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NOTIFIABLE AND OTHER DISEASES IN NEW ZEALAND

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

CONTENTS

LIST OF FIGURES

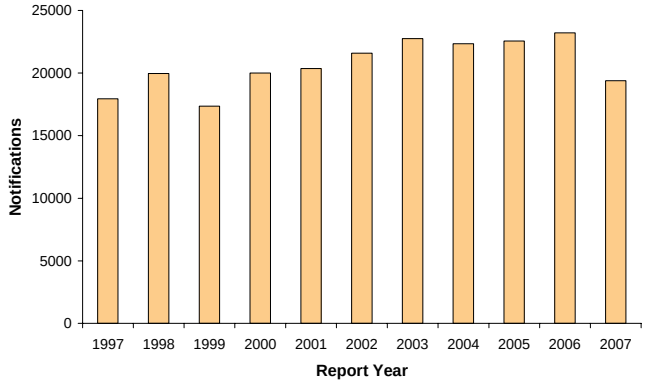
LIST OF TABLES

SURVEILLANCE SUMMARY 2007

Notifiable Diseases

In 2007, there were 19 383 cases of notifiable diseases reported through EpiSurv (Figure 1). This is lower than the number reported in any of the previous seven years (23 219 in 2006, 22 553 in 2005, 22 340 in 2004, 22 759 in 2003, 21 586 in 2002, 20 357 in 2001, and 20 003 in 2000).

Figure 1. Total disease notifications by year, 1997 - 2007



Between 2006 and 2007 there were some significant changes to the number of cases reported for individual diseases. There was a statistically significant increase in reported cases of dengue fever (19 to 114, 500.0%), mumps (47 to 75, 59.6%), rheumatic fever (107 to 140, 30.8%), cryptosporidiosis (737 to 924, 25.4%), giardiasis (1214 to 1401, 15.4%) and hydatid disease (0 to 6).

There was a statistically significant decrease in reported cases of rickettsial disease (12 to 2, 83.3%), pertussis (1120 to 331, 70.4%), hepatitis A (123 to 42, 65.9%), chemical poisoning from the environment (28 to 13, 53.6%), meningococcal disease (160 to 106, 33.8%), gastroenteritis (937 to 621, 33.7%), campylobacteriosis (15 873 to 12 776, 19.5%) and tuberculosis disease (354 to 290, 18.1%).

Other non-significant changes in case numbers and rates are to be found in Appendix A.

Vaccine Preventable Diseases (VPDs)

Both the pertussis and meningococcal disease notification rates continue to show significant decreases. In 2007, the pertussis rate dropped from 26.8 to 7.8 per 100 000. The 2007 pertussis notification rate was below the 2003 rate (14.5 per 100 000), the year in between the current and the previous pertussis epidemic, but above the 1998 rate (4.0 per 100 000), the year before the start of the previous epidemic. The meningococcal disease rate dropped in 2007, from 3.8 to 2.5 per 100 000. Although the meningococcal disease rate is well down on the peak annual rate observed during the epidemic (16.7 per 100 000 in 2001), the rate remains higher than before the start of the epidemic in 1989-90 (1.5 per 100 000).

Mumps and acute hepatitis A disease were the only other VPDs to show a significant change in notification rate compared to 2006, with a significant increase and decrease respectively.

Enteric Diseases

Enteric diseases continued to comprise the overwhelming majority of disease notifications in 2007. In particular, at 12 776 notifications, campylobacteriosis contributed 65.9% of all disease notifications. There were statistically significant decreases in the notification rate of campylobacteriosis and gastroenteritis. In contrast, two enteric diseases, cryptosporidiosis and giardiasis, had statistically significant rate increases compared to 2006.

Exotic Diseases

During 2007, there was a statistically significant increase in reported cases of hydatid disease and dengue fever, and a statistically significant decrease in reported cases of rickettsial disease. There was no evidence of recent locally acquired hydatid disease and all dengue fever cases had a history of overseas travel. For rickettsial disease, neither of the two reported cases had travelled overseas during the incubation period.

Influenza

The average weekly consultation rate for 2007, 37.2 per 100 000 patient population, was the second lowest rate recorded by the sentinel surveillance system since 1997. The year was characterised by a peak in activity in late July.

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

Sexually Transmitted Infections (STI)

In 2007, *Chlamydia trachomatis* infection was again the most commonly diagnosed STI in New Zealand. The number of chlamydia cases detected in sexual health clinics (SHCs), family planning clinics (FPCs) and student and youth health clinics (SYHCs) increased from 2006 levels respectively by 4.8% (4501 compared to 4294), 13.2% (3433 compared to 3033) and 23.3% (942 compared to 764). For laboratory based surveillance, the Bay of Plenty region had the highest chlamydia rate overall at 990 per 100 000, compared to 690 and 570 per 100 000 for the Auckland and Waikato regions, respectively.

The number of gonorrhoea cases increased for all clinic types in 2007 compared to 2006, by 1.6% (190 compared to 187), 15.3% (925 compared to 802), and 37.5% (66 compared to 48) for FPCs, SHCs, and SYHCs respectively. For laboratory based surveillance, the Auckland region had the highest gonorrhoea rate overall at 144 per 100 000, compared to 98 and 92 per 100 000 for the Bay of Plenty and Waikato regions, respectively. In 2007 compared to 2006, the number of syphilis cases increased in SHCs by 4.4% (71 compared to 68) and in FPCs by 50.0% (3 compared to 2). No cases of syphilis were reported in SYHCs in 2007 or 2006.

In 2007, the number of people newly reported with human immunodeficiency virus (HIV) infection (195 cases) was lower than in 2006 (204 cases). This is the second consecutive year where the number of reported cases has

dropped. Homosexual transmission was implicated in more cases than heterosexual transmission (83 compared to 73). In 2007, eight were children with HIV infection acquired through mother to child vertical transmission.

In 2007, 31 cases of Acquired Immune Deficiency Syndrome were notified. The 2007 notification rate (0.7 per 100 000) is the same as the 2006 rate (0.7 per 100 000, 29 cases).

Outbreak Surveillance

In 2007, there were 492 reported outbreaks involving 7988 cases. This represented a slight decrease in the number of outbreaks but an increase in the number of cases compared to 2006 figures (495 outbreaks with 6302 cases).

The most common pathogen implicated was norovirus with 206 of the outbreaks and 5902 of the cases, followed by *Cryptosporidium* spp. with 29 outbreaks and 102 cases.

The most common setting linked to an outbreak was a rest/retirement home (130 outbreaks, 3695 cases), followed by the home (96 outbreaks, 541 cases).

Antibiotic Resistance

National surveillance of methicillin-resistant *Staphylococcus aureus* (MRSA) in 2007 was conducted in August. This indicated an annualised incidence rate of 191.5 per 100 000, an 11.4% increase on the 2006 rate of 171.9. Among the 664 patients with MRSA, 50.6% were categorised as hospital patients and 49.4% as community patients. WSPP MRSA (28.2%), EMRSA-15 (27.3%), WR/AK1 MRSA (9.7%), AK3 MRSA (9.3%), DN1 MRSA (3.1%) and AKh4 MRSA (3.0%) accounted for most of the cases.

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

While vancomycin-resistant enterococci remain uncommon in most areas of New Zealand, the first hospital-based outbreak occurred at the end of 2007.

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 2007 and where data are available, the trend since 1996, 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, sexually transmitted infections (STIs), methicillin-resistant *Staphylococcus aureus* (MRSA), 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 extraction of data from EpiSurv
- the date used to aggregate data (e.g. date reported or date of onset of illness)
- whether laboratory-reported or 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 (District Health Board).

It should be noted that various factors influence disease notification and therefore the calculation of notifiable disease rates. Cases where the illness is not severe 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.

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

Because of the small size of the New Zealand population and the low numbers of cases for some diseases, the 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:

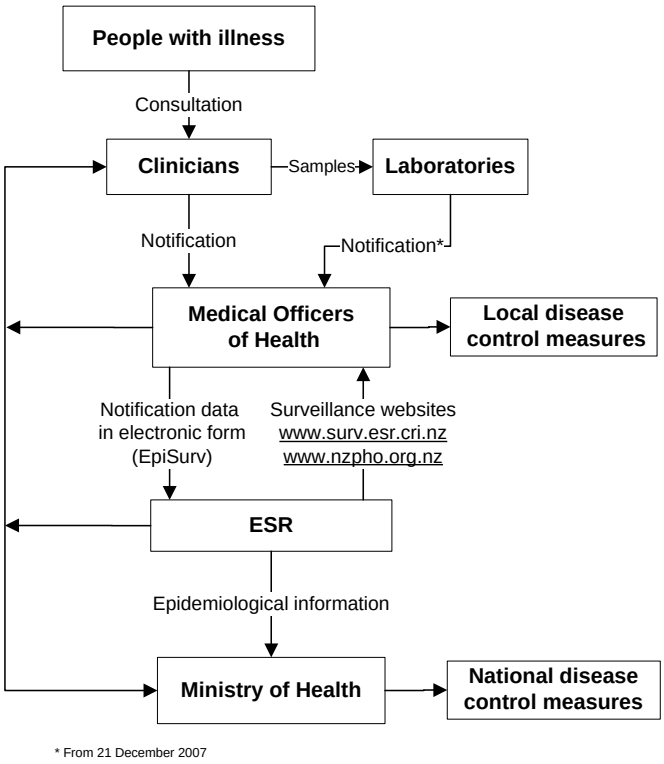
EpiSurv - the national notifiable disease surveillance system

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 e.g. measles, 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 HIV and 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. Detailed information has also been collected about people infected with HIV since 1996, through a laboratory-based surveillance system involving the two laboratories that perform confirmatory HIV antibody testing using the western blot method (ESR and LabPLUS, Auckland District Health Board) [4]. For each confirmed diagnosis, either the laboratory or the AEG send a letter to the doctor who requested the test seeking information on the likely mode of infection and other demographic data. 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 (CJD) Registry

The New Zealand Creutzfeldt-Jakob Disease (CJD) 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 (STI) Surveillance System

Sexually Transmitted Infections (STIs) are not notifiable in New Zealand. Data on STIs of public health importance (chlamydia, gonorrhoea, genital herpes, genital warts, syphilis and non-specific urethritis) are submitted voluntarily from sexual health clinics (SHCs), family planning clinics (FPCs) and student and youth health clinics (SYHCs). This is supplemented by data on chlamydia and gonorrhoea from diagnostic laboratories in the Auckland, Waikato and Bay of Plenty (BOP) regions. Laboratory STI surveillance is being extended to other regions.

Influenza Sentinel Surveillance System

A sentinel surveillance system, which operates from May to September each year, gathers data on the incidence and distribution of influenza [5]. In 2007, this was based on a network of 87 general practices from all health districts in New Zealand except Gisborne. 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 (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.

New Zealand Health Information Service (NZHIS)

NZHIS in 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 (NMDS). Cases are assigned disease codes using the tenth revision of the International Classification of Diseases (ICD10) coding system. 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 NZHIS 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 NZHIS databases and sent to ESR for analysis and comparison with data from other surveillance systems.

Hospital admission data includes repeated admissions for patients with chronic notifiable diseases, e.g. tuberculosis or diseases which have long-term health impacts, e.g. 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 (NZPSU)

NZPSU 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 [6]. Information from the NZPSU is used in this report to enhance notification data on polio, VTEC/STEC infection (HUS data) and rubella (CRS data).

Outbreak Surveillance

ESR introduced an outbreak surveillance system in July 1996 and has been refining this system in a series of planned steps 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 public health units on disease outbreaks, rather than individual cases.

Statistics New Zealand

Data used to calculate rates of disease are supplied by Statistics New Zealand. See Analytical Methods section below 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 2008. 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 2007 have been updated to reflect those in EpiSurv as at 12 February 2008.

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.

Data Used for Calculating Rates of Disease

All disease rates, except for ethnicity, have been calculated using 2007 mid-year population estimates from Statistics New Zealand. Disease rates for ethnic groups are based on 2006 census data from Statistics New Zealand. 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 for comparisons.

Geographical Breakdown

This report provides rates for current District Health Boards (DHBs) where this is available and health districts where data cannot be presented by DHB (owing to collection methods).

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. DHB Population, 2007

DHB	Population
Northland	153900
Waitemata	513300
Auckland	433200
Counties Manukau	464700
Waikato	353059
Lakes	101500
Bay of Plenty	203310
Tairawhiti	45900
Taranaki	107290
Hawke's Bay	152970
Whanganui	63590
MidCentral	164195
Hutt	141500
Capital and Coast	281354
Wairarapa	39540
Nelson-Marlborough	134500
West Coast	32250
Canterbury	490150
South Canterbury	55240
Otago	185876
Southland	110373
Total	4227697

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

The maps classification for the disease rates is quantiles i.e. the data have been divided into three groups containing equal numbers of DHBs. The darkest colour represents the highest rates and the lightest colour the lowest rates. The grey colour shows where there are insufficient data to calculate a rate (fewer than five cases).

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.

Statistical Tests

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.

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 2006 [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%. 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. The system is inherently less sensitive for surveillance of conditions resulting from longer-term environmental exposure.

Completeness

The completeness of data provided in EpiSurv varies between diseases. Table 3 shows the percentage of notifications for which complete data were provided for selected key EpiSurv variables annually from 1999 to 2007.

The completeness of date of birth, age and sex are generally very high, changing little over the last five years. The completeness of ethnicity has decreased from last year.

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 four years.

Table 3. Data completeness by year and EpiSurv variable, 1999 - 2007

	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

Timeliness

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

Of the notifications with an onset date recorded (60.9% of notifications) in 2007, 58.6% were reported to a public health service within one week of the onset of symptoms and 83.3% were reported within two weeks.

In 2007, 97.7% of disease notifications were entered into EpiSurv within one week of being reported to the public health service and 98.5% were entered within two weeks of being reported.

Accuracy

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

With the exception of HIV, another limitation is the accuracy of diagnoses of infections made serologically.

NOTIFIABLE DISEASES

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)

Acquired Immune Deficiency Syndrome (AIDS), but not Human Immunodeficiency Virus (HIV) infection, is a notifiable disease in New Zealand. Both are reported here. The AIDS Epidemiology Group (AEG) within the University of Otago Medical School carries out national AIDS/HIV surveillance. The following report is based on the AEG report of February 2008 [10].

HIV

A total of 195 new people were reported to the AEG as having HIV in 2007 (Table 4), comprising 156 cases newly diagnosed through antibody testing and an additional 39 reported through viral load testing (most of whom had previously been diagnosed overseas).

HIV notifications peaked in 2005 at 218 (comprising 183 newly diagnosed through antibody testing, and 35 through viral load testing). In the two years since 2005, the number of HIV notifications has decreased each year. In 2006, a total of 204 HIV cases were reported (comprising 177 newly diagnosed through antibody testing, and 27 diagnosed through viral load testing).

Of the 156 cases newly diagnosed through antibody testing in 2007, 71 (45.5%) were men infected through sex with men (MSM), including three men who were infected either through sex with men or injecting drug use (IDU). The number of cases in these exposure categories have been relatively stable since 2003, except for 2005 when there were 90 such cases.

Of the 71 MSM newly diagnosed in 2007, for three-quarters (53/71), infection was reported to have occurred in New Zealand. Previous negative HIV tests indicated that for at least seven of these MSM infection occurred within the last 12 months.

Sixty (38.5%) of the 156 cases newly diagnosed through antibody testing in 2007 were thought to have acquired HIV infection heterosexually (31 males and 29 females). This is a decrease from the 86 reported in 2006, which was the highest number ever reported in New Zealand in any one year. The decrease reflects a drop in the number of infections acquired overseas. However, there was a small but steady increase in the number of infections acquired in New Zealand, rising from eight in 2005, to 11 in 2006, to 16 in 2007. Of these 16 in 2007 (five males, 11 females), almost half were infected by a partner who had been heterosexually infected overseas.

Out of the 195 overall cases, eight were children with HIV infection acquired through mother to child transmission. However, all but one were born prior to 2007, and five were born overseas. For the three children born in New Zealand, none of their mothers had been diagnosed with HIV prior to giving birth.

For 25 of the total cases diagnosed in 2007, the source of HIV exposure remains unknown.

Table 4. Risk behaviour category for HIV infections, 1985 - 2007

		2007		Total 1985 – 2007 [a]	
Exposure	Sex	Cases	%	Cases	%
Homosexual contact	M	83	42.6	1535	53.4
Homosexual & IDU	M	3	1.5	39	1.5
Heterosexual contact	M	37	19.0	368	12.8
	F	36	18.5	395	13.7
Injecting drug use (IDU)	M	1	0.5	57	2.0
	F	0	0.0	11	0.4
Blood product recipient	M	0	0.0	34	1.2
Transfusion recipient [b]	M	1	0.5	11	0.4
	F	0	0.0	9	0.3
	NS	0	0.0	5	0.2
Perinatal	M	5	2.6	28	1.0
	F	3	1.5	18	0.6
Other	M	1	0.5	7	0.2
	F	0	0.0	9	0.3
Awaiting information/ Undetermined	M	20	10.2	293	10.2
	F	5	2.6	40	1.4
	NS	0	0.0	13	0.4
Total		195	100.0	2872	100.0

Source: AIDS Epidemiology Group.

[a] Includes people who have developed AIDS. Numbers are recorded by date of diagnosis for those reported through antibody testing and by time of first viral load for those reported through viral load testing. The latter include many who have initially been diagnosed overseas and have not had an antibody test here.

[b] All people in this category, diagnosed since 1996, acquired their HIV overseas.

NS = not stated.

The majority of cases, 153 (78.5%), were aged between 20 and 49 years at time of diagnosis, with 35 (17.9%) in the 20-29 years, 65 (33.3%) in the 30-39 years, and 53 (27.2%) in the 40-49 years age groups. Eighty-three (42.5%) were of European ethnicity, 22 (11.3%) Maori and 7 (3.6%) Pacific Peoples. There were 70 (35.9%) in other ethnic group categories, including 42 (21.5%) of African and 20 (10.3%) of Asian ethnicity. The ethnicity of 13 cases (6.6%) is currently unknown.

AIDS

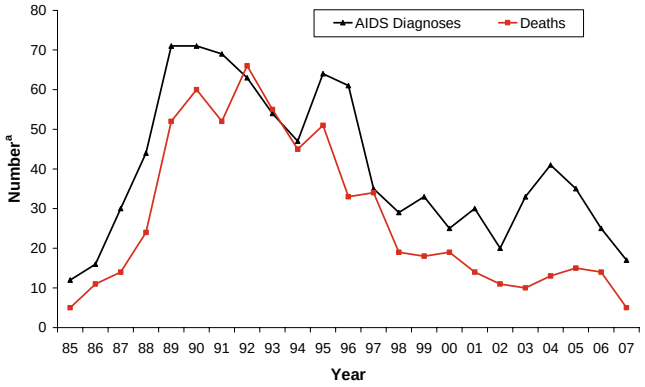
In 2007, 31 cases of AIDS were notified. The 2007 notification rate (0.7 per 100 000) is the same as the 2006 rate (0.7 per 100 000, 29 cases).

Seventeen of the cases (54.8%) acquired the disease heterosexually, 12 (38.7%) men were infected through sex with other men, one case was infected through injecting drug use, and the mode of infection is unknown for one person.

The distribution of the 2007 cases according to ethnicity was: 15 (48.4%) European, six (19.4%) African, five (16.1%) Maori, four (12.9%) Asian, and one (3.2%) Pacific, and the mean age was 41 years.

Five deaths in 2007 were notified to the AEG as being due to AIDS; however this number is likely to increase due to late notifications. The number of AIDS deaths peaked at 66 in 1992. Since then the number of deaths has decreased considerably and for 2004-2006 was relatively stable at 13 to 15 deaths per year (Figure 3).

Figure 3. AIDS cases and deaths by year of diagnosis/death, 1985 - 2007



[a] The number of cases diagnosed and deaths reported in recent years are likely to rise due to late notifications.

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]. Human outbreaks of anthrax still occur in countries without widespread livestock immunisation programmes. *Bacillus anthracis* is classified as a Category A bioterrorism agent by the Centers for Disease Control (CDC) [12]. Only one bioterrorism-related outbreak of anthrax has been reported, involving 22 cases and five deaths in the United States in 2001 [13].

ARBOVIRAL DISEASES

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

Barmah Forest Virus

No cases of Barmah Forest virus infection were notified in 2007.

Chikungunya Fever

One case of Chikungunya fever was notified in 2007. The case was a male in the 50-59 years age group of Other ethnicity. The case was not laboratory-confirmed and had travelled overseas to India during the incubation period for the disease.

Japanese Encephalitis

No cases of Japanese encephalitis were notified in 2007.

Kunjin Virus

No cases of Kunjin virus infection were notified in 2007.

Murray Valley Encephalitis

No cases of Murray Valley encephalitis (also known as Australian encephalitis) were notified in 2007.

Ross River Virus

No cases of Ross River virus infection were notified in 2007, compared to two cases in 2006.

BOTULISM

There have been no notifications of botulism in New Zealand in humans since two cases were reported in 1985 [14].

BRUCELLOSIS

Four cases of brucellosis were notified in New Zealand in 2007. Since 1997, a total of nine 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.

Of the four cases notified in 2007, one case was in the 30-39 years age group, two were in the 40-49 years age group and one was in the 50-59 years age group. Two cases were male and two were female. Two cases were Pacific Peoples and two were Other ethnicity.

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 (MAF) for investigation of possible disease reservoirs in New Zealand animals.

CAMPYLOBACTERIOSIS

There were 12 776 cases of campylobacteriosis notified in 2007. The 2007 rate of 302.2 per 100 000 population was significantly lower than the 2006 rate of 379.3 per 100 000 population (15 873 cases). Campylobacteriosis continues to be the most commonly notified disease, comprising 65.9% of all notifications (19 383) in 2007.

Figure 4 shows campylobacteriosis incidence for the last 12 years and Figure 5 shows the number of cases notified each month since 2003.

Figure 4. Campylobacteriosis notifications by year, 1996 - 2007

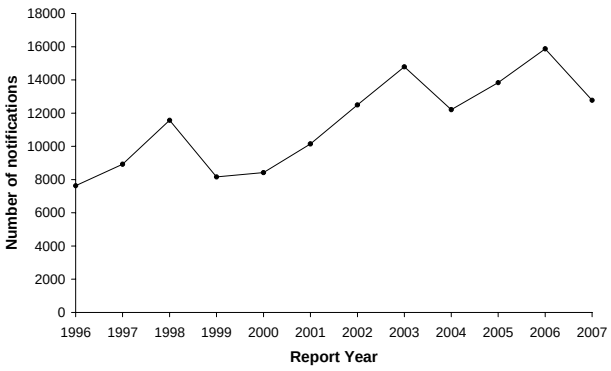
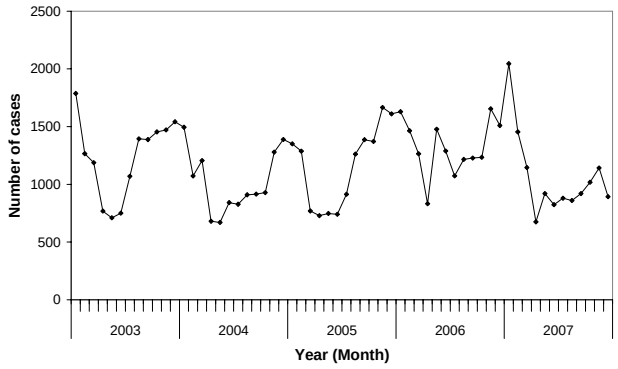


Figure 5. Campylobacteriosis notifications by month, January 2003 - December 2007



Campylobacteriosis is highly seasonal with a summer peak and winter trough. The pattern in 2007 is similar to 2006,where there was a second peak in early winter. The highest monthly campylobacteriosis total for 2007 was for the month of January when 2045 cases were notified.

Campylobacteriosis rates varied throughout the country as demonstrated in Figure 6. The highest rates were reported for South Canterbury and Taranaki DHBs (398.3 per 100 000 population, 220 cases; 382.1 per 100 000 population, 410 cases, respectively) and the lowest rates were reported for Tairawhiti and Wairarapa DHBs (106.8 per 100 000 population, 49 cases; 172.0 per 100 000 population, 68 cases, respectively).

Age was recorded for 99.0% (12 648/12 776) of cases. The highest age-specific rate occurred for children aged 1-4 years (449.3 per 100 000 population, 1036 cases), followed by the 20-29 year age group (389.6 per 100 000 population, 2178 cases) and 60-69 year age group (333.2 per 100 000 population, 1202 cases).

Sex was recorded for 97.9% (12 509/12 776) of the cases. The sex-specific notification rate was higher for males (327.9 per 100 000 population, 6790 cases) compared to females (265.1 per 100 000 population, 5719 cases).

Ethnicity was recorded for 76.0% (9714/12 776) of the cases. Those of European ethnicity made up the majority of notifications (87.7%, 8522 cases), followed by Maori (6.7%, 652 cases), Other ethnicity (4.2%, 405 cases) and Pacific Peoples (1.4%, 135 cases).

Of the 6916 cases for which hospitalisation status was recorded, 581 (8.4%) were hospitalised. One death from campylobacteriosis was reported during 2007.

The risk factors recorded for campylobacteriosis are shown in Table 5. Similar to previous years, the most common risk factor is c-onsumption of food from retail premises.

In 2007, 20 outbreaks of campylobacteriosis were reported involving 54 cases. See the Outbreak Surveillance section for further details.

Figure 6. Campylobacteriosis notifications by DHB, 2007

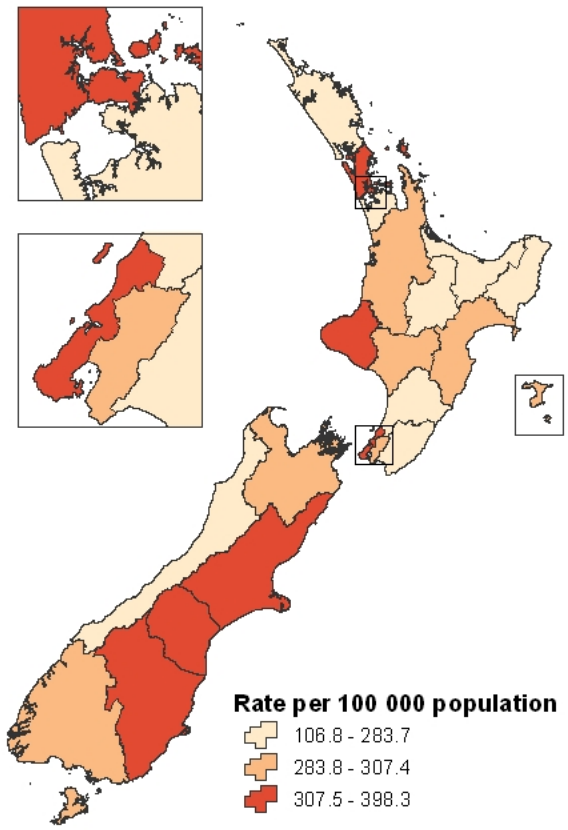


Table 5. Exposure to risk factors associated with campylobacteriosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Consumed food from retail premises	1488	1632	9656	47.7
Contact with farm animals	1117	2414	9245	31.6
Consumed untreated water	558	2329	9889	19.3
Contact with faecal matter	384	2878	9514	11.8
Contact with other symptomatic people	367	2985	9424	10.9
Recreational water contact	337	2839	9600	10.6
Travelled overseas during the incubation period	283	3891	8602	6.8
Contact with sick animals	135	2942	9699	4.4

[a] "%" refers to the percentage 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 2007, 13 cases were notified as poisonings arising from chemical poisoning from the environment. This is significantly lower than the number notified in 2006 (28 cases) but higher than the number notified previously: two (2005), seven (2004), one (2003 and 2002), and four (2001 and 2000).

Cases were primarily notified by North Island DHBs: Waitemata (3), Auckland (1), Waikato (2), Bay of Plenty (1), Hutt Valley (1), Capital and Coast (4) and Canterbury (1).

Four cases were aged 10-14 years and the age range of all cases was 11 to 79 years (age was unknown for one case). The number of notifications was similar for males (6) and females (5) (sex was unknown for two of the cases).

