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NOTIFIABLE AND OTHER DISEASES IN NEW ZEALAND

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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

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SURVEILLANCE SUMMARY 2003

This report aims to provide a concise review of the descriptive epidemiology of the main infectious diseases under public health surveillance in New Zealand in 2003. In addition, data on lead absorption, MRSA, anti-microbial sensitivities, sexually transmitted infections and outbreaks are also made available. The focus is on events and trends that emerged in 2003. Trends over the last ten years are presented for most diseases though additional years are added where appropriate.

SARS was added to the list of notifiable diseases in 2003. The content of the report is similar to other years but the format has been changed.

LIMITATIONS OF SURVEILLANCE DATA

It is important to recognise the limitations of the data contained in this report. The first major limitation of the information is that not all important infectious diseases (particularly those not currently notifiable) are under effective national public health surveillance.

Even where a disease is notifiable for surveillance purposes, the data inevitably have quality limitations. Previous studies *(20, 42)* have shown the following

Sensitivity

An assessment of sensitivity was made in 2003 using reporting on meningococcal disease. This showed that the sensitivity of meningococcal disease surveillance is probably in excess of 87%. The sensitivity of surveillance for other disease will often be less, particularly for common enteric diseases where only a small proportion of those infected will present to the health system. The system is inherently less sensitive for surveillance of chronic infections, notably hepatitis B and C, where initial infection is frequently asymptomatic and for other conditions resulting from longer term environmental exposure.

Completeness of data

In the 2003 Report, high levels of completeness were found for a minimum data set although there was some variation between DHBs. Inspection of data, other than the minimum data set, shows a rapid fall off in completeness particularly for diseases occurring in large numbers e.g. campylobacteriosis.

Data errors

Reliable population denominator data is available, except in the case of sexually transmitted infections.

Small Numbers

Because of the small size of the population and small numbers of cases for some diseases the rates calculated in this report may be highly variable year on year. As such it is necessary to interpret trends with caution.

VACCINE-PREVENTABLE INFECTIONS

Pertussis

The national pertussis epidemic, that began in June 1999, and peaked in 2000, has continued through 2002 and 2003. The incidence fell again in 2003. In spite of the fact that Pertussis vaccination has been available since 1945 there were still 589 cases notified in 2003. There is a significant pool of pertussis infection in the older age groups (20 years and over). This may indicate that the strategy needed to tackle this disease should be modified.

Measles

In 2003 there was a significant increase in the number of cases of measles notified. In New Zealand measles normally shows a cycle of outbreaks approximately every six years. The last outbreak was in 1997. It is possible the expected outbreak has been averted. A change in the immunisation schedule was implemented in January 2001 but it is probably too soon to attribute any change to this. Given the problems of the public perception of the safety of the MMR vaccine and the impact on vaccination rates there is no room for complacency.

Influenza

General practice based sentinel surveillance was carried out from May to September 2003 inclusively. The average weekly consultation rate for influenza like illnesses was one of the lowest since recording began in 1991. The number of laboratory isolates was also slightly down compared with 2002. The total number of isolates from year round laboratory surveillance continued to increase. Some of this increase may be a reflection of the increased awareness caused by the SARS threat. Influenza A comprised 99.6% of the isolates with only three isolates of Influenza B.

Other VPDs

There was a slight increase in the number of Hepatitis B notifications in 2003 compared to 2002. Most cases were in the 20 – 39 years age group. Mumps and rubella notifications remained low. *Haemophilus influenzae* serotype b (Hib) cases increased in 2003 but overall remained low with 13 cases, nine of which were aged less than 5 years. Two cases died, of whom one was recorded as having had three doses of vaccine. The risk of VPD disease is associated with delayed or incomplete immunisation. More information is needed about the efficacy and effectiveness of the immunisation programme in New Zealand.

INFECTIOUS RESPIRATORY DISEASES AND DISEASES FROM CLOSE CONTACT

Acute Rheumatic Fever (ARF)

There were 141 new cases of ARF in 2003. This is the highest number of cases since 1988. There are problems with the reporting of ARF in that institutions tend to report cases in batches without routinely including a date of onset.

Nonetheless the rate is still too high for a developed country of New Zealand's status. Among those aged under 15 years, the incidence rates of ARF increased markedly with increasing deprivation (as measured on the NZDep 2001 scale) *(41)*. Given that many streptococcal infections may be asymptomatic, improvements in living conditions should be a key strategy to deal with this disease.

Meningococcal disease

The meningococcal epidemic, which began in mid-1991, continued into 2003. The number of cases and rate were very similar to 2002 though the number of deaths was reduced. The 2003 case fatality rate was the lowest of the current epidemic. The rates in 2003 were highest in the under one year age group. Amongst Pacific Peoples and Maori, rates of disease were respectively four times and twice as high as in Europeans. The new vaccination programme is to be introduced in 2004. This together with other strategies to improve living conditions is needed to combat this persistent epidemic.

Tuberculosis

The number of cases of tuberculosis, new and reactivations, increased in 2003. The highest rates of new disease were in Auckland and Counties Manukau District Health Boards. Most cases were born overseas. Cases arose from both local transmission (29%) and imported disease (71%). Among all age groups, rates of disease increase with increasing deprivation (as measured on the NZDep 2001 scale).

ENTERIC INFECTIONS

Enteric disease notifications continued to increase in 2003. Most of this increase is accounted for by the increase in campylobacteriosis. Most other enteric diseases remained at about the same level or decreased in incidence.

Campylobacteriosis

This remains the most frequently notified disease in New Zealand. The national incidence in 2003 is the highest on record and is markedly higher than that reported by other developed countries. There is also undoubtedly a large number of sub-clinical and unreported infections.

Hepatitis A

The incidence of this disease decreased back to the level experienced prior to 2002 when there was a large outbreak. Most cases are sporadic and linked to overseas travel or household contact.

Salmonellosis

The incidence of this disease continued to fall in 2003 but the rate is still high compared to other developed countries. The dominant serotype in New Zealand during 2003 continued to be *Salmonella* Typhimurium Definitive Type 160. *S.* Typhimurium and *S.* Enteriditis accounted for the majority of cases.

VTEC/STEC

VTEC/STEC notifications in 2003 increased to 105 cases, the highest level ever recorded. The NZPSU reported four cases of VTEC/STEC associated haemolytic uraemic syndrome. This continuing increase is a matter for concern given the spectrum of severe illness associated with this infection and its potential to cause large outbreaks.

Other enteric diseases

Cryptosporidiosis, shigellosis, giardiasis, typhoid and yersiniosis notifications all decreased in 2003. The decreases were generally small.

INFECTIONS AND CHEMICAL POISONINGS FROM ANIMAL CONTACT AND THE ENVIRONMENT

Legionellosis

A total of 78 cases of legionellosis was notified in 2003 compared to 49 in 2002. As in previous years, incidence rates were highest in the elderly. One death was reported. *L pneumophila* and *L. longbeachae* dominated the strains with 33% and 30% each. Most cases were sporadic with four outbreaks occurring. The common source for two of them was compost, for the other two, a display spa pool was confirmed for one and suspected for the other. A cluster was also identified with a suspected common source of compost.

Leptospirosis

Leptospirosis remains New Zealand's most important directly transmitted zoonotic disease. The incidence in 2003 was down compared with 2002. Most cases occurred in those with known high-risk occupations. Of these meat processing workers, and farmers or farm workers had the highest rates. There is some evidence for the emergence of new reservoirs, notably sheep. The dominant serovars were *L.borgpetersenii* sv *hardjo*, *L.interogans* sv *Pomona* and *L. borgopetersenii* sv *ballum*.

Lead absorption

More lead absorption cases were notified in 2003 than in 2002. The highest incidence was in children aged one to four years. The next highest incidence was amongst males in the 40–49 years age group. The major risk factor for children was living in, or regularly visiting a house built prior to 1970 where the paint was chalking and flaking and recent renovations had been undertaken. The most commonly reported risk factors among adults were occupational or hobby-related exposure to lead and/or exposure to lead paint flakes or dust in the home.

BLOOD, TISSUE-BORNE AND SEXUALLY-TRANSMITTED INFECTIONS

HIV /AIDS

There has been a steady increase in the number of cases diagnosed with HIV infection in New Zealand since 1999. It is thought that a large proportion of the increase is due to increasing unsafe sex behaviour in homosexual males. There was also an unusually high number, five cases, of infection in children. In 2003, a total of 33 cases of AIDS was notified with 6 deaths.

Sexually transmitted infections

Sexually transmitted infections are not notifiable but surveillance is carried out through clinics and laboratories. Geographical coverage is incomplete. Chlamydia overtook genital warts as the most commonly reported STI by sexual health clinics in 2003. Genital warts was the next most commonly reported followed by NSU in males, genital herpes, gonorrhoea and syphilis. The epidemic of STIs continues in New Zealand. Even allowing for differences in surveillance systems the New Zealand rates of disease are significantly higher than most comparable countries.

Blood borne and tissue-borne infections

The number of cases of hepatitis B was slightly lower in 2003. Only five cases were aged less than 20 years indicating the effect of the vaccination programme introduced in 1985. The number of cases of Hepatitis C notified in 2003 was also down compared to the previous year. The principal risk factor was a history of injecting drug use. The data greatly underestimate the true incidence of HCV infection, as most new infections are asymptomatic. One definite case and five probable cases of Creutzfeldt-Jakob disease (CJD) were notified in 2003. For one case the diagnosis of variant CJD was excluded by tonsil biopsy. There were four deaths due to CJD.

ANTIBIOTIC RESISTANCE

Antimicrobial resistance

Most antimicrobial resistance data are only available in a completely analysed form up to the end of 2002. There is an increasing prevalence of MRSA generally, with an increasing proportion multi-resistant. A high prevalence of Mupirocin-resistant *staphylococcus aureus* has persisted since the mid-1990s. There is also an increase in the resistance of *Streptococcus pneumoniae* to the third generation cephalosporins. Resistance of *Neisseria gonorrhoea* to ciprofloxacin has increased four-fold since 2001. On the positive side, vancomycin resistant enterococci does not appear to have become established in New Zealand hospitals. Multi-drug resistant tuberculosis remains uncommon and there does not appear to have been any transmission of this organism.

NEW, EXOTIC AND IMPORTED INFECTIONS

Vector borne diseases

The incidence of imported dengue fever decreased again in 2003. All cases reported overseas travel with Fiji accounting for most cases. Malaria showed a similar decline with most cases recording a history of travel to endemic regions. Military personnel accounted for five cases. The continuing dengue outbreaks in the Pacific Islands and Australia compounded with the recent discovery of *Aedes aegypti* and other non-indigenous exotic mosquitos in New Zealand could lead to the establishment of some of these diseases in New Zealand.

Severe acute respiratory syndrome (SARS)

The SARS outbreak in South East Asia mobilised resources in New Zealand as in most countries. SARS was made a notifiable disease in 2003. There were 13 cases notified on suspicion of SARS but all proved to be negative on further investigation. The disease served to highlight the vulnerability of nations to new diseases disseminated by rapid air travel.

OUTBREAKS

The number of reported outbreaks (340) and cases (2 789) was similar to that reported in 2002.

There were 89 hospitalisations and four deaths. In 117 outbreaks the pathogen was not determined and enteric pathogens dominated the others with 194 outbreaks.

Most of the reported outbreaks arose from commercial food operations following by outbreaks in the home and in institutions.

IMPACT OF INFECTIOUS DISEASE

Fatalities

A total of 25 deaths from notifiable diseases was reported in 2003, compared to 43 deaths in 2002. Meningococcal disease accounted for the greatest number of deaths (13 deaths), followed by tuberculosis (6), AIDS (6), CJD and listeriosis (both 4). The highest case fatality rates were in CJD (66.6%), listeriosis (17.4%) and Hib (15.4%).

Ethnic disparities

Most of the serious infectious diseases described in this report have higher rates in Maori and Pacific Peoples than in Europeans. This is particularly evident for meningococcal disease, tuberculosis, rheumatic fever and hepatitis B. Enteric diseases and pertussis appear to have higher rates in the European population, based on notification data.

Age distribution

The diseases most common among young children were the enteric diseases, some vaccine-preventable diseases (pertussis, mumps and measles), and meningococcal disease, while rheumatic fever was most common among children and young adults. Hepatitis B and C, tuberculosis, leptospirosis, malaria and STIs were most common among adults, while legionellosis and listeriosis were most common among older adults and the elderly. An unusual feature in 2003 was the increase in lead absorption cases in children.

CONCLUSIONS

There has been some progress in the control of infectious diseases but it is still disappointing to report that the conclusions of the 2003 report mirror those of the report for 2002. The same problems are identified as previously with only slight additions.

- New Zealand's ongoing meningococcal disease epidemic.
- The increasing burden of enteric disease, most notably campylobacteriosis.
- Persistent high levels of pertussis.
- Increasing rates of chlamydia and gonorrhoea.

- Significant incidence of imported disease, notably dengue fever and tuberculosis.
- The continuing impact of poor living conditions disproportionately borne by ethnic groups.
- The absence of an effective infrastructure to address threat of new exotic infections such as SARS.

These data continue to show that the burden of serious infectious diseases is not spread evenly across the population, with particularly high rates among Maori and Pacific people populations for meningococcal and other diseases.

Surveillance data also reinforce some successes in controlling infectious diseases in New Zealand, notably the continuing decline in the incidence of Hepatitis B following successful immunisation programmes. The progress in other diseases such as Hib can be difficult to ascertain because of the impact of small numbers of cases in a relatively small population. The roll out of the new meningococcal vaccine in 2004 will be watched with great interest.

The continuing epidemic of STIs needs urgent attention. The surveillance system lacks sensitivity and representativeness and efforts are underway to try and establish a more extensive laboratory based system. This should help in the identification and quantification of the disease burden in the young adult population.

The evidence suggests the importance of a travel history in assessing patients. There is a large number of New Zealanders who travel each year, an increasing number of whom go to very remote regions. Some of these places still have a significant incidence of severe rare infections such as plague, diphtheria, and rabies.

SURVEILLANCE IMPROVEMENTS

Surveillance, as a whole needs improvement. Recent local and global experience with SARS and deliberate release events has highlighted the inadequacies of the current surveillance systems for the needs of the 21st century. Moves are underway to replace the platform with a system with greater flexibility and capacity that will allow immediate reporting of cases, and data amendments.

In addition to the development of a new platform, the current case report forms are being reviewed with key stakeholders.

Quality assurance programmes have also been developed for EpiSurv. These are limited at the moment to a narrow data set. A mechanism to produce automatic reports on data quality has been developed giving the reporting services useful feedback on performance. With further field testing the dataset will be expanded.

Other programmes are also being developed for chemical injury surveillance. This is a very significant area of morbidity. The programme is currently being field-tested using selected Accident and Emergency departments.

Programmes are also being developed to improve the integration of surveillance data and laboratory data. For many diseases in this report there is a discrepancy between the numbers notified by the laboratory and those notified through clinicians. This is even the case where great care has been taken to match data. The new programme and linkages should improve this process and outcome.

In late 2003 ESR established a dedicated website (www.surv.esr.cri.nz) for the dissemination of public health surveillance information and reports. Copies of the current notifiable disease reporting forms are available from this site.

The outcome of the review of notifiable diseases in New Zealand is awaited. The developments outlined above should ensure changes to the list of notifiable diseases could be made more easily.

The major review of public health surveillance has not yet taken place. There has been a call for a new look at what is being collected, for what reason and to support what action. This reassessment needs to be on a national scale and incorporated into the new Health Act when it comes to fruition.

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 2003 and where data is available, the trend over the previous ten years, with the aim of supporting prevention and control measures.

Data on individual diseases is presented in alphabetical order but the Surveillance Summary is presented according to the IAID disease groups *(17)*.

Also presented in this report are data for sexually transmitted diseases, 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 *(44)*. 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 *(43)*.

The main objectives for disease surveillance are *(10)*:

- 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 fulfill statutory and international reporting requirements

SURVEILLANCE METHODS

INTERPRETING DATA

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

Notifiable disease data in this report may differ to that 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). Reporting practices affect 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.

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 and the interest, resources and priorities of local public health services.

Disease rates for different ethnic groups are presented. However caution should be exercised in the interpretation of these rates as different ethnic groups have different patterns of health care access and the rates may not reflect the true incidence of disease in the population.

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 year on year. As such it is necessary to interpret trends with caution.

