 2006 census data from Statistics New Zealand and should not be compared with disease rates used else-where in the report, which have been calculated using 2009 mid-year population estimates from Statistics New Zealand. Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.

NOTIFIABLE DISEASE CASES AND RATES BY SEX, 2009

Table 46. Number of cases and rates per 100 000 population of notifiable diseases by sex, 2009

	Sex							
	Male		Female		Unknown		Total	
Disease	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	3976	187.8	3119	141.9	81		7176	166.3
Cryptosporidiosis	384	18.1	463	21.1	7		854	19.8
Dengue fever	57	2.7	83	3.8			140	3.2
Gastroenteritis	276	13.0	407	18.5	31		714	16.5
Giardiasis	838	39.6	781	35.5	21		1640	38.0
Haemophilus influenzae type b	7	0.3	4				11	0.3
Hepatitis A	26	1.2	18	0.8			44	1.0
Hepatitis B	42	2.0	13	0.6			55	1.3
Hepatitis C	12	0.6	19	0.9	1		32	0.7
Invasive pneumococcal disease	369	17.4	335	15.2			704	16.3
Lead absorption	316	14.9	36	1.6	16		368	8.5
Legionellosis	50	2.4	28	1.3			78	1.8
Leptospirosis	64	3.0	7	0.3			71	1.6
Listeriosis - non perinatal	6	0.3	12	0.5			18	0.4
Malaria	32	1.5	18	0.8			50	1.2
Measles	136	6.4	117	5.3			253	5.9
Meningococcal disease	59	2.8	74	3.4			133	3.1
Mumps	35	1.7	28	1.3			63	1.5
Non seasonal influenza A (H1N1)	1667	78.7	1944	88.4	57		3668	85.0
Paratyphoid fever	16	0.8	9	0.4			25	0.6
Pertussis	596	28.1	798	36.3	5		1399	32.4
Rheumatic fever	83	3.9	57	2.6			140	3.2
Salmonellosis	555	26.2	564	25.7	10		1129	26.2
Shigellosis	57	2.7	61	2.8	1		119	2.8
Tuberculosis disease	158	7.5	148	6.7			306	7.1
Typhoid fever	15	0.7	19	0.9	1		35	0.8
VTEC/STEC infection	59	2.8	82	3.7	2		143	3.3
Yersiniosis	220	10.4	207	9.4	4		431	10.0

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

NOTIFIABLE DISEASE CASES AND RATES BY AGE GROUP, 2009

Table 47. Number of cases and rates per 100 000 population of notifiable diseases by age group, 2009