Four cases were hospitalised from chemical contamination from the environment, three cases were not hospitalised, and it was unknown whether the remaining six cases were hospitalised.

A range of substances resulted in the cases being poisoned, including: carbon monoxide (4), chlorine gas (2), mercury (2), asbestos (1), sodium silicate (1) and smoke from burning PVC pipe (1) (the substance was unknown for the remaining two cases). Two outbreaks of chemical poisoning from the environment were reported involving six cases (further details in the Outbreak Surveillance section).

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 Public Health Units (of which there were three notifications in EpiSurv during 2007). The official implementation of the case report form by the Ministry of Health will take place from July 2008. ESR manages a separate chemical injury surveillance system (CISS) relating to chemical injuries including poisonings. Currently the CISS captures cases of chemical poisoning from the environment where these cases have been reported in the current data sources covered by the CISS. Reports are published on the www.survinz.esr.cri.nz website.

CHOLERA

There was one case of cholera notified in 2007. This 76 year old New Zealand European male was infected with *Vibrio cholerae* O1 biotype E1T. He had recently returned from India where he had consumed untreated water. Since 1997 there have been a total of 10 confirmed cases of cholera notified.

CREUTZFELDT-JAKOB DISEASE

The New Zealand Creutzfeldt-Jakob Disease (CJD) Registry was established in 1996 to monitor sporadic, familial, iatrogenic and variant CJD. This section is based on the 11th annual report of the Registry [15].

In 2007, a total of eight cases of possible CJD were referred to the Registry, three of which did not meet the case definition due to a benign course and/or further investigations. Of the remaining five cases, one was confirmed through post-mortem brain histology as dura mater graft-associated CJD. The case, a female in the 30-39 years age group, had received a cadaveric dura mater implant during a neurosurgical procedure 20 years previously. Three cases were classified as probable sporadic CJD based on clinical, cerebrospinal fluid, electroencephalogram, and/or magnetic resonance imaging findings. These three cases were fatal but none underwent post-mortem examination. Two were male and one female, with one from each of the following age groups: 50-59, 70-79, and 80-89 years. One remaining case, a male in the 70-79 years age group with deteriorating clinical status, is still being assessed.

Since 1996, there has been a total of 37 cases of CJD reported to the Registry, 14 confirmed and 23 probable. No cases of variant CJD, the form linked with bovine spongiform encephalopathy, have ever been identified in New Zealand.

CRYPTOSPORIDIOSIS

During 2007, 924 cases of cryptosporidiosis were notified (21.9 per 100 000 population). This is significantly greater than the number notified during 2006 (737 cases, 17.6 per 100 000 population) (Figure 7).

Figure 8 shows cryptosporidiosis cases by month since 2003. There is a distinct seasonal pattern, with the largest number of notifications occurring during October each year.

Cryptosporidiosis notification rates varied throughout the country as illustrated in Figure 9. The highest rate was recorded for South Canterbury (74.2 per 100 000 population, 41 cases) and Southland DHBs (52.5 per 100 000 population, 58 cases), the lowest rate was recorded for Auckland DHB (10.4 per 100 000 population, 45 cases).

Figure 7. Cryptosporidiosis notifications by year, 1996 - 2007

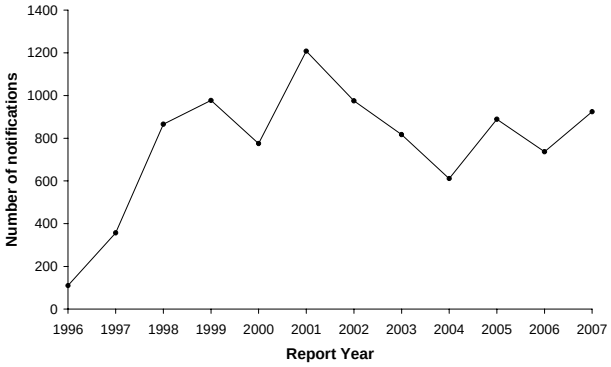


Figure 8. Cryptosporidiosis notifications by month, January 2003 - December 2007

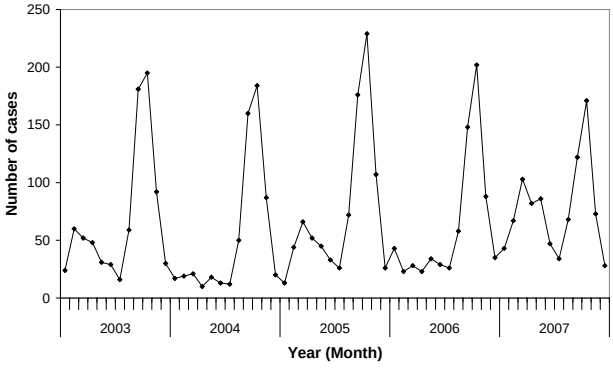
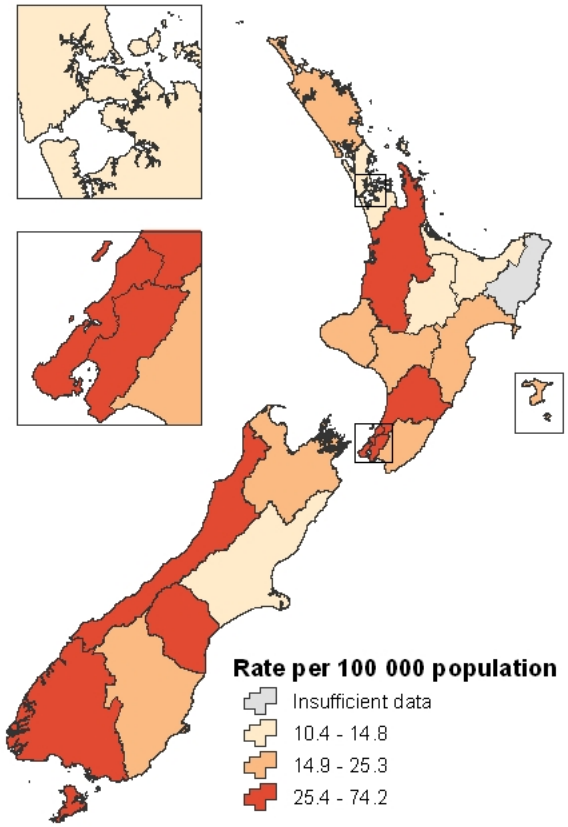


Figure 9. Cryptosporidiosis notifications by DHB, 2007



Age was recorded for 99.8% of the cases reported (922/924) and, of these cases, 59.0% occurred in children aged less than 15 years (544 cases). The highest age-specific rate was for children aged 1-4 years (142.7 per 100 000 population, 329 cases) followed by infants aged less than 1 year (48.6 per 100 000 population, 30 cases).

Sex was recorded for 98.9% of the cases reported (914/924). Sex-specific notification rates for cryptosporidiosis were similar for males (21.4 per 100 000 population, 444 cases) and females (21.8 per 100 000 population, 470 cases).

Ethnicity was recorded for 86.4% of the cases reported (798/924). Of these, the majority of cases were of European ethnicity (84.7%, 676 cases) followed by Maori ethnicity (11.2%, 89 cases), Other ethnicity (2.4%, 19 cases) and Pacific Peoples (1.8%, 14 cases).

Of the 722 cases for which hospitalisation status was recorded, 40 (5.5%) were hospitalised.

The risk factors recorded for cryptosporidiosis are shown in Table 6.

In 2007, 29 cryptosporidiosis outbreaks were reported, involving 102 cases. See the Outbreak Surveillance section for further details.

Table 6. Exposure to risk factors associated with cryptosporidiosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Contact with farm animals	319	284	321	52.9
Consumed untreated water	163	256	505	38.9
Recreational water contact	191	312	421	38.0
Contact with faecal matter	153	378	393	28.8
Consumed food from retail premises	102	254	568	28.7
Contact with other symptomatic people	147	380	397	27.9
Contact with sick animals	92	383	449	19.4
Travelled overseas during the incubation period	42	613	269	6.4

[a] "%" refers to the percentage 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

Two cases of probable cysticercosis were notified in New Zealand in 2007. Both cases were of Indian ethnicity. One case, a 13 year old female, had visited India in the past 15 months. The other case, a 12 year old male, was not recorded as having travelled overseas during the incubation period of the disease. Both cases were hospitalised and had been diagnosed by CT scan of the head.

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 [16].

DECOMPRESSION SICKNESS

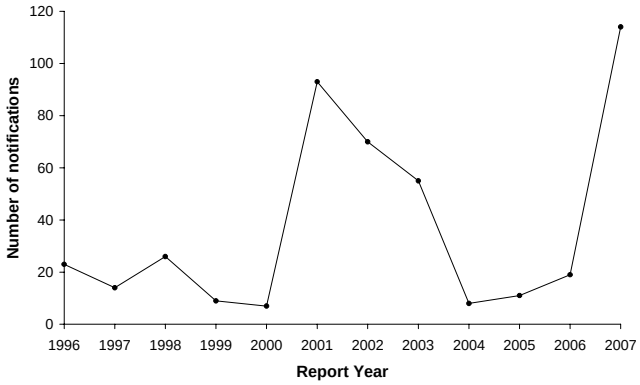
There were no cases of decompression sickness notified in 2007. This continues the trend of low numbers of decompression sickness notifications since 2002: one (2006 and 2005), none (2004), two (2003) and seven (2002). The highest number of notifications was recorded in 2001 (23).

As with previous years, the annual number of hospitalisations for decompression sickness exceeds the annual number of notifications, indicating continued under-reporting. Diagnosis of decompression sickness as the primary reason for admission (ICD-10-AM code T70.3) was specified in 12 cases for 2007. Since 2002, the number of hospitalisations ranges from seven in 2004 to 41 in 2002.

DENGUE FEVER

In 2007, 114 cases of dengue fever were notified compared to 19 cases in 2006 (Figure 10). The 2007 notification rate was 2.7 per 100 000 population compared to 0.5 per 100 000 population in 2006. The number of cases in 2007 was a significant increase on the number notified in 2006 (19 cases), 2005 (11 cases) and 2004 (8 cases). The majority of the 2007 cases (89 cases, 78.1%) were notified between January to May, peaking in February (39 cases, 34.2%).

Figure 10. Dengue fever notifications, 1996 - 2007



The majority of cases were aged between 20 and 69 years of age (102 cases, 89.5%). The age specific rates were highest in the 30-39 years (4.4 per 100 000 population, 26 cases), followed by the 50-59 years (4.1 per 100 000 population, 21 cases), and the 40-49 years (3.8 per 100 000 population, 24 cases) age groups.

Sex was recorded for 99.1% (113/114) of the cases. The highest notification rate was for females (2.8 per 100 000 population, 60 cases), followed by males (2.6 per 100 000 population, 53 cases).

Ethnicity was recorded for 84.2% (96/114) of the cases. Of the 96 cases, the highest number of notifications occurred among those of European ethnicity (49 cases, 51.0%), followed by Pacific Peoples (28 cases, 29.2%), Maori (12 cases, 12.5%), and Other ethnicity (7 cases, 7.3%).

Hospitalisation status was recorded for 88.6% (101/114) of the cases. Of the 101 cases, 31.7% (32 cases) were hospitalised. Of the 114 notified cases, 112 were confirmed by serology.

All cases recorded overseas travel during the incubation period. The most common countries travelled to were the Cook Islands (75 cases, 65.8%), followed by Samoa (11 cases, 9.6%).

Sixty-six (57.9%) cases undertook some protective measures e.g. use of insect repellent, bed nets, protective clothing and staying in screened/air conditioned accommodation. Ten (8.8%) cases undertook no protective measures, and for 38 (33.3%) cases no information was recorded.

NZHIS hospitalisation data for 2007 recorded 45 cases where dengue fever was the primary diagnosis on admission. Of these, 44 cases were dengue fever (classical dengue) and one case was dengue haemorrhagic fever.

DIPHTHERIA

No cases of toxigenic diphtheria were notified in New Zealand in 2007.

In 2007, 31 cultures of *Corynebacterium diphtheriae* were received by the ESR Special Bacteriology Laboratory for toxigenicity testing, typing and surveillance purposes. The majority (27) were from cutaneous sources with patients ranging in age from 3 months to 53 years. Four cultures were from blood, with patients aged between 21 years and 57 years.

All the isolates were determined to be non-toxigenic by PCR examination for the toxin gene. Eighteen (66.7%) of the isolates were biovar *mitis*, and 13 (33.3%) were biovar *gravis*, including three of the blood isolates. This compares with 2006, where the ESR laboratory received 29 non-toxigenic isolates from cases. Of these isolates, 23 (79%) were biovar *mitis*, and 6 (21%) were biovar *gravis* including the one blood isolate received.

Since 1997 there have been only three confirmed cases of toxigenic diphtheria notified in New Zealand.

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 [17].

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 a 70+ year old male with peritonitis who was on a renal ward. There have been no notified cases since the 2005 case.

GASTROENTERITIS

Gastroenteritis comprises a variety of communicable diseases and infections. Included in this section are infections by the following pathogens: norovirus, rotavirus, histamine fish poisoning, and *Clostridium perfringens* (Table 7). Diseases and conditions that are notifiable in their own right (for example salmonellosis, campylobacteriosis, VTEC/STEC infection etc.) are reported separately.

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

In 2007, 621 cases of gastroenteritis (14.7 per 100 000 population) were notified. While this is a significant decrease from 2006 (22.4 per 100 000 population, 937 cases), it is similar to the number notified in 2005 (13.5 per 100 000 population, 557 cases). A causal agent was reported for 118 cases (19.0%). Where the agent was identified, the most common pathogen was norovirus (82 cases).

Table 7. Gastroenteritis cases where organism was identified, 2007

Organism	Cases	%
Norovirus	82	69.5
Rotavirus	25	21.2
Histamine fish poisoning	5	4.2
Clostridium perfringens	3	2.5
Aeromonas spp.	1	0.8
Staphylococcus aureus	1	0.8
Vibrio cholerae (non O1, non O139)	1	0.8
Total	118	100.0

Gastroenteritis notifications were highest in Canterbury and West Coast DHBs (144 cases, 29.4 per 100 000 population; 8 cases, 24.8 per 100 000 population, respectively) and lowest in Nelson-Marlborough and Otago DHBs (3.7 per 100 000 population, 5 cases; 3.8 per 100 000 population, 7 cases, respectively).

Age-specific rates were highest for adults aged 70+ years (19.3 per 100 000 population, 70 cases), followed by infants aged less than 1 year of age and the 60-69 year age group (17.8 per 100 000 population, 11 cases; 17.2 per 100 000 population, 62 cases, respectively). The lowest age specific rate was for those aged 5-9 years (3.4 per 100 000 population, 10 cases). Age was unknown for 37 of the cases.

Gastroenteritis rates were higher for females (16.1 per 100 000 population, 348 cases) compared to males (12.3 per 100 000 population, 255 cases). Sex was unknown for 18 of the cases.

Ethnicity was recorded for 523 cases (84.2%) of gastroenteritis for 2007. Of these responses, the highest percentage of notifications occurred among those of European ethnicity (88.9%, 465 cases) followed by Maori ethnicity (5.0%, 26 cases), Other ethnicity (4.4%, 23 cases) and Pacific Peoples (1.7%, 9 cases).

Hospitalisation status was recorded for 76.3% of cases (474 cases). Of these responses, 30 cases (6.3%) were hospitalised.

The risk factors recorded for gastroenteritis cases are shown in Table 8. Similar to previous years, consumption of food from retail premises was the most common risk factor associated with gastroenteritis cases during 2007.

In 2007, 147 gastroenteritis (type unspecified) outbreaks were reported, involving 1206 cases. The Outbreak Surveillance section summarises enteric outbreaks where the pathogen is known.

Table 8. Exposure to risk factors associated with gastroenteritis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Consumed food from retail premises	320	41	260	88.6
Contact with other symptomatic people	76	294	251	20.5
Contact with faecal matter	39	270	312	12.6
Recreational water contact	16	305	300	5.0
Contact with farm animals	16	320	285	4.8
Consumed untreated water	13	287	321	4.3
Travelled overseas during the incubation period	6	349	266	1.7
Contact with sick animals	2	326	293	0.6

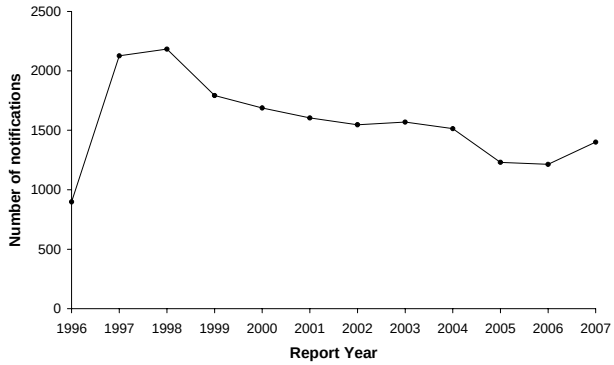
[a] "%" refers to the percentage of cases that answered "yes" out of the total number of cases for which this information was supplied. Cases may have more than one risk factor recorded.

GIARDIASIS

There were 1401 cases of giardiasis notified in 2007. The 2007 rate (33.1 per 100 000 population) was significantly higher than the 2006 rate (29.0 per 100 000, 1214 cases).

Figure 11 shows giardiasis cases by year since the disease became notifiable in June 1996.

Figure 11. Giardiasis notifications by year, 1996 - 2007



Rates varied throughout the country as illustrated in Figure 12. The highest rates were recorded in Nelson-Marlborough (69.1 per 100 000 population, 93 cases), followed by Capital and Coast (49.0 per 100 000, 138 cases) and Northland (47.4 per 100 000, 73 cases) DHBs.

Age specific notification rates were highest in the 1-4 years age group (108.4 per 100 000 population, 250 cases), followed by the 30-39 years age group (57.4 per 100 000, 340 cases), and those aged less than 1 year (48.6 per 100 000, 30 cases). This pattern has been consistent across all years from 1996 when the disease became notifiable in New Zealand.

Sex was recorded for 1379 (98.4%) of the 1401 cases. Rates were similar for females (33.2 per 100 000, 716 cases) and males (32.0 per 100 000, 663 cases).

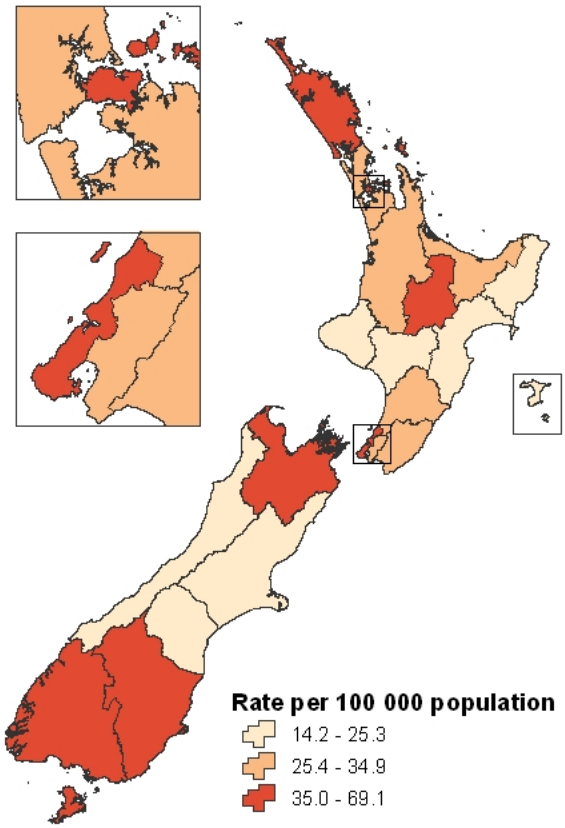
Ethnicity was recorded for 1072 (76.5%) giardiasis cases. The highest percentage of reported cases were for those of European ethnicity (945 cases, 88.2% of responses), followed by Maori (77 cases, 7.2%), Other ethnicity (43 cases, 4.0%), and Pacific Peoples (7 cases, 0.7%).

Hospitalisation status was recorded for 786 (56.1%) notifications. Of these 17 (2.2%) were hospitalised.

The risk factors recorded for giardiasis are shown in Table 9.

There were 21 giardiasis outbreaks reported in 2007, involving 111 cases, of which 78 cases are included as individual case reports. See the Outbreak Surveillance section for further details.

Figure 12. Giardiasis notifications by DHB, 2007



HAEMOPHILUS INFLUENZAE SEROTYPE b DISEASE

Fifteen cases of *Haemophilus influenzae* serotype b (Hib) were notified in 2007, of which 13 were laboratory-confirmed. The unconfirmed cases were a child aged five months, and an adult aged 74 years.

Eight of the laboratory-confirmed cases were aged less than five years (giving an age specific rate of 2.7 per 100 000 population) in comparison to four cases in 2006 and two cases in 2005.

Four of the laboratory-confirmed cases aged less than five years were male and four were female. Four were European, three were Maori and one was of Other ethnicity. They were from Waitemata (3), Counties Manukau (2), Hawke's Bay (2) and Bay of Plenty (1) DHBs.

A Hib vaccine was introduced in January 1994. Prior to August 2000, the recommended immunisation schedule consisted of four doses of DTPH vaccine given at six weeks, three months, five months and 15 months of age. The current schedule introduced in mid August 2000 recommends three doses of Hib vaccine at six weeks, three months and 15 months [18].

Two of the eight laboratory-confirmed cases aged less than five years were partially immunised. Of these, one case reported having received two undocumented doses of Hib vaccine. The other case received one documented dose. All of the remaining six cases did not receive Hib vaccination. All the laboratory-confirmed cases aged less than five years were hospitalised (two children with epiglottitis, two children with meningitis, one child with pneumonia and seven with septicaemia). Children may present with more than one clinical manifestation.

Table 9. Exposure to risk factors associated with giardiasis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Contact with faecal matter	186	264	951	41.3
Contact with other symptomatic people	182	284	935	39.1
Consumed untreated water	152	242	1007	38.6
Recreational water contact	149	301	951	33.1
Consumed food from retail premises	114	253	1034	31.1
Contact with farm animals	126	359	916	26.0
Travelled overseas during the incubation period	137	488	776	21.9
Contact with sick animals	17	415	969	3.9

[a] "%" refers to the percentage 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.

HEPATITIS A

There were 42 cases of hepatitis A notified in 2007, compared to 123 notifications in 2006. Over the last 10 years there has been an overall downward trend in the number of notifications of hepatitis A, although an increase in notifications was observed in 2002 and again in 2006 (Figure 13). The 2002 increase was attributed to a single outbreak linked to contaminated blueberries [19]. The 2006 increase was attributed to two outbreaks that involved approximately 30 people each and had cases that had recently travelled to the Pacific Islands followed by person-to-person transmission.

The national hepatitis A notification rate for 2007 was 1.0 per 100 000 population, which was a significant decrease from the 2006 rate of 2.9 per 100 000 population. The highest rate was observed in the Counties Manukau DHB (1.9 per 100 000, 9 cases) followed by the Waitemata (1.4 per 100 000, 7 cases), and Auckland (1.2 per 100 000, 5 cases) DHBs. None of the DHBs outside the Auckland region reported more than four cases for the year.

Figure 13. Hepatitis A notifications by year, 1996 - 2007

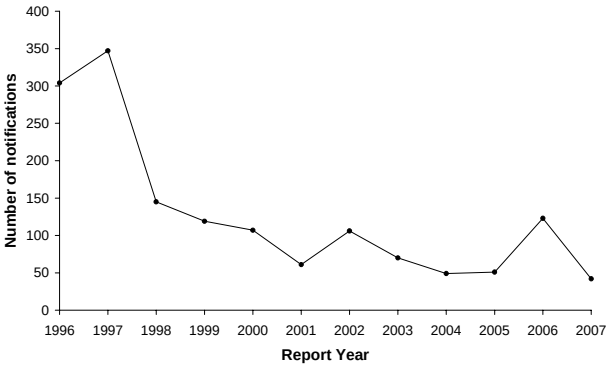
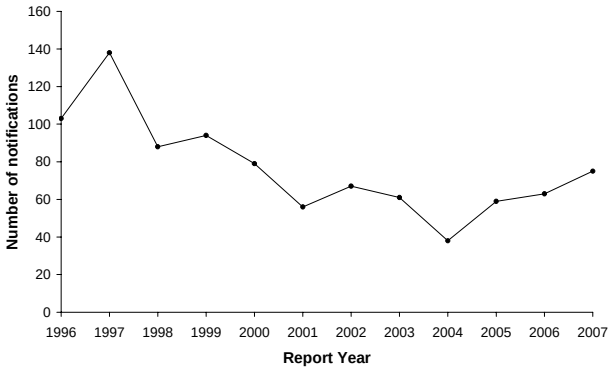


Figure 14. Hepatitis B notifications by year, 1996 - 2007



In 2007, there were no hepatitis A cases in those aged less than five years. Age-specific rates were highest in the 15-19 years age group (2.5 per 100 000, 8 cases) followed by 5-9 years age group (2.1 per 100 000, 6 cases).

Males (1.3 per 100 000 population, 26 cases) had a higher notification rate than females (0.7 per 100 000 population, 16 cases).

Ethnicity was recorded for 40 (95.2%) hepatitis A cases. The highest percentage of reported cases were of European ethnicity (17 cases, 42.5%), followed by Other ethnicity (14 cases, 35.0%), Pacific Peoples (6 cases, 15.0%) and Maori (3 cases, 7.5%).

Of the 39 cases (92.9%), for which hospitalisation status was recorded, 17 cases (43.6%) were hospitalised. No deaths due to hepatitis A were reported in 2007.

For 37 cases (88.1%) with a history of overseas travel recorded, 21 cases (56.8%) had travelled overseas during the incubation period. Countries most frequently visited included: India (5 cases), Samoa (3 cases), Fiji, Singapore and South Africa (2 cases each).

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.

There were 75 cases of hepatitis B notified in 2007, compared to 63 notifications in 2006. Between 1997 and 2004, there was a general downward trend in the number of hepatitis B notifications, which has been primarily attributed to the introduction of the hepatitis B vaccine to the immunisation schedule. Since 2004, an increasing number of cases have been reported each year (Figure 14).

The 2007 national notification rate for acute hepatitis B was 1.8 per 100 000 population compared to 1.5 per 100 000 population in 2006. The highest rate by DHB was reported in Hawke's Bay (3.3 per 100 000) followed by Auckland (2.8 per 100 000), Canterbury (2.2 per 100 000) and Waitemata (2.1 per 100 000).

In 2007, there was one hepatitis B case aged less than five years and a further case in the 10-14 years age group. The age-specific incidence rate was highest in the 30-39 years age group (3.9 per 100 000, 23 cases), followed by the 20-29 years age group (2.7 per 100 000, 15 cases) and 50-59 years age group (2.5 per 100 000, 13 cases).

The hepatitis B notification rate was higher for males (2.0 per 100 000 population, 42 cases) than females (1.5 per 100 000, 33 cases).

Ethnicity was recorded for 70 (93.3%) hepatitis B cases. The highest percentage of reported cases were European (40 cases, 57.1%), followed by Other ethnicity (14 cases, 20.0%), Maori (9 cases, 12.9%) and Pacific Peoples (7 cases, 10.0%).

Of the 69 cases (92.0%), for which hospitalisation status was recorded, 20 cases (29.0%) were hospitalised. One death due to hepatitis B was recorded in 2007.

The risk factors recorded for hepatitis B are shown in Table 10. The most commonly associated risk factors were sexual contact (27.3%) or household contact with a confirmed case or carrier (23.1%). In 2006 each of these two risk factors were only associated with approximately 5% of cases.