DATA SOURCES

The key sources of data used in this report are:

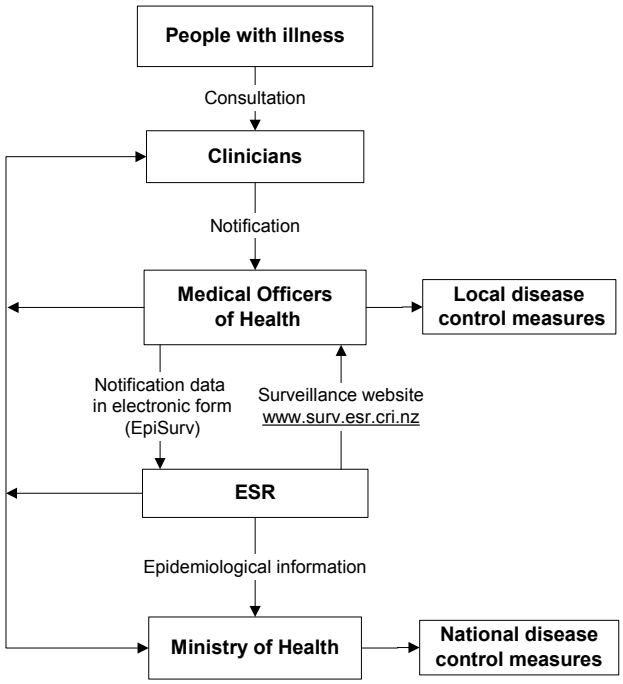
EpiSurv - the national notifiable disease surveillance system

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. These notifications provide the basis for surveillance and hence control of these diseases in New Zealand. Notification data are recorded on a computerised database (EpiSurv) installed in each of 20 public health services (PHSs). Each week, these data are sent to the Institute of Environmental Science and Research (ESR) Ltd where they are collated and analysed on behalf of the Ministry of Health. The data collected on each disease depend on the specific disease but usually include demography, outcome, basis of diagnosis, risk factor and some 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 *(10)*.

During 2003 SARS was added to the list of notifiable diseases. This report includes sections on all of the diseases that are currently notifiable in New Zealand.

The major components and information flow of the notifiable disease surveillance system is shown in Figure 1.

Figure 1. 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 & AIDS in New Zealand

Since 1989, the AIDS Epidemiology Group 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 the Virus Laboratory, Auckland Hospital) *(38)*. For each confirmed diagnosis, either the laboratory or the AIDS Epidemiology Group 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.

Sexually Transmitted Infection (STI) surveillance system

Except for AIDS, no STIs are notifiable in New Zealand. Surveillance is primarily based on reporting by sexual health clinics *(45)*. ESR took over the national operation of the STI sentinel surveillance system in 1995. Sexual health clinics report basic demographic data on cases of chlamydia, gonorrhoea, genital herpes, genital warts, syphilis, and non-specific urethritis (NSU) in males. STI surveillance has progressively been expanded since 1998 to include data from family planning clinics, student and youth health services, and laboratories. Laboratory-based surveillance for chlamydia and gonorrhoea is now operating in the Waikato-Bay of Plenty, and Auckland regions *(37)*.

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 *(28)*. This is based on a network of 88 general practices from all health districts in New Zealand. The number is proportional to the size of the population in each health district. 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 Paediatric Surveillance Unit (NZPSU)

NZPSU was established in 1997 to provide active surveillance of acute flaccid paralysis (AFP) to fulfil World Health Organisation requirements for certification of polio eradication. In 1998, the conditions under surveillance were expanded to include haemolytic uraemic syndrome (HUS), congenital rubella syndrome (CRS), perinatal exposure to HIV, vitamin K deficiency bleeding, and neonatal herpes simplex infection. 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 *(18)*. Information from the NZPSU is used in this report to enhance notification data on VTEC/STEC infection (HUS data) and rubella (CRS data).

Outbreak surveillance

ESR introduced an outbreak surveillance system in July 1996 and has been improving this system in a series of planned steps since then *(12)*. The surveillance system has operated electronically since mid 1997 as an additional module of EpiSurv. In mid 2000, EpiSurv and ESR laboratory reported outbreaks were matched for the first time. Unlike the other surveillance systems described above, this system collects data on disease outbreaks, rather than individual cases.

Statistics New Zealand

Data used to calculate rates of disease is supplied by Statistics New Zealand. See analytical methods section for further details.

ANALYTICAL METHODS

Key analytic methods used include:

Dates

Notification data contained in this report are based on information recorded on EpiSurv as at 10 February 2004. Changes made to EpiSurv data by PHS 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 2002 has been updated to reflect that in EpiSurv as at 10 February 2004.

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

Data used for calculating rates of disease

Census: All rates for 2003 and 2002 have been calculated using Usually Resident population data from the 2001 Census, supplied by Statistics New Zealand.

Ethnicity: Unless otherwise specified, denominators 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.

Occupation: For calculating rates of disease in certain occupational classes, 2001 Census counts of the employed population aged 15 years and over have been used.

Geographical breakdown

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

The maps classification for the disease rates is quantiles i.e. the data has been divided into three equal sized groups. The darkest colour represents the highest rates and the lightest colour the lowest rates.

Statistical tests

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

LIMITATIONS OF SURVEILLANCE DATA

QUALITY

The notifiable disease data reported through EpiSurv are generally of high quality. A report was prepared on the quality of selected EpiSurv fields in 2003 to assist in the development of a quality assurance programme *(20)*.

Sensitivity

An assessment of sensitivity was made in 2003 using reporting on meningococcal disease. This showed that the sensitivity of meningococcal disease surveillance is probably in excess of 87%. The sensitivity of surveillance for other disease will often be less, particularly for common enteric diseases where only a small proportion of those infected will present to the health system. The system is inherently less sensitive for surveillance of chronic infections, notably hepatitis B and C, where initial infection is frequently asymptomatic and for other conditions resulting from longer term environmental exposure.

Completeness

The completeness of data provided in EpiSurv varies between diseases. Table 1 shows the percentage of notifications for which complete data is provided for selected key EpiSurv variables.

The completeness of date of birth, age and sex are generally very high and have changed little over the last five years. The completeness of ethnicity has remained high.

The National Health Index (NHI) is an important link between notifiable disease records and laboratory records. While significant progress has been made in the completeness of the NHI over the past five years there is still significant room for improvement.

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Table 1. Completeness by year and EpiSurv variable, 2003

Reporting	Completeness of data				
	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%

Timeliness

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

Of the notifications with an onset date recorded (63% of notifications) in 2003, 49% were reported to a public health service within one week of the onset of symptoms and 77% were reported within two weeks.

In 2003, 95.5% of disease notifications were entered into EpiSurv within one week of being reported to the public health service and 97.7% were entered within two weeks of being reported.

This has remained consistent with small incremental increases over the last four years.

DATA ERRORS

Reliable population denominator data is available, except in the case of sexually transmitted infections.

NOTIFIABLE DISEASES

AIDS

HIV/AIDS surveillance is carried out in New Zealand by the AIDS Epidemiology Group. A more detailed account of AIDS/HIV in New Zealand in 2003 is also available *(8)*.

There was a total of 188 new cases of HIV infection reported during 2003. 154 of those cases were diagnosed through antibody testing which is more than in any previous single year. The other 34 were reported through viral load testing and were previously diagnosed overseas.

The trend of increasing incidence of HIV in men who have sex with men continued with 93 new cases diagnosed (71 by antibody testing and 22 by viral load testing). This was the largest number since 1991. Forty-six (65%) of these identified by antibody testing were reported to have been infected in New Zealand, six in Australia and 19 elsewhere.

There has been a steady rise over the last 15 years in the number of people reported as being infected through heterosexual contact. In 2003 out of 52 cases 28 were male and 24 female. In this group the proportion of those contracting the infection overseas increased.

Over the last five years out of a total of 197 cases of heterosexually acquired HIV, 161 (82%) acquired their infection overseas. There were five cases of children acquiring their infection from their mothers around the time of birth in 2003. This is the largest number ever recorded in any one year. In the period 1999-2003 13 children were diagnosed with perinatally acquired HIV.

Table 2 shows the most likely risk behaviour categories of people notified with AIDS or diagnosed with HIV in 2003.

There is no clear explanation for the increase in the number of HIV infection cases. It is possible that there has been

Table 2. Risk behaviour category for AIDS notifications and HIV infections, 2003

		AIDS[a]				HIV Infection[b]			
		2003		Total to 31 Dec 2003		2003		Total to 31 Dec 2003	
Risk category	Sex	Cases	%	Cases	%	Cases	%	Cases	%
Homosexual contact	M	17	51.5	609	75.6	93	49.5	1112	53.6
Homosexual & IDU	M	1	3.0	11	1.4	3	1.6	26	1.2
Heterosexual contact	M	7	21.2	58	7.2	31	16.5	204	9.8
	F	3	9.1	45	5.6	29	15.4	229	11.0
Injecting drug user (IDU)	M	0	0	13	1.6	5	2.7	51	2.5
	F	0	0	5	0.6	0	0.0	11	0.5
Blood product recipient	M	0	0	16	2.0	0	0.0	34	1.6
Transfusion related	M	0	0	2[c]	0.2	0	0.0	9	0.4
	F	1	3.0	2[c]	0.2	1	0.5	8	0.4
	NS	0	0	0	0.0	0	0.0	5	0.2
Perinatal	M	0	0	3	0.4	3	1.6	12	0.6
	F	1	3.0	5	0.6	2	1.0	11	0.5
Awaiting information/ Undetermined	M	3	9.1	33	4.1	17	9.0	309	14.9
	F	0	0	2	0.2	4	2.1	30	1.5
	NS	0	0	0	0.0	0	0.0	13	0.6
Other	M	0	0	0	0.0	0	0.0	4	0.2
	F	0	0	1	0.1	0	0.0	7	0.3
Total		33		805		188		2075	

Source: Sue McAllister, Aids Epidemiology Group, 27 Feb 2004

[a] Reported by date of notification

[b] 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

[c] Transfusion related

.

increased testing carried out. However examination of the data shows that this is not the case. Among men who have sex with men it is likely that there has been a real increase. Several other countries have reported increasing unprotected anal sex in this group *(26)*. This is thought to be due to the perception of a decreased risk of HIV/AIDS because of the impact of antiretroviral therapy. Given that infectiveness is particularly high soon after infection, men recently infected and as yet asymptomatic and undiagnosed, can spread HIV more readily.

In 2003 there were 33 cases of AIDS notified representing an annual incidence rate of 0.87 per 100 000. This compares to 17 cases and a rate of 0.45 per 100 000 in 2002. The reasons for this increase are not clear. It may simply be a result of normal variation in small numbers of reported cases or late diagnosis of HIV infection. A total of 805 cases of AIDS has been notified in New Zealand since surveillance began in 1983. Six deaths from AIDS were reported in 2003.

ANTHRAX

No cases of anthrax have been recorded in New Zealand for many years. There are still frequent reports of outbreaks in many other countries including Indonesia and many parts of the Russian Federation. Anthrax is also considered by the Centers for Disease Control and Prevention in Atlanta to be a high priority aerosolised agent for bio-terrorist use *(14)*. Though rare the disease needs to be kept in mind in these times of increasing international travel and political turbulence.

ARBOVIRAL DISEASES

Please see individual disease sections for Dengue Fever, Ross River Virus and Yellow Fever.

BOTULISM

The first cases of botulism recorded in New Zealand were in 1985 *(22)*. There have been no notifications of botulism in New Zealand in humans since 1987. Hospital discharge data record one case in 1989, two cases in 1994 and one in 1995.

In the last few years several countries including the USA, Switzerland, Norway and the UK have reported botulism in parenteral drug users *(19)*.

BRUCELLOSIS

There was one case of brucellosis notified in New Zealand in 2003 in a male dairy farmer who had been consuming unpasteurised milk. Follow-up highlighted the problems with interpreting serology. It is now thought that in this case there was a history of infection overseas some years ago.

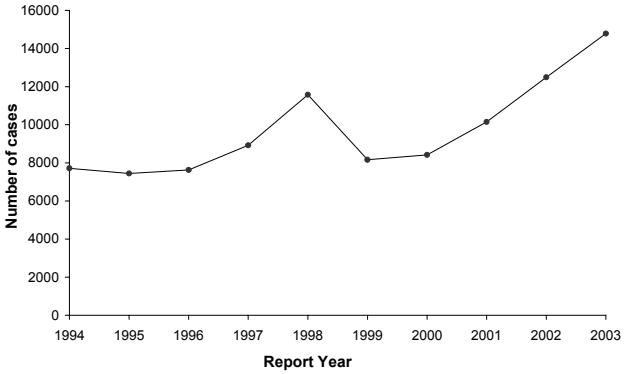
CAMPYLOBACTERIOSIS

There were 14 786 cases of campylobacteriosis notified in 2003, of whom 97.3% were reported as laboratory confirmed. The 2003 rate (395.6 per 100 000 population) was significantly higher than 2002 (334.3).

Campylobacteriosis continues to be the most commonly notified disease with 63.3% of total notifications (23 349) in 2003.

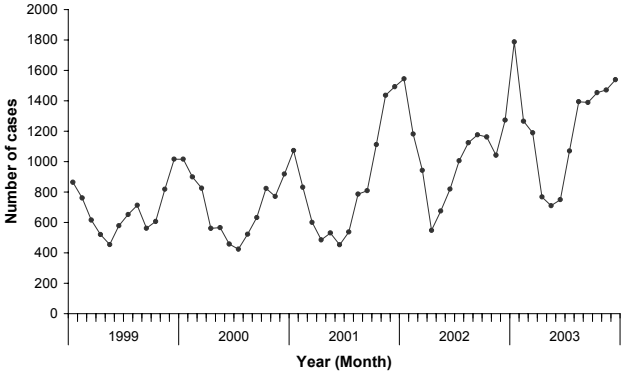
Figure 2 shows campylobacteriosis incidence for the 10-year period and Figure 3 shows the number of cases notified each month since 1999.

Figure 2. Campylobacteriosis notifications by year, 1994 – 2003



Campylobacteriosis is highly seasonal with a summer peak and winter trough. The pattern in 2003 was analogous to 2002, in that a high incidence was sustained throughout winter and early spring. The highest monthly campylobacteriosis total for 2003 was for the month of January when 1787 cases were notified.

Figure 3. Campylobacteriosis notifications by month, January 1999 - December 2003



Campylobacteriosis rates varied throughout the country. The highest rates were recorded in Capital and Coast (618.6 per 100 000 population), Hutt (502.9) and Waikato (478.7) DHBs.

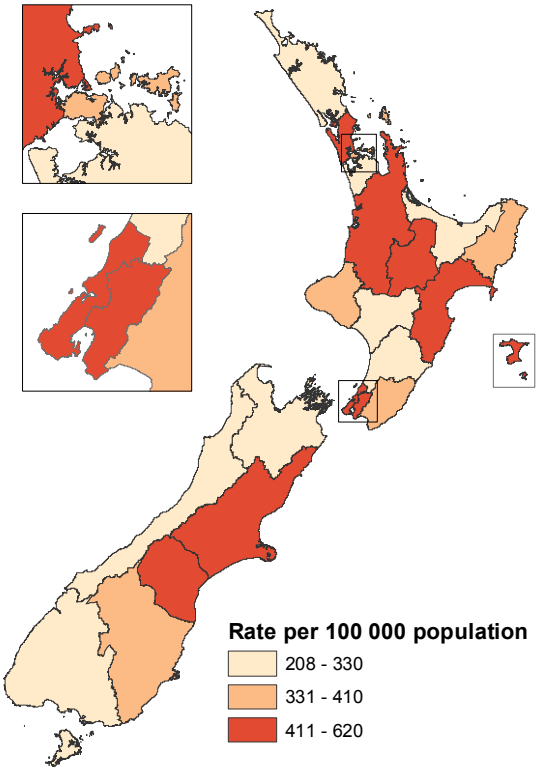
Figure 4, shows the rates of campylobacteriosis by DHB for 2003.

Sex was recorded for 14 584 (98.6%) of the 14 786 cases. Of these 7815 cases were male (53.6%) and 6769 cases (46.4%) were female. Age was recorded for 14 705. The highest age-specific rate occurred among children aged 1-4 years (598.6 per 100 000 population).

Ethnicity was recorded for 78.4% of all notifications during 2003. As in previous years, the highest rate occurred among those of European ethnicity (387.3 per 100 000 population), followed by those of Other ethnicity (239.8). Pacific Peoples had the lowest rate (87.8 per 100 000 population).

Of the 8302 (56.1%) cases for which hospitalisation status was recorded on EpiSurv, 633 (7.6%) were hospitalised.

Figure 4. Camplyobacteriosis notifications by DHB, 2003



A total of 42 outbreaks of campylobacteriosis was reported in 2003, involving 140 cases.

Of the campylobacteriosis cases for which information was recorded, 56.4% (2303/4084) had consumed food from retail premises during the incubation period, 26.7% (1283/3514) had contact with farm animals, 18.8% (766/4077) had consumed untreated water, 15.7% (711/4533) had recreational water contact and 6.5% (345/5298) had been overseas during the incubation period.

CHEMICAL POISONING FROM THE ENVIRONMENT

There was one case of "Suspect Chemical Poisoning" notified during 2003 from Northland DHB. No further details were recorded on EpiSurv.

ESR has been commissioned by the New Zealand Ministry of Health to develop a national Chemical Injury Surveillance System (CISS). Information from the system for 2003 will be published in a separate report *(36)*.

CHOLERA

One case of cholera was notified in New Zealand in 2003. Prior to presentation the patient had spent several weeks in Thailand. The organism was isolated from faeces. There have been ten cases of cholera notified in the last ten years. All cases had a history of overseas travel to Asia.