	Age Group																							
	<1		1 to 4		5 to 9		10 to 14		15 to 19		20 to 29		30 to 39		40 to 49		50 to 59		60 to 69		70+		Unknown		Total	
Disease	Cases	Rate	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	156	247.3	818	337.4	370	128.4	325	109.2	495	153.2	1262	215.7	838	145.4	887	139.7	773	145.5	666	169.5	563	147.8	23		7176	166.3
Cryptosporidiosis	29	46.0	267	110.1	102	35.4	69	23.2	44	13.6	93	15.9	131	22.7	58	9.1	30	5.6	15	3.8	13	3.4	3		854	19.8
Dengue fever					2		2		6	1.9	25	4.3	23	4.0	30	4.7	30	5.6	19	4.8	3				140	3.2
Gastroenteritis	31	49.2	87	35.9	7	2.4	12	4.0	18	5.6	67	11.5	64	11.1	87	13.7	80	15.1	53	13.5	171	44.9	37		714	16.5
Giardiasis	36	57.1	331	136.5	127	44.1	55	18.5	23	7.1	153	26.2	373	64.7	243	38.3	153	28.8	111	28.3	26	6.8	9		1640	38.0
Hepatitis A			2		4		6	2.0	3		6	1.0	4		9	1.4	6	1.1	4						44	1.0
Hepatitis B	1								1		15	2.6	7	1.2	17	2.7	3		8	2.0	3				55	1.3
Hepatitis C									2		9	1.5	12	2.1	9	1.4									32	0.7
Invasive pneumococcal disease	36	57.1	66	27.2	34	11.8	26	8.7	29	9.0	45	7.7	71	12.3	55	8.7	62	11.7	90	22.9	190	49.9			704	16.3
Lead absorption			5	2.1	2		1		19	5.9	46	7.9	77	13.4	96	15.1	68	12.8	39	9.9	15	3.9			368	8.5
Legionellosis					1				1		1		6	1.0	11	1.7	12	2.3	22	5.6	24	6.3			78	1.8
Leptospirosis									2		9	1.5	17	2.9	23	3.6	14	2.6	5	1.3	1				71	1.6
Listeriosis							1		2		5	0.9	4		1		2		3		10	2.6			28	0.6
Malaria	1		1		5	1.7	5	1.7	4		17	2.9	5	0.9	5	0.8	3		3		1				50	1.2
Measles	29	46.0	76	31.3	31	10.8	53	17.8	36	11.1	12	2.1	13	2.3	2		1								253	5.9
Meningococcal disease	28	44.4	35	14.4	10	3.5	4		21	6.5	8	1.4	4		11	1.7	4		5	1.3	3				133	3.1
Mumps	1		18	7.4	17	5.9	7	2.4	4		2		7	1.2	4		1		2						63	1.5
Non seasonal influenza A (H1N1)	153	242.6	259	106.8	267	92.7	306	102.8	445	137.7	787	134.5	483	83.8	420	66.2	337	63.4	89	22.7	61	16.0	61		3668	85.0
Paratyphoid fever	1		1						2		8	1.4	6	1.0	3		2		1		1				25	0.6
Pertussis	116	183.9	142	58.6	147	51.0	103	34.6	120	37.1	112	19.1	180	31.2	190	29.9	143	26.9	93	23.7	53	13.9			1399	32.4
Rheumatic fever			2		37	12.8	68	22.9	16	5.0	16	2.7	1												140	3.2
Salmonellosis	78	123.7	218	89.9	68	23.6	38	12.8	60	18.6	144	24.6	136	23.6	121	19.1	115	21.6	72	18.3	75	19.7	4		1129	26.2
Shigellosis	2		11	4.5	8	2.8	4		4		25	4.3	17	2.9	18	2.8	12	2.3	12	3.1	6	1.6			119	2.8
Tuberculosis disease	3		9	3.7	6	2.1	4		15	4.6	64	10.9	54	9.4	51	8.0	40	7.5	30	7.6	30	7.9			306	7.1
Typhoid fever			1		3		2		6	1.9	11	1.9	6	1.0	6	0.9									35	0.8
VTEC/STEC infection	9	14.3	53	21.9	15	5.2	3		9	2.8	12	2.1	8	1.4	7	1.1	11	2.1	9	2.3	7	1.8			143	3.3
Yersiniosis	41	65.0	94	38.8	19	6.6	14	4.7	17	5.3	40	6.8	42	7.3	48	7.6	45	8.5	36	9.2	34	8.9	1		431	10.0

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

NOTIFIABLE DISEASE CASES AND RATES BY DISTRICT HEALTH BOARD, 2009

Table 48. Number of cases and rates of notifiable diseases per 100 000 population by DHB, 2009