Table 10. Exposure to risk factors associated with hepatitis B, 2007

Risk Factor	Yes	No	Unknown	%[a]
Sexual contact	12	32	31	27.27
Household contact with confirmed case	12	40	23	23.08
Overseas during incubation period	8	48	19	14.29
Body piercing/tattooing in last 12 months	7	50	18	12.28
History of injecting drug use	3	54	18	5.26
Case dialysis patient	2	49	24	3.92
Occupational exposure to blood	2	55	18	3.51
Case child of seropositive mother	1	53	21	1.85

[a] "%" refers to the percentage 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

There were 32 cases of hepatitis C notified in 2007, compared to 35 notifications in 2006. Between 1998 and 2004, the number of hepatitis C notifications had steadily decreased, although there was a slight increase in notifications in 2005 and 2006 (Figure 15)

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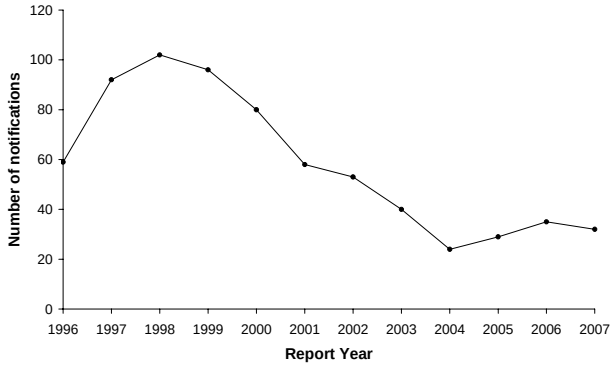
Figure 15. Hepatitis C notifications by year, 1996 - 2007



The national hepatitis C notification rate in 2007 was 0.8 per 100 000 population compared to 0.8 per 100 000 population in 2006. The highest rate by DHB was observed in Canterbury (1.8 per 100 000 population, 9 cases). No other DHB reported more than five cases for the year.

In 2007, there were no hepatitis C cases aged less than 15 years. The age-specific notification rate was highest in the 50-59 years age group (1.6 per 100 000 population, 8 cases), followed by those aged 40-49 years (1.3 per 100 000, 8 cases), 30-39 years (1.2 per 100 000, 7 cases) and 20-29 years (1.1 per 100 000, 6 cases).

Males (1.0 per 100 000 population, 20 cases) had a higher notification rate than females (0.6 per 100 000 population, 12 cases).

Ethnicity was recorded for 30 (93.8%) hepatitis C cases. For those cases where ethnicity was recorded, the highest percentage were of European ethnicity (25 cases, 83.3%), followed by Maori (3 cases, 10.0%) and Pacific Peoples (2 cases, 6.7%).

Of the 27 cases (84.4%), for which hospitalisation status was recorded, 2 cases (7.4%) were hospitalised. There were no deaths due to hepatitis C reported in 2007.

The risk factors recorded for hepatitis C are shown in Table 11. The most commonly recorded risk factor was intravenous drug use, which is consistent with data from 2005 and 2006.

Table 11. Exposure to risk factors associated with hepatitis C, 2007

Risk Factor	Yes	No	Unknown	%[a]
History of injecting drug use	14	5	13	73.7
Sexual contact	4	7	21	36.4
Body piercing/tattooing in last 12 months	4	10	18	28.6
Household contact with confirmed case	3	12	17	20.0
Overseas during incubation period	2	15	15	11.8
Case dialysis patient	1	18	13	5.3
Case child of seropositive mother	0	18	14	0.0
Occupational exposure to blood	0	18	14	0.0

[a] "%" refers to the percentage 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 (NOS)

There was one case of hepatitis NOS notified in 2007. The case, a 25 year old male of Indian ethnicity from the Counties Manukau DHB, was hospitalised after returning from travel to India. Since 2002, there have been a total of 10 cases of hepatitis NOS notified in New Zealand.

HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI)

Highly Pathogenic Avian Influenza (HPAI) was made 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 bird populations to the end of 2007.

Worldwide, during 2007, there were 86 laboratory-confirmed A(H5N1) cases resulting in 59 fatalities. These occurred in Indonesia (42 cases, 37 deaths), Egypt (25 cases, 9 deaths), Viet Nam (8 cases, 5 deaths), China (5 cases, 3 deaths), Laos (2 cases, 2 deaths), Cambodia (1 case, 1 death), Nigeria (1 case, 1 death), Pakistan (1 case, 1 death) and Myanmar (1 case, 0 deaths) [20].

HYDATID DISEASE

Six cases of hydatid disease, a disease caused by the larval stage of the tapeworm *Echinococcus granulosus*, were notified in 2007. The 2007 notification rate was 0.1 per 100 000 population. Since 1997, a total of 33 cases of hydatid disease have been notified.

One (16.7%) case was in the 40-49 years age group, one (16.7%) was in the 50-59 years age group, two (33.3%) were in the 60-69 years age group and two (33.3%) were in the 70+ years age group. Five (83.3%) cases were male and one (16.7%) was female. Two (33.3%) cases were European, two (33.3%) were Maori and two (33.3%) were Other ethnicity. Two (33.3%) cases were hospitalised and all six cases were laboratory-confirmed.

Risk factor information was recorded for 83.3% (5/6) of the cases. Of these, three cases had a history of farm/meatwork exposure in New Zealand and two cases were migrants with a history of farm exposure, with all exposures possibly dating back decades.

Echinococcus species are notifiable organisms under the Biosecurity Act 1993. All cases of hydatid disease are reported to the Ministry of Agriculture and Forestry

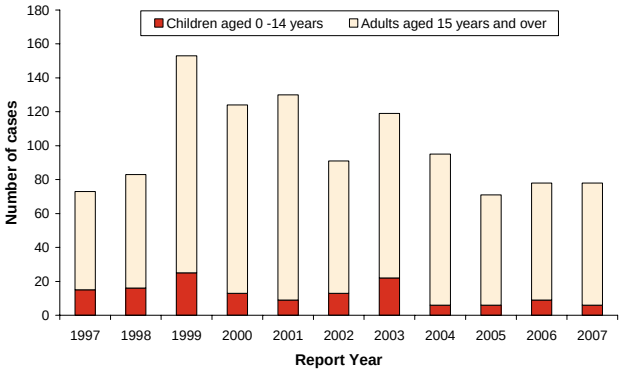
(MAF) for investigation of possible disease reservoirs in New Zealand animals. In September 2002, New Zealand was declared provisionally free of hydatids. However, hydatids are notoriously difficult to eradicate and a thorough investigation and a high level of vigilance around human cases remains appropriate. Given the natural history of the disease, cases may occur for some years yet.

LEAD ABSORPTION

There were 78 cases of lead absorption notified in 2007 (1.8 per 100 000 population), which is equal to the number notified in 2006.

Figure 16 illustrates the annual variability in lead absorption notifications in both children and adults between 1996 and 2007. From 2005 onward, the number of notifications has been relatively stable.

Figure 16. Lead absorption notifications in children and adults by year, 1997 - 2007



Note: new case definition from 2007, see text for details.

Of the 78 cases notified in 2007, six (7.7%) were aged less than 10 years; one case was aged less than 1 year, four cases were aged 1-4 years and one case was aged 5-9 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).

In 2007, the majority of lead absorption notifications were for males (83.3%, 65 cases), compared to females (16.7%, 13 cases).

Ethnicity was recorded for 92.3% (72/78) of the cases. Of these responses, the majority of lead absorption notifications were reported for Europeans (91.7%, 66 cases), followed by Maori and Pacific Peoples (each 4.2%, 3 cases).

Of the 61 cases for which hospitalisation status was recorded, two (3.3%) were hospitalised.

Table 12 and Table 13 summarise risk factor information for lead absorption cases notified in 2007. Several cases had more than one risk factor recorded. Similar to previous years, the most common risk factor for lead absorption for both adults and children was living in, or regularly visiting, a building built prior to 1970 that had paint chalking/flaking, and/or had recently undergone alteration or refurbishment.

Blood lead level concentrations were recorded for all of the notifications. Blood lead level concentrations ranged from 0.5 to 1.33 µmol/L with a median of 0.73 µmol/L. For adult notifications, blood lead level concentrations ranged from 0.5 to 8.0 µmol/L with a median of 1.0 µmol/L.

It is important to note that since 18 June 2007 the non-occupational notifiable blood lead level has reduced from 0.72 µmol/L to 0.48 µmol/L. Under the previous threshold 11 (14.1%) of these cases would not have been reported in 2007.

Table 12. Exposure to risk factors associated with lead absorption for adults (cases aged 15 years and over), 2007

Risk Factor	Yes	No	Unknown	%[a]
Case had exposure to lead through hobbies[b]	37	16	19	69.8
Case lived in or regularly visited a building built prior to 1970[c]	33	15	24	68.8
Case had exposure to high-risk occupation[d]	35	28	9	55.6
Close contact of case was occupationally exposed to lead	3	35	34	7.9

[a] "%" refers to the percentage 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.

[b] Hobbies were home renovations (24), shooting (10), making home ammunition (1), boat builder and repairer (1), lead lighting (1).

[c] Of these, 29 cases lived in or regularly visited a building that had paint chalking/flaking, and/or had recently undergone alterations or refurbishment.

[d] Occupations included painter (19), radiator repairs/mechanic (3), artist (1), boat builder and repairer (1), chemical plant worker (1), factory process worker (not elsewhere classified) (1), fitter and turner (1), general worker (1), demolition worker (1), landlord/home maintenance (1), panel beater and spray painter (1), self employed (not further defined) (1), steel cutter (1), unspecified (1).

Table 13. Exposure to risk factors associated with lead absorption for children (cases aged less than 15 years), 2007

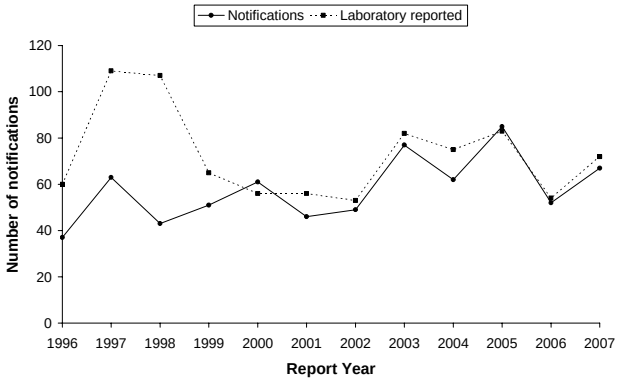
Risk Factor	Yes	No	Unknown	%[a]
Case lived in or regularly visited a building built prior to 1970 that had paint chalking/flaking, and/or had recently undergone alterations or refurbishment	4	0	2	100.0
Pica behaviour	3	1	2	75.0
Case played in soil containing paint debris	2	1	3	66.6
Close contacts of case were exposed to lead through occupation	0	4	2	0.0
Case lived near an industry that is likely to release lead	0	4	2	0.0

[a] "%" refers to the percentage 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.

LEGIONELLOSIS

There were 67 cases of legionellosis notified in 2007. This represents a rate of 1.6 per 100 000 population, which has increased from 2006 (1.2 per 100 000, 52 cases) but is similar to that in other recent years (Figure 17).

Figure 17. Legionellosis notifications and laboratory-reported cases by year, 1996 - 2007



Of the DHBs reporting more than five cases in 2007, the highest legionellosis notification rate was reported from the Tairawhiti DHB (21.8 per 100 000), where nine of the 10 notified cases were associated with a common source outbreak. The second highest rate was reported in Canterbury DHB (2.4 per 100 000, 12 cases).

The highest age specific rate (5.0 per 100 000, 18 cases) was reported in cases aged 70+ years followed by those aged 60-69 years (3.3 per 100 000, 12 cases) and those aged 50-59 years (2.5 per 100 000, 13 cases). The 2007 legionellosis rate was similar for males (1.6 per 100 000, 34 cases) and females (1.5 per 100 000, 33 cases).

Of the 54 cases in 2007 for which hospitalisation status was recorded, 38 (70.4%) were hospitalised.

There was one death reported from legionellosis in 2007 following infection with *L. longbeachae* sg 1.

Table 14 provides a summary of the risk factors for which data were available. Of the 28 cases with a definite or suspected environmental source of infection recorded, 19 (67.9%) reported contact with compost/potting mix/soil, five reported exposure to a spa/indoor pool, two reported exposure to showers (one in a motel), two were overseas during the incubation period, one reported exposure during maintenance of an air conditioning unit, and one reported exposure to muddy water as a potential source. For two cases no potential source was reported.

A total of 72 cases of legionellosis were laboratory diagnosed during 2007. Table 15 shows the strains identified for the laboratory-reported cases in 2007.

A total of six notified cases had a history of overseas travel during the incubation period.

There was one legionellosis outbreak reported in 2007 involving a total of nine cases. This outbreak was traced to a plant nursery where all the cases were involved in potting root stock using compost material. Although all nine experienced symptoms, only five cases were laboratory-confirmed with *L. longbeachae* sg 2 identified as the causative agent. See the Outbreak Surveillance section for further details.

Table 14. Risk factors associated with legionellosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Contact with definite or suspected environmental source of infection	28	5	34	84.8
Pre-existing immunosuppressive or debilitating condition	17	30	20	36.2
Smokers or ex-smokers	11	39	17	22.0

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

Table 15. Legionellosis strains for laboratory cases, 2007

Legionella species/serogroup	Number	%[a]
L. bozemanii sg 1	1	1.4
L. dumoffii	1	1.4
L. gormanii	3	4.2
L. jordanis	2	2.8
L. longbeachae sg 1	8	11.1
L. longbeachae sg 2	7	9.7
L. longbeachae sg unknown	11	15.3
L. micdadei	5	6.9
L. pneumophila sg 1	17	23.6
L. pneumophila sg 1/12	1	1.4
L. pneumophila sg 12	3	4.2
L. pneumophila sg 13	1	1.4
L. pneumophila sg 15	2	2.8
L. pneumophila sg 2	1	1.4
L. pneumophila sg 3 or 5	1	1.4
L. pneumophila sg 4 or 12 or 15	1	1.4
L. pneumophila sg 5	1	1.4
L. pneumophila sg 8	1	1.4
L. sainthelensi	2	2.8
Legionella sp. (non-*L. pneumophila)*	2	2.8
L. longbeachae & *L. bozemanii*[b]	1	1.4
Total	72	

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

[b] This case was diagnosed using serological methods. When undertaking source-tracing, both *L. longbeachae* & *L. bozemanii* were isolated from compost material used by the case during the incubation period.

LEPROSY

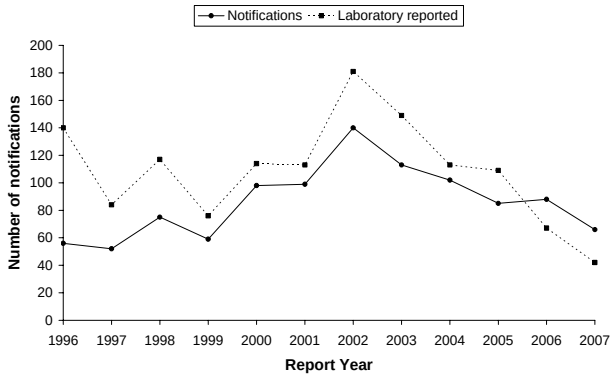
Eight cases of leprosy were notified in New Zealand in 2007, one of which was a transfer patient from a Pacific Island nation. One case was 12 years old, with the remaining cases aged between 20 and 48 years. Four cases were notified as confirmed and four as probable. The clinical form of leprosy was recorded as tuberculoid for two cases, borderline for two cases, and lepromatous for one case. The form of leprosy was not stated for the remaining three cases. Acid-fast status was only reported for two cases: one multibacillary and one paucibacillary. All cases had lived overseas during the incubation period, six in a Pacific Island nation, one in Asia, and one in Africa.

LEPTOSPIROSIS

A total of 66 cases of leptospirosis were notified in 2007, a rate of 1.6 per 100 000 population, lower than the notification rate in 2006 (2.1 per 100 000 population, 88 cases). Of the 66 notified cases, 60 (90.9%) were laboratory-confirmed.

Figure 18 shows the number of notified and laboratory-reported cases of leptospirosis each year since 1996. After a peak in notifications in 2002, there has been a general downward trend in the number of cases of leptospriosis.

Figure 18. Leptospirosis notifications and laboratory-reported cases by year, 1996 - 2007



The highest age specific rates were reported in the 40-49 years age group (3.2 per 100 000 population, 20 cases), followed by those in the 50-59 years age group (2.7 per 100 000, 14 cases). Sex was recorded for 98.5% (65/66) of the cases, where the majority were male (81.5%, 53 cases). Ethnicity was recorded for 90.9% (60/66) of the cases. The majority of the cases were European (73.3%, 44 cases), followed by Maori (23.3%, 14 cases) and Other ethnicity (3.3%, 2 cases).

No leptospirosis-related deaths were reported in 2007. Of the 62 cases for which hospitalisation status was recorded, 25 (40.3%) were hospitalised.

Occupation was recorded for 58 (87.9%) of the 66 notified cases. Of these, 48 cases (82.8%) were recorded as engaged in occupations previously identified as high risk for exposure to *Leptospira spp.* in New Zealand [21]. The proportion of leptospirosis cases in high-risk occupations was very similar to 2006 (82.7%), but has decreased compared with the previous two years (91.4% in 2005 and 93.1% in 2004). The proportion in low-risk occupations also increased from 12.3% (10 cases) in 2006 to 17.2% (10 cases) in 2007.

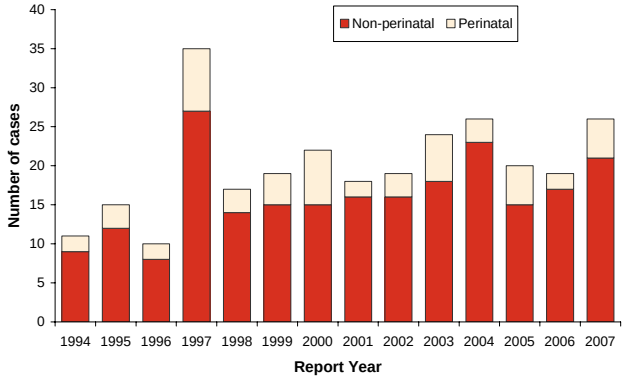
Of the 58 cases with an occupation recorded, 27 (46.6%) worked in the meat processing industry (as freezing workers, butchers, slaughtermen, or meat packers) and 21 (36.2%) were farmers or farm workers. Of the 10 cases where occupation was not a risk factor, eight had animal/outdoor exposures.

The *Leptospira* species and serovar was recorded for 52 of the 66 notified cases: *L. borgpetersenii sv hardj*o (23 cases), *L. interrogans sv pomona* (14), *L. borgpetersenii sv ballum* (10), *L. borgpetersenii sv tarassovi* (3), and *L. borgpetersenii sv copenhagii* (1). One case had *L. borgpetersenii* sv *hardjo* and *L. interrogans sv pomona* (1).

LISTERIOSIS

In 2007, 26 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 14 years. Over the preceding five years (2002-2006) the average number of cases per year was 22, peaking with 26 cases (0.6 per 100 000 population) in 2004, the highest since 1997 (35 cases).

Figure 19. Listeriosis notifications (perinatal and non-perinatal) by year, 1994 - 2007



Five (19.2%) of the 2007 cases were recorded as perinatal, an increase from 2006 (2 cases) but the same as in 2005 (5 cases). Weeks of gestation were known for all cases with a range of 16 to 37 weeks. Two cases of 16 and 21 weeks gestation died. The mothers were both from the 30-39 years age group and were of Other and European ethnicity.

The 21 non-perinatal cases were from 12 DHBs, with the greatest number from Northland (4) and Counties Manukau (4). All the non-perinatal cases were aged over 30 years, with 12 cases aged over 70 years. Sex was recorded for 20 of the 21 cases, of which seven were male and 13 were female. Ethnicity was recorded for 19 of the 21 cases, of which 16 cases were European, two were Maori, and one was of Other ethnicity.

Hospitalisation status was recorded for 19 non-perinatal cases, of which all were hospitalised but 10 were hospitalised for treatment of another illness and five were receiving immunosuppressive drugs (note that a case may have more than one risk factor). Two deaths in 2007 were due to non-perinatal listeriosis (age 56 and 81 years). Seventeen (81.0%) of the non-perinatal cases had an underlying illness such as cancer, autoimmune disease, lung disease, and other chronic illnesses.

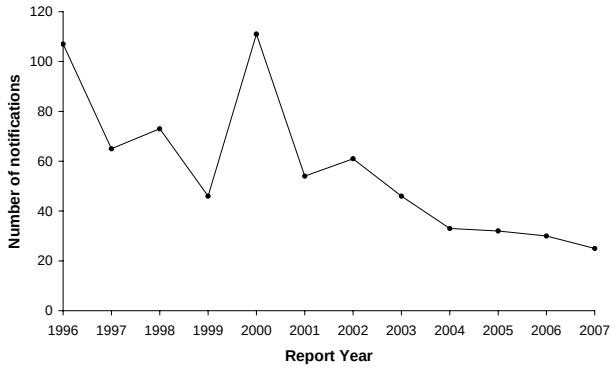
Twenty-six cultures for typing were received by the ESR Special Bacteriology Laboratory. Sixteen (61.5%) were serotype 4; the remaining 10 (38.5%) were serotype 1/2, a similar distribution to that in 2006.

There were no outbreaks of listeriosis reported in 2007.

MALARIA

There were 25 cases of malaria notified in 2007 compared to 30 cases in 2006 (Figure 20). The 2007 notification rate was 0.6 per 100 000 population compared to 0.7 per 100 000 population in 2006.

Figure 20. Malaria notifications by year, 1996 - 2007



Age was recorded for 96.6% (24/25) of the cases. The majority of cases were aged between 20 and 69 years of age (20 cases, 83.3%). The age specific rates were highest in the 50-59 years (1.0 per 100 000 population, 5 cases), followed by the 40-49 years (0.8 per 100 000 population, 5 cases) age groups.

Sex was recorded for 92.0% (23/25) of the cases. The notification rate was higher for males than females (0.8 per 100 000 population, 16 cases; 0.3 per 100 000 population, 7 cases, respectively).

Ethnicity was recorded for 88.0% (22/25) of the cases. Of the 22 cases the highest number of notifications occurred for those of European ethnicity (11 cases, 50.0%), followed by Other ethnicity (8 cases, 36.4%), Pacific Peoples (2 cases, 9.1%) and Maori (1 case, 4.5%).

Hospitalisation status was recorded for 92.0% (23/25) of the cases. Of the 23 cases, 65.2% (15 cases) were hospitalised.

All 25 notified cases were confirmed by serology.

Travel history was recorded for all 25 cases. Twenty-two (88.0%) cases had resided or travelled overseas recently and three (12.0%) cases had a past history of travel to malaria endemic areas. The most common countries visited or resided in were India (6 cases, 24.0%) and Papua New Guinea (4 cases, 16.0%). The overseas areas travelled to or resided in and the *Plasmodium* species identified are listed in Table 16.

The most common species identified was *P. vivax* (15 cases), followed by *P. falciparum* (8 cases), *P. malarie* (1 case) and one indeterminate case.

Malaria prophylaxis was used regularly by two cases. Six cases did not take any, and prophylaxis use was unknown for 17 cases.

NZHIS hospitalisation data for 2007 recorded 37 cases where malaria was the primary diagnosis on admission.

Table 16. Species of malaria and area of overseas travel, 2007

Area resided in or visited	*P. falciparum*	*P. vivax*	*P. malarie*	Indeterminate
Central African Republic	1			
Cook Islands		1		
Ethiopia		1		
Ghana	2			
India	1	4	1	
Indonesia		2		
Kenya	1			
Malaysia		1		
Mali	1			
Mozambique	1			
Nigeria				1
Pakistan		1		
Papua New Guinea	1	3		
Philippines		1		
Solomon Islands		1		
South Africa	1			
Tanzania	1			
Thailand		1		
Vanuatu		1		
Viet Nam		1		
Total[a]	10	18	1	1

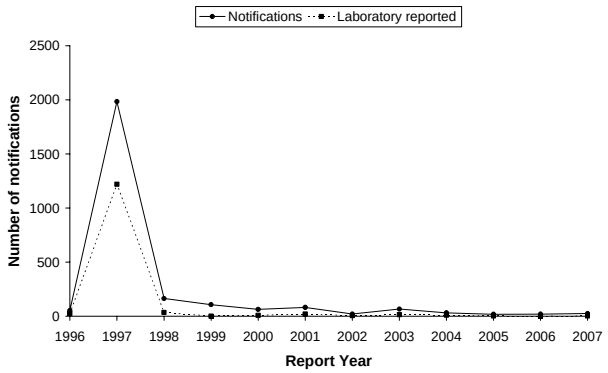
[a] Cases may have travelled to more than one country during the incubation period.

MEASLES

In New Zealand, measles immunisation was introduced in 1969 and it has been a notifiable disease since June 1996. In 2007 there were 25 measles notifications, of which four were laboratory-confirmed cases. This is similar to 2006 when there were 20 notifications with one laboratory-confirmed case. The number of annual measles notifications has remained at fewer than 100 since the year 2000 (Figure 21).

Figure 21 shows notified and laboratory-reported cases from 1996 to 2007.

Figure 21. Measles notifications and laboratory-reported cases by year, 1996 - 2007



The 2007 measles notification rate was 0.6 per 100 000 population compared to 0.5 per 100 000 in 2006.

Waitemata was the only DHB where more than five notifications were reported in the year 2007 (1.2 per 100 000 population, 6 cases).

The highest age-specific rate was seen in the 1-4 years age group (5.2 per 100 000 population, 12 cases). No other age group had more than five cases for the year.

The 2007 measles notification rates were the same for both males and females (0.6 per 100 000 population).

Ethnicity was recorded for all but one of the measles notifications during 2007. The highest number of cases occurred among those of European ethnicity (17 cases, 70.8%), followed by those of Other ethnicity (4 cases, 16.7%), Maori (2 cases, 8.3%) and Pacific Peoples (1 case, 4.2%).

Five of the 21 cases for which hospitalisation status was recorded, were admitted to hospital. Of the 18 cases for which the relevant information was recorded, nine (50.0%) attended school, pre-school or childcare. Four measles cases reported overseas travel during the incubation period.

Two family based outbreaks involving seven of the cases were reported. In each of the outbreaks at least one of the family members had recently returned from overseas travel. See the Outbreak Surveillance section for further details.

The recommended measles, mumps and rubella (MMR) immunisation schedule since January 2001 requires the administration of the first dose at 15 months and the second at four years of age. Vaccination status was recorded for 21 cases. Of these 11 (52.4%) had not received any doses of the MMR vaccine. Of the four laboratory-confirmed cases, one was less than four years and one was 10-19 years of age, both were not vaccinated. The remaining two cases were 20+ years of age, one was vaccinated (no dose information) and the vaccination status of the other case was unknown. Table 17 shows vaccination status by age group.

Table 17. Age group and vaccination status of measles notifications, 2007

Age Group	Total Cases	One Dose	Two Doses	Vaccinated (no dose info)	Not Vaccinated	Unknown
<15mths	4	0	0	0	4	0
15mths-3yrs	10	5	0	1	4	0
4-9 yrs	5	2	1	0	1	1
10-19 yrs	1	0	0	0	1	0
20+ yrs	5	0	0	1	1	3
Total	25	7	1	2	11	4

MENINGOCOCCAL DISEASE

A full description of the epidemiology of meningococcal disease in 2007 is contained in a separate report [22].

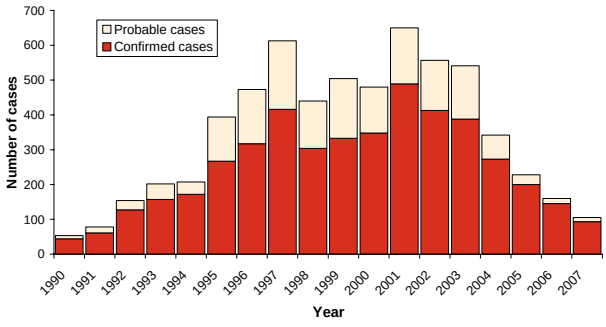
The surveillance of meningococcal disease in New Zealand is based upon the rigorous matching and follow-up of all laboratory and notification data. A total of 105 cases of meningococcal disease were notified in 2007, giving a rate of 2.6 per 100 000 population. This rate is a significant decrease from 2004 (8.5 per 100 000 population, 342 cases) yet is still 2.7 times higher than the rate of 1.5 per 100 000 population occurring in the immediate pre-epidemic years (1989-90). Figure 22 shows the number of confirmed and probable cases of meningococcal disease since 1990.