CREUTZFELDT-JAKOB DISEASE

The New Zealand Creutzfeldt-Jakob Disease (CJD) Registry was established in 1996 to monitor sporadic, familial, iatrogenic and variant CJD. *(21)*

In 2003 seven cases of possible CJD were referred to the Registry. One of these, a 54 year old male with severe memory impairment and increasing ataxia had the diagnosis of possible CJD excluded by brain biopsy *(39)*.

There were four deaths from CJD in 2003.

One case was confirmed by post-mortem examination. Two cases with rapidly progressive dementia, ataxia and myoclonus are considered probable cases because of the presence of 14-3-3 protein in their cerebro-spinal fluid. A further three cases, two of which are still being investigated, have current diagnoses of possible CJD.

One case of suspected variant CJD (vCJD), thought to be related to Bovine Spongiform Encephalopathy (BSE), was excluded after further tests performed in Melbourne.

In vCJD the abnormal isoform of the prion protein is consistently detected outside the central nervous system, usually in a tonsil biopsy. There remains a real possibility of a case of vCJD occurring in New Zealand after consumption of BSE infected meat or meat products whilst overseas.

Table 3. Cases of CJD, age, sex, location and diagnosis notified in New Zealand, 2003

Age	Sex	Location	Diagnosis
74	M	Wellington	Definite
84	F	Whangarei	Probable
26	M	Hamilton	Possible
56	F	Hamilton	Possible
50	M	Christchurch	Possible
78	M	Christchurch	Probable

CRYPTOSPORIDIOSIS

A total of 818 cases of cryptosporidiosis was notified in 2003. The rate of 21.9 per 100 000 population was significantly lower than the 2002 rate of 26.1.

Figure 5 shows the number of cases notified each year since 1996.

Figure 5. Cryptosporidiosis notifications by year, 1996 - 2003

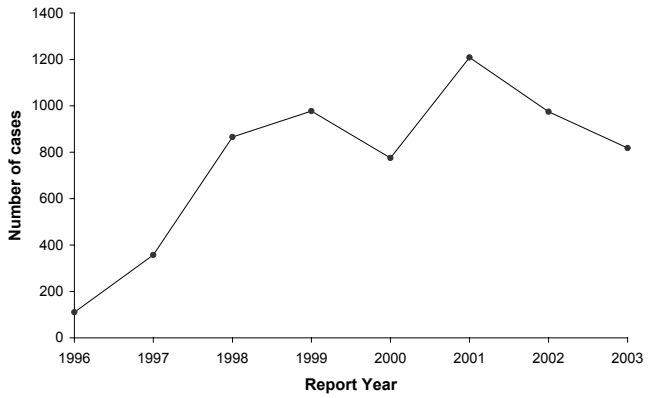
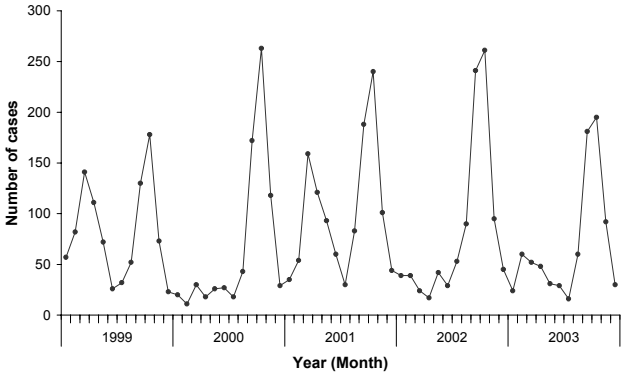


Figure 6 shows cryptosporidiosis cases by month since 1999. There is a distinct seasonal pattern with the largest number of notifications occurring in October each year.

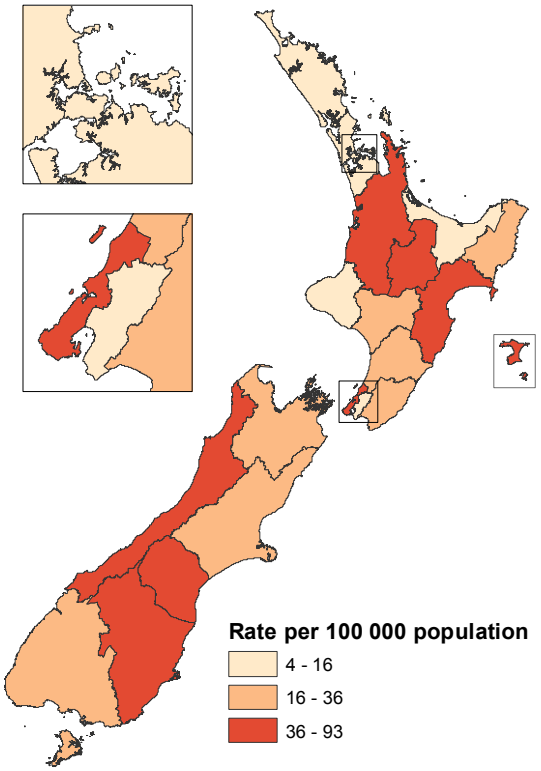
Figure 6. Cryptosporidiosis notifications by month, January 1999 - December 2003



Rates varied throughout the country as illustrated in Figure 7.

The highest rates were recorded in South Canterbury (92.8 per 100 000 population), Capital and Coast (49.2) and Waikato (44.1) DHBs.

Figure 7. Cryptosporidiosis notifications by DHB, 2003



Sex was recorded for 814 (99.5%) of the 818 cases. Of these, 432 cases (53.1%) were male and 382 (46.9%) were female. Ethnicity was recorded for 691 (84.5%) cases. The majority of cases occurred in people of European ethnicity (602, 87.1%), followed by Maori (59, 8.5 %), 'Other' ethnicity (20, 2.9%), and Pacific Peoples (10, 1.4%). Children aged between 1-4 years of European ethnicity experienced the highest rate of 200.4 per 100 000 population.

Age-specific notification rates were higher in the 1-4 years age group than in all other age groups (155.9 per 100 000 population). Rates significantly higher than the national average of 21.9 per 100 000 population were also seen in the less than one year (60.4), and 5-9 years (54.9) age groups.

Of the 697 cases for which hospitalisation status was recorded, 45 (6.5%) were hospitalised. Seven cryptosporidiosis outbreaks were reported in 2003, from Auckland, Hutt, Manawatu, Otago, Rotorua, and South Canterbury health districts accounting for 102 cases.

Among the cases for whom this information was recorded, 38.9% (192/493) had recreational water contact, 36.5% (169/463) had consumed untreated water, and 58.3% (339/581) had contact with farm animals, 28.5% (133/463) had contact with sick animals, and 25.8% (134/520) had contact with other symptomatic cases during the incubation period.

CYSTICERCOSIS

No cases of tissue infection with the larval stage of *Taenia solium* have been notified in New Zealand since 1992.

DECOMPRESSION SICKNESS

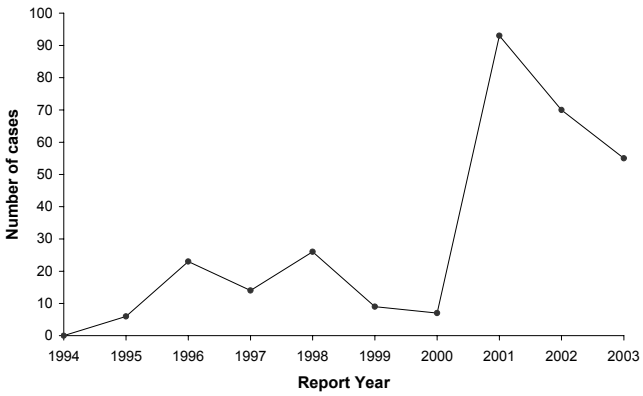
Two cases of decompression illness were reported in 2003. Both were adult males in the 40 – 49 years age group. One of the cases was hospitalised but neither died. The numbers for 2003 and 2002 (7 cases) are much lower than those notified in 2001 (19 cases) and 2000 (23 cases).

DENGUE FEVER

Fifty-five cases of dengue fever were notified in 2003, a rate of 1.5 per 100 000 population. This rate is less, though not significantly so, than the rate in 2002 (1.9 per 100 000 population, 70 cases). This change is likely to be a product of reporting bias rather than an actual change in the incidence of the disease. LabPlus in Auckland diagnosed 104 serologic cases during 2003. The ESR laboratory received a further 30 IgM+ specimens.

Figure 8 shows dengue fever notifications by year since 1994.

Figure 8. Dengue fever notifications, 1994 - 2003



Notifications were received from 11 DHBs, four of which notified more than two cases namely Auckland (23), Waitemata (9), Counties Manukau (5), and Capital and Coast (5).

Age specific rates higher than the national average occurred in the following age groups; 20-29 (3.5 per 100 000 population), 15-19 (2.3), 50-59 (2.2), and 40-49 (2.0). Thirty-four cases were male compared to 20 females (sex was unknown for one case). Ethnicity was recorded for 76.4% of

cases; of those 59.5% (25) were European, 11.9% (5) Pacific Peoples, and the remainder were of Other ethnicity.

Where hospitalisation status was recorded (all but three cases), 53.8% were hospitalised.

Travel information was recorded for 54 of the cases. All reported overseas travel during the incubation period. Implicated overseas destinations included: Fiji (36 cases), Tonga (8), Thailand (4), and one case each from Bangkok, India, Kenya, Malaysia, and Singapore (destination was unspecified for one case).

The reason for travel was recorded for 70.9% (39/55) of the cases. Of these, 27 cases (69.2%) were New Zealanders travelling overseas on business or holiday (three for more than one year), eight were overseas visitors to New Zealand and two had other reasons for overseas travel.

There have been recent outbreaks of dengue fever in Northern Queensland and New Caledonia. It is salutary to note that larvae of the main vector of dengue, the *Aedes aegypti* mosquito, have been found in Auckland on goods imported from Futuna Island via Noumea. In addition other exotic, specifically Australian, species of mosquito have been found in the Coromandel. Given that, the eggs of *Aedes aegypti* can survive desiccation for up to six months and transovarial transmission of the virus is possible, vigilance at ports of entry is very important *(6)*.

DIPHTHERIA

The last case of diphtheria (toxigenic strain isolated from a throat swab) occurred in 1998 in an unimmunised child. The disease is still endemic in many countries and unimmunised persons are at risk of serious illness *(13)* The recent death in the USA of such an individual who had travelled to Haiti on a week-long trip illustrates this *(32)*.

Nine isolates of *Corynebacterium diphtheriae* were received for toxigenicity testing, typing and surveillance purposes in 2003. The isolates were from cutaneous (5), blood (3) and nasal sources (1). All isolates were determined to be non-toxigenic by PCR testing for the presence of the toxin gene.

These isolations correspond to the pattern of sporadic cases of infection with non-toxigenic strains of *C. diphtheriae* in New Zealand. The distribution of isolates received in 2003 is shown in Table 4. The last toxigenic isolate was a single case in 2002.

Table 4. *Corynebacterium diphtheriae* isolates, 2003

Health district	Sex/Age	Source	Biovar
Central Auckland	F 3y	cutaneous	gravis
Central Auckland	M 40y	cutaneous	mitis
Central Auckland	F 3y	cutaneous	gravis
South Auckland	F 11y	blood	gravis
Central Auckland	M 33y	cutaneous	mitis
South Auckland	M 7y	blood	gravis
South Auckland	F 53y	respiratory	mitis
South Auckland	F 57y	blood	gravis
Canterbury	F 94y	cutaneous	gravis

GASTROENTERITIS

Gastroenteritis comprises a variety of communicable diseases and infections. Included in this section are infections by the following pathogens; norovirus, rotavirus, *Clostridium perfringens*, *Staphylococci* and *Bacillus cereus*. Diseases and conditions that are notifiable in their own right (e.g. salmonellosis, campylobacteriosis and *Clostridium botulinum* (botulism)) are reported separately in this report.

From July 2000, Public Health Services have also been encouraged to record all cases of gastroenteritis caused by non-notifiable or unknown food-borne intoxicants including self-reporting by the public.

In 2003, 1023 cases of gastroenteritis were notified, representing a population rate of 27.4 per 100 000. This was not significantly different than the 2002 rate of 29.1 per 100 000. In 2003, a causal agent was reported for 30 (2.9%) of gastroenteritis cases. Where the agent was identified the most common pathogen was norovirus.

Table 5. Organism identified for notified cases of gastroenteritis (as recorded in EpiSurv), 2003

Organism	Cases	Percentage[b]
Bacillus cereus	5	0.5%
Clostridium perfringens	1	0.1%
Norovirus	14	1.4%
Staphylococcus species	1	0.1%
Other[a]	9	0.9%
Unknown	993	97.1%
Total	1023	

[a] includes one case of *Campylobacter jejuni* and one case of *Campylobacter jejuni*/Salmonellosis.

[b] percentage of cases where organism was identified

Gasteroenteritis notification rates were highest in the Southland (91.0 per 100 000) and Canterbury (51.0) DHBs.

Overall rates of gastroenteritis were higher in females than males (30.7 per 100 000 and 23.2 per 100 000, respectively). Highest rates in both sexes were in the greater than 70 years age group.

Details of gastroenteritis organisms identified in disease outbreaks are recorded in the Outbreak section of this report.

A definite or suspect source of infection could be assigned to 64.8% of the 763 cases where the source of infection was reported. Hospitalisation data was recorded for 87.9% of cases, of these 33 (3.7%) were hospitalised, 32 cases with gastroenteritis of unknown causal agent and one case of chemical food poisoning.

Identifying the causal agent of a gastroenteritis outbreak is an essential component of disease control. This enables timely intervention strategies to be put in place to prevent new cases and onward transmission.

GIARDIASIS

There were 1569 cases of giardiasis notified in 2003. The rate of 42.0 cases per 100 000 population was slightly higher than the 2002 rate of 41.4.

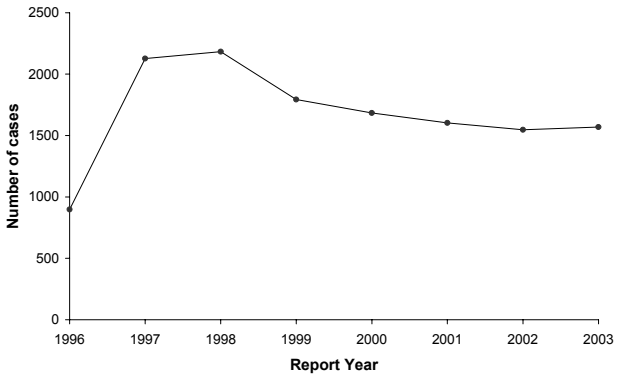
Figure 9 shows giardiasis cases by year since the disease became notifiable in June 1996.

The rate of giardiasis varied throughout the country in 2003 as Figure 10 illustrates. Auckland District Health Board recorded the highest rate of 65.0 per 100 000 population followed by Capital and Coast (62.6) and Waikato (60.7) health districts.

Sex was recorded for 1541 (98.2%) of the 1569 cases. A total of 852 cases (55.3%) were male and 689 (44.7%) were female.

There were two peaks in the age-specific rates of giardiasis notifications: the largest one in the 1-4 years age group (143.0 per 100 000 population) and a smaller peak in the 30-39 years age group (69.9).

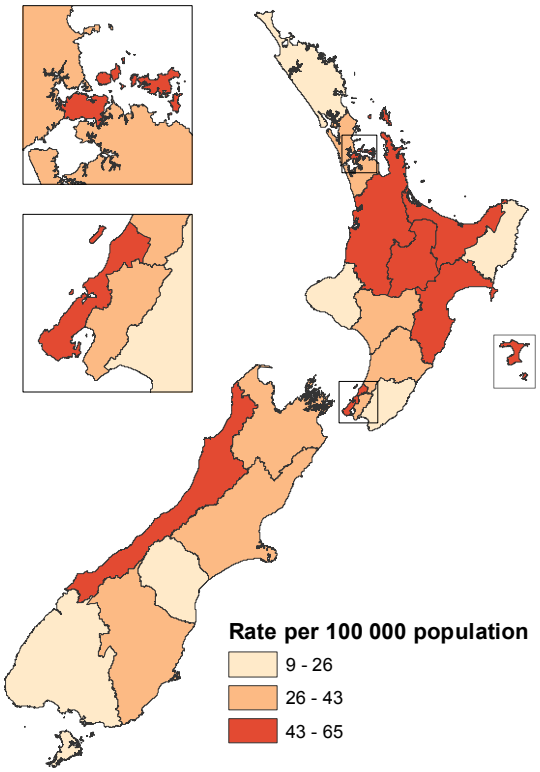
Figure 9. Giardiasis notifications by year, 1996 - 2003



Rates of giardiasis were highest in the Other ethnic group, with a rate of 48.0 per 100 000 population, and next highest in the European ethnic group (39.5). Rates were low among Maori and Pacific Peoples.

Of the 964 cases for which hospitalisation status was recorded, 26 (2.7%) were hospitalised. Twenty-seven giardiasis outbreaks involving 89 cases were reported in 2003, from Auckland, Canterbury, and Otago district health boards.

Figure 10. Giardiasis notifications by DHB, 2003



Among the cases for which this information was recorded, 33.5% (175/523) had consumed untreated water, 33.2% (195/587) indicated recreational contact with water, 37.7% (218/578) had contact with children in nappies or other faecal matter, and 33.1% (189/571) had contact with other symptomatic cases during the incubation period.