Disease	Campylobacteriosis		Cryptosporidiosis		Dengue Fever		Gastroenteritis		Giardiasis		Hepatitis A		Hepatitis B		Invasive pneumococcal disease		Lead Absorption		Legionellosis		Leptospirosis		Malaria		Measles		Meningococcal Disease		Mumps		Non seasonal influenza		Pertussis		Rheumatic Fever		Salmonellosis		Shigellosis		Tuberculosis		Typhoid Fever		VTEC/STEC Infection		Yersiniosis	
District Health Board	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Northland	208	133.5	37	23.8	4		3		64	41.1	1		3		32	20.5	4		2		7	4.5			4		6	3.9	3		180	115.6	20	12.8	16	10.3	32	20.5	3		8	5.1			6	3.9	11	7.1
Waitemata	913	172.8	74	14.0	17	3.2	82	15.5	155	29.3	3		6	1.1	64	12.1	41	7.8	13	2.5	1		7	1.3	15	2.8	6	1.1	5	0.9	333	63.0	118	22.3	8	1.5	88	16.7	23	4.4	49	9.3	5	0.9	9	1.7	51	9.7
Auckland	810	182.4	56	12.6	30	6.8	98	22.1	212	47.7	9	2.0	13	2.9	52	11.7	85	19.1	9	2.0	2		6	1.4	8	1.8	11	2.5	4		372	83.8	66	14.9	13	2.9	106	23.9	19	4.3	63	14.2	8	1.8	18	4.1	69	15.5
Counties Manukau	685	142.2	51	10.6	38	7.9	44	9.1	202	41.9	6	1.2	8	1.7	91	18.9	52	10.8	7	1.5	1		19	3.9	3		19	3.9	3		312	64.8	73	15.2	41	8.5	100	20.8	26	5.4	66	13.7	13	2.7	9	1.9	34	7.1
Waikato	661	183.6	109	30.3	6	1.7	24	6.7	148	41.1	3		1		83	23.1	24	6.7	1		17	4.7	3		1		9	2.5	7	1.9	180	50.0	233	64.7	22	6.1	104	28.9	7	1.9	16	4.4	1		27	7.5	28	7.8
Lakes	205	201.4	13	12.8	2		12	11.8	65	63.9	1		1		29	28.5	9	8.8	1		2						5	4.9	1		50	49.1	31	30.5	3		27	26.5			7	6.9			5	4.9	10	9.8
Bay of Plenty	317	152.6	27	13.0	4		5	2.4	63	30.3	2		3		50	24.1	9	4.3	9	4.3	3		2		1		9	4.3	5	2.4	105	50.5	62	29.8	5	2.4	41	19.7	4		12	5.8			9	4.3	6	2.9
Tairawhiti	36	77.9	10	21.6	2				11	23.8			1		9	19.5	7	15.2									7	15.2			50	108.2	13	28.1	10	21.6	32	69.3	1		6	13.0			4		3	
Taranaki	233	215.3	24	22.2	1				45	41.6			1		20	18.5	5	4.6	1		3		1				3		2		33	30.5	42	38.8	1		20	18.5							14	12.9	15	13.9
Hawke's Bay	336	218.3	36	23.4	4		11	7.1	66	42.9	4		1		35	22.7	6	3.9	5	3.2	4		1		1		7	4.5	1		174	113.1	28	18.2	5	3.2	58	37.7	1		8	5.2			4		15	9.7
Whanganui	139	220.1	9	14.3	1		16	25.3	21	33.3			1		12	19.0	7	11.1			3				1		1				71	112.4	6	9.5			12	19.0			1						3	
MidCentral	236	142.3	29	17.5	4		108	65.1	18	10.8	2		2		17	10.2	13	7.8	1		6	3.6			1		10	6.0			79	47.6	27	16.3	1		31	18.7	1		6	3.6			3		4	
Hutt	355	248.8	19	13.3	2		53	37.1	35	24.5	3				30	21.0	14	9.8	1								6	4.2	3		213	149.3	53	37.1	6	4.2	35	24.5	4		10	7.0			2		25	17.5
Capital and Coast	692	240.2	129	44.8	14	4.9	89	30.9	167	58.0	3		2		30	10.4	12	4.2	2		1		3		1		11	3.8	8	2.8	515	178.8	104	36.1	7	2.4	59	20.5	8	2.8	20	6.9	6	2.1	5	1.7	42	14.6
Wairarapa	69	172.6	13	32.5	1		2		12	30.0			2		12	30.0	3		2		1		1				1		2		54	135.1	10	25.0			19	47.5	1						1		1	
Nelson-Marlborough	173	126.5	24	17.5			10	7.3	48	35.1			2		22	16.1	10	7.3	2		2		2		1				1		80	58.5	93	68.0	1		40	29.2	2		4				2		2	
West Coast	42	128.9	18	55.2	1		90	276.2	13	39.9			2						3		5	15.3	2		7	21.5	1		1		65	199.4	29	89.0			10	30.7	1		2				1		12	36.8
Canterbury	545	108.6	97	19.3	7	1.4	52	10.4	190	37.9	6	1.2	5	1.0	58	11.6	30	6.0	14	2.8	7	1.4	3		170	33.9	12	2.4	14	2.8	599	119.3	317	63.1	1		149	29.7	10	2.0	22	4.4	2		16	3.2	67	13.3
South Canterbury	103	185.4	28	50.4			3		10	18.0					6	10.8	5	9.0	1		2				2				3		77	138.6	27	48.6			34	61.2	1		2				2		10	18.0
Otago	253	134.2	28	14.9	1		9	4.8	51	27.1			1		32	17.0	23	12.2	3						35	18.6	5	2.7			80	42.4	19	10.1			76	40.3	4		2				4		19	10.1
Southland	165	147.6	23	20.6	1		3		44	39.3	1				20	17.9	9	8.0	1		4				2		4				46	41.1	28	25.0			56	50.1	3		2				2		4	
Total	7176	166.3	854	19.8	140	3.2	714	16.5	1640	38.0	44	1.0	55	1.3	704	16.3	368	8.5	78	1.8	71	1.6	50	1.2	253	5.9	133	3.1	63	1.5	3668	85.0	1399	32.4	140	3.2	1129	26.2	119	2.8	306	7.1	35	0.8	143	3.3	431	10.0

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

NOTIFIABLE DISEASE CASES BY YEAR AND SOURCE, 1988–2009

Table 49. Number of notifiable disease cases by year and source, 1988–2009

Note: Cell is blank where data are unavailable.