Of the 105 cases for 2007, 93 (88.6%) were laboratory-confirmed by either culture (67) or DNA testing (27).

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

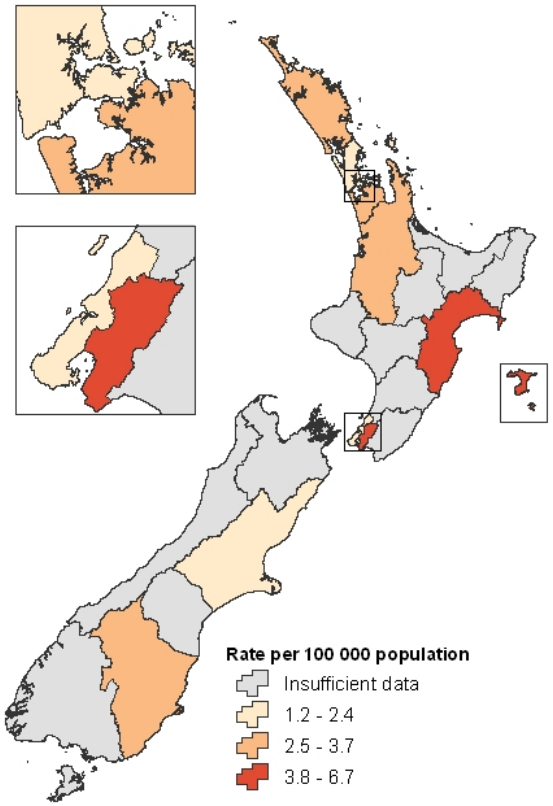
Of the DHBs with more than five cases reported in 2007, the highest rates were recorded in Hawke's Bay (6.7 per 100 000 population) and Hutt (4.4 per 100 000) DHBs. The lowest rates were from Waitemata DHB (1.2 per 100 000) and Auckland DHB (2.0 per 100 000 population). No cases were reported from the Whanganui and South Canterbury DHBs. Figure 23 illustrates the rates of meningococcal disease by DHB.

Figure 22. Meningococcal disease notifications by year, 1990 - 2007



Note: Probable cases are those for whom a meningococcus has not been identified but who fulfil the clinical criteria for meningococcal disease.

Figure 23. Meningococcal disease notifications by DHB, 2007



As in previous years, the highest age specific rates occurred in the less than 1 year age group (33.6 per 100 000 population, 19 cases) followed by the 1-4 years age group (13.3 per 100 000, 29 cases).

Ethnicity was recorded for 99.0% (104/105) of the cases reported in 2007. The majority of the cases were of European ethnicity (46.2%, 48 cases), followed by Maori (33.7%, 35 cases), Pacific Peoples (14.4%, 15 cases) and Other ethnicity (5.8%, 6 cases).

Seven deaths were reported during 2007 with the associated case fatality rate of 6.7%. This brings the number of deaths since 1991 to 252, with an average case fatality rate of 4.1%.

Data on pre-hospital management were recorded for 105 cases, including all of the fatal cases. These data show that 21.9% (23/105) of cases received antibiotic treatment prior to hospital admission. In 2007, there were three fatalities among cases seen by a doctor prior to hospital admission (only one was given antibiotics). In comparison there were four fatalities in those cases not seen by a doctor prior to admission and not given pre-hospital antibiotics.

Serogroup B disease and particularly that caused by the epidemic strain, has continued to cause disease in 2007. However, the number of epidemic strain cases in 2007 was less than one-fifth of that in the peak year of 2001 (47 cases compared to 262 cases). Of the 47 epidemic strain cases, 38 were less than 20 years of age.

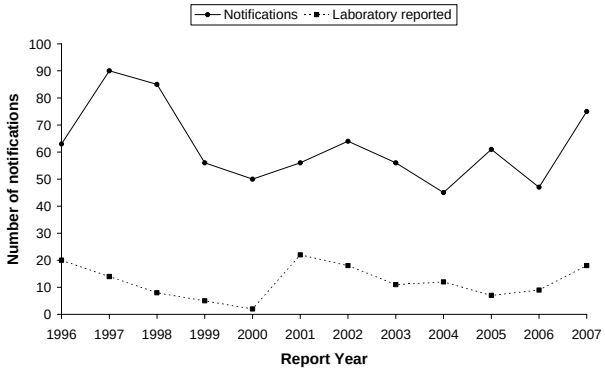
Antimicrobial susceptibility was tested for the 67 viable meningococcal isolates received at ESR from cases of invasive disease in 2007. All isolates were susceptible to penicillin, ceftriaxone, rifampicin and ciprofloxacin. Of the 67 isolates, 20.9% (14/67) had reduced susceptibility to penicillin, with minimum inhibitory concentrations (MICs) of 0.12-0.5 mg/L.

MUMPS

A total of 75 cases of mumps were notified in 2007, of which 35 cases were laboratory-confirmed. In comparison, 47 cases of mumps were notified in 2006, of which 19 were laboratory-confirmed.

After the last epidemic in 1994 involving 250 cases, mumps became a notifiable disease in June 1996. Figure 24 shows notified and laboratory-reported cases from 1996 to 2007.

Figure 24. Mumps notifications and laboratory-reported cases by year, 1996 - 2007



The 2007 notification rate of 1.8 per 100 000 population is greater than the 2006 rate of 1.1 per 100 000 population. The highest rate was recorded in Counties Manukau (3.4 per 100 000 population, 16 cases) followed by Capital and Coast (2.1 per 100 000, 6 cases) and Waikato (2.0 per 100 000, 7 cases) DHBs.

There was one case of mumps aged less than 1 year old. Age-specific rates were highest in the 1-4 years age group (9.5 per 100 000 population, 22 cases) followed by the 10-14 years (4.2 per 100 000, 13 cases) and 5-9 years (4.1 per 100 000, 12 cases) age groups.

The 2007 mumps notification rate for males was 2.0 per 100 000 population (42 cases) and the rate for females was 1.5 per 100 000 population (33 cases).

Ethnicity was recorded for 92.0% (69/75) of notifications. The highest number of cases occurred among those of European ethnicity (33.3%, 23 cases), followed by Pacific Peoples (29.0%, 20 cases), Maori (21.7%, 15 cases) and Other ethnicity (15.9%, 11 cases).

Of the 75 cases notified during 2007, 69 (92.0%) had hospitalisation information recorded. Of these, three cases were hospitalised. No deaths were reported from mumps in 2007. Of the 60 cases for which this information was recorded, 31 (51.7%) attended school, pre-school or childcare. Eleven cases reported overseas travel during the incubation period.

The recommended immunisation schedule for mumps in 2007 was two doses of MMR vaccine, the first given at 15 months of age and the second given at 4 years of age. Vaccination status was recorded for 55 cases notified during 2007. Of these, 28 (50.1%) had not received any doses of the MMR vaccine. Table 18 shows the number of doses of MMR vaccine given to mumps cases in each relevant age group.

Table 18. Age group and vaccination status of mumps notifications, 2007

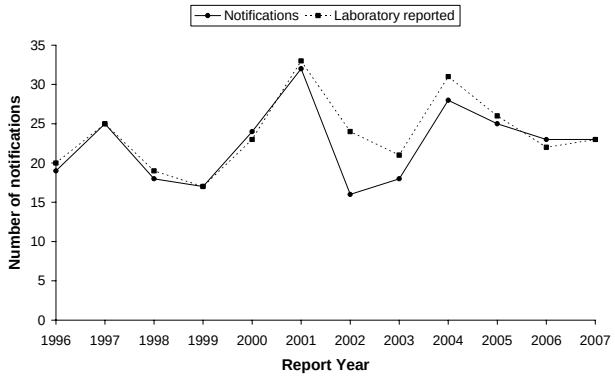
Age Group	Total Cases	Vaccination Status				
		One Dose	Two Doses	Vaccinated (no dose info)	Not Vaccinated	Unknown
<15mths	2	0	0	0	2	0
15mths-3yrs	18	7	0	1	8	2
4-9 yrs	15	3	8	1	3	0
10-19 yrs	16	1	3	2	5	5
20+ yrs	24	0	0	1	10	13
Total	75	11	11	5	28	20

PARATYPHOID FEVER

Twenty-three cases of *Salmonella* Paratyphi were notified in 2007. The 2007 rate (0.5 per 100 000 population) was the same as in 2006 (23 cases).

Figure 25 shows the number of notified and laboratory-reported cases of paratyphoid each year since 1996.

Figure 25. Paratyphoid fever notifications and laboratory-reported cases by year, 1996 - 2007



Age was recorded for 22 of the 23 cases. The most frequent age of notification was 20-29 years of age (8/22).

Sex was recorded for all 23 cases. The rate was similar for males (0.5 per 100 000 population, 11 cases) and females (0.6 per 100 000, 12 cases).

Ethnicity was recorded for all paratyphoid fever cases. The highest percentage of cases were reported for Other ethnicity (69.6%, 16 cases), followed by European (26.1%, 6 cases) and Maori (4.3%, 1 case).

Of the 20 cases for which hospitalisation status was recorded, 13 (65.0%) were hospitalised.

Overseas travel information was recorded for 22 of the 23 cases. Nineteen cases (86.4%) were recorded as having travelled overseas during the incubation period for the disease. The countries visited were: India (9), Thailand (3), Indonesia and Singapore (2 cases each), Australia, Bangladesh and South America (1 case each).

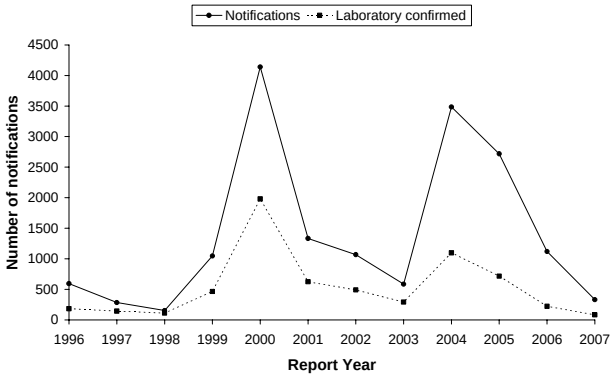
The Enteric Reference Laboratory at ESR received 23 *S.* Paratyphi isolates in 2007. The isolates were identified as *S.* Paratyphi A (16 cases), *S.* Paratyphi B var Java (4 cases), and *S.* Paratyphi B (3 cases).

PERTUSSIS (WHOOPING COUGH)

Pertussis is a vaccine preventable disease caused by the bacterial agent *Bordetella pertussis* with epidemics in young children occurring every three to four years with periodicity unchanged by mass immunisation [18]. Childhood vaccination has been routine in New Zealand since 1960, and the disease has been notifiable since 1996.

In 2007, there were 331 pertussis cases notified, of which 81 were laboratory-confirmed. The 2007 notification rate (7.8 cases per 100 000 population) was a significant decrease from 2006 (26.8 per 100 000 population, 1120 cases). In 2000 and again in 2004 New Zealand experienced epidemics of pertussis, with annual cases peaking at 4140 and 3485, respectively (Figure 26).

Figure 26. Pertussis notifications and laboratory-confirmed cases by year, 1996 - 2007

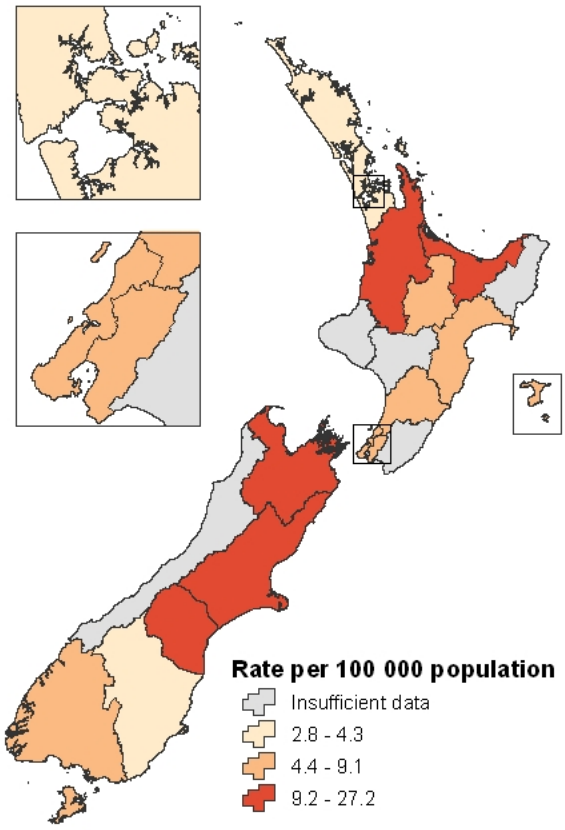


In 2007, pertussis notification rates varied throughout the country. The highest rates were reported in South Canterbury (27.2 per 100 000, 15 cases) followed by the Nelson-Marlborough (20.8 per 100 000, 28 cases) and Waikato (20.1 per 100 000, 71 cases) DHBs. No cases of pertussis were reported in the West Coast or Taranaki DHBs (Figure 27).

Age was recorded for 99.4% (329/331) of cases. The highest age specific rates were for cases aged less than 1 year (43.7 per 100 000 population, 27 cases), followed by cases aged 1-4 years (14.3 per 100 000 population, 33 cases) and 10-14 years (8.2 per 100 000 population, 25 cases).

Sex and ethnicity were recorded for 99.4% (329/331) and 94.0% (311/331) of all pertussis cases, respectively. In 2007, females (9.1 per 100 000 population, 196 cases) had a higher notification rate than males (6.4 per 100 000, 133 cases). The highest number of cases occurred among those of European ethnicity (243 cases, 78.1%), followed by Maori (41 cases, 13.2%), Other ethnicity (15 cases, 4.8%) and Pacific Peoples (12 cases, 3.9%).

Figure 27. Pertussis notifications by DHB, 2007



Of the 290 cases for which hospitalisation status was recorded in 2007, 35 cases (12.1%) were hospitalised. Twenty-three of the 35 cases were aged less than 1 year, four were 1-4 years, three were 5-9 years, and five were 20+ years. Of those hospitalised, nine were known to have started the vaccination schedule and dose information was recorded for eight of these. Five had been given one dose of vaccine, two had been given three doses and one had completed the entire five-dose course of vaccinations. There were no fatal cases of pertussis recorded in 2007.

From February 2002 to January 2006 the recommended immunisation schedule for pertussis was a primary course of DTaP-IPV at six weeks, three months and five months of age [23]. A booster was recommended at 15 months with Hib, and a further booster, DTaP-IPV, at four years of age prior to beginning school. From February 2006 onwards, the 15-month booster was removed from the schedule, and replaced with an adult dose vaccine DTaP-IPV booster at 11 years [18].

Table 19 shows the number of doses of vaccine given to cases in each relevant age group. Vaccination status was known for 146 (44.1%) cases notified during 2007. Of these, 84 (57.5%) were recorded as having had at least one dose of vaccine, although dose details were only recorded for 43 of these cases. A total of 35 cases had received three or more doses of pertussis vaccine.

Table 19. Age group and vaccination status of pertussis notifications, 2007

		Vaccination Status							
Age Group	Total Cases	One Dose	Two Doses	Three Doses	Four Doses	Five Doses	Vaccinated (no dose info)	Not Vaccinated	Unknown
0-5wks	6	-	-	-	-	-	0	6	0
6wk-2mths	13	4	-	-	-	-	0	7	2
3-4mths	6	2	1	-	-	-	0	3	0
5-14mths	6	0	0	3	-	-	1	2	0
15mths-3yrs	23	0	0	5	4	-	2	7	5
4-6 yrs	15	0	0	1	0	1	1	8	4
7-9 yrs	11	0	0	1	1	4	2	0	3
10-19 yrs	49	1	0	3	0	7	14	5	19
20+ yrs	200	0	0	0	1	4	21	24	150
Unknown	2	0	0	0	0	0	0	0	2
Total	331	7	1	13	6	16	41	62	185

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].

After a worldwide low of 200 plague cases reported to the WHO in 1981, case numbers continued to increase with a peak of 5419 cases in 1998 [24]. In 2003, 2118 cases of human plague were reported globally, resulting in 182 fatalities [25]. Global statistics suggest a shift in the geographical distribution of human plague. Africa has reported the vast majority of plague cases since the 1980s, whereas during the 1970s plague cases were predominantly reported in Asia. It is important to note that global statistics on plague are incomplete due to inadequate surveillance and reporting [24].

POLIOMYELITIS (POLIO)

There were no polio notifications in 2007. The New Zealand Paediatric Surveillance Unit carries out active surveillance of acute flaccid paralysis (AFP). In 2007, there were four cases of AFP notified to the Unit. All cases have been reviewed by the National Certification Committee for the Eradication of Polio (NCCEP) and have been classified as non-polio.

PRIMARY AMOEBIC MENINGOENCEPHALITIS

Primary amoebic meningoencephalitis, caused by the amoeboflagellate *Naegleria fowleri*, is a rare communicable disease with just over 160 cases reported worldwide, though this may be low due to identification and reporting bias [16].

The last notified case of primary amoebic meningo-encephalitis in New Zealand occurred in 2000. There have been eight 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 [26].

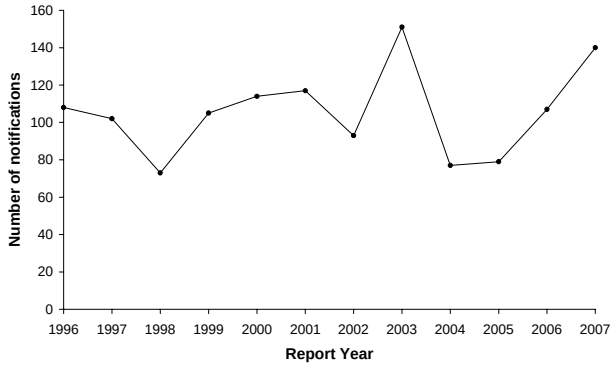
RABIES

New Zealand is classified as a rabies-free country [27]. There were no notifications of rabies in 2007. In the African and Asian continents combined, there are estimated to be 55 000 deaths per year from endemic canine rabies [28].

RHEUMATIC FEVER

In 2007, 132 initial attack cases and eight recurrent cases of rheumatic fever were notified. For initial cases this represents a population rate of 3.1 per 100 000, higher than the rate of 2.5 per 100 000 observed in 2006 (103 cases). For recurrent cases the population rate was 0.2 per 100 000 (4 cases in 2006). Figure 28 shows the number of initial attack cases of rheumatic fever each year since 1996.

Figure 28. Rheumatic fever (initial attack cases) by year, 1996 - 2007



Of the eight recurrent rheumatic fever cases, three were in the 10-14 year age group, one was in the 15-19 year age group, three were in the 20-29 year age group, and one was in the 40-49 year age group. Four cases were male, three were female, and the sex of one case was unknown. Two cases were Maori, three were Pacific Peoples, and the ethnicity of three cases was unkown.

The following analysis is for initial attack cases of rheumatic fever.

The highest rates of initial attack rheumatic fever were reported in Counties Manukau (11.2 per 100 000 population, 52 cases) and Hawke's Bay (5.2 per 100 000 cases, 8 cases) DHBs. Thirteen DHBs had fewer than five cases of initial attack rheumatic fever reported.

Age was recorded for 99.2% (131/132) of the cases. Of these responses, the majority were aged less than 20 years (88.5%, 116 cases) and the highest age-specific rate was in the 10-14 years age group (16.7 per 100 000 population, 51 cases).

Sex was recorded for 93.9% (124/132) of the cases. The notification rate of initial attack cases was 3.1 per 100 000 population for males (65 cases) and 2.7 per 100 000 for females (59 cases).

Of the initial attack cases where ethnicity was recorded (127/132, 96.2%), the majority were of Maori ethnicity (50.4%, 64 cases) followed by Pacific Peoples (44.1%, 56 cases), European (3.1%, 4 cases) and Other ethnicity (2.4%, 3 cases).

For all rheumatic fever cases (initial and recurrent attack), hospitalisation data was recorded for 56 cases, of which 49 (87.5%) were hospitalised.

Of the initial attack rheumatic fever cases for which laboratory diagnosis was recorded, 96.7% (87/90) had a laboratory-confirmed diagnosis for streptococcal infection.

RICKETTSIAL DISEASE

Two cases of rickettsial disease were notified in 2007 compared to 12 cases in 2006. One case was reported from Waikato DHB and the other case from Waitemata DHB.

One case was a female in the 40-49 years age group of European ethnicity and the second was a male in the 60-69 years age group of European ethnicity. Both cases were hospitalised and laboratory-confirmed. *Rickettsia typhi* was reported as the pathogen for both cases. Neither case had travelled overseas during the incubation period.

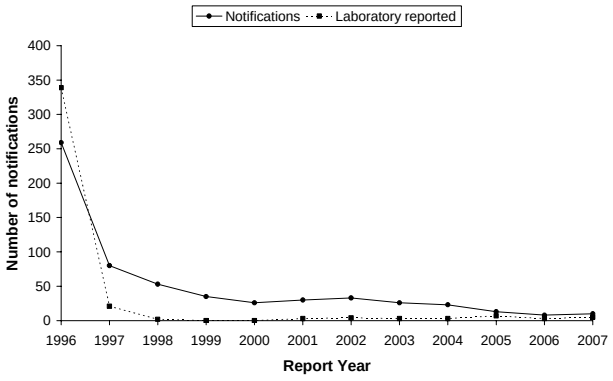
NZHIS hospitalisation data for 2007 recorded four cases where rickettsial disease was the primary diagnosis on admission. Of these, two cases were typhus fever (due to *R. typhi*) and two cases were rickettsiosis (unspecified).

RUBELLA (GERMAN MEASLES)

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

In 2007, a total of 10 cases of rubella were notified, of which two cases were laboratory-confirmed. This is similar to 2006, when eight cases of rubella were notified and three cases were laboratory-reported. There were no cases of congenital rubella reported in 2007. Since 1996, there has been a general decrease in the number of cases of rubella notified (Figure 29).

Figure 29. Rubella notifications and laboratory-reported cases by year, 1996 - 2007



The 2007 rubella notification rate was 0.2 per 100 000 population which is the same as the 2006 rate. The 10 notified cases were from seven DHBs, with the greatest number of notifications from the Capital and Coast (3 cases) and MidCentral (2 cases) DHBs.

Age and sex data were recorded for all rubella cases. Cases were all aged between six months and six years, with the majority of cases in the 1-4 years age group (6 cases, 2.6 per 100 000 population). Six of the cases were recorded as male and four as female.

Ethnicity was recorded for all rubella notifications during 2007. Nine cases were of European ethnicity and one case was of Maori ethnicity.

Hospitalisation status was recorded for all the cases and no cases were admitted to hospital. None of the notified cases died from rubella in 2007. Of the nine cases for which information was collected, six cases were known to have attended school, pre-school or childcare. No cases reported overseas travel.

The recommended vaccination schedule for rubella in 2007 was a primary dose at 15 months and a second dose at four years of age. Vaccination status was recorded for all cases. Five cases (50.0%) had received at least one dose of MMR vaccine. Both of the two laboratory-confirmed cases of rubella were not vaccinated. Table 20 shows the number of doses of MMR vaccine given to rubella cases in each relevant age group.

Data suggest that the incidence of rubella in New Zealand continues to decline after the last national epidemic in 1995. Since 1998, no further cases of congenital rubella syndrome have been reported to the New Zealand Paediatric Surveillance Unit. However, epidemics can occur every six to nine years in populations where the rubella vaccine is not on the national immunisation schedule of that country.

Table 20. Age group and vaccination status of rubella notifications, 2007

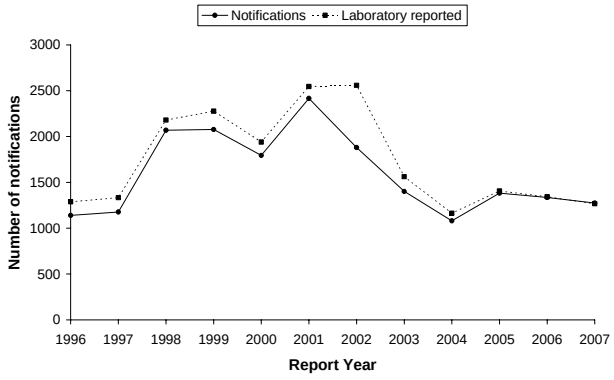
		Vaccination Status			
Age Group	Total Cases	One Dose	Two Doses	Not Vaccinated	Unknown
<15mths	4	0	0	4	0
15mths-3yrs	4	3	0	1	0
4-9 yrs	2	2	0	0	0
Total	10	5	0	5	0

SALMONELLOSIS

A total of 1274 cases of salmonellosis were notified in 2007. The Enteric Reference Laboratory at ESR received 1267 *Salmonella* isolates (exclusive of *S.* Paratyphi and *S.* Typhi reported elsewhere). The 2007 notification rate (30.1 per 100 000 population) is not significantly different from 2006 (31.9 per 100 000, 1335 cases) (Figure 30).

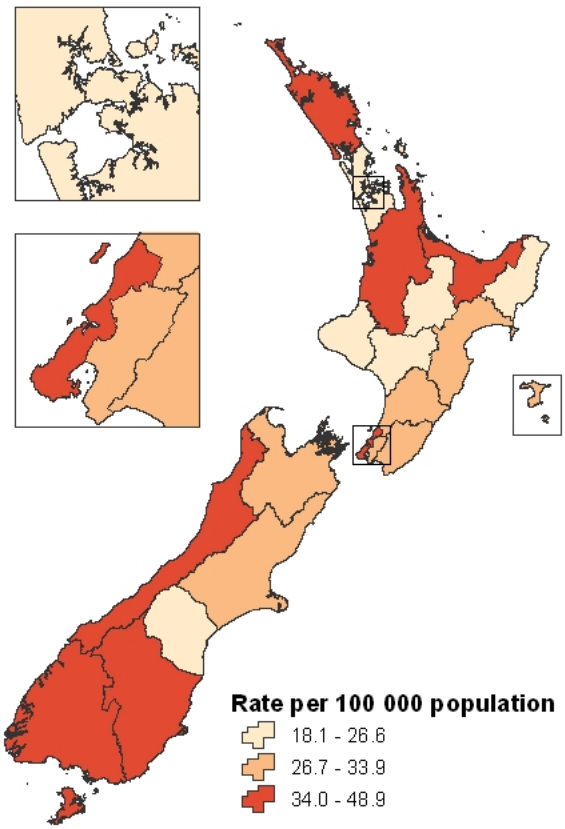
Figure 30 shows the number of notified and laboratory-reported cases of salmonellosis by year from 1996 to 2007. Both notifications and laboratory-reported cases have essentially been the same since 2005.

Figure 30. Salmonellosis notifications and laboratory-reported cases by year, 1996 - 2007



Rates varied throughout the country as illustrated in Figure 31. The highest rates were reported in Southland DHB (48.9 per 100 000 population, 54 cases), followed by the Bay of Plenty (45.3 per 100 000, 92 cases) and Otago (40.3 per 100 000, 75 cases) DHBs. The lowest rates were reported in Counties Manukau and South Canterbury (both 18.1 per 100 000) DHBs.

Figure 31. Salmonellosis notifications by DHB, 2007



Age was recorded for 1266 (99.4%) of the salmonellosis cases. Age specific rates were highest in the less than 1 year age group (111.7 per 100 000, 69 cases), followed by the 1-4 years age group (108.4 per 100 000, 250 cases) and the 20-29 years age group (30.8 per 100 000, 172 cases).

Sex was recorded for 1252 (98.3%) cases. Rates were higher for males (31.5 per 100 000, 652 cases) than females (27.8 per 100 000, 600 cases).

Ethnicity was recorded for 1029 (80.8%) cases. The highest percentage was reported for those of European ethnicity (830 cases, 80.7% of responses), followed by Maori (93 cases, 9.0% of responses), Other ethnicity (58 cases, 5.6% of responses) and Pacific Peoples (48 cases, 4.7% of responses).

Of the 833 (65.4%) cases for which hospitalisation status was recorded, 110 (13.2%) were hospitalised.

The risk factors recorded for salmonellosis are shown in Table 21.