Of the 697 cases with this information recorded, 170 (24.4%) attended school, pre-school or childcare.

HAEMOPHILUS INFLUENZAE SEROTYPE B DISEASE

Thirteen cases of *Haemophilus influenzae* serotype b (Hib) disease were notified in 2003, nine of which were aged less than five years. While seven of the cases aged less than five years were laboratory confirmed, an isolate from a child aged three weeks was unable to be confirmed. PCR analysis showed that the isolate did not have the gene encoding serotype b expression. An isolate was not referred for the remaining case.

The 2003 age specific rate for confirmed cases aged less than five years was 2.6 per 100 000 population (seven cases). In comparison, only three cases were notified in 2002, none of which were aged less than five years.

The seven confirmed notifications aged less than five years were from six DHBs; two from each of Bay of Plenty and Canterbury and one each from Northland, Counties Manukau, and MidCentral.

Sex was recorded for all seven cases; five were male and two were female. Ethnicity was recorded for all but one case; four were recorded as European, one as Maori and one as Pacific Peoples.

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 a booster at 15 months.

Vaccination status was recorded for six of the seven confirmed cases aged less than five years. Five cases had received one or more doses of Hib vaccine. Two were recorded as having received three doses, the remaining three recorded as having received only one dose (see Table 6).

A one year baby who died was reported to have received three doses of vaccine.

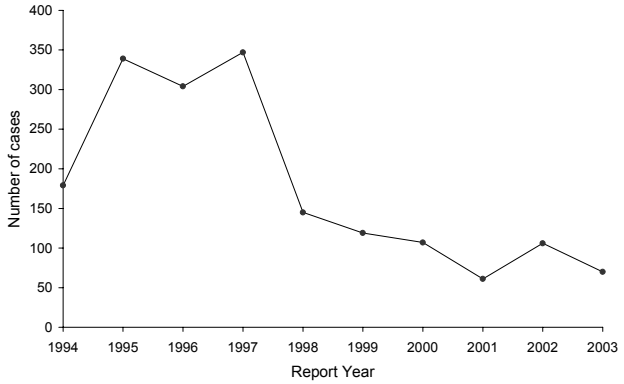
Table 6. Age group of Hib notifications and vaccination received, 2003

Age group	Total cases	Vaccination Status				
		1 dose	2 doses	3 doses	No doses	Unknown
< 15 mths	6	2	0	2	1	1
15 mths – 4 yrs	1	1	0	0	0	0
Total	7	3	0	2	1	1

HEPATITIS A

There were 70 notifications of hepatitis A in 2003 compared with 106 in 2002. There is a downward trend to lower numbers after the high of 347 cases in 1997 (Figure 11). This trend was interrupted in 2002 with an outbreak linked to consumption of contaminated blueberries.

Figure 11. Hepatitis A notifications by year, 1994 - 2003



The national incidence rate was 1.9 cases per 100 000. DHBs recording the highest rates included Auckland (4.6), Capital and Coast (3.3), Waitemata (3.0) and Counties Manukau (2.9).

Distribution of cases amongst the sexes was equal at 35 cases each. Of those for whom ethnicity was recorded (67/70, 96%), the highest number of notifications (29 cases, 43.2%) were for Europeans, following by Pacific Peoples (16, 23.9%) and Maori (4, 6%). A table showing age distribution of cases is in the appendix (Table 34). Out of those for whom the information was recorded (69 cases), 16 were hospitalised.

The most common risk factor for hepatitis A was travel overseas (26 cases), 42% of those for whom this information was recorded. The most common countries cited were Samoa (9 cases), India and Pakistan (6 cases) and Fiji (3 cases). New Zealand is a low-incidence country for hepatitis A infection with the most common sources of infection now being overseas travel and secondary household transmission.

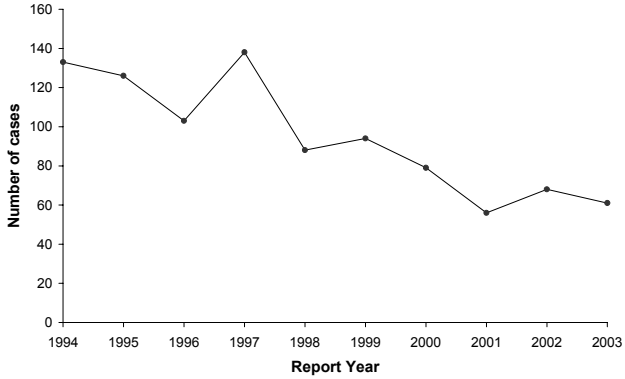
There were four outbreaks with a total of 14 people involved. All of these were in Auckland. Of these, one outbreak occurred in a group thought to have been infected by drinking bore water in Fiji. One other outbreak was attributed to contact with symptomatic overseas visitors.

HEPATITIS B

In 2003 there were 61 notifications of acute hepatitis B. This continues a downward trend over the last twenty years. In 1984 there were 609 cases notified. Hepatitis B vaccine was added to the immunisation schedule from September 1985 becoming universal with a catch-up programme in February 1988.

Figure 12 shows the number of notifications by year since 1994.

Figure 12. Hepatitis B notifications by year, 1994 - 2003



The national rate for 2003 was 1.6 cases per 100 000. DHBs with the highest recorded rates were Tairawhiti (4.6), Lakes (4.2) and Hawke's Bay (2.8).

Males accounted for 37 (61%) of all cases. Forty three (70%) of the cases were in the 20-39 years age group. Detailed breakdown for age and sex is in the appendix (Table 34). Forty one per cent (25) of the cases were in European, 28% in Maori, 15% in Pacific Peoples, 15% in Other and 1% were of unknown ethnicity.

Two cases in children aged 2 years or less were of a sero-positive mother. Although they received immunoglobulin and the first dose of hepatitis B vaccine at birth there is no record of further vaccination. The three cases in the 15-19 age group were all females and their vaccination status is unknown.

The risk factors for hepatitis B infection are shown in Table 7.

These proportional risks are very similar to those recorded in 2002. The importance of overseas travel is difficult to evaluate because of the overriding importance of behavioural factors during the period away.

Table 7. Exposure to risk factors associated with Hepatitis B, 2003

Risk Factor	Yes	No	Unknown	%[a]
Sexual contact with confirmed case/carrier	8	23	30	26%
Case overseas during incubation period	8	31	31	21%
Household contact with case	7	31	23	18%
Occupational exposure to blood	5	33	23	13%
Body piercing/tattooing in last 12 months	4	34	23	11%
History of injecting drug use	3	36	22	8%
Child of sero-positive mother	2	35	24	5%
Blood product/tissue recipient	1	40	20	2%

[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.

Table 8. Exposure to risk factors associated with Hepatitis C, 2003

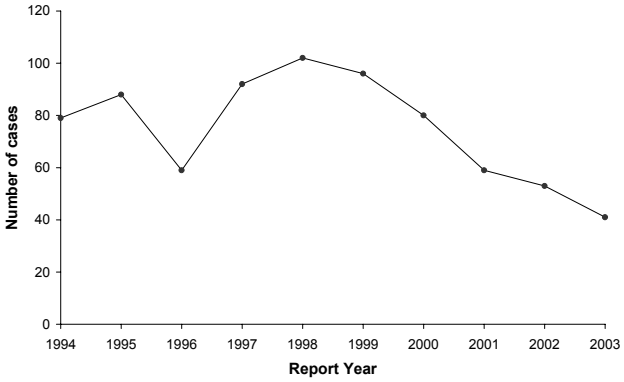
Risk Factor	Yes	No	Unknown	%[a]
Intravenous drug use	18	8	15	69%
Sexual contact with confirmed case	7	10	24	59%
Overseas travel in incubation period	3	17	21	15%
Body piercing/tattoo in last 12 months	5	12	24	29%
Household contact of confirmed case	5	16	20	24%
Occupational exposure to blood	1	10	20	5%
Blood product/tissue recipient	1	21	19	5%

[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 41 notifications of Hepatitis C in 2003. This is the lowest number since 1991 (Figure 13).

Figure 13. Hepatitis C notifications by year, 1994 - 2003



Rates varied for the DHBs throughout the country with the highest being for West Coast with 9.9 cases per 100 000 (3 cases) followed by Whanganui (3.1) and Bay of Plenty (2.8). Small numbers tend to distort these rates. The largest number of cases found in any one locality was six cases in Canterbury.

Sixty three per cent of notifications were for the 20 – 39 years age group. Twenty nine (71%) of the cases were males and 12 (29%) females. A table showing incidence by age and sex is in the appendix (Table 34).

Table 8 shows information about risk factors for hepatitis C in 2003. In keeping with other years the major risk factor was a history of intravenous drug use followed by sexual contact with a confirmed case. There has been a decrease in the number of cases with a history of occupational exposure to blood from five cases in 2002.

HEPATITIS (VIRAL) NOT OTHERWISE SPECIFIED (NOS)

There were five notifications of Hepatitis NOS in 2003, three in males and two in females all in the 20 – 39 age group. In the last seven years the mean number of cases notified has been four. Three of the five cases had been overseas during the incubation period, two of these to India. None had received a blood transfusion or blood products and none of the cases was hospitalised.

HYDATID DISEASE

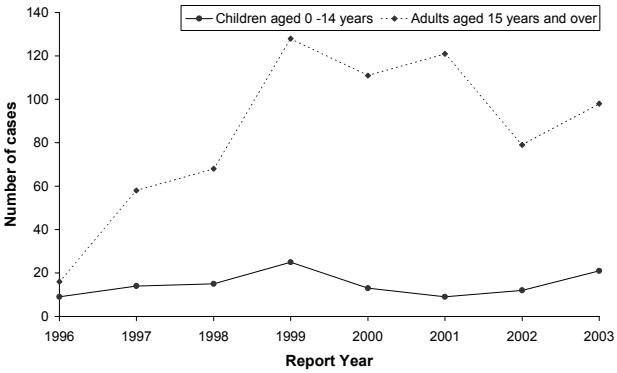
In September 2002 New Zealand was declared provisionally free of hydatids *(33)*. For the first time since 1991 there were no notifications of hydatid disease in 2003. There were nine hospitalisations for hydatid disease (ICD 9 code 122) in 2003, a decrease from 13 in the previous year. The incidence of this disease has been at very low levels for many years with the mean number of cases notified since 1994 being 3 cases per year.

LEAD ABSORPTION

One hundred and nineteen cases of lead absorption were notified in 2003. This is greater than 2002 (91 cases) but less than in 2001 (130 cases).

Lead absorption became a notifiable disease in June 1996. Figure 14, illustrates the number of lead absorption notifications in both children and adults, each year since 1996.

Figure 14. Lead absorption notifications by year, 1996 - 2003



Notifications were received from all DHBs except Hutt and West Coast. The highest rates were recorded in Waikato (7.9 per 100 000 population), MidCentral (7.7) and Otago District Health Boards (6.4).

Of the 119 cases notified in 2003, 21 (17.6%) were children aged 14 years or younger. This is the highest percentage of cases involving children since 1998 (18.1%, 15/83 cases). Fourteen of the 2003 cases were in the 1-4 years age group (age specific rate of 6.5 per 100 000 population), and one was aged less than one year. The next highest age specific rate was for the 40-49 years age group (6.0 per 100 000 population, 32 cases).

The majority of the cases were male; 84.7% of cases where sex was known (100/118). Ethnicity was recorded for 83.2% of cases; 93.9% (93/99) were of European ethnicity.

Of the 94 cases in 2003 for which hospitalisation status was recorded, five (5.3%) were hospitalised. Ten cases were linked to three reported outbreaks of lead absorption during 2003.

Table 9 shows a summary of risk factor information for lead absorption in 2003.

Blood lead concentrations were recorded for 20 of the 21 children and ranged from 0.66 to 2.1 µmol/l with a median of 1.12 µmol. Some cases had more than one risk factor recorded. In addition to those factors listed below, occupational exposure was also analysed. Information on occupation for the 98 adult cases was inconsistently recorded on EpiSurv.

Thirty cases were recorded as having had occupational exposure. Occupations included; painter, decorator, builder or sander (15 cases), foundry worker (4), and one each of ammunition packer, gold miner, scrap metal diver, demolition worker, engineer, lead battery manufacture employee, farmer, general hand and welder. A further case did not have an occupation recorded and another was recorded as retired. In addition, there were 14 cases with high-risk occupations, where occupational exposure was recorded as either unknown or not a risk factor. These cases included painters, builders, plasterers, handymen (13), and a bearing manufacture employee (1).

The most prominent risk factor for children was living in or regularly visiting a building built prior to 1970 that had paint chalking/flaking, and/or old paint been/being stripped and/or undergoing or had recently undergone alterations or refurbishment

Table 9. Exposure to risk factors associated with lead absorption, 2003

Risk Factor	Yes	No	Unknown	%[a]
Adults				
Case lived in or regularly visited a building built prior to 1970.	45	18	35	71.4
Case lived in or regularly visited a building built prior to 1970, that had paint chalking/flaking, and/or old paint been/being stripped and/or undergoing or recently undergone alterations or refurbishment	34	9	55	79.1
Case had exposure to lead through hobbies	17	39	42	30.4
Hobby is shooting/gun club	9			
Manufactures lead sinkers/bullets	4			
Boat renovations	2			
Close contact of case was occupationally exposed to lead	2	55	41	3.5
Case had gunshot pellets in body	2			
Children (<15 years)				
Case lived in or regularly visited a building built prior to 1970.	12	1	8	92.3
Case lived in or regularly visited a building built prior to 1970, that had paint chalking/flaking, and/or old paint been/being stripped and/or undergoing or had recently undergone alterations or refurbishment	11	0	10	100
Case played in soil containing paint debris	3	7	11	30.0
Close contacts of case were exposed to lead through hobbies	1	11	9	8.3
Close contacts of case were exposed to lead through occupation	0	12	9	0.0
Pica behaviour	2	10	9	16.7

[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 78 cases of legionellosis notified in 2003. This represents a rate of 2.1 per 100 000 compared with 1.3 in 2002. This is the highest number of cases recorded in the last ten years (mean 47 per year). Of the 78 cases notified, 72 were laboratory tested with 64 being confirmed and eight were not shown to be a case. The remaining six were notified only.

The highest rates were recorded in the Wairarapa (5.2), Hutt Valley (3.8), Waitemata and Capital and Coast (3.7 each) DHBs.

Forty eight cases were male, 29 were female with one of unknown sex. There were no cases aged less than 20 years with the highest rates of 5.5 per 100 000 in the 50 – 59 age group and 5.3 in the 70+ age group.

Figure 15. Legionellosis notifications and laboratory reported cases by year, 1994 - 2003

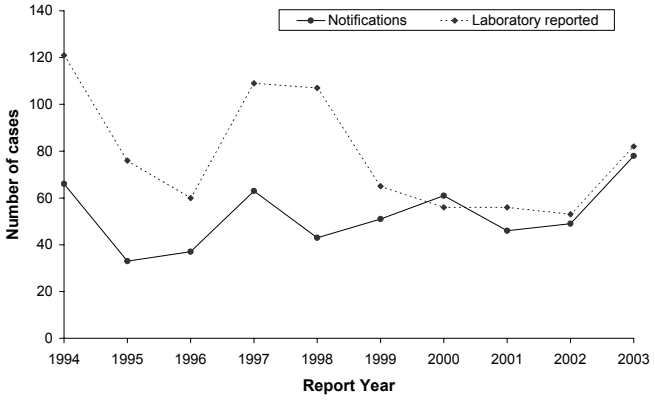


Table 10 provides a summary of risk factors. Note that some cases had more than one risk factor recorded.

Table 10. Risk factors associated with legionellosis, 2003

Risk Factor[a]	Yes	No	%[b]
Contact with definite or suspected environmental source of infection	25	10	71%
Smokers or ex-smokers	17	29	37%
Pre-existing immunosuppressive or debilitating condition	15	27	36%

[a] Potting mix or compost was also separately referred to as a risk factor (in the free text field) for nine cases.

[b] "%" refers to the percentage of cases who answered "yes" out of the total number of cases for whom this information was recorded

The majority of cases were sporadic in nature with four identified outbreaks in 2003, although only one was notified in 2003. The notified outbreak occurred in December 2002 and involved three cases of *L. pneumophila* serogroup 2 infection. All three cases were hospitalised and one of these cases, a male aged more than 70 years, died. *L. pneumophila* serogroup 2 was isolated from a display spa pool in an Auckland shop, which two cases had visited. No link could be found for the third case. A further outbreak also involving *L. pneumophila* serogroup 2 infections occurred in Lower Hutt in October 2003. Although there is strong circumstantial evidence of a display spa pool again being the source of this outbreak, *L. pneumophila* serogroup 2 was not isolated from the implicated spa pool. The other two outbreaks involved two cases each of *L. longbeachae* infection after exposure to compost. These both occurred in Auckland.

A cluster of *L. longbeachae* infections during October and November 2003 occurred in Upper Hutt involving four cases. The cases lived or worked within 1km of each other and the onset dates for three of the four cases were within two weeks of each other. The onset date for the fourth case in the cluster was within a month of the first. The implicated source for this common cluster was compost material.