Disease	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AIDS	Notification	38	59	73	78	50	70	44	49	76	43	29	33	26	26	17	33	38	49	29	31	48	28
Campylobacteriosis	Notification	2796	4187	3850	4148	5144	8101	7714	7442	7635	8924	11572	8161	8418	10146	12494	14788	12215	13836	15873	12778	6694	7176
Cholera	Notification	0	0	5	0	0	0	2	2	0	0	1	1	0	3	1	1	2	0	0	1	0	0
Creutzfeldt-Jakob Disease	Notification									2	1	0	2	3	1	3	6	8	3	5	8	5	8
Cryptosporidiosis	Notification									119	357	866	977	775	1208	975	817	611	889	737	924	764	854
Dengue Fever	Notification	1	3	2	3	1	1	0	6	23	14	26	9	7	93	70	55	8	11	19	114	113	140
Gastroenteritis	Notification									555	310	492	601	727	940	1087	1026	1363	557	937	622	687	714
Giardiasis	Notification									1235	2127	2183	1793	1688	1604	1547	1570	1514	1231	1214	1402	1660	1640
H. influenzae type b	Notification									26	9	11	10	13	11	3	12	4	7	9	15	9	11
	Laboratory	107	121	143	148	166	118	75	14	24	8	10	9	10	8	3	9	3	6	8	13	4	8
Hepatitis A	Notification	176	134	150	224	288	257	179	338	311	347	145	119	107	61	106	70	49	51	123	42	89	44
Hepatitis B	Notification	370	309	242	227	221	145	133	125	104	138	88	94	79	56	67	61	38	59	62	73	38	55
Hepatitis C	Notification	20	13	11	25	89	91	79	88	59	92	102	96	80	58	53	40	24	29	35	31	23	32
Hydatid Disease	Notification	2	0	4	0	4	4	1	5	3	2	2	8	3	7	2	0	1	2	0	6	7	3
Influenza	Sentinel isolates	136	119	343	183	317	423	441	521	673	743	127	425	73	313	241	230	231	273	315	239	466	624
Legionellosis	Notification	62	17	20	14	11	24	66	33	36	63	43	51	61	46	49	77	62	85	52	64	73	78
	Laboratory			21	42	60	76	121	76	60	109	107	65	56	56	53	82	75	83	54	72	74	77
Leprosy	Notification	2	4	1	4	5	3	1	1	10	3	3	10	4	3	4	4	3	2	4	8	5	3
Leptospirosis	Notification	99	90	117	106	70	116	70	65	56	52	75	59	98	99	140	113	102	85	87	66	118	71
	Laboratory	192	182	229	176	218	234	168	183	140	84	117	76	114	113	181	149	113	109	67	42	72	60
Listeriosis	Notification	7	10	16	26	16	11	8	13	10	35	17	19	22	18	19	24	26	20	19	26	27	28
Malaria	Notification	25	27	32	39	29	58	34	41	107	65	73	46	111	54	61	46	33	32	30	25	40	50
Measles	Notification									68	1984	164	107	64	82	21	66	32	19	18	24	12	253
Meningococcal Disease	Notification	83	49	53	71	153	202	208	394	473	609	439	507	477	648	555	542	343	226	160	104	122	133
Mumps	Notification									76	90	85	56	50	56	64	56	45	61	47	73	76	63
Paratyphoid Fever	Notification	2	0	1	1	2	10	7	24	20	25	18	17	24	32	16	18	28	25	23	23	25	25
Pertussis	Notification									1022	284	153	1046	4140	1334	1068	585	3485	2719	1120	332	417	1399
Rheumatic Fever (initial attack)	Notification	153	148	90	97	70	81	98	88	110	93	66	97	108	114	87	148	75	76	104	133	138	123
Rubella	Notification									306	80	53	35	26	30	33	26	23	13	8	11	9	4
Salmonellosis	Notification	1128	1860	1619	1244	1239	1340	1522	1334	1141	1177	2069	2077	1795	2417	1880	1401	1081	1382	1335	1275	1345	1129
Shigellosis	Notification	145	137	197	152	124	128	185	191	167	117	122	147	115	157	112	87	140	183	102	129	113	119
Tetanus	Notification	1	0	0	0	8	2	2	2	3	0	2	6	1	4	1	2	1	1	1	1	0	1
Tuberculosis	Notification	295	303	348	335	327	323	352	391	352	323	365	446	354	369	381	423	375	330	350	283	296	306
Typhoid Fever	Notification	15	17	7	9	11	14	24	21	15	16	31	10	21	27	23	20	31	30	42	48	29	35
VTEC/STEC Infection	Notification						3	3	6	7	13	48	64	67	76	73	104	89	92	87	100	124	143
Yersiniosis	Notification									330	488	546	503	396	429	472	436	407	383	453	502	508	431