Table 21. Exposure to risk factors associated with salmonellosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Consumed food from retail premises	212	262	800	44.7
Contact with farm animals	180	416	678	30.2
Travelled overseas during the incubation period	159	547	568	22.5
Consumed untreated water	96	338	840	22.1
Recreational water contact	86	426	762	16.8
Contact with faecal matter	77	455	742	14.5
Contact with other symptomatic people	73	470	731	13.4
Contact with sick animals	34	483	757	6.6

[a] "%" refers to the percentage 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 22 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 identified in the samples received.

In 2007, eight outbreaks of salmonellosis were reported involving 141 cases, of which nine cases were hospitalised. See the Outbreak Surveillance section for further details.

Figure 32 illustrates examples of *Salmonella* types that have emerged in recent years and their changing contribution to the overall *Salmonella* burden in New Zealand.

Figure 32. Laboratory-reported cases of *S.* Brandenburg, STM 156 and STM 160 by quarter, 2002 - 2007

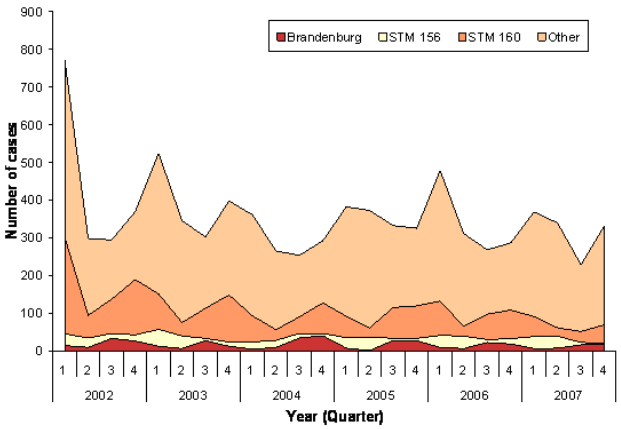


Table 22. Selected *Salmonella* serotypes and subtypes of laboratory-confirmed salmonellosis, 2004 - 2007

Subtype[a]	2004	2005	2006	2007
S. Typhimurium	580	757	733	596
DT160	221	248	260	152
DT1	65	114	72	91
DT156	56	75	87	73
DT101	31	67	71	43
DT74	46	28	42	29
Other or unknown	161	225	201	208
S. Enteritidis	142	151	107	151
PT9a	44	73	53	60
PT1b	9	9	9	18
PT26	8	9	7	17
Other or unknown	81	60	38	56
S. Infantis	63	67	58	86
S. Brandenburg	86	68	55	47
S. Chester	0	0	1	37
S. Virchow	26	16	13	34
S. Saintpaul	33	65	35	25
S. Corvallis	11	14	20	17
Other or unknown serotypes	223	268	321	274
Total	1164	1406	1343	1267

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

SARS (SEVERE ACUTE RESPIRATORY SYNDROME)

No cases of SARS were reported in New Zealand in 2007.

During the international outbreak of SARS in 2003, there were 13 notifications of suspected SARS cases in New Zealand, however, all of these cases subsequently tested negative for the SARS coronavirus [29]. The last outbreak of SARS occurred in China during April 2004. The index cases were two researchers from the same institution who were linked to the infection of seven others, including one death [30]. Subsequently, two other researchers working at the same facility also tested positive for SARS antibodies [31].

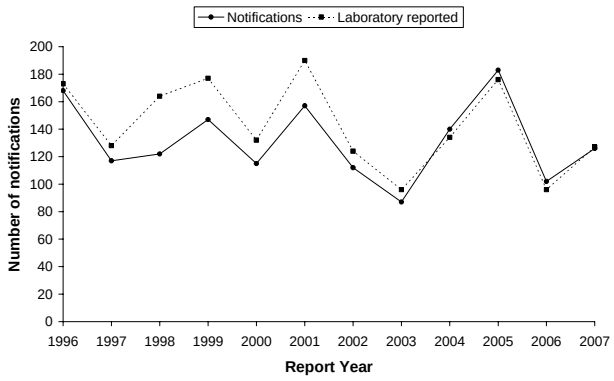
SHIGELLOSIS

A total of 126 cases of shigellosis were notified in 2007. The 2007 notification rate (3.0 per 100 000 population) was higher than the 2006 rate (2.4 per 100 000, 102 cases) and below the annualised rate for the 10-year period 1997-2006 (3.2 per 100 000).

The Enteric Reference Laboratory at ESR received 127 *Shigella* isolates during 2007. The predominant serogroups identified were: *S. sonnei* biotype a (33.9%, 43 cases), *S. sonnei* biotype g (33.9%, 43 cases), *S. flexneri* 2a (11.8%, 15 cases), and *S. flexneri* (4.7%, 6 cases).

Figure 33 shows the number of notified and laboratory-reported cases of shigellosis each year since 1996.

Figure 33. Shigellosis notifications and laboratory-reported cases by year, 1996 - 2007



The rate of shigellosis varied throughout the country in 2007. The highest rates of shigellosis were reported in the Lakes (6.9 per 100 000, 7 cases), Auckland (5.5 per 100 000, 24 cases), Counties Manukau (3.9 per 100 000, 18 cases), and Bay of Plenty (3.9 per 100 000, 8 cases) DHBs. Waitemata and Capital and Coast DHBs reported the lowest rates (1.6 per 100 000, 6 cases; 1.8 per 100 000, 5 cases, respectively).

Age was recorded for all of the 126 cases. The highest age specific rate occurred among children aged 1-4 years (10.4 per 100 000, 24 cases), followed by the 50-59 years age group (4.3 per 100 000, 22 cases) and the 30-39 years age group (3.0 per 100 000, 18 cases).

Sex was recorded for 125 (99.2%) of the 126 cases. Of these, 60 cases were male (2.9 per 100 000 population) and 65 cases (3.0 per 100 000) were female.

Ethnicity was recorded for 107 (84.9%) of the 126 cases reported in 2007. The majority of the cases were of European ethnicity (59.8%, 64 cases), followed by Pacific Peoples (18.7%, 20 cases), Maori (12.1%, 13 cases) and Other ethnicity (9.3%, 10 cases).

Of the 96 notified cases for which hospitalisation status was recorded, 27 (28.1%) were hospitalised.

The risk factors recorded for shigellosis are shown in Table 23.

Of those cases that reported overseas travel during the incubation period the most frequent overseas destinations were: India (18), Samoa (5), Australia (3), Fiji (3), Nepal (3) and Vanuatu (3).

Six shigellosis outbreaks were reported in 2007, involving 24 cases. See the Outbreak Surveillance section for further details.

Table 23. Exposure to risk factors associated with shigellosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Travelled overseas during the incubation period	54	42	30	56.3
Contact with other symptomatic people	25	44	57	36.2
Consumed food from retail premises	17	38	71	30.9
Recreational water contact	12	46	68	20.7
Contact with faecal matter	11	44	71	20.0
Contact with farm animals	10	51	65	16.4
Consumed untreated water	6	37	83	14.0
Contact with sick animals	2	53	71	3.6

[a] "%" refers to the percentage 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

One case of taeniasis was notified in 2007. The case, a 52 year old man, had travelled in the Central African Republic during the incubation period. Only six cases have been notified in New Zealand since 1997. All of these cases have reported a history of overseas travel.

TETANUS

There was one probable case of tetanus notified in 2007 involving a 71 year old female of unknown ethnicity from the Waikato DHB. The case was hospitalised and later died. The suspected source was infection through a leg wound acquired whilst gardening. The case was not vaccinated against tetanus.

TOXIC SHELLFISH POISONING

There were three cases of toxic shellfish poisoning in 2007. This continues the trend of low numbers of toxic shellfish poisoning cases reported in past years. Since 1997, numbers of reported cases range from one in 1998, 2002 and 2006, to seven cases in 1999. A male (65 years) and female (64 years) from Taranaki DHB collected and consumed raw, boiled and marinated mussels while on holiday at Ohawe Beach. The type of toxic shellfish poisoning was unspecified. One case did not require hospitalisation and hospitalisation status was unknown for the other case. The remaining case was a male (41 years) from Hutt Valley DHB who purchased and consumed fried oysters in the Wellington CBD. The man was treated in Wellington Hospital for paralytic shellfish poisoning.

TRICHINELLOSIS

No cases of trichinellosis were notified in 2007. 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. The global incidence of trichinellosis has been increasing. The main determinants of human infection are the worldwide distribution of *Trichinella* and cultural meat eating practices. However, the increasing trend of trichinellosis is also attributed to international social, political and economic changes, leading to the breakdown in veterinary services in charge of infection control and changes in hunting and eating practices [32].

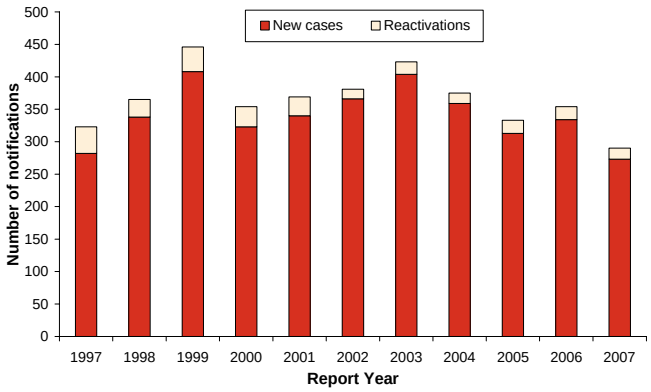
TUBERCULOSIS

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.

In 2007, 290 cases of tuberculosis (new and reactivations) were notified, of which 17 (5.9%) 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 6.9 per 100 000 population in 2007 is significantly lower than that reported in 2006 (8.5 per 100 000, 354 total cases including 20 reactivations). In 2007, a total of 216 (74.5%) cases were reported as laboratory-confirmed.

Figure 34 shows the total number of new tuberculosis cases and reactivations reported since 1997.

Figure 34. Tuberculosis notifications (new cases and reactivations) by year, 1997 - 2007



Reports of new tuberculosis cases

In 2007, the rates of new tuberculosis notifications per 100 000 population differed by geographical region (Figure 35). Auckland DHB had the highest rate (12.0 per 100 000 population, 52 cases) followed by Hawke's Bay DHB (10.5 per 100 000, 16 cases).

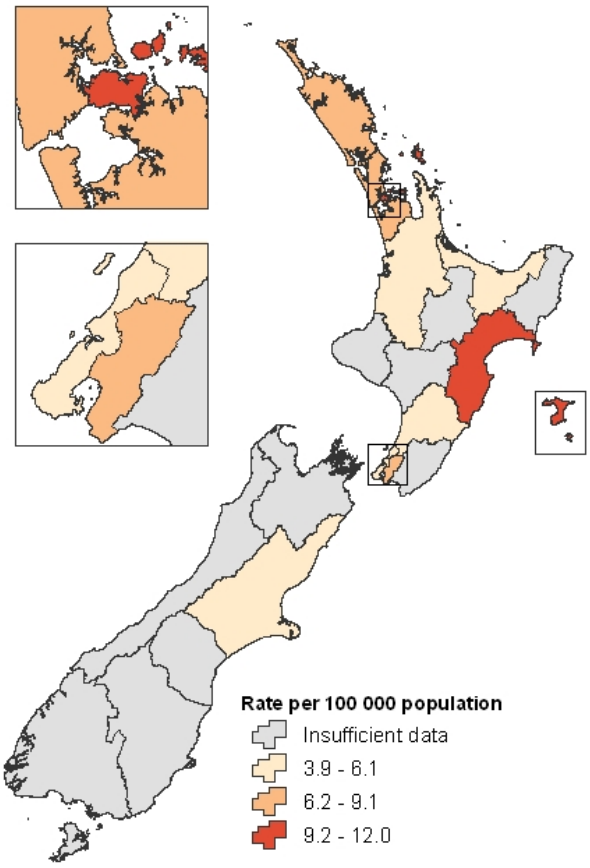
For the 273 new cases of tuberculosis, age and sex were recorded for 271 (99.3%). There were 10 cases aged less than five years with another 11 cases aged between 5 and 14 years. The highest age specific rates were reported for persons aged 70+ years (9.6 per 100 000 population, 35 cases), females aged 20-29 years (10.3 per 100 000 population, 29 cases) and males aged 70+ years (12.1 per 100 000 population, 19 cases). Overall, for new tuberculosis cases, 122 cases were male and 149 were female.

Ethnicity was recorded for 95.6% (261/273) of the cases. The majority of the cases were classified as Other ethnicity (56.7%, 148 cases) followed by Maori (18.0%, 47 cases), European (14.6%, 38 cases), and Pacific Peoples (10.7%, 28 cases).

Of the 257 (94.1%) new cases in 2007 for which hospitalisation data were recorded, 142 (55.3%) were hospitalised. Three deaths in 2007 were due to tuberculosis disease (age range 66 to 88 years). BCG vaccination status was recorded for 140 cases and vaccination was confirmed for 93 (66.4%) of those cases. A further seven (5.0%) cases had unconfirmed positive vaccination status.

In 2007, of the 253 (92.7%) new cases for which place of birth was recorded, 175 (69.2%) were born outside New Zealand. Of the 78 cases that were known to have been born in New Zealand, 27.4% (17/62 where information was recorded) had been or were presently residing with a person born outside New Zealand. Of the 196 cases for which these data were recorded, 78 (39.8%) reported contact with a confirmed case of tuberculosis.

Figure 35. Tuberculosis notifications (new cases) by DHB, 2007



Reactivations of tuberculosis

Six of the 17 reactivations were from the combined Auckland DHBs. One case was aged between 5-9 years. Ten cases (58.8%) were aged over 50 years. There were more male than female reactivations (10 versus 6, respectively). Sex was

unknown for one case. Sixty-five percent (11/17) of the reactivations were of Other ethnicity.

Hospitalisation data were recorded for 15 reactivations, and 11 (73.3%) cases were hospitalised. There were no recorded fatalities amongst the reactivation cases. Vaccination status was recorded for eight cases, of which vaccination was confirmed for four cases, and stated as "not given" for the remaining four cases.

In 2007, information on the place where the diagnosis was made and country of birth was recorded for 15 of the 17 reactivated cases. The first diagnosis of tuberculosis disease was made in New Zealand for six cases and overseas for nine cases. Table 24 shows the cases treated for tuberculosis disease by place of original diagnosis.

Table 24. Place of original TB disease diagnosis and treatment (for reactivations), 2007

Place of TB disease diagnosis	Case treated for TB disease			
	Yes	No	Unknown	Total
Overseas	5	2	2	9
New Zealand	5	0	1	6
Unknown	0	0	2	2
Total	10	2	5	17

Table 25 shows where the original tuberculosis disease diagnosis was made, stratified by the country of birth.

Table 25. Country of birth and place of original TB disease diagnosis (for reactivations), 2007

Place of TB disease diagnosis	Country of birth of case			
	New Zealand	Overseas	Unknown	Total
Overseas	0	9	0	9
New Zealand	3	3	0	6
Unknown	1	0	1	2
Total	4	12	1	17

Antimicrobial drug-resistant tuberculosis

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

www.surv.esr.cri.nz/antimicrobial/tuberculosis.php

TYPHOID FEVER

Forty-eight cases of typhoid were notified in 2007. The 2007 rate (1.1 per 100 000) is similar to the 2006 rate (1.0 per 100 000, 42 cases).

The Enteric Reference Laboratory at ESR received 51 *Salmonella* Typhi isolates in 2007. Since 1999 there has been a general trend of increasing numbers of typhoid notifications (Figure 36).

Most cases were reported in the Auckland region (37 cases). The highest rates were recorded in the Counties Manukau (3.7 per 100 000 population, 17 cases), Auckland (2.8 per 100 000, 12 cases) and Waitemata (1.6 per 100 000, 8 cases) DHBs.

Age was recorded for all cases. Age specific notification rates were highest in the 1-4 years age group (3.0 per 100 000 population, 7 cases), followed by the 15-19 years age group (2.5 per 100 000, 8 cases), the 30-39 years age group (1.9 per 100 000, 11 cases) and the 5-9 years age group (1.7 per 100 000, 5 cases).

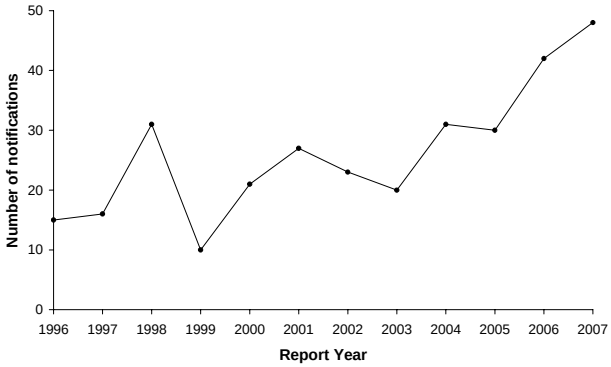
Sex was recorded for 97.9% (47/48) of cases, of these cases 24 were female and 23 male.

Ethnicity was recorded for 95.8% (46/48) of cases. The highest percentage was reported for Pacific Peoples (24 cases, 52.2%), followed by Other (17 cases, 37.0%), Maori (3 cases, 6.5%) and European (2 cases, 4.3%) ethnicities.

Hospitalisation status was recorded for 87.5% (42/48) of cases, of which 34 (81.0%) were hospitalised.

Overseas travel information was recorded for all cases. Thirty-four cases (70.8%) were recorded as having travelled overseas during the incubation period for this disease. The countries most commonly visited included India (15 cases) and Samoa (13 cases).

Figure 36. Typhoid notifications by year, 1996 – 2007



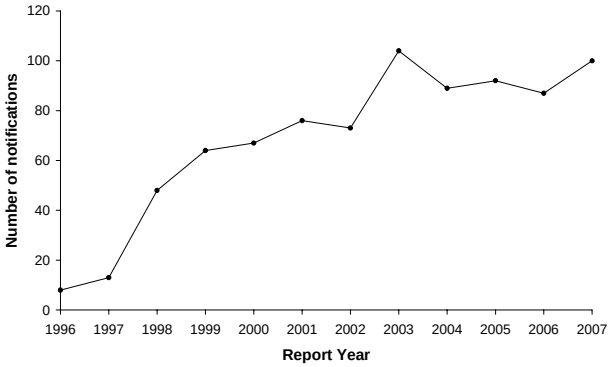
VEROTOXIN OR SHIGA TOXIN PRODUCING *ESCHERICHIA COLI* (VTEC/STEC INFECTION)

There were 100 cases of verocytotoxigenic *Escherichia coli* infection (VTEC), also known as shigatoxigenic *Escherichia coli* infection (STEC), notified in 2007. The 2007 notification rate (2.4 per 100 000 population) is higher than the 2006 rate (2.1 per 100 000, 87 cases). Four cases of VTEC/STEC-associated haemolytic uraemic syndrome (HUS) were reported to the New Zealand Paediatric Surveillance Unit (NZPSU) in 2007.

The Enteric Reference Laboratory at ESR received a total of 97 VTEC/STEC isolates. Of these, 96 (99.0%) were identified as serotype O157: H7, and one as non-O157: H7.

Figure 37 shows the number of notified cases of VTEC/STEC infection each year since 1996.

Figure 37. VTEC/STEC notifications by year, 1996 - 2007



Rates varied throughout the country. The highest rates were recorded in Waikato (6.2 per 100 000, 22 cases), Bay of Plenty (3.9 per 100 000, 8 cases) and Canterbury (3.9 per 100 000, 19 cases) DHBs.

Age was recorded for all cases. The highest rates were reported in the less than 1 year age group (19.4 per 100 000, 12 cases), followed by the 1-4 years age group (18.2 per 100 000, 42 cases) and the 5-9 years age group (4.1 per 100 000, 12 cases).

Sex was recorded for all VTEC/STEC cases. The rate was similar for males (2.2 per 100 000, 45 cases) and females (2.5 per 100 000, 55 cases).

Ethnicity was recorded for 92.0% (92/100) of cases. Of these, the highest percentage was reported for European ethnicity (84.8%, 78 cases), followed by Maori and Other ethnicity (7.6%, 7 cases each).

Of the 96 (96.0%) notified cases for which hospitalisation status was recorded, 27 (28.1%) were hospitalised.

The risk factors recorded for VTEC/STEC cases reported in 2007 are shown in Table 26. The foods consumed by cases are shown in Table 27.

Six outbreaks of VTEC/STEC were reported in 2007, involving 13 cases. The largest outbreak involved three cases. See the Outbreak Surveillance section for further details.

Table 26. Exposure to risk factors associated with VTEC/STEC, 2007

Risk Factor	Yes	No	Unknown	%[a]
Contact with pets	47	7	46	87.0
Contact with farm animals	32	20	48	61.5
Contact with animal manure	15	24	61	38.5
Contact with children in nappies	25	45	30	35.7
Contact with recreational water	21	49	30	30.0
Contact with other animals	13	31	56	29.5
Contact with a person with similar symptoms	19	54	27	26.0
Travelled overseas during the incubation period	5	84	11	5.6

[a] "%" refers to the percentage 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 27. Foods consumed by VTEC/STEC cases, 2007

Food	Yes	No	Unknown	%[a]
Consumed raw fruit or vegetables	52	10	38	83.9
Consumed dairy products	53	16	31	76.8
Consumed beef or beef products	43	19	38	69.4
Consumed chicken or poultry	38	27	35	58.5
Consumed fruit or vegetable juice	26	29	45	47.3
Consumed processed meat	23	38	39	37.7
Consumed lamb or hogget or mutton	19	41	40	31.7
Consumed home kill meat	18	48	34	27.3
Consumed pink or undercooked meat	2	57	41	3.4
Consumed unpasteurised milk or milk products	2	60	38	3.2

[a] "%" refers to the percentage 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 were notified in 2007.

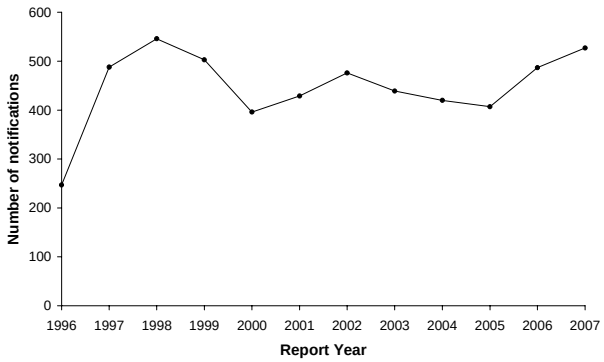
YERSINIOSIS

A total of 527 cases of yersiniosis were notified in 2007. The 2007 rate (12.5 per 100 000 population) is higher, although not significantly, than the 2006 rate (11.6 per 100 000, 487 cases).

Figure 38 shows the number of notified cases of yersiniosis by year since 1996.

Rates varied throughout the country as illustrated in Figure 39. The highest rates were recorded in the West Coast (74.4 per 100 000 population, 24 cases), Canterbury (26.7 per 100 000, 131 cases), South Canterbury (25.3 per 100 000, 14 cases) and Lakes (21.7 per 100 000, 22 cases) DHBs.

Figure 38. Yersiniosis notifications by year, 1996 - 2007



Age was recorded for 99.2% (523/527) of the cases. Age specific rates were highest in the less than 1 year age group (51.8 per 100 000 population, 32 cases), followed by the 1-4 years age group (43.8 per 100 000, 101 cases) and the 70+ years age group (14.6 per 100 000, 53 cases).

Sex was recorded for 97.9% (516/527) of the cases. Of these, males had a higher rate (13.1 per 100 000 population, 271 cases) than females (11.4 per 100 000, 245 cases).

Ethnicity was recorded for 85.6% (451/527) of the cases. The majority of the cases were of European ethnicity (80.7%, 364 cases), followed by Other ethnicity (9.5%, 43 cases), Maori (7.3%, 33 cases) and Pacific Peoples (2.4%, 11 cases).

Of the 75.0% (395/527) of cases for which hospitalisation status was recorded, 71 (18.0%) were hospitalised.

The risk factors recorded for yersiniosis cases reported in 2007 are shown in Table 28.

Figure 39. Yersiniosis notifications by DHB, 2007

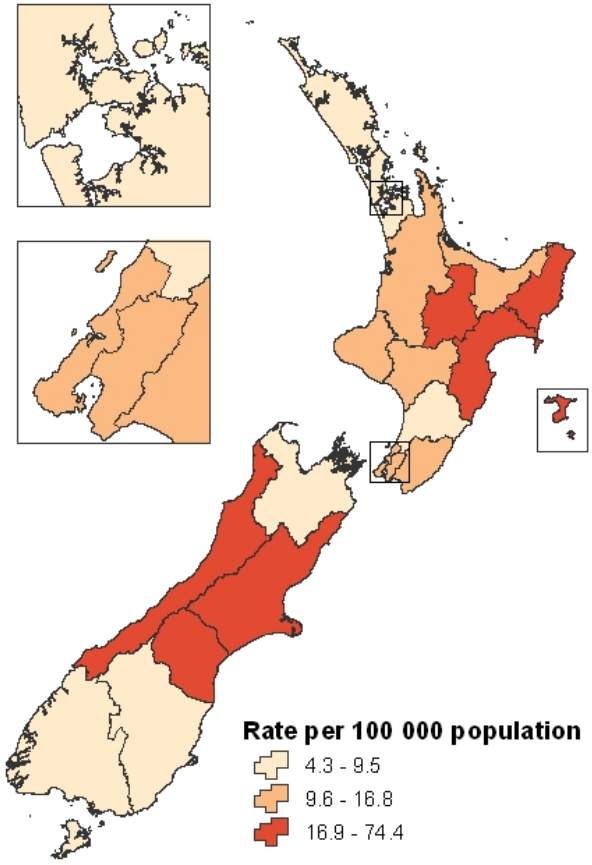


Table 28. Exposure to risk factors associated with yersiniosis, 2007

Risk Factor	Yes	No	Unknown	%[a]
Consumed food from retail premises	77	144	306	34.8
Contact with farm animals	73	201	253	26.6
Consumed untreated water	50	168	309	22.9
Recreational water contact	33	206	288	13.8
Contact with other symptomatic people	32	219	276	12.7
Contact with faecal matter	29	215	283	11.9
Travelled overseas during the incubation period	18	277	232	6.1
Contact with sick animals	8	220	299	3.5

[a] "%" refers to the percentage 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 2007 was undertaken between May and September using a sentinel network of 87 general practices. On average, 79 practices, with a total patient roll of 347 723 participated each week.

During the surveillance period, 2695 consultations for influenza-like illness (ILI) were reported. The average weekly consultation rate was 37.2 per 100 000 patient population. This rate is the second lowest rate recorded by the sentinel surveillance system since 1997. The 2007 rate was lower than the 2004 and 2000 rates of 32.5 and 35.5 per 100 000, respectively. The consultation rate remained relatively low throughout the sentinel surveillance period but peaked in week 31 (end of July), two weeks earlier than the peak in laboratory isolations (week 33) and four weeks earlier than hospitalisations (week 35). Considerable activity continued until the end of the sentinel surveillance period. Figure 40 compares the weekly consultation rates for influenza-like illness in 2007 with 2006 and 2005.

Figure 40. Weekly sentinel surveillance consultation rates for influenza-like illness, 2005 – 2007

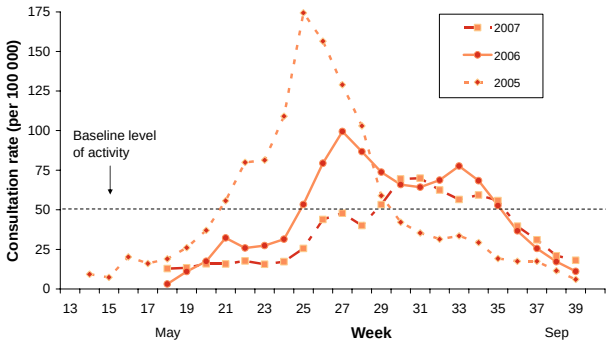
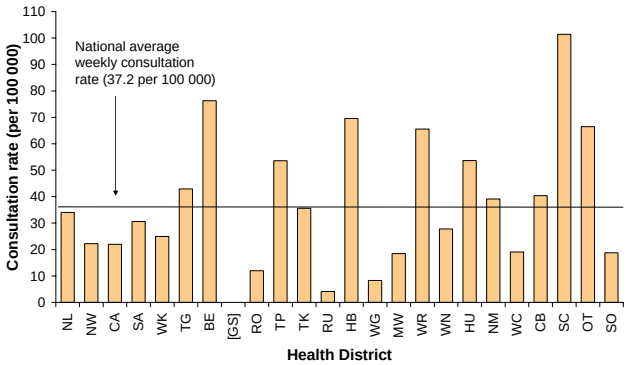


Figure 41 shows the average weekly consultation rates by health district for the influenza season.