A suspected outbreak involving staff and visitors at the Otahuhu Police Station in 2003 was not proven due to the inability to link any cases to the building. There had been a confirmed outbreak in this building in 2000. Although three legionellosis cases were identified amongst 12 notified cases from staff at the police station between February and August 2003, there was no commonality for the causative legionella agent. Clinical assessments were ambiguous. Extensive sampling did not isolate any legionella bacteria from the potable water supply for the building and there was no match between the legionella isolated from the cooling tower and the legionella serology results from any of the three positive cases.

A total of 82 cases of legionellosis fitting the case definition were laboratory diagnosed during 2003. Of these 52 fitted the confirmed case definition and 30 fitted the probable case definition. Sixty five (79%) of the laboratory diagnosed cases were notified. Table 11 shows the number of strains identified for the laboratory reported cases in 2003.

Table 11. Legionellosis strains for laboratory cases, 2003

Legionella species / serogroup	Number	%[a]
L. pneumophila	27	33%
L. longbeachae	25	30%
L. hackeliae	7	9%
L. micdadei	7	9%
L. bozemanii	4	5%
L. anisa	1	1%
L. bozemanii/L. longbeachae	1	1%
L. dumoffii	1	1%
L. jordanis	1	1%
Strain unable to be identified	8	10%

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

The number of cases of *L. longbeachae* and *L. pneumophila* both increased in 2003 compared with 2002. These accounted for most of the increased number of laboratory notifications (20/23).

LEPROSY

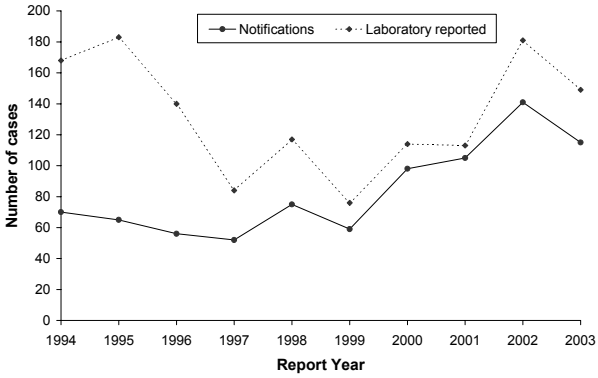
Four cases of leprosy were notified in New Zealand in 2003. All four were confirmed by biopsy. Two cases were multibacillary, one tuberculoid and one unknown. Two of the cases were hospitalised. For the first time since 1995 a child was notified. This was a case where a parent (a known case) transmitted the disease to their child. Of the cases two were Pacific people, one Maori and one of Indian ethnicity.

LEPTOSPIROSIS

A total of 115 cases of leptospirosis were notified in 2003, a rate of 3.1 per 100 000 population. This rate is not significantly different than that for 2002 (3.8 per 100 000 population) where 141 cases were notified. Of the 115 notified cases, 108 were laboratory confirmed. In addition, a further 41 cases were laboratory reported but not notified. This latter figure is known not to include all cases confirmed by Auckland A+ Laboratories.

The following graph Figure 16 shows the number of notified and laboratory-reported cases of leptospirosis each year since 1994.

Figure 16. Leptospirosis notifications and laboratory reported cases by year, 1994 - 2003



Cases were reported from 14 DHBs. The highest DHB specific rates were from Nelson Marlborough (10.6 per 100 000 population), Hawke's Bay (9.8) and Tairawhiti (9.1).

The majority of the cases where sex was recorded were male (89.3%). The highest age specific rates were in the 40-49 years (7.8 per 100 000 population, 42 cases) and 30-39 years (5.2 per 100 000 population, 30 cases) age groups. Ethnicity was recorded for 82.6% of the cases; rates were similar for Europeans (2.9 per 100 000 population, 76 cases) and Maori (2.5 per 100 000 population, 13 cases).

No leptospirosis related deaths were reported. Of the 84 cases for which hospitalisation status was recorded, 35 (41.7%) were hospitalised.

Occupation was recorded for 102 (88.7%) of the 115 notified cases. Of these, 88 cases (86.3%) were recorded as engaged in occupations previously identified to present high risk for exposure to *Leptospira spp.* in New Zealand The proportion of leptospirosis cases in high-risk occupations has not changed appreciably over the last two years (90.1% in 2002 and 88.4% in 2001).

Of the 102 cases with recorded occupation, 36 (35.3%) were farmers or farm workers, and 47 (46.1%) worked in the meat processing industry as freezing workers, butchers, or meat inspectors. Cases also included one stock truck driver, a shearer, a fencer/hunter, a forestry pruner (who had previously worked as a freezing worker) and a stevedore. Three further cases were recorded as having had occupational exposure, although their occupation was either not stated or not identified as high risk. Nine of the remaining 24 cases were recorded to have had non-occupational exposure to farm or wild animals or their products in the twenty days preceding onset of illness. In three instances, this was identified as recreational hunting. Of the remaining 15 cases, six were linked to outbreaks of leptospirosis although not all outbreaks were notified. There was one leptospirosis outbreak notified during 2003, involving four cases.

The Leptospira species and serovar was recorded on EpiSurv for 80 of the 115 notified cases: *L. borgpetersenii* sv *hardjo* (51 cases), *L. interrogans* sv *pomona* (18), *L. borgpetersenii* sv *ballum* (11), *L. borgpetersenii* sv *tarassovi* (4), and *L. interrogans* sv *copenhageni* (3). More than one serovar was recorded for six cases.

LISTERIOSIS

Twenty-four cases of listeriosis were notified in 2003, the highest number since 35 cases were notified in 1997. The 2003 rate of 0.6 per 100 000 population is not significantly different from the 2002 rate (0.5 per 100 000 population, 19 cases).

Six (25.0%) of the 2003 cases were recorded as perinatal. The percentage of perinatal cases over the last five years has ranged from 11.1% (2/18) in 2001 to 31.8% (7/22) in 2000.

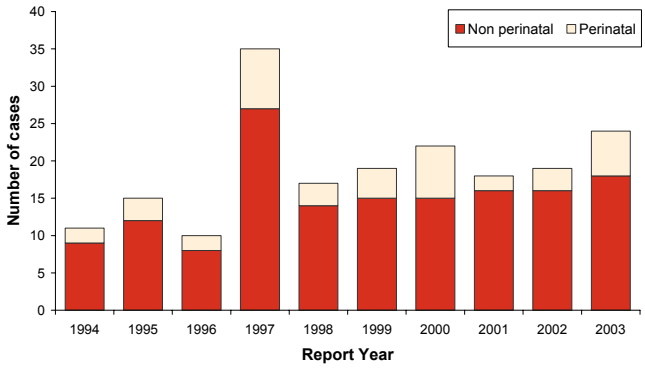
Figure 17 shows listeriosis notifications (perinatal and non-perinatal) each year for the last 10 years.

Cases were reported from 10 DHBs with the greatest number reported from Waitemata, Auckland, and MidCentral (four each).

Thirteen (72.2%) of the 18 non-perinatal cases were aged 50 years or over, five of who were more than seventy years old. Two non-perinatal cases were aged less than one, and a further two were in the 1-4 years age group. Males outnumbered females 2 to 1 for the non-perinatal cases. Over three quarters (76.5%) of the non-perinatal cases for which ethnicity was recorded were European.

Two non-perinatal and two perinatal cases resulted in death. Where hospitalisation status was recorded (all but two cases), all cases were hospitalised. Twelve of the 18 non-perinatal cases had an underlying illness, including one of the fatal cases. Eight were receiving immunosuppressive drugs including the same fatal case, and four were admitted to hospital for treatment of another illness.

Figure 17. Listeriosis notifications by year, 1994 – 2003



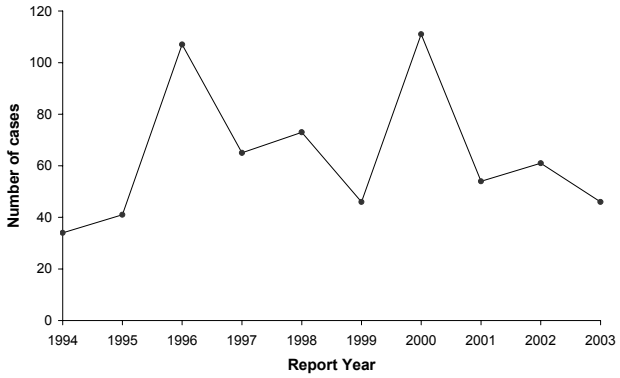
All 24 cases were laboratory confirmed. Just over half (14/24, 58.3%) of the isolates were serotype 4, the remainder were serotype 1/2.

MALARIA

There were 46 cases of malaria notified in New Zealand in 2003. This was the lowest number of cases since 1995.

Four cases were aged less than 15 years. Five were military personnel. Seven cases were recorded as being on an accepted prophylaxis regime.

Figure 18. Malaria notifications by year, 1994 – 2003



Forty cases (87.0%) had a history of overseas travel with six unknown. Nine had been to Papua New Guinea, six to Africa, five to the Solomon Islands and four to Vanuatu.

In 40 cases the species of plasmodium was identified with only one mixed infection of *P. falciparum* and *P. vivax*. Only four cases of *P. falciparum* were dianosed in contrast to 2002 when there were 15 cases. *P. falciparum* was related to travel in PNG (2), Solomon Islands (1) and Indonesia(1). There were three cases of *P. malariae* and one case of *P.ovale* all related to travel in Africa. The summary of travel history and plasmodium species is given in Table 12

Table 12. Species of malaria associated with area of overseas travel, 2003

Area visited	*P. vivax*	*P. falciparum*	*P. ovale*	*P. malariae*	Unknown
PNG/East Timor	9	2			2
Solomon Islands	2	1			2
Vanuatu	3				1
Africa			1	3	
Asia	6	1			
Central America					1
Unknown travel	11				1
Total	31	4	1	3	7

MEASLES

In 2003 there were 66 measles notifications, and 15 laboratory-reported cases.

Figure 19 shows notified and laboratory-reported cases from 1996 to 2003. The 2003 notification rate was 1.8 per 100 000 population.

Measles notification rates varied geographically throughout the country in 2003. The highest rates were recorded in MidCentral (10.3), West Coast (9.9), Nelson Marlborough (6.5) DHBs.

Age-specific rates were highest in the less than one year and the 1-4 years age groups, with rates of 22.0 and 13.4 per 100 000 population, respectively.

Ethnicity was recorded for 61 (92.4%) of all measles notifications during 2003. The highest rate occurred among those of Other ethnicity (2.4 per 100 000 population), followed by those of Pacific Peoples ethnicity (2.0). Maori experienced the lowest rate of disease (1.1 per 100 000 population).

Of the 62 notified cases in 2003 for which hospitalisation status was recorded on EpiSurv, eight were hospitalised. Of these five cases were female and three cases were male.

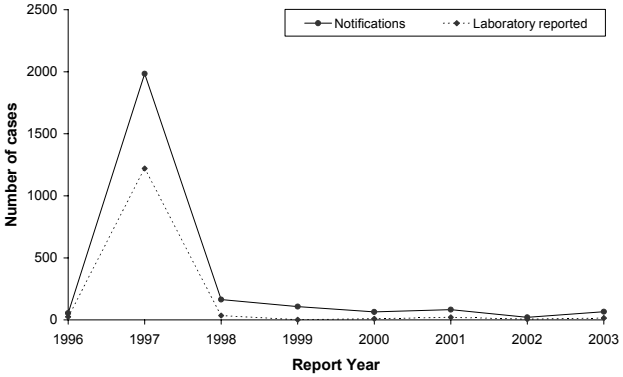
The recommended MMR immunisation schedule since January 2001 is to give the first dose at 15 months and the second at four years of age. Vaccination status was recorded for 58 cases. Of these 21 (36.2%) had received at least one dose of MMR vaccine.

Table 13 shows vaccination status by age group.

Three measles cases reported overseas travel during the incubation period.

Of the 52 cases for which this information was recorded, 32 (61.5%) attended school, pre-school or childcare.

Figure 19. Measles notifications and laboratory reported cases by year, 1996 – 2003



Two outbreaks of measles were reported in 2003, involving 23 cases.

Measles can be a difficult diagnosis to make clinically. According to the Immunisation Handbook 2002 notification should be made on clinical suspicion with laboratory testing for the first cases seen in a community *(30)*. Frequently notifications of "probable" cases are not confirmed. Data for 2003 highlight this particular difficulty with measles surveillance. In 2003 there were 66 notifications, and 15 laboratory-reported cases. Only 8 of the remaining 51 cases reported contact with a laboratory confirmed case of measles.

Measles epidemics have a periodicity of approximately 6 years in New Zealand with the last one in 1997. In this situation it is particularly important that follow-up laboratory information is provided for accurate surveillance.

Table 13. Age and vaccination status of measles notifications, 2003

Age group	Total cases	Vaccination Status					
		1 dose	2 doses	3 doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15mths	12	0	0	0	0	10	2
15mths-4yrs	29	6	0	1	5	15	2
5-9 yrs	14	2	3	0	3	4	2
10-19 yrs	4	1	1	0	1	1	0
20+ yrs	7	1	0	0	2	2	2
Total	66	10	4	1	11	32	8

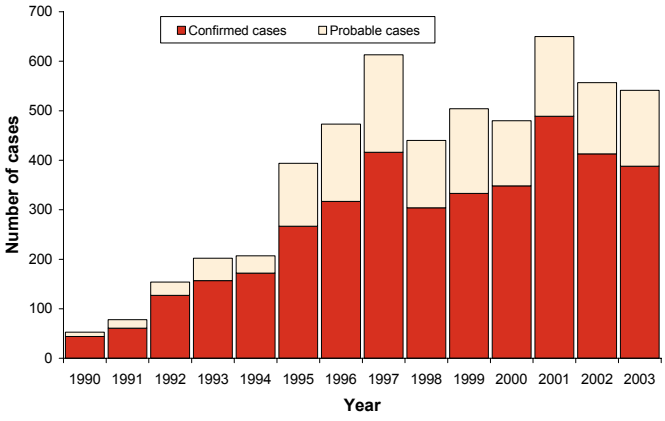
MENINGOCOCCAL DISEASE

A full description of the epidemiology of meningococcal disease in 2003 is contained in a separate report *(34)*.

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 541 cases of meningococcal disease was notified in 2003, giving a rate of 14.5 per 100 000 population. This rate is slightly less than that for 2002 (14.9 per 100 000 population, 557 cases) yet is still approximately ten times higher than the rate of 1.5 per 100 000 population occurring in the immediate pre-epidemic years (1989-90). Of the 541 cases for 2003, 388 (71.7%) were laboratory confirmed. 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). All tables in the appendices of this report are based on report date hence figures may differ slightly.

Figure 20 shows the number of confirmed and probable cases of meningococcal disease since 1990.

Figure 20. Meningococcal disease notifications by year, 1990 - 2003



The rate of meningococcal disease varied throughout the country in 2003, with the highest rates recorded in the Counties Manukau (28.5 per 100 000 population), Whanganui (28.3) and Lakes (27.1) DHBs. The lowest rates were from Nelson Marlborough DHB (0.8 per 100 000 population) and West Coast DHB (3.3) each with only one notified case.

Figure 21 illustrates the rates of meningococcal disease by DHB. Note that this map uses a different classification to that used elsewhere in this report. The legend has been adjusted to show how New Zealand rates differ to those in most industrialised countries where less than 3 cases are reported per 100 000 population per annum.

As in previous years, the highest age specific rates occurred in the less than one age group (124.4 per 100 000 population) followed by the 1-4 years age group (59.7). Pacific Peoples had the highest age standardised rate (39.2 per 100 000 population), followed by Maori (22.7). The age standardised rate for Europeans was 10.4 per 100 000 population.

For children the risk of disease is strongly associated with increasing deprivation (as measured on the NZDep 2001 scale *(41)*).

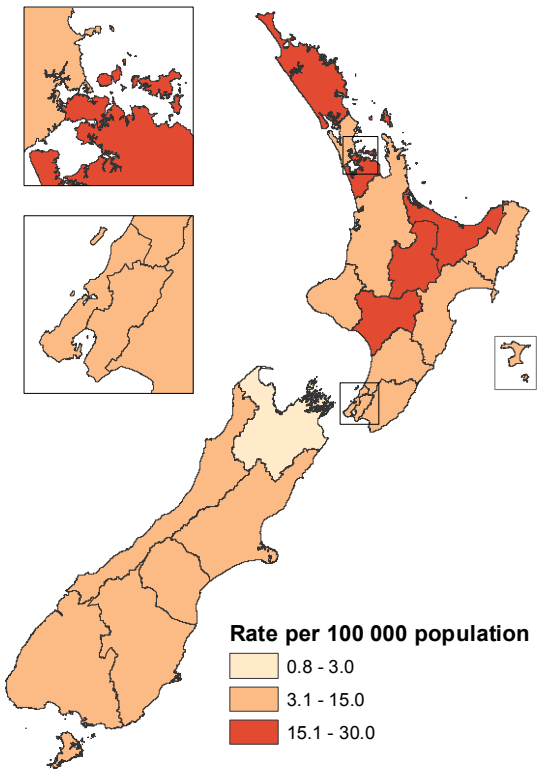
Thirteen deaths were reported during 2003 with the associated case fatality rate of 2.4% the lowest throughout the course of the epidemic. This brings the number of deaths since 1991 to 216, with an average case fatality rate of 4.1%. Hospitalisation status was recorded for all 541 cases, and of these 97.2% (526) were hospitalised.