PREVALENCE OF ANTIMICROBIAL RESISTANCE, 1994–2008

Table 50. Prevalence of antimicrobial resistance, 1994–2008

Pathogen	Antimicrobial	Percent resistance[a] (number tested)				
		1994-1996	1997-1999	2000-2002	2003-2005	2006-2008
S. aureus[b]	methicillin	2.8 (58283)	4.9 (136356)	7.2 (251448)	7.4 (219363)	8.2 (242146)
	erythromycin	8.0 (54870)	10.8 (134350)	12.0 (221394)	12.0 (164220)	12.1 (98055)
	co-trimoxazole	0.8 (32926)	0.6 (91391)	1.2 (149166)	2.0 (126840)	1.3 (89071)
	fluoroquinolone				7.3 (47116)	7.9 (28846)
	fusidic acid				19.7 (25609)	15.7 (32730)
	mupirocin	10.1 (9291)	18.2 (37173)	20.0 (91555)	16.7 (48423)	12.9 (67154)
Methicillin-resistant *S. aureus*[c]	erythromycin	31.5 (2249)	26.2 (1303)	40.0 (1409)	46.3 (1596)	37.5 (3146)
	co-trimoxazole	8.6 (2249)	1.8 (1303)	6.7 (1409)	7.4 (1596)	2.8 (3068)
	fluoroquinolone			40.0 (1409)	50.3 (1596)	37.4 (3000)
	fusidic acid			7.0 (1409)	9.2 (1596)	11.6 (3011)
	mupirocin	6.4 (2244)	6.0 (1303)	8.5 (1409)	9.5 (1596)	7.5 (2926)
	rifampicin	0.3 (2249)	0.8 (1303)	0.7 (1409)	0.5 (1596)	0.7 (1336)
S. pneumoniae, non-invasive disease[b]	penicillin[d]	9.5 (7076)	19.0 (10976)	26.5 (12859)	27.0 (15037)	30.0 (14104)
	erythromycin	8.3 (6832)	14.5 (11212)	18.6 (14404)	19.9 (10222)	21.3 (7273)
	tetracycline	10.5 (5019)	11.2 (5993)	15.4 (9476)	18.1 (6796)	19.0 (5496)
S. pneumoniae, invasive disease[e]	penicillin[f]	3.4 (989)	15.0 (1182)	15.3 (1494)	17.2 (1560)	20.3 (1707)
	erythromycin	2.6 (989)	5.7 (910)	7.2 (1494)	9.9 (1560)	12.2 (1707)
	cefotaxime[f]	1.8 (989)	7.3 (1182)	6.2 (1494)	11.5 (1560)	13.2 (1707)
Enterococcus spp[b]	amoxicillin[g]	1.5 (7373)	2.4 (17548)	3.0 (22566)	2.8 (26492)	3.7 (35746)
	vancomycin	0.2 (1141)	0.5 (4752)	0.3 (7505)	0.1 (9948)	1.3 (20291)
E. coli, urinary isolates[b]	amoxicillin[g]	55.9 (48706)	56.0 (138712)	54.4 (194799)	50.7 (117009)	49.9 (117456)
	co-amoxiclav	10.6 (42666)	12.2 (136326)	9.6 (194950)	8.5 (127750)	9.6 (117965)
	trimethoprim	19.6 (48098)	22.6 (111710)	22.3 (207837)	21.5 (138748)	22.1 (128276)
	nitrofurantoin	1.6 (48123)	1.7 (124362)	1.5 (206149)	1.4 (139738)	1.3 (127682)
	fluoroquinolone	0.5 (40032)	0.6 (118917)	1.6 (201382)	2.4 (135803)	4.6 (110769)
E. coli, non-urinary isolates[b,h]	co-amoxiclav	22.8 (7358)	21.8 (15948)	17.5 (11508)	15.2 (5059)	15.1 (3249)
	cefuroxime	3.2 (6309)	4.5 (6893)	4.2 (6576)	3.4 (3956)	4.5 (2534)
	ESBL positive					2.6 (2307)
	gentamicin	0.8 (10352)	0.9 (13789)	2.4 (10392)	2.6 (5290)	5.3 (3896)
	fluoroquinolone	0.5 (4717)	0.8 (10800)	2.4 (8821)	3.9 (4212)	8.1 (3808)