Figure 41. Sentinel average weekly consultation rates for influenza-like illness by health districts, 2007

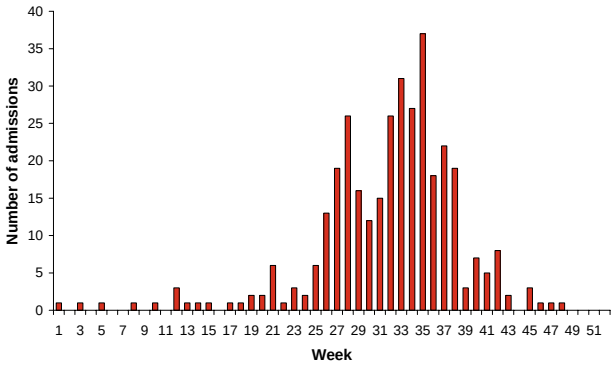


Note: Gisborne health district did not participate in 2007.

Consultation rates varied between health districts, with rates above the national average in 10 of the 23 health districts that participated and rates more than twofold the national average in South Canterbury (101.4 per 100 000) and Eastern Bay of Plenty (76.3 per 100 000) health districts.

In 2007, there were a total of 347 hospital admissions for influenza. This compares with 464 admissions in 2006 and 390 in 2005. Figure 42 shows these admissions by week, 85.3% (296) of which occurred during June to September. The highest number of admissions (123) occurred in August. The highest hospitalisation rate due to influenza occurred in children aged less than 1 year (data not shown).

Figure 42. Influenza hospitalisation by week admitted, 2007

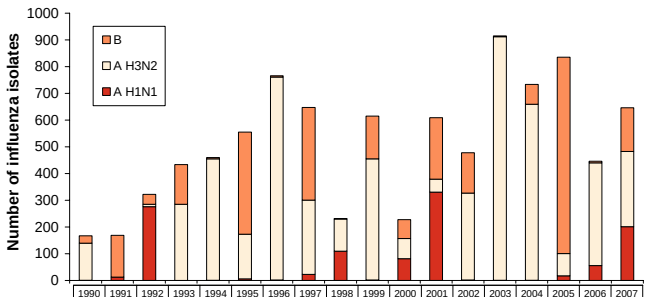


A total of 744 influenza isolates were identified in 2007, lower than the 768 isolates in 2006 and 845 isolates in 2005. Of the 744 isolates, 239 came from sentinel practice surveillance during May to September. This is lower than the 315 sentinel isolates identified in 2006 and 273 isolates in 2005. There were 505 non-sentinel isolates identified in 2007, compared to 453 in 2006 and 572 in 2005.

During 2007, the majority of influenza isolates (581/744 or 78.1% of all isolates) were characterised as influenza A. Influenza A(H3N2) represented 43.7% (282/646) of the typed and subtyped isolates and 37.9% (282/744) of the total isolates. Influenza A(H1N1) represented 31.1% (201/646) of the typed and subtyped isolates and 27.0% (201/744) of the total isolates. A total of 163 influenza B isolates were identified in 2007, which represented 25.2% of typed and subtyped isolates (163/646) and 21.9% of all influenza isolates (163/744).

Figure 43 shows the number and percentage of typed and subtyped influenza isolates from 1990 to 2007.

Figure 43. Influenza isolates by type, 1990 - 2007



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
B	16%	92%	11%	34%	1%	69%	1%	53%	1%	26%	31%	38%	32%	0%	10%	88%	1%	25%
A H3N2	83%	0%	3%	66%	99%	30%	99%	43%	52%	74%	33%	8%	68%	100%	90%	10%	86%	44%
A H1N1	1%	8%	86%	0%	0%	1%	0%	4%	47%	0%	36%	54%	0%	0%	0%	2%	13%	31%

Three noticeable changes in predominant patterns are described below.

Influenza A(H1N1)

During the period from 1990 to 1999 influenza A(H1N1) emerged as the predominant circulating strain in 1992 (85.7%) and six years later in 1998 (47.4%). However in 2000 and 2001, influenza A(H1N1) predominated in two consecutive years occurring in 36.0% and 54.0% of isolates tested. This is in contrast to 2003 and 2004, when only one A(H1N1) was isolated each year. Since 2005, more A(H1N1) viruses were isolated with 18 isolates (2.0%) in 2005, 56 isolates (13.0%) in 2006 and 201 isolates (31.0%) in 2007.

Influenza A(H3N2)

Influenza A(H3N2) viruses have often been associated with more severe disease and with excess pneumonia and influenza mortality. For example, the highest number of deaths (94) in 1996 in New Zealand was recorded during an A(H3N2) epidemic [5]. During 1993 to 2000, A(H3N2) had been the predominant circulating influenza A strain. However in 2001, A(H3N2) constituted only 7.8% of typed/subtyped isolates. The percentage of influenza A(H3N2) isolates in 2004 was very similar to that in 1994, 1996 and 2003 with over 90% of typed/subtyped isolated as A(H3N2). Influenza A(H3N2) was not the predominant strain in 2005 but it co-circulated at lower levels (10.0%) with influenza B throughout the winter season. In 2006, A(H3N2) was the predominant strain (86.0% of typed and subtyped isolates) and again in 2007 (44.0% of typed and subtyped isolates).

Influenza B

It is well documented that influenza B predominates or co-dominates every second year in the southern hemisphere. In New Zealand, influenza B predominated or co-dominated in 1991, 1993, 1995, 1997, 1999, 2001 and 2005. However, this pattern has changed since 2001. Influenza B has been the co-predominant strain consecutively in 2001 and 2002, while very low influenza B activity was observed in 2003 and 2004. In 2003, there were only three (0.3%) influenza B isolations but this increased to 10.1% (74) in 2004. In 2005, influenza B was the predominant strain with 734 isolations (88.0%) the highest percentage of influenza B isolations over the last 15 years and exceeding levels detected in 1995 (68.8%) and 1997 (53.5%). In 2006, influenza B activity was recorded at a low level (1.0% of typed and subtyped isolates) but this increased to 25.0% in 2007.

Summary

Characterisation of the influenza viruses isolated during the 2007 winter indicated a need for a change in the influenza A(H3N2) and B component of the vaccine for the 2008 winter. Accordingly, the 2008 southern hemisphere winter influenza vaccine has the following composition:

- A(H1N1) an A/Solomon Islands/3/2006 (H1N1) - like strain
- A(H3N2) an A/Brisbane/10/2007 (H3N2) - like strain
- B a B/Florida/4/2006 - like strain

Influenza immunisation is recommended for those at increased risk of complications from influenza due to either age or medical condition [18]. 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 2007 can be found at www.surv.esr.cri.nz.

SEXUALLY TRANSMITTED INFECTIONS

This brief report summarises the epidemiology of sexually transmitted infections for the year 2007, and examines trends since 2003. A more detailed account is to be found in the STI Annual Report for 2007, available at www.surv.esr.nz.

The AIDS Epidemiology Group carries out HIV/AIDS surveillance and a summary of the figures for 2007 may be found in the AIDS section under Notifiable Diseases in this report.

Sexually Transmitted Infections (STIs) are not notifiable in New Zealand. Data on STIs of public health importance - chlamydia, gonorrhoea, genital herpes, genital warts, syphilis and non-specific urethritis - are submitted voluntarily from sexual health clinics (SHCs), family planning clinics (FPCs) and student and youth health clinics (SYHCs). This is supplemented by data on chlamydia and gonorrhoea from diagnostic laboratories in the Auckland, Waikato and Bay of Plenty (BOP) regions. Since June 2004, efforts have been made to extend STI surveillance to additional laboratories across New Zealand. Data from these laboratories can be found in the STIs in New Zealand Annual Surveillance Report for 2007.

It is important to be aware of the different denominators used to calculate the rates in the clinical as compared with the laboratory settings. Data from the clinics use the total number of clinic visits ("clinic visit rate"). In the case of FPCs and SYHCs many visits are not related to STIs. For laboratory data the denominator is the population of the area covered by the laboratory.

Comparison of data has shown that the number of cases reported by laboratories is triple the number of cases reported from the clinics. STI cases reported through the clinic-based surveillance system underestimate 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 provide a useful, complementary source of STI incidence data.

CLINIC BASED SURVEILLANCE

Chlamydia

In 2007, genital *Chlamydia trachomatis* infection was the most commonly reported STI in New Zealand.

Between 2006 and 2007, the number of cases of chlamydia increased by 4.8% in SHCs (4501 compared to 4294), 13.2% in FPCs (3433 compared to 3033) and 23.3% in SYHCs (942 compared to 764).

From 2003 to 2007, the number of chlamydia cases reported increased by 19.4% in SHCs (4501 compared to 3770), more than doubled in FPCs (3433 compared to 1675) and tripled in SYHCs (942 compared to 305).

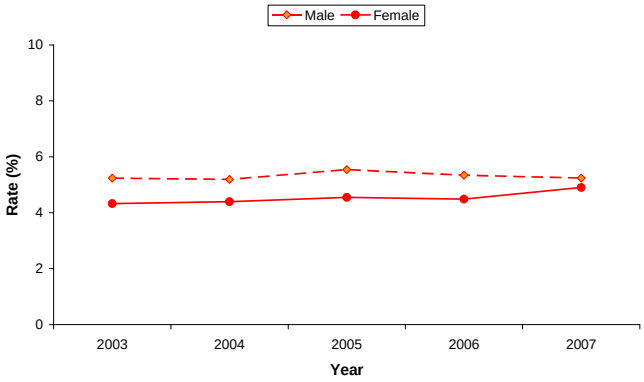
In 2007, SHCs, FPCs and SYHCs reported chlamydia clinic visit rates (cases per total number of clinic visits) of 5.0%, 1.8% and 0.4%, respectively (Table 29). From 2003 to 2007, the clinic visit rate of chlamydia diagnosed in both males and females combined at SHCs increased by 7.3% (Figure 44). These 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 29. Chlamydia cases and clinic visit rates by sex and health care setting, 2007

Clinic type	Sex	SHCs	FPCs	SYHCs
No. of cases	Female	2543	2947	706
	Male	1958	486	236
	Total	4501	3433	942
Clinic visit rate (%)[a]	Female	4.9	1.6	0.5
	Male	5.3	5.2	0.4
	Total	5.0	1.8	0.4

[a] Cases/total number of clinic visits

Figure 44. Rates of chlamydia diagnosed at SHCs, 2003 - 2007



Denominator is the number of clinic visits

Gonorrhoea

Between 2006 and 2007, the number of cases of gonorrhoea increased by 15.3% in SHCs (925 compared to 802), 1.6% in FPCs (190 compared to 187) and 37.5% in SYHCs (66 compared to 48).

From 2003 to 2007, the number of gonorrhoea cases reported increased by 55.5% in SHCs (925 compared to 595), 1.1% in FPCs (190 compared to 188) and more than doubled in SYHCs (66 compared to 24).

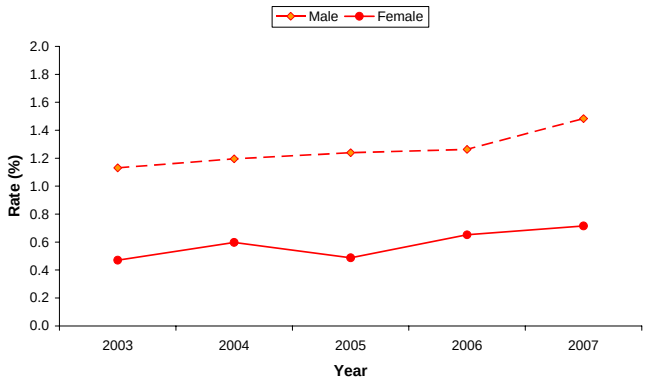
In 2007, SHCs, FPCs and SYHCs reported gonorrhoea clinic visit rates of 1.0%, 0.1% and 0.03%, respectively (Table 30). From 2003 to 2007, the clinic visit rate of gonorrhoea diagnosed in both males and females combined at SHCs increased by 39.7% (Figure 45).

Table 30. Gonorrhoea cases and clinic visit rates by sex and health care setting, 2007

Clinic type	Sex	SHCs	FPCs	SYHCs
No. of cases	Female	371	145	39
	Male	554	45	27
	Total	925	190	66
Clinic visit rate (%)[a]	Female	0.7	0.1	0.1
	Male	1.5	0.7	0.1
	Total	1.0	0.1	0.03

[a] Cases/total number of clinic visits

Figure 45. Rates of gonorrhoea diagnosed at SHCs, 2003 - 2007



Denominator is the number of clinic visits

Genital Herpes (first presentation)

The number of cases of genital herpes (first presentation) and clinic visit rates by sex and health care setting for 2007 is shown in Table 31.

Between 2006 and 2007, the number of cases of genital herpes increased by 3.6% in SHCs (746 compared to 720), 10.4% in FPCs (149 compared to 135) and 29.0% in SYHCs (89 compared to 69)

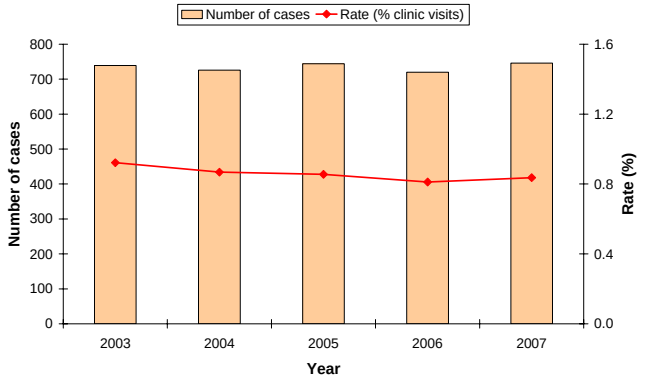
From 2003 to 2007, the number of genital herpes cases reported by SHCs has fluctuated (Figure 46). However, the clinic visit rate of genital herpes has remained between 0.8% and 0.9%. Routine clinic surveillance methods in New Zealand do not facilitate the collection of data on the type of HSV infection, and so it is not possible to determine if the trends in genital herpes differ by type of viral infection.

Table 31. Genital herpes (first presentation) cases and clinic visit rates by sex and health care setting, 2007

Clinic type	Sex	SHCs	FPCs	SYHCs
No. of cases	Female	397	119	75
	Male	349	30	14
	Total	746	149	89
Clinic visit rate (%)[a]	Female	0.8	0.1	0.1
	Male	1.0	0.6	0.1
	Total	0.8	0.1	0.04

[a] Cases/total number of clinic visits

Figure 46. Number of cases and rates of genital herpes (first presentation) diagnosed at SHCs, 2003 - 2007



Genital Warts (first presentation)

The number of cases of genital warts (first presentation) and clinic visit rates by sex and health care setting for 2007 is shown in Table 32.

Table 32. Genital warts (first presentation) cases and clinic visit rates by sex and health care setting, 2007

Clinic type	Sex	SHCs	FPCs	SYHCs
No. of cases	Female	2046	472	128
	Male	1751	149	73
	Total	3797	621	201
Clinic visit rate (%)[a]	Female	3.9	0.3	0.1
	Male	4.7	1.8	0.2
	Total	4.3	0.3	0.1

[a] Cases/total number of clinic visits

Between 2006 and 2007, the number of cases of genital warts increased by 18.6% in SHCs (3797 compared to 3 201) and 1.8% in FPCs (621 compared to 610). In contrast there was a decrease of 2.9% in SYHCs (201 compared to 207).

From 2003 to 2007, the rate of genital warts reported by SHCs has varied between 3.6% and 4.5%.

Infectious Syphilis

Between 2006 and 2007, the number of cases of syphilis increased by 4.4% in SHCs (71 compared to 68) and 50.0% in FPCs (3 compared to 2). No cases of syphilis were reported in SYHCs. In 2007, the rate of syphilis at SHCs was 0.1%. From 2003 to 2007, the number of syphilis cases diagnosed at SHCs more than doubled (71 compared to 30).

The mean age of syphilis cases was 37 years (range 18-69 years). Of the 74 syphilis cases reported in 2007 (across all clinic types), 68 (91.9%) were male and 6 (8.1%) were female.

Non-Specific Urethritis (Males only)

For surveillance purposes, non-specific urethritis 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 2007, there were 769 reported cases of NSU in SHCs, 15 cases in FPCs and 15 cases in SYHCs. From 2003 to 2006 the number of NSU cases diagnosed at SHCs steadily decreased. However, in 2007 an increase of 12.1% (769 compared to 686) was observed.

LABORATORY SURVEILLANCE

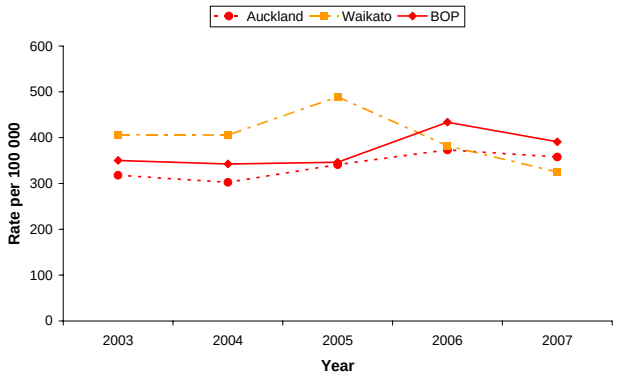
This section is based on data from participating laboratories in the Auckland, Waikato and Bay of Plenty (BOP) regions.

Chlamydia

In general, from 2003 to 2007, the overall rate of chlamydia diagnosed by participating laboratories in the Auckland, Waikato and BOP regions has risen more or less steadily by 20.6%, from 592 per 100 000 in 2003 to 714 per 100 000 in 2007. This trend can be explained only in part by the introduction of more sensitive diagnostic techniques.

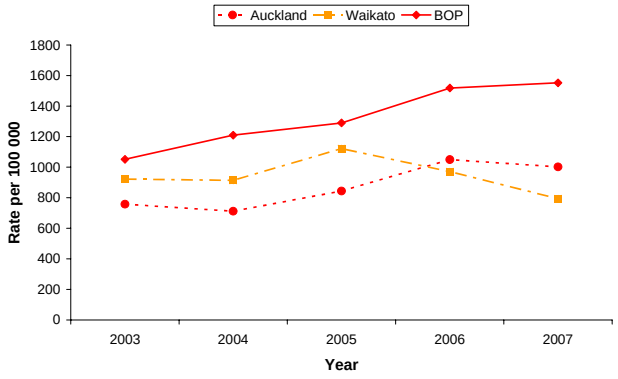
Figure 47 and Figure 48 show the chlamydia rates from 2003 to 2007 for males and females, respectively. From 2006 to 2007, the Waikato region had the highest decrease in male and female rates of chlamydia (15.0% and 18.3%, respectively). The only increase from 2006 to 2007 was seen in the female rate in the BOP region (2.2%). The BOP region had the highest chlamydia rate overall at 990 per 100 000 population, compared to 690 per 100 000 for the Auckland and 570 per 100 000 population for the Waikato regions, respectively.

Figure 47. Male chlamydia rates diagnosed in the Auckland, Waikato and BOP regions, 2003 - 2007



Denominator is the population in each region

Figure 48. Female chlamydia rates diagnosed in the Auckland, Waikato and BOP regions, 2003 - 2007



Denominator is the population in each region

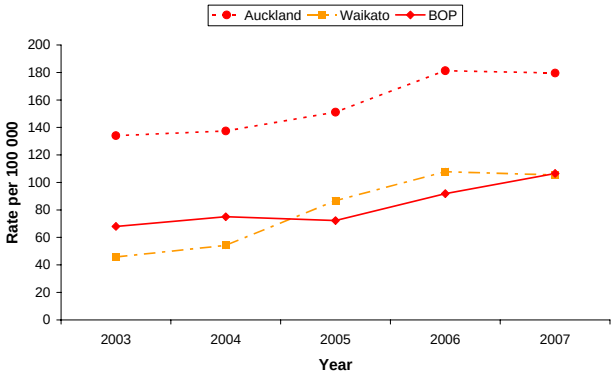
Gonorrhoea

Over the last five years gonorrhoea rates in the Auckland, Waikato and BOP regions have increased by 48.8% from a rate of 82 per 100 000 in 2003 to 123 per 100 000 in 2007.

Figure 49 and Figure 50 show the gonorrhoea rates from 2003 to 2007 for males and females, respectively. From 2006 to 2007, the BOP region had an increase in the male rate of gonorrhoea (16.0%) while the Auckland and Waikato regions had a decrease in male rates (0.9% and 2.2%, respectively). Female rates from 2006 to 2007 increased in the Auckland region by 1.1% while they decreased in the Waikato and BOP regions by 29.5% and 19.3%, respectively. The Auckland region had the highest gonorrhoea rate overall at 144 per 100 000 population, compared to 98 and 92 per 100 000 population for the BOP and Waikato regions, respectively.

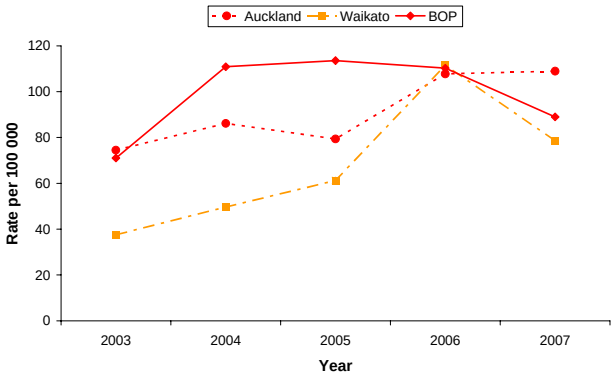
The number of laboratories reporting in these regions has not changed from 2003 to 2007. Therefore the overall trends suggest a true increase in the rate of gonorrhoea.

Figure 49. Male rates of gonorrhoea in the Auckland, Waikato and BOP regions, 2003 - 2007



Denominator is the population in each region

Figure 50. Female rates of gonorrhoea in the Auckland, Waikato and BOP regions, 2003 - 2007



Denominator is the population in each region

OUTBREAK SURVEILLANCE

Introduction

The following is a summary of surveillance data for outbreaks reported in 2007. A full report on outbreaks can be found in the Annual Summary of Outbreaks in New Zealand 2007 available at www.surv.esr.cri.nz.

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

Outbreak Definition

The Manual for Public Health Surveillance in New Zealand [33] 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 492 outbreaks reported by the PHUs in 2007 involving 7988 cases. Table 33 outlines the number of outbreaks and associated cases reported by each Public Health Unit in 2007.

Table 33. Outbreaks of infectious disease and associated cases by reporting PHU, 2007

PHU	Outbreaks	Cases
Northland	5	96
Auckland	234	2146
Waikato	31	495
Eastern Bay of Plenty	0	0
Rotorua	4	69
Tauranga	21	389
Gisborne	1	9
Hawke's Bay	16	270
Taranaki	5	95
Manawatu	14	307
Wanganui	1	37
Wellington[a]	47	1187
Marlborough	3	8
Nelson	2	29
Canterbury	63	2252
South Canterbury	1	60
West Coast	10	42
Otago	32	471
Southland	2	26
Total	492	7988

[a] Wairarapa PHU is combined with Wellington.

Note: As outbreaks can occur across geographic boundaries this may not indicate the geographical distribution of outbreaks reported.

Of the reported outbreaks, all 492 were final reports. According to the case definition for each outbreak, there were 2521 (31.6%) confirmed cases and 5467 probable cases (68.4%).

There were 193 hospitalisations and 11 deaths that resulted from outbreaks reported in 2007. Ten deaths were related to norovirus outbreaks in Wellington (4), Otago (4), Auckland (1) and Hawke's Bay (1). One death was related to an influenza outbreak in Wellington.

Pathogens

The pathogens or agents that caused the outbreaks are listed in Table 34.

Enteric Bacteria

During 2007, enteric bacteria were implicated in 10.0% (49/492) of all reported outbreaks and 3.4% (275/7988) of all cases. Approximately 40% of these outbreaks and 20% of all cases attributed to enteric bacteria were linked to *Campylobacter* species (20/49 and 54/275, respectively). Of the 20 *Campylobacter* outbreaks, 12 were attributed to foodborne transmission, most frequently in a restaurant/café setting (six outbreaks) or in the home (nine outbreaks).

Salmonella species accounted for approximately half of all cases linked to outbreaks due to enteric bacteria (51.3%, 141/275), even though *Salmonella* was only associated with eight of the 49 outbreaks due to enteric bacteria. Foodborne transmission was identified in almost all (7/8) *Salmonella* outbreaks. A mixture of foodborne and person-to-person transmission was suspected for the remaining outbreak. The most common setting was takeaways, cafés or other food premises, which were linked to five outbreaks.

There were five outbreaks of typhoid fever in 2007, three were due to *Salmonella typhi* phage type E1a. Three of the outbreaks involved overseas travel, to either Samoa (2) or Sri Lanka (1), and a further outbreak occurred after cases consumed imported ethnic Samoan food. The setting and mode of transmission was unknown for the remaining outbreak.

Five of the six *Shigella* outbreaks reported in 2007 were set in the home and involved person-to-person transmission. The remaining outbreak occurred following overseas travel to Tonga and had an unknown mode of transmission.

An outbreak due to *Vibrio parahaemolyticus* occurred among cases who had recently returned to New Zealand from Thailand. The suspected source of the outbreak was a buffet meal consumed aboard a river cruise boat in Bangkok.

Verotoxin or shiga toxin producing *Escherichia coli* (VTEC/STEC) was associated with six outbreaks in 2007. The mode of transmission was reported as person-to-person (3), foodborne (2) or unknown (1). Three were set in the home, and one outbreak occurred after cases consumed food left over from a community event. The setting for the remaining two outbreaks was unknown.

There were three outbreaks due to *Yersinia* species in 2007. One outbreak occurred after pre-cooked cheerio sausages, distributed by a local butcher, were cross-contaminated by raw meat and inadequately reheated. A further outbreak occurred on a farm following exposure to sick animals, and the remaining via person-to-person spread at a childcare facility.

Enteric Protozoa

Enteric protozoa accounted for 10.2% (50/492) of all outbreaks reported in 2007.

There were 29 outbreaks involving *Cryptosporidium* spp. in 2007. Person-to-person transmission was established in 22 outbreaks. However, eight of these outbreaks involved multiple modes of transmission. Three outbreaks were linked to both a farm and a home while 15 outbreaks occurred in the home only.

Giardia species was the infectious agent in 21 outbreaks, 17 of which involved person-to-person transmission. The most commonly identified setting for *Giardia* outbreaks was the home, which was associated with 20 outbreaks.

Enteric Viruses

Enteric viruses were the infectious agent in 42.9% (211/492) of all outbreaks and 74.7% (5971/7988) of all associated cases in 2007.

The vast majority of outbreaks due to enteric viruses were caused by norovirus (206/211), which resulted in 5902 associated cases. The average number of cases per norovirus outbreak was 29. Person-to-person transmission was ascertained in 180 outbreaks, 82 of which also involved other modes of transmission. An institution was identified as a setting for 173 outbreaks including: rest homes (101), continuing care hospitals (44), acute care hospitals (18), child care (5) and camps (5). Restaurants or cafés were implicated in 17 outbreaks.

There were five outbreaks of Rotavirus resulting in 69 cases. All of these outbreaks involved person-to-person transmission although two outbreaks had multiple modes of transmission. The outbreak settings were either at a resthome (3) or childcare centre (2).

Enteric (unspecified)

During 2007, outbreaks of gastroenteritis (where no organism was isolated) accounted for 29.9% (147/492) of all outbreaks and 15.1% (1206/7988) of all associated cases.

Respiratory Diseases

Respiratory diseases resulted in 1.4% (7/492) of all outbreaks and 1.7% (135/7988) of all associated cases.