Data on pre-hospital management were recorded for 534 cases, including all of the fatal cases. These data show that 24.2% (129/534) of cases received antibiotic treatment prior to hospital admission. In 2003, there were two fatalities among cases seen by a doctor prior to hospital admission and given antibiotics, giving a case-fatality rate among this group of 1.6%. By comparison the case-fatality rate was 2.9% among those cases not seen by a doctor prior to admission and not given pre-hospital antibiotics.

In 2003, information on clinical presentation was available for 526 (97.2%) of the 541 cases. A petechial or purpuric rash was the most common clinical description, (71.4%, 390/526), followed by septicaemia (59.5%, 313/526) and meningitis (49.0%, 258/526). There were 2 cases with septic arthritis.

The increase in disease rates since 1991 has almost completely been attributable to serogroup B meningococci expressing the PorA P1.7b,4 protein. Serogroup B disease and particularly that caused by the epidemic strain continued to dominate in 2003. Serotyping and PCR analysis of either isolates or DNA from cases showed that in 2003 84.9% of group B cases possessed the P1.7b,4 PorA protein.

Figure 21. Meningococcal disease notifications by DHB, 2003



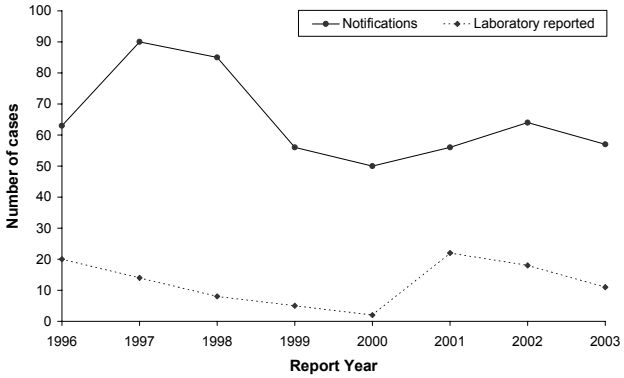
MUMPS

A total of 57 cases of mumps was notified and 11 cases were laboratory-reported in 2003. In comparison, during 2002, 64 cases of mumps were notified and 18 cases were lab-reported.

After the last epidemic in 1994 involving 250 cases, mumps became a notifiable disease in June 1996. Figure 22 shows notified and/or laboratory-reported cases each year since 1996.

The 2003 notification rate of 1.5 per 100 000 population was similar to the 2002 rate of 1.7 per 100 000 population. The rates of mumps varied throughout the country in 2003. The highest rates were recorded in Wairarapa (2.6 per 100 000 population), Tairawhiti (2.3), Capital and Coast (2.0) and Canterbury (1.9) DHBs.

Figure 22. Mumps notifications and laboratory reported cases by year, 1996 - 2003



There were no mumps cases in the less than 15 months age group. Age-specific rates were highest in the 1-4 years and 5-9 years age groups, with rates of 6.5 and 5.2 per 100 000 population, respectively.

The 2003 mumps notification rates for females was 7.2 per 100 000 population and for males 5.0 per 100 000 population in 5-9 years age group. In all the other age groups, rates were higher in males than females.

Ethnicity was recorded for 50 notifications during 2003. The highest rate occurred among those of Other ethnicity (1.6 per 100 000 population with four cases), followed by those of Maori ethnicity (1.5 per 100 000 population with eight cases). The European ethnic group experienced the lowest rate of disease (1.3 per 100 000 population with 35 cases).

Of the 57 cases notified during 2003, 53 (91.2%) had hospitalisation information recorded. Of these 3 cases were hospitalised.

One mumps case reported overseas travel during the incubation period and one cases reported contact with a laboratory confirmed case of mumps. Of the 37 cases for which this information was recorded, 20 (54.1%) attended school, pre-school or childcare. The recommended immunisation schedule for mumps in 2003 was two doses of MMR vaccine, the first given at 15 months of age and the second given at age 4 years of age. Vaccination status was recorded for 39 cases notified during 2003. Of these, 24 (61.5%) had received at least one dose of MMR vaccine.

Table 14 shows the number of doses of MMR vaccine given to mumps cases in each relevant age group.

Table 14. Age group of mumps notifications and vaccination received, 2003

Age group	Total cases	Vaccination Status					
		1 dose	2 doses	3 doses	Vaccinated (no dose info)	Not vaccinated	Unknown
<15mths	0	0	0	0	0	0	0
15mths-4yrs	17	6	1	0	2	5	3
5-9 yrs	15	5	4	0	1	2	3
10-19 yrs	9	0	3	1	1	0	4
20+ yrs	16	0	0	0	0	8	8
Total	57	10	9	1	4	15	18

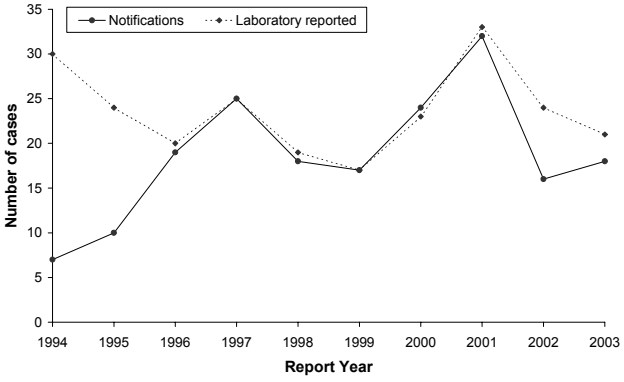
PARATYPHOID FEVER

Eighteen cases of *Salmonella* Paratyphi were notified in 2003. In addition three further cases were laboratory confirmed. The isolates were identified as *S.* Paratyphi A (10), *S.* Paratyphi B var Java (9), and *S.* Paratyphi A (2). The 2003 rate of 0.5 per 100 000 population was slightly higher than the 2002 rate of 0.4. Of the 14 cases for which hospitalisation status was recorded, 10 (71.4%) were hospitalised. One *S.* Paratyphi outbreak was reported in 2003, from Auckland accounting for two cases. Figure 23 shows the number of notified and laboratory-reported cases of paratyphoid each year since 1994.

The majority of the cases (12/18 or 66.7%) were aged between 20-49 years. Eight cases (44.4%) were male and 10 (55.6%) were female. Ethnicity was recorded for 16 (88.9%) cases, of whom nine were European (56.3%) and seven were Other ethnicity (43.8%).

Overseas travel information was recorded for 14 of the 18 cases. Twelve of the 14 cases (85.7%) were recorded as having travelled overseas during the incubation period for the disease. The countries visited were: India (3), Thailand (2), Cambodia (2), Indonesia (3), Malaysia, and Peru (1 each).

Figure 23. Paratyphoid fever notifications and laboratory reported cases by year, 1994 - 2003

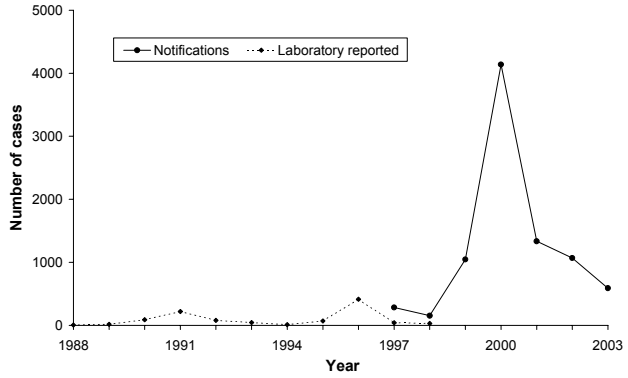


PERTUSSIS (WHOOPING COUGH)

Pertussis is a vaccine preventable disease caused by the bacterial agent *Bordetella pertussis* with epidemics of four to five years periodicity. In New Zealand routine childhood vaccination was introduced in 1960 and it has been a notifiable disease since 1996.

In 2003, 589 cases of pertussis were notified, representing a population rate of 15.8 per 100 000. Fifty eight percent of all cases were laboratory confirmed. The number of pertussis cases in 2003 was significantly lower than in 2002, and continues to decline after the most recent epidemic, which started in 1999 (see Figure 24).

Figure 24. Pertussis notifications and laboratory confirmed cases by year, 1988 - 2003



In 2003, the rate of pertussis varied by geographical region (see Figure 25), with the highest rates reported in South Canterbury (56.8 per 100 000) and Hawke's Bay (43.9 per 100 000) DHBs. The lowest rate was in the Taranaki DHB (4.9 per 100 000) and Wairarapa DHB reported no cases.

Sex and ethnicity were recorded for 99.0% and 90.8% of cases, respectively. Age was recorded for all cases. Forty six percent (267/583) of cases were males and 81.3% (435/535) were of European ethnicity. Highest rates were found in those aged less than one year (168.3 per 100 000 in males and 157.1 per 100 000 in females).

Overall, highest rates were found in those of European ethnicity (16.7 per 100 000) compared to all other ethnic groups. However when stratified by age, highest rates were in Pacific Peoples aged less than one year (213.9 per 100 000).

Of the 559 notified cases in 2003 for which hospitalisation status was recorded on EpiSurv, 70 (12.5%) were hospitalised. Of those hospitalised 41.4% (29) were known to have started the vaccination schedule, and 5.7% (4) had completed the course of vaccinations. One fatal case of pertussis was recorded in 2003, that of a hospitalised one-month-old male.

From February 2002 the recommended immunisation schedule for pertussis was a primary course of DtaP-IPV at six weeks, three months and five months of age. A booster was recommended at 15 months with DtaP/Hib, and a further booster at four years of age with DtaP-IPV prior to school entry. During 2002, the EpiSurv Case Report Form captured information on up to four vaccine doses.

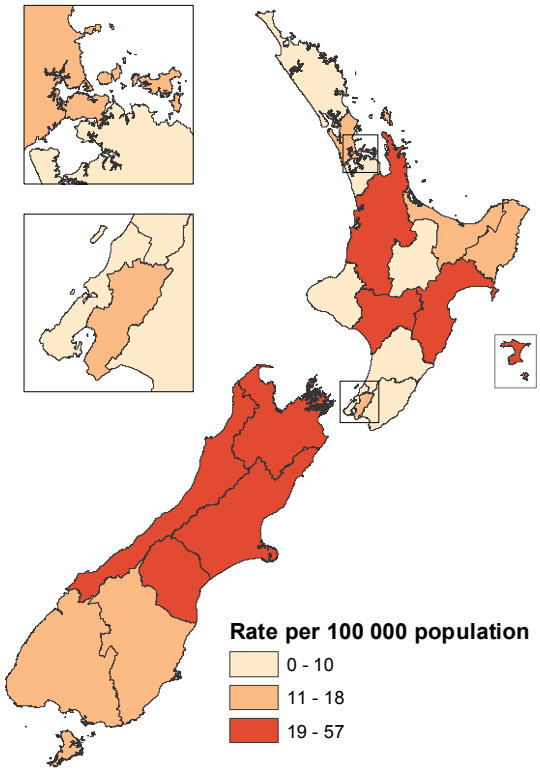
Vaccination information was recorded for 432 (73.3%) cases. A total of 103 cases had received a complete course of vaccinations and a further 61 cases were in receipt of three vaccine doses. Across all age groups, the proportion of cases vaccinated was 50.8% (299/589). A major aim of vaccination is to prevent infection in young children who are particularly vulnerable to disease. However, the surveillance data available from EpiSurv shows that only 30.2% (16/53) of those aged four months or less, had received the vaccines for which they were eligible (see Table 15).

Table 15. Pertussis notifications by age group and vaccination received, 2003

Age group	Total cases	Vaccination Status[a]				
		1 dose	2 doses	3 doses	4 doses	Unknown
0 - 5wks	6	(0)	(0)	(1)	(0)	0
6wk - 2mths	40	9	(0)	(0)	(0)	2
3 - 4mths	13	6	1	(0)	(0)	0
5 - 14mths	54	2	4	14	(5)	3
15mths - 3yrs	61	1	0	6	21	6
4+ yrs	415	10	5	40	77	86
Total	589	28	10	61	103	97

[a] Numbers in brackets indicate vaccination when the case was ineligible or age or vaccination data has been incorrectly recorded.

Figure 25. Pertussis notifications by DHB, 2003



In 2003, there was six outbreaks of pertussis involving a total of 16 cases, two of the outbreaks occurred in the Southland Health District.

In 2003, the incidence of pertussis in New Zealand continued to decline after the last national epidemic in 2000. However, there is evidence to suggest that the effective vaccination rate in New Zealand is as low as 50% *(29)*. This along with high population infection rates and the death of an infant in 2003, reaffirms the need for increases in vaccine coverage *(24)* and timely vaccination *(25)* in New Zealand.

Pertussis vaccination has been available since 1945 and supplied free to medical practitioners, as DPT, since 1960. In spite of that after 43 years there were still 589 cases notified in 2003. There is a significant pool of pertussis infection in

the older age groups. There were 87 cases (14.8%) in the over 40 years group and 67 (11.4%) cases in those aged 20 – 39 years. These patient usually do not have the classic "whoop" and serological surveys indicate that there is probably considerable under reporting of cases *(16)*.

The immunity provided by vaccination is not life-long and is not 100% effective and therefore it is important that children are immunised on time according to the immunisation schedule. A strategy may also be needed to address the persisting pool of infection in the adult population.

PLAGUE

Although no plague cases have been notified in New Zealand for many years it continues to be enzoonotic in wild rodent populations over large rural areas of the Americas, Africa and Asia and adventure tourists may be at risk of contracting the disease *(23)*.

POLIOMYELITIS (POLIO)

There were no polio notifications in 2003. The last case of wild-type polio virus infection was in 1962. Cases of vaccine-associated paralytic poliomyelitis (VAPP) have occurred in 1970, 1977, 1990 and 1998. In February 2002 New Zealand introduced the Inactivated Polio Vaccine to avoid these problems in the future.

The New Zealand Paediatric Surveillance Unit carries out active surveillance of acute flaccid paralysis (AFP). In 2003 there were nine cases of AFP notified to the unit. All of these were negative for polio on investigation.

PRIMARY AMOEBIC MENINGOENCEPHALITIS

No case of this disease was reported in 2003. Only one case of primary amoebic meningoencephalitis (PAM) has been reported in the last 20 years and that was in 2000 *(1)*.

A recent review of cases in Thailand indicates that PAM is still a public health issue with swimming in public pools being a major risk factor. With the increasing number of New Zealand adventure tourists to Thailand and similar destinations vigilance needs to be maintained *(48)*.

RABIES

New Zealand has long been a rabies-free country. The disease is still occurring overseas in both developed and developing countries and two deaths were reported from the USA in 2003. One in Virginia associated with raccoon rabies and another in California associated with bat rabies *(15, 40)*.

RICKETTSIAL DISEASE

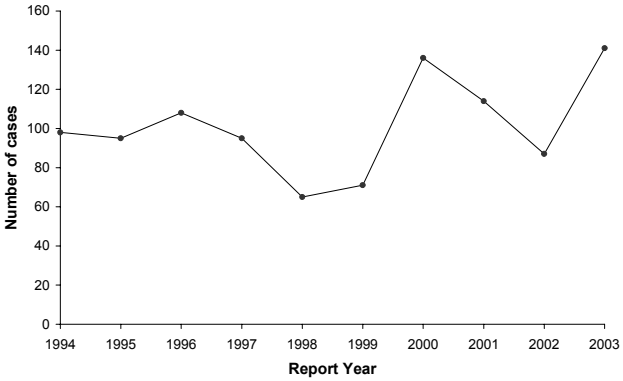
Only one case of Rickettsial disease was notified in 2004. This was a case of Boutonneuse Fever caused by *Rickettsia conorri.* The case was in an adult male with a history of overseas travel to South Africa. The disease is endemic in the African continent, India and those parts adjacent to the Mediterranean, Black and Caspian Seas.

RHEUMATIC FEVER

In 2003, 141 initial cases and two recurrent cases of rheumatic fever were notified. This represents a population rate of 3.8 per 100 000 initial cases, a significant increase from 2002 (2.3 per 100 000). This increase may not be a true increase in the burden of disease but rather due to delayed reporting of 2002 cases. Some healthcare facilities report rheumatic fever in batches at irregular intervals. Because the date of onset is not routinely reported, it is not possible to determine the proportion of 2003 cases attributed to 2002. The rate of recurrent cases in 2003 of 0.1 per 100 000 was not significantly different to 2002 (0.2 per 100 000).

In 2003, the rates of initial cases of rheumatic fever varied by geographical region with the highest rates reported in the Counties Manukau and Auckland DHB (14.4 per 100 000 and 7.9 per 100 000 respectively). The two recurrent cases also occurred in these two DHBs.