P. aeruginosa[b]	gentamicin	12.5 (9556)	9.5 (20542)	10.5 (25561)	6.1 (23148)	4.3 (23399)
	tobramycin	3.9 (6757)	2.8 (11033)	3.6 (10421)	3.3 (7616)	3.4 (9388)
	ceftazidime	5.0 (4832)	5.2 (11147)	3.9 (13253)	4.3 (16031)	3.2 (18163)
	fluoroquinolone	8.8 (8123)	9.9 (16551)	9.3 (22869)	8.3 (23761)	7.1 (23961)
	Imipenem/meropenem				4.8 (9956)	4.9 (13703)
	Piperacillin/tazobactam				1.5 (4928)	2.5 (11960)
H. influenzae, non-invasive disease[b]	amoxicillin[g]	12.0 (12244)	19.3 (18852)	21.9 (28476)	19.9 (19529)	22.0 (24823)
	co-amoxiclav	1.1 (9839)	0.6 (15040)	0.8 (16333)	1.0 (14090)	2.6 (15123)
	co-trimoxazole	11.9 (6605)	14.7 (13964)	17.3 (22443)	18.2 (15939)	20.2 (13098)
	tetracycline	1.0 (7810)	1.5 (13007)	1.2 (15633)	0.8 (12783)	0.8 (11263)
H. influenzae, invasive disease[e]	amoxicillin[g]	21.8 (179)	11.5 (122)	19.2 (125)	31.6 (155)	36.9 (176)
	co-amoxiclav	3.4 (179)	1.6 (122)	1.6 (125)	9.7 (155)	23.9 (176)
	cefuroxime	3.4 (179)	4.9 (122)	0.8 (125)	9.7 (155)	23.9 (176)
N. meningitidis, invasive disease[e]	penicillin[i]	3.9 (659)	7.9 (431)	7.5 (796)	12.0 (551)	19.5 (231)
	rifampicin	0 (659)	0 (431)	0 (796)	0.2 (551)	0.0 (231)
N. gonorrhoeae[b,j]	penicillin	11.6 (879)	10.4 (1437)	7.1 (2782)	5.8 (4700)	7.5 (6028)
	fluoroquinolone	0.7 (864)	1.8 (1437)	6.3 (2349)	14.3 (4195)	20.1 (7315)
M. tuberculosis[b]	isoniazid	4.6 (438)	8.2 (757)	8.5 (811)	8.9 (872)	6.6 (725)
	rifampicin	0.7 (438)	1.3 (757)	0.7 (811)	1.0 (872)	0.6 (725)
	MDR[k]	0.7 (438)	0.9 (757)	0.5 (811)	1.0 (872)	0.4 (725)

[a] intermediate resistance not included in resistant category unless otherwise stated (refer footnotes d, f and i below)
[b] collated clinical laboratory data
[c] MRSA tested by ESR up until 2007, thereafter collated clinical laboratory data
[d] penicillin non-susceptible (intermediate resistant and resistant), according to the CLSI interpretive criteria for the oral treatment of non-meningitis infections
[e] invasive disease isolates tested by ESR
[f] penicillin resistant and cefotaxime non-susceptible (intermediate resistant and resistant), according to the CLSI interpretive criteria for the parenteral treatment of meningitis
[g] ampicillin used in laboratory testing
[h] from 2004, data based on *E. coli* from bacteraemia
[I] penicillin reduced susceptibility (MIC 0.12-0. 5 mg/L)
[j] data from northern North Island only up until 2000, thereafter national data used multidrug resistant (ie, resistant to at least isoniazid and rifampicin)

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