There were three outbreaks of *Mycobacterium tuberculosis*, involving 29 cases and one outbreak of *Mycobacterium bovis* involving two cases. The largest outbreak, due to person-to-person spread within an extended family, occurred in the Hawke's Bay and included seven confirmed and 15 probable cases. Cases associated with an outbreak in Wellington were identified through a combination of laboratory DNA typing and epidemiology.

Influenza caused two of the reported outbreaks of respiratory diseases in 2007, both in the Wellington area. One outbreak involved 88 cases, aged 5-11 years, who were attending an adventure school. The other outbreak occurred at a rest home and involved seven cases including one fatality.

Legionella longbeachae was implicated in an outbreak in Gisborne, which resulted in nine cases. The source of transmission was identified as environmental from contaminated potting mix, which all cases had been exposed to while working in a horticultural nursery.

Table 34. Outbreaks and associated cases by agent type, 2007

Agent Type	Outbreaks	Cases
Enteric Bacteria		
Campylobacter spp.	20	54
Salmonella spp.	8	141
Salmonella Typhi	5	17
Shigella spp.	6	24
Vibrio parahaemolyticus	1	11
VTEC/STEC	6	13
Yersinia spp.	3	15
Total	**49**	**275**
Enteric Protozoa		
Cryptosporidium spp.	29	102
Giardia spp.	21	111
Total	**50**	**213**
Enteric Viruses		
Norovirus	206	5902
Rotovirus	5	69
Total	**211**	**5971**
Enteric (unspecified)		
Gastroenteritis	147	1206
Total	**147**	**1206**
Respiratory Bacteria		
Legionella longbeachae	1	9
Mycobacterium spp.	4	31
Total	**5**	**40**
Respiratory Viruses		
Influenza	2	95
Total	**2**	**95**
Toxins		
Bacillus cereus	1	51
Ciguatera fish poisoning	1	2
Clostridium perfringens	13	87
Histamine (scombroid) fish poisoning	2	8
Staphylococcus aureus	2	6
Toxic Shellfish Poisoning (Type Unspecified)	1	2
Total	**20**	**156**
Poison		
Carbon monoxide	1	4
Chlorine	1	2
Methyl bromide	1	4
Total	**3**	**10**
Other Bacteria		
Group A *Streptococcus*	1	8
Total	**1**	**8**
Other Viruses		
Hepatitis B	1	3
Measles	2	7
Mumps	1	4
Total	**4**	**14**
Total	**492**	**7988**

Toxins

Toxins were involved in 4.1% (20/492) of all outbreaks reported in 2007. The implicated agents included *Clostridium perfringens* (13), Histamine (2), *Staphylococcus aureus* (2), *Bacillus cereus* (1), Toxic Shellfish Poisoning (1) and Ciguatera fish poisoning (1). Almost all toxin-related outbreaks involved foodborne transmission related to commercial food operators.

Poisons

During 2007, there were three reported outbreaks involving 10 cases due to chemical poisoning of the environment. One reported outbreak of chlorine poisoning occurred in the Waitemata DHB when two students accidentally inhaled chlorine gas at a local swimming pool. An outbreak due to carbon monoxide poisoning occurred in Wellington, the source was identified as a coal fired brazier that was used inside a room with little ventilation. A third outbreak occurred in Auckland, due to methyl bromide exposure from opening a shipping container of treated furniture.

Other Bacteria

A single outbreak due to Group A Streptococcus occurred after person-to-person transmission in a continuing care hospital.

Other Viruses

Hepatitis B caused one outbreak in 2007, involving three cases. This outbreak was linked to person-to-person sexual transmission.

There were two outbreaks due to measles and one outbreak due to mumps in 2007. The setting for the measles outbreaks were in the home, and in both outbreaks inadequate vaccine coverage was noted as a risk factor. The mumps outbreak occurred at a university hostel.

Mode of Transmission

The modes of transmission recorded for outbreaks are detailed in Table 35. The primary modes of transmission were person-to-person transmission, recorded in 326 outbreaks, and environmental transmission, recorded in 91 outbreaks. Person-to-person transmission was associated with over twice as many cases as environmental transmission (7018 compared to 2582) and over ten-times as many cases as foodborne transmission (7018 compared to 611). The mode of transmission was unknown in 19.7% (97/492) of outbreaks and more than one mode of transmission was identified in 25.2% (124/492) of all outbreaks reported in 2007.

Table 35. Outbreaks of infectious disease and associated cases by mode of transmission, 2007

Transmission Mode	Outbreaks[a]	Cases[a]
Person to person	326	7018
Environmental	91	2582
Foodborne	74	611
Waterborne	15	205
Zoonotic	7	35
Sexual contact	2	6
Other	24	709
Unknown	97	397

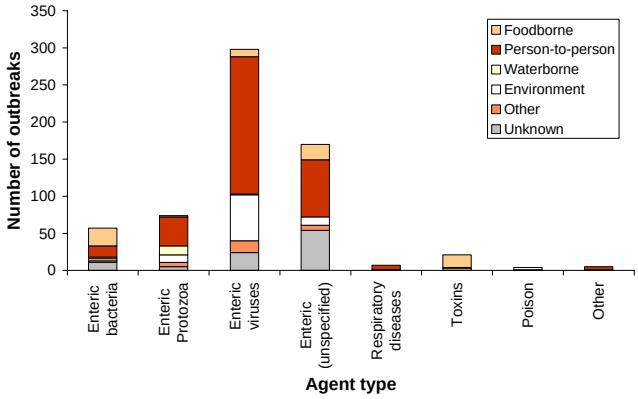
[a] More than one mode of transmission was reported for some outbreaks.

Person-to-person transmission was the most common mode of transmission for enteric viruses (87.7%, 185/211), enteric protozoa (78.0%, 39/50), unspecified enteric pathogens (52.4%, 77/147), and also contributed substantially to enteric bacteria outbreaks (30.6%, 15/49). Foodborne transmission was the principal mode of transmission for enteric bacteria (49.0%, 24/49) and toxins (85.0%, 17/20) (Figure 51).

Although person-to-person transmission was most commonly reported for outbreaks of respiratory diseases (85.7%, 6/7), environmental transmission was involved in one outbreak due to *Legionella longbeachae*.

Environmental transmission was important contributing factor in 29.4% (62/211) of outbreaks due to enteric viruses and 39.3% (2348/5971) of associated cases.

Figure 51. Number of outbreaks by agent type and mode of transmission, 2007



Setting

Outbreaks reported in 2007 were most commonly linked to the home (19.5%, 96/492) and institutions (52.2%, 257/492), with rest/retirement homes involved in 26.4% (130/492) of total outbreaks (Table 36).

Table 36. Number of cases arising as a result of outbreaks of infectious disease by location, 2007

Outbreak Setting	Outbreaks[a]	Cases[a]
Commercial Food Operators		
Restaurant/Café	41	406
Takeaway	26	164
Caterer	6	217
Other food outlet	2	12
Supermarket/deli	1	4
Institutions		
Rest/Retirement Home	130	3695
Hospital (continuing care)	63	2122
Hospital (acute care)	23	954
Childcare centre	25	387
Camp	9	458
School	3	139
Hotel/Motel	2	12
Hostel/Boarding house	1	4
Prison	1	55
Community		
Community/Church gathering	5	80
Swimming/spa pool	4	10
Tangi	1	2
Workplace		
Workplace	6	32
Farm	7	32
Home	96	541
Other setting	24	330
Setting unknown	83	235

[a] More than one mode of transmission was reported for some outbreaks.

ANTIBIOTIC RESISTANCE

ANTIMICROBIAL RESISTANCE

The prevalence of resistance among common, important clinical pathogens between 1994 and 2006 is shown in Appendix J. Most antimicrobial resistance data are only available in a complete analysed form up to the end of 2006. Data from ESR's national surveillance of antimicrobial resistance is available at http://www.surv.esr.cri.nz/antimicrobial/antimicrobial_resistance.php.

Of particular note are the following trends:

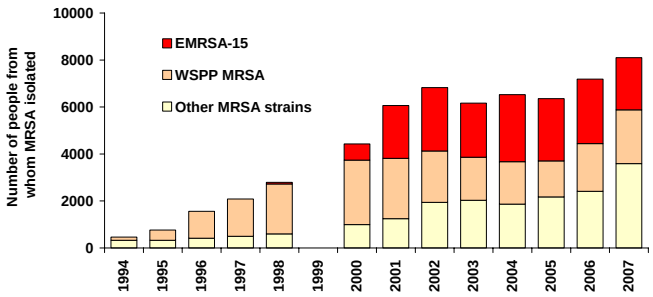
- Methicillin resistance among *Staphylococcus aureus* has been stable at 7-8% each year since 2000.
- There has been a high prevalence of mupirocin-resistant *S. aureus* since the mid-1990s, although the prevalence appears to have decreased from a peak of 20% in the 2000-2002 period. Mupirocin resistance is lower among methicillin-resistant (MRSA) than methicillin-susceptible *S. aureus*, as the most common MRSA strains in New Zealand are mupirocin susceptible.
- There has been a high prevalence of penicillin non-susceptibility among *Streptococcus pneumoniae* and increasing non-susceptibility to third-generation cephalosporins, such as ceftriaxone.
- Stable levels of trimethoprim resistance among urinary *Escherichia coli*, continuing low levels of nitrofurantoin resistance, but a gradual increase in fluoroquinolone resistance.
- There has been an increasing prevalence of extended-spectrum β-lactamases (ESBLs) in Enterobacteriaceae.
- Ciprofloxacin resistance in *Neisseria gonorrhoeae* is now more common than penicillin resistance in most parts of New Zealand.
- While vancomycin-resistant enterococci (VRE) remain uncommon in most areas of New Zealand, the first hospital-based outbreak occurred at the end of 2007.
- Multidrug-resistant tuberculosis (MDR-TB) remains uncommon and there does not appear to have been any transmission of MDR-TB within New Zealand.

METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*

Since 2000, national surveillance of methicillin-resistant *Staphylococcus aureus* (MRSA) has been based on annual one-month surveys. The 2007 survey was conducted in August 2007.

In August 2007, MRSA were referred from 675 people (664 patients and 11 staff) (Figure 52). This number of referrals equates to an annual incidence of 191.5 per 100 000, an 11.4% increase on the 2006 rate of 171.9 per 100 000. Among the 664 patients with MRSA, 50.6% were categorised as hospital patients and 49.4% as community patients. Patients were classified as hospital patients if they were in a healthcare facility (including residential care facility) when MRSA was isolated or had been in a healthcare facility in the previous three months. MRSA was reported as causing infection in 79.2% of the 572 patients for whom this information was provided.

Figure 52. MRSA isolations, 1994 - 2007



Note: Data for 1994 to 1998 are based on continuous surveillance of all MRSA isolations. Data for 2000 to 2007 are annualised and based on one-month surveys conducted in these years. No survey was undertaken in 1999.

Six MRSA strains were predominant in 2007 and represented 80.7% of all MRSA isolations. Internationally, MRSA clones are often described in terms of their multilocus sequence type (ST) and SCCmec cassette type (SCCmec). We have included this information in the following descriptions of the six most common strains.

- WSPP MRSA [ST30, SCCmec type IV]: a non-multiresistant community strain of MRSA usually resistant to only β-lactam antibiotics. In 2007, WSPP MRSA was the dominant strain and accounted for 28.2% of the MRSA isolated, with the majority (72.8%) from people in the community. The increase in MRSA in New Zealand from the mid-1990s to 2000 was driven by the spread and almost total dominance of this strain. However, since 2001, WSPP MRSA has represented a smaller proportion of the MRSA isolations (Figure 52).

- EMRSA-15 [ST22, SCCmec type IV]: a British epidemic MRSA strain that is ciprofloxacin resistant with variable erythromycin susceptibility. Erythromycin-resistant EMRSA-15 isolates have inducible clindamycin resistance. In 2007, this strain accounted for 27.3% of the MRSA isolated, which was the first year since 2002 that EMRSA-15 has not been the dominant MRSA strain (Figure 52). This strain is typically isolated from elderly patients in hospital and other healthcare facilities. In 2007, 79.5% of the EMRSA-15 isolates were from patients classified as hospital patients or from healthcare staff.

- WR/AK1 MRSA [ST1, SCCmec type IV]: a multiresistant community strain of MRSA, usually resistant to fusidic acid and high-level mupirocin with variable erythromycin susceptibility. The strain accounted for 9.7% of the MRSA isolated in 2007, with the majority (56.1%) from people in the community. This strain is now typically isolated from children and young adults in the North Island.

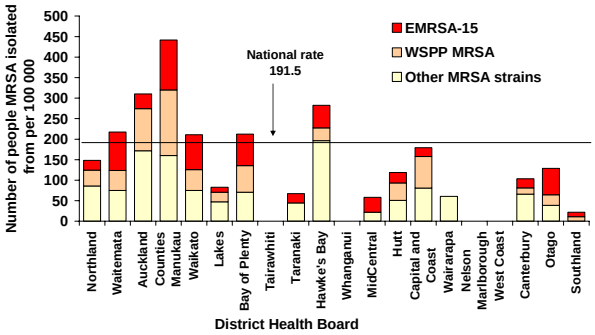
- AK3 MRSA [ST5, SCCmec type IV]: a non-multiresistant strain, with variable susceptibility, but often fusidic acid or erythromycin resistant, or resistant to only β-lactams. In 2007, this strain accounted for 9.3% of the MRSA isolated, with the majority (65.1%) from people in the community. This strain was first identified during the 2005 survey among isolates from the Auckland area. While it is now sporadically isolated throughout the country, 76.6% of AK3 MRSA were isolated in the greater Auckland area in 2007. It is usually isolated from children and young adults.

- DN1 MRSA [ST8, SCCmec type IV]: a multiresistant strain frequently erythromycin resistant with variable ciprofloxacin susceptibility. Erythromycin-resistant isolates do not have inducible clindamycin resistance. In 2007, DN1 MRSA accounted for 3.1% of the MRSA isolated. This strain is indistinguishable from the widely disseminated United States community-associated MRSA strain, USA300. However, in 2007 in New Zealand, this strain was most commonly isolated from hospital patients (61.9%) rather than community patients. DN1 MRSA was first identified in 2004 in the Dunedin area and has subsequently been isolated throughout New Zealand.

- AKh4 MRSA [ST 239, SCCmec type III]: a multiresistant MRSA typical of multiresistant MRSA isolated in Australia, and resistant to ciprofloxacin, clindamycin, co-trimoxazole, erythromycin, gentamicin and tetracycline. This strain accounted for 3.0% of the MRSA isolated in 2007. Like EMRSA-15, AKh4 MRSA is most commonly isolated from hospital patients, with 85.0% of the isolations in 2007 from hospital patients.

There are marked geographic variations in the incidence of MRSA in New Zealand (Figure 53). In 2007, the highest annualised incidence rates were in the Counties Manukau (441.6 per 100 000), Auckland (310.2 per 100 000), Hawkes Bay (282.4 per 100 000), Waitemata (217.4 per 100 000), Bay of Plenty (212.5 per 100 000) and Waikato (210.7 per 100 000) DHBs. Differences in screening policies may contribute to some of the apparent differences in incidence.

Figure 53. Annualised incidence of MRSA by DHB, 2007



Note: Data for the Canterbury and South Canterbury DHBs are combined.

APPENDIX: NATIONAL SURVEILLANCE DATA AND TRENDS

A. COMPARISON OF NOTIFIABLE DISEASE CASES AND RATES FOR 2006 AND 2007

Table 37. Number of cases and rates per 100 000 population of notifiable diseases in New Zealand, 2006 - 2007

Disease[a]	2006		2007		Change[d,e]
	Cases	Rates	Cases	Rates	
AIDS	29	0.7	31	0.7	→
Brucellosis	0	0.0	4	0.1	→
Campylobacteriosis	15873	379.3	12776	302.2	←
Chemical Poisoning from the Environment	28	0.7	13	0.3	←
Chikungunya Fever	0	0.0	1	0.0	→
Cholera	0	0.0	1	0.0	→
Creutzfeldt-Jakob Disease	5	0.1	5	0.1	
Cryptosporidiosis	737	17.6	924	21.9	➔
Cysticercosis	0	0.0	2	0.0	→
Decompression Sickness	1	0.0	0	0.0	←
Dengue Fever	19	0.5	114	2.7	➔
Gastroenteritis[b]	937	22.4	621	14.7	←
Giardiasis	1214	29.0	1401	33.1	➔
Haemophilus influenzae type b	9	0.2	15	0.4	→
Hepatitis A	123	2.9	42	1.0	←
Hepatitis B[c]	63	1.5	75	1.8	→
Hepatitis C[c]	35	0.8	32	0.8	←
Hepatitis NOS	0	0.0	1	0.0	→
Hydatid Disease	0	0.0	6	0.1	➔
Lead Absorption	78	1.9	78	1.8	
Legionellosis	52	1.2	67	1.6	→
Leprosy	4	0.1	8	0.2	→
Leptospirosis	88	2.1	66	1.6	←
Listeriosis	19	0.5	26	0.6	→
Lyme Disease	1	0.0	0	0.0	←
Malaria	30	0.7	25	0.6	←
Measles	20	0.5	25	0.6	→
Meningococcal Disease	160	3.8	106	2.5	←
Mumps	47	1.1	75	1.8	➔
Paratyphoid Fever	23	0.5	23	0.5	
Pertussis	1120	26.8	331	7.8	←
Rheumatic Fever	107	2.6	140	3.3	➔
Rickettsial Disease	12	0.3	2	0.0	←
Ross River Virus Infection	2	0.0	0	0.0	←
Rubella	8	0.2	10	0.2	→
Salmonellosis	1335	31.9	1274	30.1	←
Shigellosis	102	2.4	126	3.0	→
Taeniasis	0	0.0	1	0.0	→
Tetanus	1	0.0	1	0.0	
Toxic Shellfish Poisoning	1	0.0	3	0.1	→
Tuberculosis	354	8.5	290	6.9	←
Typhoid Fever	42	1.0	48	1.1	→
VTEC/STEC Infection	87	2.1	100	2.4	→
Yersiniosis	487	11.6	527	12.5	→

[a] No cases of the following notifiable diseases were reported in 2006 & 2007: Anthrax, Barmah Forest virus, Japanese encephalitis, Kunjin virus, Murray Valley encephalitis, Botulism, Diphtheria, *E. sakazakii*, HPAI, Plague, Poliomyelitis, Rabies, Primary amoebic meningo-encephalitis, SARS, Trichinellosis, Yellow fever.

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

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

[d] ←= Significant decrease, ➔ = Significant increase, -- = No change, ← = Not significant decrease, → = not significant increase

[e] 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.

B. DEATHS FROM NOTIFIABLE DISEASES RECORDED IN EPISURV, 1997 - 2007

Table 38. Deaths due to notifiable diseases recorded in EpiSurv, 1997 - 2007

Disease	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
AIDS[a]	34	19	18	19	14	11	10	13	15	14	5
Campylobacteriosis	2	2	1	3	1	1	0	0	1	1	1
Creutzfeldt-Jakob Disease[b]	3	0	2	3	1	3	4	3	0	5	0
Gastroenteritis	0	0	0	0	0	1	0	0	0	0	0
Giardiasis	1	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
Hepatitis B	2	0	0	0	1	0	0	0	1	0	1
Hydatid Disease	0	0	0	1	0	0	0	0	0	0	0
Legionellosis[c]	4	1	1	5	2	3	1	1	4	3	1
Listeriosis - non perinatal	2	0	1	2	1	0	2	3	1	0	2
Listeriosis - perinatal	6	0	2	4	1	3	2	2	0	1	2
Malaria	1	0	0	0	0	0	0	0	0	0	0
Meningococcal Disease	24	23	23	17	26	18	13	8	14	7	7
Pertussis	0	0	0	0	1	1	1	1	0	0	0
Primary amoebic meningoencephalitis	0	0	0	1	0	0	0	0	0	0	0
Rheumatic Fever[d]	1	0	0	0	0	0	0	0	0	0	0
Salmonellosis	2	2	1	7	2	1	0	0	1	1	1
Shigellosis	0	0	1	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	1	0	0	0	0	0	1
Tuberculosis	15	8	14	8	2	6	6	6	4	5	3
VTEC/STEC Infection	1	1	0	0	0	0	0	0	0	0	0
Yersiniosis	0	2	0	0	0	0	0	1	0	0	0

[a] Data source [10]

[b] Data source [15]

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

[d] 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.

C. NZHIS MORTALITY DATA FOR SELECTED NOTIFIABLE DISEASES, 2003 - 2005

Table 39. Reported deaths from selected notifiable diseases, 2003 - 2005

Disease	ICD 10 Codes	2003		2004		2005[a]	
		Underlying[b]	Contributory[c]	Underlying[b]	Contributory[c]	Underlying[b]	Contributory[c]
AIDS	B20-B24	10	5	15	2	13	7
Campylobacteriosis	A04.5	1	0	1	1	0	3
Creutzfeldt-Jakob Disease	A81.0	4	0	4	0	4	0
Cryptosporidiosis	A072	1	0	0	0	0	0
Hepatitis B	B16	1	1	0	6	3	5
Hepatitis C	B17.1	0	0	0	3	0	1
Legionellosis	A48.1	0	0	1	1	2	1
Listeriosis	A32	2	0	1	0	0	0
Meningococcal Disease	A39	14	0	8	0	13	0
Meningoencephalitis - primary amoebic	B602	0	1	0	0	0	0
Pertussis	A37	0	0	1	0	1	0
Salmonellosis	A02	1	0	0	1	0	1
Tuberculosis	A15-A19, P37.0	10	22	13	13	5	14
VTEC/STEC Infection	A44	0	0	0	1	0	0

[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)

D. NZHIS Morbidity Data for Selected Notifiable Diseases, 2005 - 2007

Table 40. Hospital admissions for selected notifiable diseases, 2005 - 2007

Disease	ICD 10 Codes	2005		2006		2007	
		Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis
AIDS	B20-B24	16	296	35	282	28	261
Arboviral Diseases	A83, A84, A85.2, A92, A93, A94, B33.1	4	2	2			2
Brucellosis	A23				1		2
Campylobacteriosis	A04.5	871	198	967	212	752	185
Cholera	A00					1	
Creutzfeldt-Jakob Disease	A81.0	3		6		2	5
Cryptosporidiosis	A07.2	34	8	20	10	26	14
Cysticercosis	B69			2	1	4	2
Decompression Sickness	T70.3	8	1	8		12	1
Dengue Fever	A90, A91	8		11	3	45	9
Diphtheria	A36		1		1		3
Giardiasis	A07.1	27	25	43	28	20	14
Hepatitis A	B15	21	15	33	14	17	18
Hepatitis B	B16	53	67	35	89	41	90
Hepatitis C	B17.1	8	6	11	13	12	19
Lead Absorption	T56.0	1	2	5		12	
Legionellosis	A48.1	33	7	12	10	18	7
Leprosy	A30		4	2		4	6
Leptospirosis	A27	51	10	50	8	41	2
Listeriosis	A32	8	11	13	10	12	17
Malaria	B50-B54	55	2	42	4	37	5
Measles	B05	3		1	1	5	1
Meningococcal Disease	A39	260	59	175	31	120	21
Mumps	B26	17	2	9	2	13	2
Paratyphoid fever	A01.1-A01.4	4		4		13	
Pertussis	A37	142	30	60	10	51	10
Poliomyelitis	A80		4				
Rheumatic fever	I00, I01, I02	191	44	186	42	206	34
Rickettsial diseases	A75, A77, A78, A79	4		16	1	4	
Rubella	B06	1	1	1	4		1
Salmonellosis	A02	130	36	122	39	123	27
Shigellosis	A03	20	2	13	2	27	1
Taeniasis	B689		1				2
Tetanus	A33-A35	2	3	2	2	1	
Tuberculosis	A15-A19, P37.0	393	146	301	151	229	154
Typhoid Fever	A01.0	25	2	30	2	42	2
VTEC/STEC Infection	A40-A44	15	18	16	23	22	24
Yersiniosis	A04.6	12	15	29	26	19	31

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.

E. NOTIFIABLE DISEASE CASES AND RATES BY ETHNIC GROUP, 2007

Table 41. Number of cases and rates per 100 000 population of notifiable diseases by ethnic group, 2007

	Ethnicity											
	European		Maori		Pacific Peoples		Other Ethnicity		Unknown		Total	
Disease	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	8522	316.4	652	115.3	135	59.7	405	108.1	3062		12776	317.2
Cryptosporidiosis	676	25.1	89	15.7	14	6.2	19	5.1	126		924	22.9
Dengue Fever	49	1.8	12	2.1	28	12.4	7	1.9	18		114	2.8
Gastroenteritis	465	17.3	26	4.6	9	4.0	23	6.1	98		621	15.4
Giardiasis	945	35.1	77	13.6	7	3.1	43	11.5	329		1401	34.8
Haemophilus influenzae type b	8	0.3	5	0.9			1		1		15	0.4
Hepatitis A	17	0.6	3		6	2.7	14	3.7	2		42	1.0
Hepatitis B	40	1.5	9	1.6	7	3.1	14	3.7	5		75	1.9
Hepatitis C	25	0.9	3		2				2		32	0.8
Hydatid Disease	2		2				2				6	0.1
Lead Absorption	66	2.5	3		3				6		78	1.9
Legionellosis	41	1.5	8	1.4			2		16		67	1.7
Leprosy					6	2.7	2				8	0.2
Leptospirosis	44	1.6	14	2.5			2		6		66	1.6
Listeriosis	18	0.7	2				4		2		26	0.6
Malaria	11	0.4	1		2		8	2.1	3		25	0.6
Measles	17	0.6	2		1		4		1		25	0.6
Meningococcal Disease	48	1.8	36	6.4	15	6.6	6	1.6	1		106	2.6
Mumps	23	0.9	15	2.7	20	8.8	11	2.9	6		75	1.9
Paratyphoid Fever	6	0.2	1				16	4.3			23	0.6
Pertussis	243	9.0	41	7.3	12	5.3	15	4.0	20		331	8.2
Rheumatic Fever	4		67	11.9	59	26.1	3		7		140	3.5
Rickettsial Disease	2										2	
Rubella	9	0.3	1								10	0.2
Salmonellosis	830	30.8	93	16.5	48	21.2	58	15.5	245		1274	31.6
Shigellosis	64	2.4	13	2.3	20	8.8	10	2.7	19		126	3.1
Tetanus	1										1	
Tuberculosis	40	1.5	50	8.8	29	12.8	159	42.4	12		290	7.2
Typhoid Fever	2		3		24	10.6	17	4.5	2		48	1.2
VTEC/STEC Infection	78	2.9	7	1.2			7	1.9	8		100	2.5
Yersiniosis	364	13.5	33	5.8	11	4.9	43	11.5	76		527	13.1

Note: Disease rates for ethnic groups and total cases are based on 2006 census data from Statistics New Zealand and should not be compared to disease rates used else-where in the report, which have been calculated using 2007 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.