Figure 26. Rheumatic fever (initial cases) by year, 1994 - 2003



Of the 141 initial rheumatic fever cases, 63.8% had laboratory confirmed diagnosis for streptococcal infection. Complete data on age was recorded in EpiSurv, but sex and ethnicity were only completed for 80.1% and 96.5%, respectively, of cases. The rate of initial cases was 3.8 per 100 000 in males and 2.2 per 100 000 in females. The majority (90.8%) of cases were in those aged less than 19 years and the highest rates were found in the 10-14 year age group (28.2 per 100 000). Among those aged under 15 years, the incidence rates of ARF increased markedly with increasing deprivation (as measured on the NZDep 2001 scale *(41)*).

Differences in disease burden by ethnic group are shown in the appendix (Table 34). Overall rates were more than ten times higher in Pacific Peoples compared to the European population.

Of the 45 cases where hospitalisation data was recorded in EpiSurv, 86.7% were hospitalised. No cases were recorded as having died of rheumatic fever in 2003.

Rheumatic fever can be prevented through early detection of streptococcal infections, appropriate antibiotic treatment and addressing socioeconomic determinants of health e.g. reducing overcrowding.

ROSS RIVER VIRUS

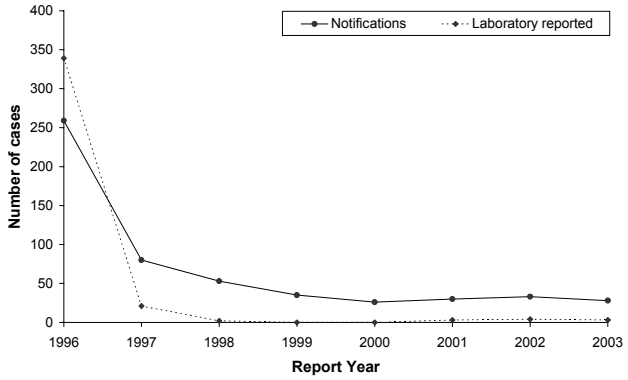
One case of Ross River virus infection was notified in 2003. The case was a visiting male from Australia in the 15-19 years age group who required hospitalisation. Similarly one case was notified in 2002, also linked to Australia. Since the disease became notifiable in 1970, 11 cases have been notified; one in 1980 and 10 since January 1997, peaking at three cases in 2001.

RUBELLA (GERMAN MEASLES)

Rubella is a mild infectious disease, although it can have serious consequences for the foetus of a pregnant woman. It can occur in epidemics every six to nine years in populations where vaccinations have not been in use. In New Zealand, rubella immunisation was introduced in 1970 and it has been a notifiable disease since June 1996.

In 2003 there were 28 notifications of rubella representing a population rate of 0.7 per 100 000. Between 2002 and 2003 the number of notifications was not significantly different (see Figure 27). Laboratory surveillance reported three cases of rubella, in 2003. There were no cases of congenital rubella.

Figure 27. Rubella notifications and laboratory reported cases by year, 1994 - 2003



In 2003, highest rates were seen in the West Coast and Hawke's Bay DHBs (13.2 and 4.2 per 100 000 respectively). There was one rubella outbreak in the West Coast Health District in 2003. The outbreak was contained within a home and involved two cases.

Sex and ethnicity data was recorded in 96.4% of cases, age in all cases. Fifty two percent (14/27) of the cases were in males and 70.4% (19/27) in those of European ethnic origin. Over three quarters of cases (78.6%) were in those of four years old or less.

None of the 25 cases for which hospitalisation status was recorded, were admitted to hospital.

Of the 21 cases for which risk factor information was collected eight were known to have attended preschool, of which 37.5% (3/21) were not immunised. No cases reported overseas travel.

The recommended vaccination schedule for rubella is a primary dose at 15 months and a second dose at four years of age. Of all the cases, eleven (39.3%) had received part or complete vaccination. Of these, three had completed the MMR vaccination course and six had received only the first dose of MMR. Table 16 shows vaccination status by 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 Paediatric Surveillance Unit.

Table 16. Age group of rubella notifications and vaccination received, 2003

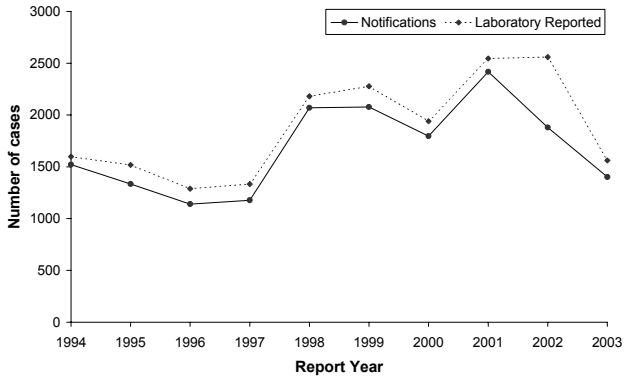
Age group	Total	Vaccination Status[a]		
		1 Dose	2 Doses	Unknown
<15mths	16	(3)	(1)	0
15mths- 3yr	6	3	0	1
4yr - 10 yr	3	0	2	0
>10yr	3	0	0	1
Total	28	6	3	2

[a] Numbers in brackets indicate vaccination when the case was ineligible or age or vaccination data has been incorrectly recorded.

SALMONELLOSIS

A total of 1 401 cases of salmonellosis were notified in 2003. The Enteric Reference Laboratory at ESR reported 1562 *Salmonella* isolates (exclusive of *S*. Paratyphi and *S*. Typhi reported elsewhere). The 2003 notification rate of 37.5 cases per 100 000 population was significantly lower than the 2002 rate of 50.3. Figure 28 shows the number of laboratory-reported cases of salmonellosis by year since 1997 and the number of notified cases since 1994.

Figure 28. Salmonellosis notifications and laboratory reported cases by year, 1994 - 2003



Salmonellosis rates varied throughout the country in 2003, as Figure 29 illustrates. The highest rates were recorded in South Canterbury (64.4 per 100 000 population), Waikato (51.6) and Hawke's Bay (49.5) District Health Boards.

Sex was recorded for 1380 (98.5%). Of these, 721 cases (52.2%) were male and 659 (47.8%) were female. Age was recorded for 1397 of the cases. Age-specific rates of 153.7 and 135.6 per 100 000 for the less than one year and the 1-4 years age groups respectively, were higher than for all other age groups.

Of the 1118 cases for which hospitalisation status was recorded, 167 (14.9%) were hospitalised. Among the cases for whom this information was recorded, 26.1% (196/752) had consumed untreated water, 25.7% (234/911) had contact with farm animals, 18.3% (145/793) had recreational water contact, 15.4% (150/974) had been overseas during the incubation period, 14.7% (122/828) had contact with children in nappies or other faecal matter, 13.4% (110/820) had contact with a symptomatic case, 5.9% (45/765) had contact with sick animals, and 5.3% (50/936) were food handlers.

Figure 29. Salmonellosis notifications by DHB, 2003

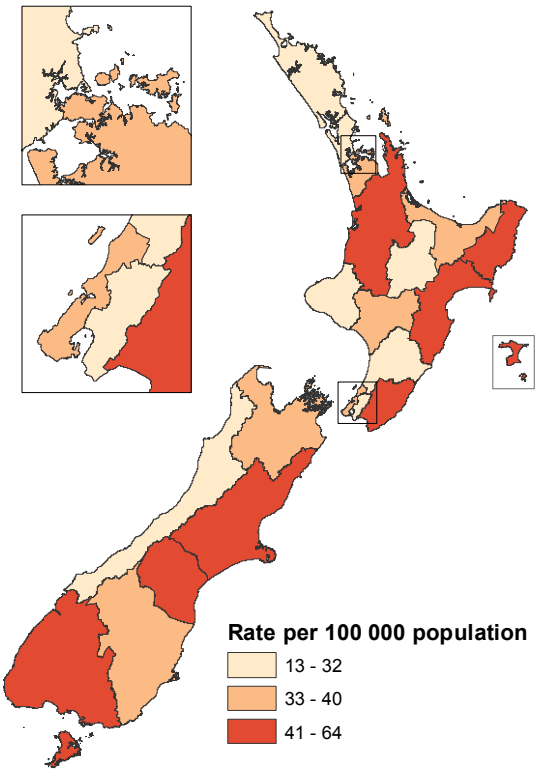


Table 17 shows the number of cases of selected *Salmonella* types reported by the Enteric Reference Laboratory at ESR.

Table 17. Selected *Salmonella* serotypes and subtypes of laboratory-confirmed salmonellosis, 2000 - 2003

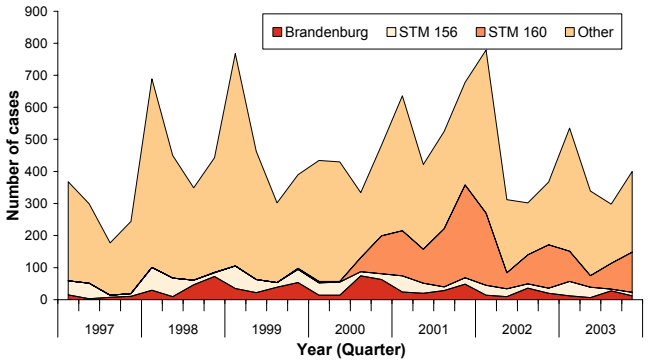
Subtype	2000	2001	2002	2003
S. Typhimurium	1257	1666	1267	953
DT160	180	791	561	334
DT1	146	171	225	110
DT135	420	264	155	68
DT156	110	111	85	95
DT101	122	77	44	66
Other or unknown	279	252	197	280
S. Enteritidis	156	170	172	137
PT9a	80	73	88	65
PT4	50	24	41	22
Other or unknown	26	73	43	50
S. Infantis	35	73	94	89
S. Brandenburg	184	137	85	55
S. Saintpaul	25	16	35	27
S. Thompson	9	16	25	10
S. Montevideo	18	5	21	37
S. Heidelberg	3	127	15	11
Other/unknown serotypes	444	336	305	243
TOTAL[a]	1940	2546	2559	1562

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

The incidence of most Typhimurium definitive types (DT) declined, with the exception of DT156. The incidence of *S.* Montevideo has increased following the tahini outbreak in 2003. DT160 remained the most common single type, despite a decline in incidence.

Figure 30 illustrates examples of *Salmonella* types that have emerged in recent years and their changing contribution to the overall *Salmonella* burden in New Zealand. The contribution of *S.* Typhimurium DT160 and *S.* Brandenburg have declined while *S.* Typhimurium DT 156 and *S.* Montevideo have increased in 2003.

Figure 30. Laboratory reported cases of *S.* Brandenburg, STM 156 and STM 160 by month, 1995 – 2003



Twenty-three outbreaks of salmonellosis were reported in 2003, involving 59 cases from Auckland, Rotorua, Waikato, and Wanganui health districts.

SARS (Severe Acute Respiratory Syndrome)

The national and international response to the SARS epidemic has been well documented. There was an unprecedented level of international cooperation in both public health surveillance and laboratory circles. This lead to the identification of a unique coronavirus though the actual source of the outbreak is still not certain *(31, 49)*.

This international activity was reflected in New Zealand with SARS being made a notifiable disease and putting in place a facsimile based reporting system. Protocols were developed for handling cases and contacts. A SARS Technical Advisory Group was established at the Ministry of Health. One of its major functions was to examine each notified case and make an assessment as to classification.

Within New Zealand there were 13 notifications between 20th March and the 4th of June 2003. Ages ranged from 2 years to 67 years. Five of the cases were female and eight males.

As with any influenza like illness the case definition was vital in the detection of cases prior to the availability of laboratory results. The most important risk factors were contact with a known case of SARS or travel in an endemic country. Presenting symptoms and risk factors for the notifications were as in Table 18.

Laboratory investigations for all cases were negative for a coronavirus.

Cases are still being reported in China in January 2004 highlighting the need for continued vigilance.

Table 18. Exposure to risk factors associated with SARS, 2003

Risk Factor	Yes	No	Unknown
Travel to endemic area	13	0	0
Contact with SARS case	0	12	1
Fever > 38 degrees C	13	0	0
Cough	12	1	0
Dyspnoea	4	9	0
'Flu' like symptoms	6	7	0
Hospitalised	11	2	0
Chest X-ray evidence	4	9	0
Acute respiratory distress syndrome	0	13	0

SHIGELLOSIS

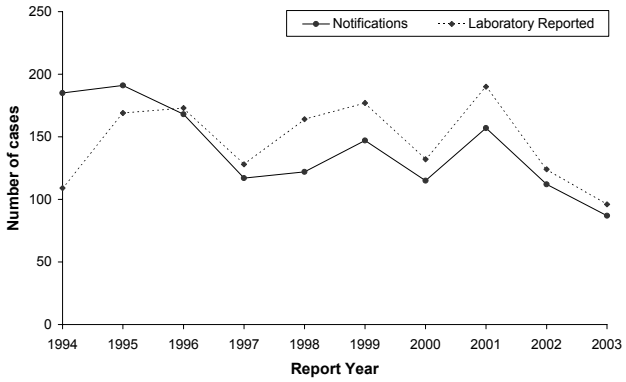
A total of 87 cases of shigellosis was notified in 2003. The 2003 notification rate of 2.3 per 100 000 population was lower than the 2002 rate of 3.0. Of the 67 notified cases for whom hospitalisation status was recorded, 25 (37.3%) were hospitalised. Three shigellosis outbreaks were reported in 2003, from Auckland accounting for 15 cases.

The Enteric Reference Laboratory at ESR reported 96 *Shigella* isolates during 2003. The predominant serogroups identified were: *S. flexneri* 2a (31.3 %), *S. sonnei* Biotype a (25.0%), *S. flexneri* 3a (6.3%), and *S. boydii* 13 (5.2%).

Figure 31 shows the number of notified and laboratory-reported cases of shigellosis each year since 1994.

The rate of shigellosis varied throughout the country in 2003, as Figure 32 illustrates. The highest rates were recorded in Auckland (7.3 per 100 000 population), Wairarapa (5.2), Counties Manukau (3.7), Waitemata (3.5), and Capital and Coast (2.8) District Health Boards.

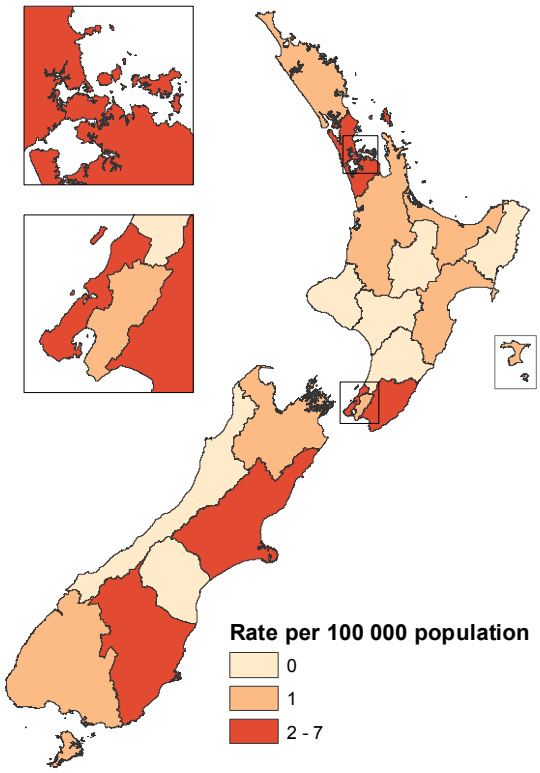
Figure 31. Shigellosis notifications by year, 1994 - 2003



Sex was recorded for 85 (97.7%) of the 87 cases. Of these, 38 (44.7%) were male and 47 (55.3%) were female. Ethnicity was recorded for 62 (71.3%) cases, of which 32 (51.6%) were European, 27 (43.5%) were Pacific People, 6 (9.7%) were Other ethnicity and 3 (4.8%) were Maori.

Risk factors were recorded for some of the cases. Among cases for whom this information was recorded, 21.1% (8/38) had consumed non-habitual water, 8.1% (3/37) had consumed untreated water, 6.5% (2/31) had contact with a confirmed case, 4.7% (2/43) had contact with faecal matter, and 4.3% (2/46) had contact with farm animals.

Figure 32. Shigellosis notifications by DHB, 2003



Overseas travel information was recorded for 58 of the 87 notified cases. Of these, 31 (53.4%) reported travelling overseas during the incubation period. The countries/regions visited were recorded for 30 of the 31 cases. Overseas destinations were: Vanuatu (4), Fiji (4), India (3), Iran (2), Marshall Islands (2), Mexico (2), Afghanistan, Australia, Bali, Cambodia, Ethiopia, Laos, Malaysia, New Caledonia, Pakistan, Peru, Samoa, Singapore, and Thailand (1 each).

TAENIASIS

One case of taeniasis was notified in 2003. The case was confirmed by laboratory testing and occurred in an adult female who had spent two months in Thailand. There have been 5 other cases of taeniasis notified since 1997 all of whom were thought to have contracted the infection on overseas travel.

TETANUS

Two cases of tetanus were notified in 2003. One was in an elderly female who became infected from soil whilst gardening. This is typical of most recent cases in that it occurred in an elderly person. As a group elderly people have relatively less protection from tetanus vaccinations.