F. NOTIFIABLE DISEASE CASES AND RATES BY SEX, 2007

Table 42. Number of cases and rates per 100 000 population of notifiable diseases by sex, 2007

	Sex							
	Male		Female		Unknown		Total	
Disease	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
Campylobacteriosis	6790	327.9	5719	265.1	267		12776	302.2
Cryptosporidiosis	444	21.4	470	21.8	10		924	21.9
Dengue Fever	53	2.6	60	2.8	1		114	2.7
Gastroenteritis	255	12.3	348	16.1	18		621	14.7
Giardiasis	663	32.0	716	33.2	22		1401	33.1
Haemophilus influenzae type b	8	0.4	7	0.3			15	0.4
Hepatitis A	26	1.3	16	0.7			42	1.0
Hepatitis B	42	2.0	33	1.5			75	1.8
Hepatitis C	20	1.0	12	0.6			32	0.8
Hydatid Disease	5	0.2	1				6	0.1
Lead Absorption	65	3.1	13	0.6			78	1.8
Legionellosis	34	1.6	33	1.5			67	1.6
Leprosy	4		4				8	0.2
Leptospirosis	53	2.6	12	0.6	1		66	1.6
Listeriosis - non perinatal	7	0.3	13	0.6	1		21	0.5
Malaria	16	0.8	7	0.3	2		25	0.6
Measles	13	0.6	12	0.6			25	0.6
Meningococcal Disease	56	2.7	50	2.3			106	2.5
Mumps	42	2.0	33	1.5			75	1.8
Paratyphoid Fever	11	0.5	12	0.6			23	0.5
Pertussis	133	6.4	196	9.1	2		331	7.8
Rheumatic Fever	69	3.3	62	2.9	9		140	3.3
Rickettsial Disease	1		1				2	
Rubella	6	0.3	4				10	0.2
Salmonellosis	652	31.5	600	27.8	22		1274	30.1
Shigellosis	60	2.9	65	3.0	1		126	3.0
Tetanus			1				1	
Tuberculosis	132	6.4	155	7.2	3		290	6.9
Typhoid Fever	23	1.1	24	1.1	1		48	1.1
VTEC/STEC Infection	45	2.2	55	2.5			100	2.4
Yersiniosis	271	13.1	245	11.4	11		527	12.5

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

G. NOTIFIABLE DISEASE CASES AND RATES BY AGE GROUP, 2007

Table 43. Number of cases and rates per 100 000 population of notifiable diseases by age group, 2007

	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	201	325.3	1036	449.3	604	208.3	577	188.5	940	294.2	2178	389.6	1589	268.3	1678	265.7	1536	299.3	1202	333.2	1107	304.5	128		12776	302.2
Cryptosporidiosis	30	48.6	329	142.7	120	41.4	65	21.2	39	12.2	104	18.6	121	20.4	42	6.7	34	6.6	25	6.9	13	3.6	2		924	21.9
Dengue Fever	1				1		1		4		19	3.4	26	4.4	24	3.8	21	4.1	12	3.3	5	1.4			114	2.7
Gastroenteritis	11	17.8	28	12.1	10	3.4	11	3.6	28	8.8	77	13.8	100	16.9	103	16.3	84	16.4	62	17.2	70	19.3	37		621	14.7
Giardiasis	30	48.6	250	108.4	97	33.5	22	7.2	23	7.2	137	24.5	340	57.4	210	33.3	135	26.3	105	29.1	40	11.0	12		1401	33.1
H. influenzae type b	6	9.7	3		1		1								1						3				15	0.4
Hepatitis A					6	2.1	2		8	2.5	7	1.3	3		5	0.8	6	1.2	2		3				42	1.0
Hepatitis B	1						1		2		15	2.7	23	3.9	11	1.7	13	2.5	7	1.9	2				75	1.8
Hepatitis C									2		6	1.1	7	1.2	8	1.3	8	1.6			1				32	0.8
Hydatid Disease															1		1		2		2				6	0.1
Lead Absorption	1		4		1				1		14	2.5	13	2.2	23	3.6	14	2.7	6	1.7	1				78	1.8
Legionellosis											5	0.9	5	0.8	14	2.2	13	2.5	12	3.3	18	5.0			67	1.6
Leprosy							1				2		3		2										8	0.2
Leptospirosis	1								1		14	2.5	14	2.4	20	3.2	14	2.7	2						66	1.6
Listeriosis											2		3		1		2		6	1.7	12	3.3			26	0.6
Malaria							3				4		3		5	0.8	5	1.0	3		1		1		25	0.6
Measles	4		12	5.2	3				1		2		3												25	0.6
Meningococcal Disease	19	30.7	29	12.6	10	3.4	7	2.3	12	3.8	10	1.8	6	1.0	3		4		2		4				106	2.5
Mumps	1		22	9.5	12	4.1	13	4.2	3		8	1.4	6	1.0	7	1.1	2				1				75	1.8
Paratyphoid Fever			1				3		2		8	1.4	2		3		3						1		23	0.5
Pertussis	27	43.7	33	14.3	20	6.9	25	8.2	24	7.5	27	4.8	42	7.1	46	7.3	38	7.4	27	7.5	20	5.5	2		331	7.8
Rheumatic Fever			2		34	11.7	54	17.6	30	9.4	12	2.1	5	0.8	2								1		140	3.3
Rickettsial Disease															1				1						2	
Rubella	3		6	2.6	1																				10	0.2
Salmonellosis	69	111.7	250	108.4	70	24.1	58	18.9	69	21.6	172	30.8	145	24.5	150	23.8	112	21.8	102	28.3	69	19.0	8		1274	30.1
Shigellosis	1		24	10.4	6	2.1	7	2.3	6	1.9	13	2.3	18	3.0	18	2.9	22	4.3	6	1.7	5	1.4			126	3.0
Tetanus																					1				1	
Tuberculosis	2		8	3.5	7	2.4	5	1.6	19	5.9	53	9.5	51	8.6	35	5.5	31	6.0	35	9.7	42	11.6	2		290	6.9
Typhoid Fever			7	3.0	5	1.7	1		8	2.5	9	1.6	11	1.9	5	0.8	1				1				48	1.1
VTEC/STEC Infection	12	19.4	42	18.2	12	4.1	2		2		2		4		7	1.1	4		7	1.9	6	1.7			100	2.4
Yersioniosis	32	51.8	101	43.8	24	8.3	22	7.2	20	6.3	54	9.7	69	11.6	58	9.2	55	10.7	35	9.7	53	14.6	4		527	12.5

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

H. NOTIFIABLE DISEASE CASES AND RATES BY DISTRICT HEALTH BOARD, 2007

Table 44. Number of cases and rates per 100 000 population of notifiable diseases by DHB, 2007

Disease	Campylobacteriosis		Cryptosporidiosis		Dengue Fever		Gastroenteritis		Giardiasis		Hepatitis A		Hepatitis B		Hepatitis C		Lead Absorption		Legionellosis		Leptospirosis		Listeriosis		Malaria		Measles		Meningococcal Disease		Mumps		Paratyphoid Fever		Pertussis		Rheumatic Fever		Rubella		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	Cases	Rate
Northland	369	239.8	24	15.6	1		4		73	47.4	1		1		1				4		2		4		1				5	3.2	1		1		5	3.2	5	3.2			60	39.0	2		15	9.7			3		11	7.1
Waitemata	1699	331.0	58	11.3	24	4.7	82	16.0	143	27.9	7	1.4	11	2.1	3		8	1.6	9	1.8	1		1		1		6	1.2	9	1.8	1		18	3.5	8	1.6	1		113	22.0	8	1.6	42	8.2	8	1.6	11	2.1	37	7.2
Auckland	1382	319.0	45	10.4	32	7.4	93	21.5	187	43.2	5	1.2	12	2.8	3		6	1.4	8	1.8			3		8	1.8			8	1.8	8	1.8	1		12	2.8	19	4.4			110	25.4	24	5.5	54	12.5	12	2.8	4		41	9.5
Counties Manukau	1118	240.6	57	12.3	37	8.0	55	11.8	129	27.8	9	1.9	9	1.9	1		2		6	1.3	1		5	1.1	3		1		16	3.4	16	3.4	9	1.9	17	3.7	56	12.1			84	18.1	18	3.9	40	8.6	17	3.7	3		20	4.3
Waikato	1080	305.9	182	51.5	6	1.7	34	9.6	118	33.4	1		5	1.4	1		5	1.4			10	2.8	1		3				12	3.4	7	2.0	2		71	20.1	10	2.8			137	38.8	13	3.7	20	5.7			22	6.2	37	10.5
Lakes	288	283.7	15	14.8			12	11.8	38	37.4			1		2				1										1		1		1		7	6.9	3				27	26.6	7	6.9	1				4		22	21.7
Bay of Plenty	498	244.9	30	14.8	3		13	6.4	71	34.9	3		3				5	2.5	1		2		2				1		5	2.5	3		2		24	11.8	5	2.5			92	45.3	8	3.9	8	3.9			8	3.9	20	9.8
Tairawhiti	49	106.8	3						11	24.0							1		10	21.8	1				1				4						4		3				11	24.0									9	19.6
Taranaki	410	382.1	21	19.6	2		6	5.6	16	14.9	2		3				2		1		3		1				3		4		1		1								28	26.1	2		3		1		2		18	16.8
Hawke's Bay	461	301.4	37	24.2	1		21	13.7	36	23.5	4		5	3.3			2				8	5.2							10	6.5	4		1		10	6.5	9	5.9			49	32.0	2		17	11.1			2		28	18.3
Whanganui	190	298.8	10	15.7	1		5	7.9	9	14.2	1						2				2										1				2		3		1		14	22.0			3						8	12.6
MidCentral	332	202.2	50	30.5			32	19.5	42	25.6							6	3.7	2		11	6.7	1						1		3		1		8	4.9	2		2		44	26.8	2		10	6.1	3		2		7	4.3
Hutt	435	307.4	61	43.1			25	17.7	36	25.4	2		4		2		4		1				2		2		2		6	4.2	2		1		7	4.9	7	4.9			48	33.9	5	3.5	11	7.8					22	15.5
Capital and Coast	988	351.2	74	26.3			61	21.7	138	49.0	1		5	1.8	4		7	2.5	6	2.1	1		2		1		4		6	2.1	6	2.1	1		16	5.7	6	2.1	3		112	39.8	5	1.8	17	6.0	3		3		47	16.7
Wairarapa	68	172.0	10	25.3	1		6	15.2	12	30.3			1		1		1		1										1		1				1		1				11	27.8			2						6	15.2
Nelson-Marlborough	409	304.1	30	22.3	3		5	3.7	93	69.1	1		3				4		2		3				1		1		1		1				28	20.8			1		36	26.8	4		4		1		5	3.7	7	5.2
West Coast	81	251.2	12	37.2			8	24.8	6	18.6					3				1		4						4		1								1				12	37.2			1				3		24	74.4
Canterbury	1754	357.8	70	14.3	3		144	29.4	124	25.3	3		11	2.2	9	1.8	12	2.4	12	2.4	9	1.8	1		4		3		11	2.2	7	1.4	1		68	13.9	3				147	30.0	17	3.5	35	7.1	2		19	3.9	131	26.7
South Canterbury	220	398.3	41	74.2			4		12	21.7							1				2		1												15	27.2					10	18.1	1		4				3		14	25.3
Otago	621	334.1	36	19.4			7	3.8	66	35.5	1		1		1		9	4.8	1		3		2						6	3.2	2				8	4.3			1		75	40.3	5	2.7	2		1		3		13	7.0
Southland	324	293.6	58	52.5			4		41	37.1	1				1		1		1		3								2		2				10	9.1					54	48.9	3		1				3		5	4.5
Total	12776	302.2	924	21.9	114	2.7	621	14.7	1401	33.1	42	1.0	75	1.8	32	0.8	78	1.8	67	1.6	66	1.6	26	0.6	25	0.6	25	0.6	106	2.5	75	1.8	23	0.5	331	7.8	140	3.3	10	0.2	1274	30.1	126	3.0	290	6.9	48	1.1	100	2.4	527	12.5

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

I. NOTIFIABLE DISEASE CASES BY YEAR AND SOURCE, 1987 - 2007

Table 45. Number of cases of notifiable disease cases by year and source, 1987 - 2007

Note: Cell is blank where data are unavailable.

Disease	Source	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
AIDS	Notification	28	38	59	73	78	50	70	44	49	76	43	29	33	26	26	17	33	38	49	29	31
Campylobacteriosis	Notification	2921	2796	4187	3850	4148	5144	8101	7714	7442	7635	8924	11572	8161	8418	10146	12495	14788	12215	13836	15873	12776
Cholera	Notification	2	0	0	5	0	0	0	2	2	0	0	1	1	0	3	1	1	2	0	0	1
Creutzfeldt-Jakob Disease	Notification										2	1	0	2	3	1	3	6	8	3	5	5
Cryptosporidiosis	Notification										119	357	866	977	775	1208	975	817	611	889	737	924
Dengue Fever	Notification	0	1	3	2	3	1	1	0	6	23	14	26	9	7	93	70	55	8	11	19	114
Gastroenteritis	Notification										555	310	492	601	727	940	1087	1026	1363	557	937	621
Giardiasis	Notification										1235	2127	2183	1793	1688	1604	1547	1570	1514	1231	1214	1401
H. influenzae type b	Notification										26	9	11	10	13	11	3	12	4	7	9	15
	Laboratory	93	107	121	143	148	166	118	75	14	24	8	10	9	10	8	3	9	3	6	8	13
Hepatitis A	Notification	158	176	134	150	224	288	257	179	338	311	347	145	119	107	61	106	70	49	51	123	42
Hepatitis B	Notification	474	370	309	242	227	221	145	133	125	104	138	88	94	79	56	67	61	38	59	63	75
Hepatitis C	Notification	18	20	13	11	25	89	91	79	88	59	92	102	96	80	58	53	40	24	29	35	32
Hydatid Disease	Notification	2	2	0	4	0	4	4	1	5	3	2	2	8	3	7	2	0	1	2	0	6
Influenza	Sentinel isolates	18	136	119	343	183	317	423	441	521	673	743	127	425	73	313	241	230	231	273	315	239
Legionellosis	Notification	91	62	17	20	14	11	24	66	33	36	63	43	51	61	46	49	77	62	85	52	67
	Laboratory				21	42	60	76	121	76	60	109	107	65	56	56	53	82	75	83	54	72
Leprosy	Notification	8	2	4	1	4	5	3	1	1	10	3	3	10	4	3	4	4	3	2	4	8
Leptospirosis	Notification	129	99	90	117	106	70	116	70	65	56	52	75	59	98	99	140	113	102	85	88	66
	Laboratory		192	182	229	176	218	234	168	183	140	84	117	76	114	113	181	149	113	109	67	42
Listeriosis	Notification	12	7	10	16	26	16	11	8	13	10	35	17	19	22	18	19	24	26	20	19	26
Malaria	Notification	22	25	27	32	39	29	58	34	41	107	65	73	46	111	54	61	46	33	32	30	25
Measles	Notification										68	1984	164	107	64	82	21	67	32	19	20	25
	Laboratory	26	5	5	7	355	53	4	4	15	25	1220	35	2	9	21	6	15	10	3	1	3
Meningococcal Disease	Notification	179	83	49	53	71	153	202	208	394	473	609	439	507	477	648	555	542	343	226	160	106
Mumps	Notification										76	90	85	56	50	56	64	56	45	61	47	75
	Laboratory	28	5	105	26	23	10	25	245	66	20	14	8	5	2	22	18	11	12	7	9	18
Paratyphoid Fever	Notification	3	2	0	1	1	2	10	7	24	20	25	18	17	24	32	16	18	28	25	23	23
Pertussis	Notification										1022	284	153	1046	4140	1334	1068	585	3485	2719	1120	331
Rheumatic Fever (initial attack)	Notification	215	153	148	90	97	70	81	98	88	110	93	66	97	108	114	87	148	75	76	103	132
Rubella	Notification										306	80	53	35	26	30	33	26	23	13	8	10
	Laboratory	50	95	114	168	81	27	244	104	1581	339	21	2	0	0	3	4	3	3	7	3	5
Salmonellosis	Notification	1140	1128	1860	1619	1244	1239	1340	1522	1334	1141	1177	2069	2077	1795	2417	1880	1401	1081	1382	1335	1274
Shigellosis	Notification	143	145	137	197	152	124	128	185	191	167	117	122	147	115	157	112	87	140	183	102	126
Tetanus	Notification	4	1	0	0	0	8	2	2	2	3	0	2	6	1	4	1	2	1	1	1	1
Tuberculosis	Notification	296	295	303	348	335	327	323	352	391	352	323	365	446	354	369	381	423	375	333	354	290
Typhoid Fever	Notification	4	15	17	7	9	11	14	24	21	15	16	31	10	21	27	23	20	31	30	42	48
VTEC/STEC Infection	Notification							3	3	6	7	13	48	64	67	76	73	104	89	92	87	100
Yersiniosis	Notification										330	488	546	503	396	429	476	439	420	407	487	527

J. PREVALENCE OF ANTIMICROBIAL RESISTANCE, 1994 - 2006

Table 46. Prevalence of antimicrobial resistance, 1994 - 2006

		Percent resistance[a] (number tested)				
Pathogen	Antimicrobial	1994-1996	1997-1999	2000-2002	2003-2005	2006
S. aureus[b]	methicillin	2.8 (58283)	4.9 (136356)	7.2 (251448)	7.4 (219363)	8.0 (70584)
	erythromycin	8.0 (54870)	10.8 (134350)	12.0 (221394)	12.0 (164220)	11.3 (31415)
	co-trimoxazole	0.8 (32926)	0.6 (91391)	1.2 (149166)	2.0 (126840)	1.4 (25631)
	mupirocin	10.1 (9291)	18.2 (37173)	20.0 (91555)	16.7 (48423)	13.2 (28075)
Methicillin-resistant *S. aureus*[c]	erythromycin	31.5 (2249)	26.2 (1303)	40.0 (1409)	46.3 (1596)	37.7 (597)
	co-trimoxazole	8.6 (2249)	1.8 (1303)	6.7 (1409)	7.4 (1596)	2.5 (597)
	mupirocin	6.4 (2244)	6.0 (1303)	8.5 (1409)	9.5 (1596)	7.0 (597)
	rifampicin	0.3 (2249)	0.8 (1303)	0.7 (1409)	0.5 (1596)	0.8 (597)
S. pneumoniae, non-invasive disease[b]	penicillin[d]	9.5 (7076)	19.0 (10976)	26.5 (12859)	27.0 (15037)	32.3 (4389)
	erythromycin	8.3 (6832)	14.5 (11212)	18.6 (14404)	19.9 (10222)	23.5 (1829)
	tetracycline	10.5 (5019)	11.2 (5993)	15.4 (9476)	18.1 (6796)	22.5 (1457)
S. pneumoniae, invasive disease[e]	penicillin[d]	3.4 (989)	15.0 (1182)	15.3 (1494)	17.2 (1560)	15.9 (522)
	erythromycin	2.6 (989)	5.7 (910)	7.2 (1494)	9.9 (1560)	11.1 (522)
	cefotaxime[d]	1.8 (989)	7.3 (1182)	6.2 (1494)	11.5 (1560)	10.0 (522)
Enterococcus spp[b]	amoxicillin[f]	1.5 (7373)	2.4 (17548)	3.0 (22566)	2.8 (26492)	2.7 (9036)
	vancomycin	0.2 (1141)	0.5 (4752)	0.3 (7505)	0.1 (9948)	0.1 (4389)
E. coli, urinary isolates[b]	amoxicillin[f]	55.9 (48706)	56.0 (138712)	54.4 (194799)	50.7 (117009)	49.1 (28892)
	co-amoxiclav	10.6 (42666)	12.2 (136326)	9.6 (194950)	8.5 (127750)	8.9 (26922)
	trimethoprim	19.6 (48098)	22.6 (111710)	22.3 (207837)	21.5 (138748)	21.5 (29024)
	nitrofurantoin	1.6 (48123)	1.7 (124362)	1.5 (206149)	1.4 (139738)	1.0 (29408)
	fluoroquinolone	0.5 (40032)	0.6 (118917)	1.6 (201382)	2.4 (135803)	4.6 (24840)
E. coli, non-urinary isolates[b,g]	co-amoxiclav	22.8 (7358)	21.8 (15948)	17.5 (11508)	15.2 (5059)	12.4 (1029)
	cefuroxime	3.2 (6309)	4.5 (6893)	4.2 (6576)	3.4 (3956)	4.0 (857)
	gentamicin	0.8 (10352)	0.9 (13789)	2.4 (10392)	2.6 (5290)	4.8 (1212)
	fluoroquinolone	0.5 (4717)	0.8 (10800)	2.4 (8821)	3.9 (4212)	7.2 (1189)
P. aeruginosa[b]	gentamicin	12.5 (9556)	9.5 (20542)	10.5 (25561)	6.1 (23148)	4.5 (6507)
	tobramycin	3.9 (6757)	2.8 (11033)	3.6 (10421)	3.3 (7616)	3.1 (2190)
	ceftazidime	5.0 (4832)	5.2 (11147)	3.9 (13253)	4.3 (16031)	3.0 (5244)
	fluoroquinolone	8.8 (8123)	9.9 (16551)	9.3 (22869)	8.3 (23761)	6.5 (6365)
H. influenzae, non-invasive disease[b]	amoxicillin[f]	12.0(12244)	19.3 (18852)	21.9 (28476)	19.9 (19529)	17.7 (6899)
	co-amoxiclav	1.1 (9839)	0.6 (15040)	0.8 (16333)	1.0 (14090)	2.0 (3056)
	co-trimoxazole	11.9 (6605)	14.7 (13964)	17.3 (22443)	18.2 (15939)	21.2 (3140)
	tetracycline	1.0 (7810)	1.5 (13007)	1.2 (15633)	0.8 (12783)	1.0 (2960)
H. influenzae, invasive disease[e]	amoxicillin[f]	21.8 (179)	11.5 (122)	19.2 (125)	31.6 (155)	32.7 (52)
	co-amoxiclav	3.4 (179)	1.6 (122)	1.6 (125)	9.7 (155)	23.1 (52)
	cefuroxime	3.4 (179)	4.9 (122)	0.8 (125)	9.7 (155)	23.1 (52)
N. meningitidis, invasive disease[e]	penicillin[h]	3.9 (659)	7.9 (431)	7.5 (796)	12.0 (551)	11.8 (85)
	rifampicin	0 (659)	0 (431)	0 (796)	0.2 (551)	0 (85)
N. gonorrhoeae[b,i]	penicillin	11.6 (879)	10.4 (1437)	7.1 (2782)	5.8 (4700)	8.4 (1906)
	fluoroquinolone	0.7 (864)	1.8 (1437)	6.3 (2349)	14.3 (4195)	13.6 (2105)
M. tuberculosis[b]	isoniazid	4.6 (438)	8.2 (757)	8.5 (811)	8.9 (872)	6.6 (258)
	rifampicin	0.7 (438)	1.3 (757)	0.7 (811)	1.0 (872)	0.4 (258)
	MDR[j]	0.7 (438)	0.9 (757)	0.5 (811)	1.0 (872)	0.4 (258)

[a] Intermediate resistance not included in resistant category unless otherwise stated (refer footnotes d and h below).
[b] Collated clinical laboratory data.
[c] MRSA isolates tested by ESR.
[d] Includes intermediate resistant and resistant isolates.
[e] Invasive disease isolates tested by ESR.
[f] Ampicillin used in laboratory testing.
[g] From 2004, data based on *E. coli* from bacteraemia.
[h] Reduced susceptibility (MIC 0.12-0. 5 mg/L).
[i] Data from northern North Island only up until 2000, thereafter national data used.
[j] Multidrug resistant (ie, resistant to at least isoniazid and rifampicin).

REFERENCES

1. Thacker, S.B. and R.L. Berkelman 1988. Public Health Surveillance in the United States. *Epidemiologic Reviews* **10**: 164.
2. Thacker, S.B. 2000. Historical Development, in *Principles and Practice of Public Health Surveillance*, S.M. Teutsch and R.E. Churchill, Editors. Oxford University Press, New York.
3. Baker, M. and A. Roberts 1996. A new schedule of notifiable diseases for New Zealand. *New Zealand Public Health Report* **3(5)**: 33-37.
4. Paul, C. et al. 2000. Enhanced surveillance of HIV infections in New Zealand, 1996-1998. *New Zealand Medical Journal* **113**: 390.
5. Jennings, L. et al. 2001. Influenza surveillance and immunisation in New Zealand, 1990-1999. *New Zealand Public Health Report* **8(2)**: 9-12.
6. Dow, N., N. Dickson and B. Taylor 1999. The New Zealand Paediatric Surveillance Unit: Establishment and first year of operation. *New Zealand Public Health Report* **6(6)**: 41-44.
7. Boxall, N.S. and J. Ortega-Benito 2003. *Annual Summary of Outbreaks in New Zealand 2002*. Institute of Environmental Science & Research Ltd (ESR), Wellington.
8. Pirie, R. and D. Peterkin 2007. *EpiSurv Data Quality Report 2006*. Institute of Environmental Science and Research Ltd (ESR), Wellington.
9. Sneyd, E. and M. Baker 2003. *Infectious Diseases in New Zealand: 2002 annual surveillance summary*. Institute of Environmental Science & Research Ltd (ESR), Wellington.
10. AIDS Epidemiology Group *2008.* HIV/AIDS in New Zealand - 2007, in *AIDS - New Zealand*. AIDS Epidemiology Group, University of Otago, Dunedin.
11. Khan, R., C. Thornley and M. Baker 2001. Intentional release of biologic agents. *New Zealand Public Health Report* **8(11)**: 84-85.
12. Centers for Disease Control and Prevention 2005. *Anthrax: What You Need To Know* [accessed 7 April 2008]; Available from: http://www.bt.cdc.gov/agent/anthrax/needtoknow.asp.
13. Jernigan, D. et al. 2002. Investigation of bioterrorism-related anthrax, United States, 2001: epidemiologic findings. *Emerging Infectious Diseases* [serial online]. [accessed 7 April 2008]; Available from: http://www.cdc.gov/ncidod/EID/vol8no10/02-0353.htm.
14. Flack, L. 1985. Botulism in New Zealand. *New Zealand Medical Journal* **98**: 892 - 893.
15. Pollock, M. 2008. *Eleventh Annual Report. Creutzfeldt-Jacob Disease Surveillance in New Zealand. 1 January 2007 – 31 December 2007*. New Zealand Creutzfeldt-Jacob Registry, University of Otago, Dunedin.
16. Heymann, D., ed. 2004. *Control of Communicable Diseases Manual*. 18th ed. American Public Health Association, Washington DC.
17. Ministry of Health 2005. *Inquiry into Actions of Sector Agencies in Relation to Contamination of Infant Formula with Enterobacter sakazakii*. Ministry of Health, Wellington. [accessed 7 April 2008]; Available from: http://www.moh.govt.nz.
18. Ministry of Health 2006. *Immunisation Handbook 2006*. Ministry of Health, Wellington.
19. Calder, L. et al. 2003. An outbreak of hepatitis A associated with consumption of raw blueberries. *Epidemiology and Infection* **131(1)**: 745-51.
20. World Health Organization *Cumulative number of confirmed human cases of avian influenza A/(H5N1) reported to WHO*. World Health Organization, Geneva. [accessed 7 April 2008]; Available from: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2008_02_15/en/index.html.
21. Thornley, C. et al. 2002. Changing epidemiology of human leptospirosis in New Zealand. Epidemiology and Infection **128**: 29-36.
22. Martin, D. and L. Lopez 2008. *The Epidemiology of Meningococcal Disease in New Zealand.* Report to the Ministry of Health (unpublished report).
23. Ministry of Health 2002. *Immunisation Handbook 2002*. Ministry of Health, Wellington.
24. World Health Organization 2000. *WHO Report on Global Surveillance of Epidemic-prone Infectious Diseases*. World Health Organization, Geneva.
25. World Health Organization 2004. Human Plague in 2002 and 2003. *Weekly Epidemiological Record* **79(33)**: 301-305.
26. Cursons, R., J. Sleigh, D. Hood and D. Pullon 2003. A case of primary amoebic meningoencephalitis: North Island, New Zealand. *New Zealand Medical Journal* **116(1187)**.
27. World Health Organization 2002. *World Survey for Rabies No. 35 for the Year 1999*. World Health Organization, Geneva.

28. World Health Organization 2005. *WHO Expert Consultation on Rabies: First Report*. World Health Organization, Geneva.

29. ESR 2004. *Notifiable and Other Diseases in New Zealand: Annual Report 2003*. Institute of Environmental Science & Research Ltd (ESR), Wellington.

30. World Health Organization 2004. Confirmation of all previously confirmed SARS cases, China. *Weekly Epidemiological Record* **79(19)**: 190.

31. ProMED-mail 2004. *SARS – worldwide (30): China, cases*. ProMED-mail. [accessed 7 April 2008]; Archive Number 20040703.1774. Available from: http://www.promedmail.org.

32. Zarlenga, D.S. and E. Pozio 2005. Recent advances on the taxonomy, systematics and epidemiology of Trichinella. *International Journal for Parasitology* **35(11/12)**: 1191-1204.

33. ESR 2002. *Disease Outbreak Manual*. Institute of Environmental Science & Research Ltd (ESR), Wellington.