The other notification was in a 36 years old female who contracted the infection from a cat scratch. Both patients were hospitalised and recovered.

There has recently been an interesting outbreak amongst parenteral drug users in the UK *(4, 27)*.

TOXIC SHELLFISH POISONING

Four cases of toxic shellfish poisoning were notified in 2004. One of these cases was self-notified. A total of 20 cases has been notified since 1997. Of the four cases notified in 2003, all were adults, three were associated with eating seafood and

two were part of a group that had similar symptoms. In one case Paralytic Shellfish Poisoning heat-stable saxitoxins were identified. One case was hospitalised. Hospitalisation data has consistently indicated many more cases of toxic shellfish poisoning than are notified in EpiSurv. For example, in 2002 only one case was notified but hospitalisation data showed 13 cases.

TRICHINELLOSIS

No cases of Trichinellosis were reported in 2003. The only notifications of endemic human Trichinellosis in New Zealand were in 2001 when there were 3 cases. Two of these related to the consumption of wild pork and infection with *Trichinella spiralis (42)*.

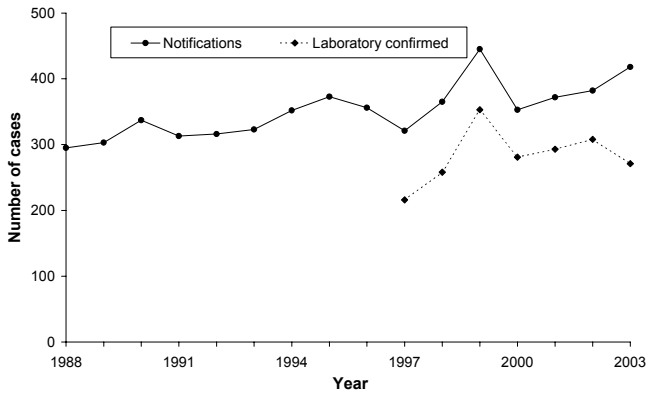
TUBERCULOSIS

Tuberculosis is thought to cause more deaths worldwide than any other single infectious agent. Infection is usually curable with a combination of specific antibiotics.

In 2003, 418 cases of tuberculosis (new and reactivations) were notified, of which 19 (4.5%) were reactivations. This represents a population rate of 11.2 per 100 000 in 2003, which is not significantly different to that reported in 2002 (10.2 per 100 000). In 2003, a total of 271 (64.8%) cases were reported as laboratory confirmed in EpiSurv.

Figure 33 shows the total of new tuberculosis cases and reactivations reported since 1988.

Figure 33. Tuberculosis notifications and laboratory reported cases by year, 1988 - 2003



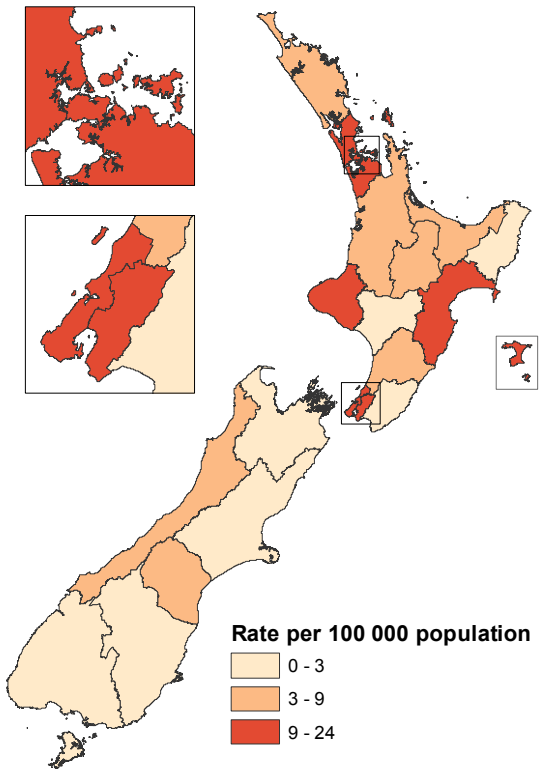
Reports of new tuberculosis cases

In 2003, the rates of new tuberculosis per 100 000 population varied by geographical region (see Figure 34).

For the 399 new cases of tuberculosis, complete data on age was recorded, sex and ethnicity were 99.5% and 97.0% complete respectively. There was little difference in the rate of new cases between sexes (11.0 per 100 000 in males and 10.3 per 100 000 in females). Highest rates were found in males aged 15-24 years and over 65 years, and in females aged less than five years.

Overall, rates were higher in the Pacific Peoples ethnic group (95.3 per 100 000) than in all other ethnic groups. This remained when stratified by age, with highest rates reported in Pacific Peoples and Other ethnicities in the greater than 65 years age group (159.9 and 125.9 per 100 000 respectively). Rates were low in the European population, but in all ethnic groups rates increased with increasing age.

Figure 34. Tuberculosis notifications (new cases) by DHB, 2003



Of the 361 new cases in 2003 for which hospitalisation status was recorded on EpiSurv, 206 (57.1%) were hospitalised. Five deaths were due the disease (1.4% of 358 cases where death data was recorded). Three of these were in people aged more than 45 years, and one was a female aged one year old. BCG vaccination status was recorded in 213 cases and 69.5% of those were vaccinated.

In 2003, information on country of birth was recorded for 342 new tuberculosis cases, of these 69.3% were born overseas. A greater proportion of cases (74.3% of the 300 cases where data was recorded), reported to be currently residing with a person born outside of New Zealand. Of the 271 cases for which data was recorded, 103 (38.0%) reported contact with a confirmed case of tuberculosis. A further 19 cases had been exposed to tuberculosis in a health care setting.

Reactivations of tuberculosis

For the 19 reactivation cases of tuberculosis, complete data on age and sex was recorded. Forty seven percent of reactivation cases occurred in males, and the greatest proportion in both sexes were in those aged 25-44 years. Ethnicity data was collected for 18 cases, and of those Pacific Peoples accounted for 5.6% of reactivations the majority (77.8%) were in those of Other ethnic origin.

In 2003, only one of the seven reactivation cases for whom hospitalisation status was recorded on EpiSurv, was hospitalised. Complete data on deaths was available in EpiSurv, recording one fatal case in a 50 year old female. BCG vaccination status was recorded in nine cases and 77.8% of those were vaccinated. The vaccination status of the fatal case is unknown.

In 2003, information on country of birth was recorded for 18 of the reactivated tuberculosis cases, of these 88.9% were

born overseas. Of the 15 cases where data on HIV testing was recorded, 9 (56.3%) were infected with both tuberculosis and HIV.

Antimicrobial resistant tuberculosis

The data contained in this section is based on antimicrobial susceptibility of the 315 isolates from the Microbiology Reference Laboratory. A total of 315 TB notifications (298 new cases and 17 reactivations) in 2003 can be matched to an isolate. Of these, *M. tuberculosis* was isolated from 288 new cases and all reactivations. *M. bovis* was isolated from a further five new cases. An additional five new cases were of the mycobacterium complex. The proportion of isolates resistant to each antimicrobial is shown in Table 19.

Table 19. TB antimicrobial resistance, 2003

Antibiotic	% Resistant	
	New cases[a]	Reactivations[b]
Streptomycin	7.4%	5.9%
Isoniazid	9.1%	29.4%
Rifampicin	0.3%	5.9%
Ethambutol	0.7%[c]	17.6%
Pyrazinamide	5.7%	5.9%

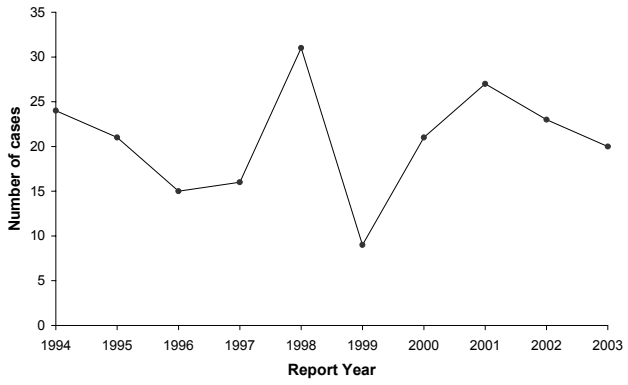
[a] 298 samples were tested including five *M. bovis* cases
[b] 17 samples were tested
[c] 297 samples were tested

In 2003, two *M. tuberculosis* cases were multidrug resistant (MDR-TB), i.e. resistant to at least isoniazid and rifampicin. Of these, one was a new case of TB and one a reactivation case. Since 1996, there has been a total of 16 MDR-TB cases.

TYPHOID FEVER

Twenty cases of typhoid were notified in 2003, of which 18 were confirmed by the Enteric Reference Laboratory at ESR. The 2003 rate of 0.5 per 100 000 population was lower than the 2002 rate of 0.6 per 100 000 population. Figure 35 shows typhoid notifications by year since 1994.

Figure 35. Typhoid notifications by year, 1994 – 2003



The majority of cases (13/19 or 68.4%) were aged 10 to 39 years. Six cases (30.0%) were male and 14 (70.0%) were female. Ethnicity was recorded for 18 cases, of which nine were of Other ethnicity (50.0%), seven were Pacific Peoples (38.9%), and two were European (11.1%).

Hospitalisation status was recorded for 17 cases, of which 10 (58.8%) were hospitalised.

Overseas travel information was recorded for 15 of the 20 cases. Of these, fourteen (93.3%) were recorded as having travelled overseas during the incubation period for this disease. The countries visited were: India (7), Samoa (3), Bangladesh, Korea, Thailand, and Tonga (1 each).

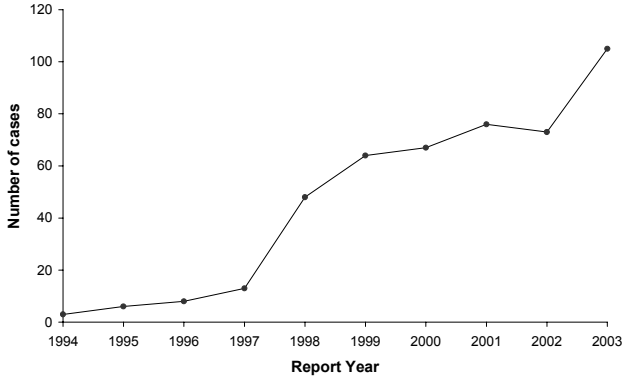
There were five cases with no recorded history of overseas travel.

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

There were 105 cases of VTEC/STEC infection notified in 2003, but the Enteric Reference Laboratory confirmed 94 (91 as O157 and three as non O157 serotype), which is the highest number reported in New Zealand in a single year. The 2003 notification rate of 2.8 cases per 100 000 population was significantly higher than the 2002 rate of 2.0. Four cases of VTEC/STEC-associated haemolytic uraemic syndrome (HUS) were reported in 2003 to the New Zealand Paediatric Surveillance Unit (NZPSU). All four cases were notified.

Figure 36 shows VTEC/STEC infection notifications by year since 1994.

Figure 36. VTEC/STEC notifications by year, 1994 - 2003



The rate of VTEC/STEC varied throughout the country in 2003, as Figure 37 illustrates. The highest rates were recorded in South Canterbury (17.1 per 100 000 population), Taranaki (8.7) and Northland (7.1) District Health Boards.

Rates significantly higher than the overall rate of 2.8 per 100 000 population occurred among children aged four years or less, with an age-specific rate of 25.4 in the 1-4 years age group, and a rate of 20.1 in the less than one year age group.

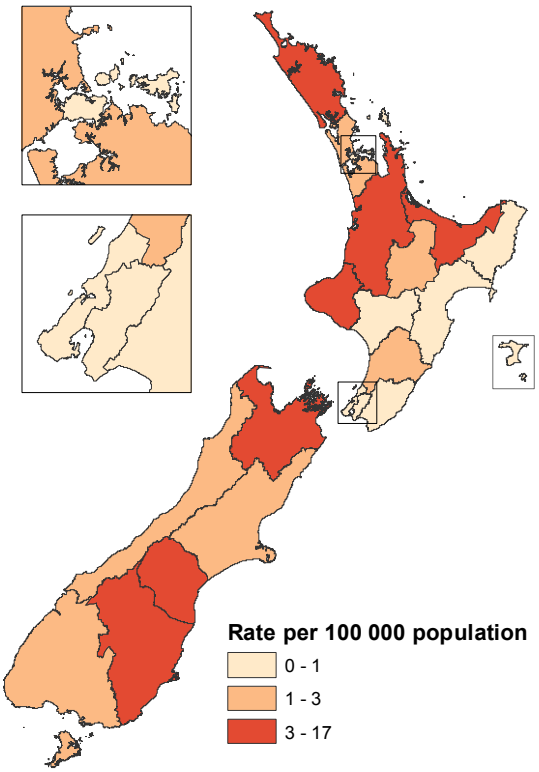
Notification rates were highest in the European and Maori ethnic groups, with rates of 2.9 and 2.3 per 100 000 population, respectively. There were no cases in Pacific Peoples.

Of the 99 notified cases of VTEC/STEC for whom hospitalisation status was recorded, 24 (24.2%) were hospitalised.

Among cases for whom risk information was recorded, 77.6% (66/85) reported contact with animals, 50.0% (29/58) with farm animals the week before becoming ill, 52.0% (26/50) reported contact with animal manure, 46.3% (37/80) reported contact with children in nappies, 22.4% (17/76) reported recreational contact with water, and 22.4% (17/76) reported contact with a person with similar symptoms.

Eleven household clusters were identified through the Enteric Reference Laboratory. All individual cases were notified but only four clusters were identified through the Public Health Units outbreak surveillance.

Figure 37. VTEC/STEC notifications by DHB, 2003



YELLOW FEVER

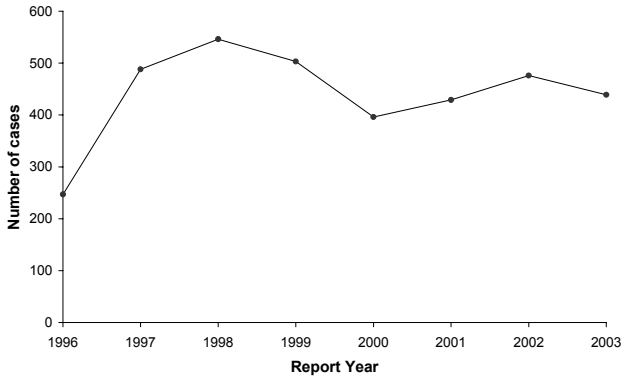
There has never been an imported case of yellow fever in New Zealand. World wide there are two prolonged outbreaks in Colombia and West and Central Africa and proof of yellow fever vaccination is a prerequisite for visas to endemic countries *(11)*.

YERSINIOSIS

A total of 439 cases of yersiniosis was notified in 2003. The 2003 rate of 11.7 per 100 000 population was slightly lower than the 2002 rate of 12.7.

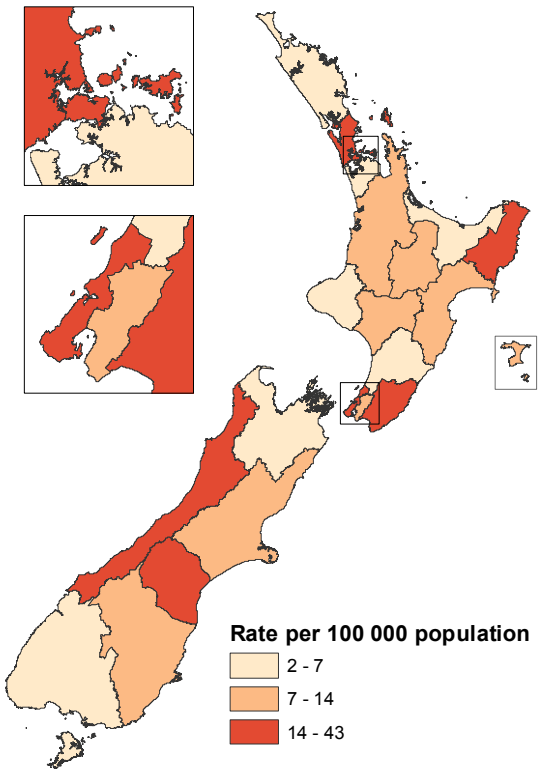
Figure 38 shows the number of notified cases of yersiniosis by year since the disease became notifiable in June 1996.

Figure 38. Yersiniosis notifications by year, 1996 - 2003



The rate of yersiniosis varied throughout the country in 2003, as Figure 39 illustrates. The highest rates were recorded in the West Coast (43.0 per 100 000 population), Tairawhiti (34.1), and Wairarapa (23.6) District Health Boards.

Figure 39. Yersiniosis notifications by DHB, 2003



Sex was recorded for 432 (98.4%) of the 439 cases. Of these, 237 cases (54.9%) were male and 195 (45.1%) were female. Ethnicity was recorded for 334 (76.1%) cases, of whom 249 (74.6%) were European, 43 (12.9%) were Other ethnicity, 36 (10.8%) were Maori, and 6 (1.8%) were Pacific Peoples.

Information on contact with farm animals was recorded for 202 cases, of which 57 (28.2%) reported contact. In 2003, occupations were recorded for 89 notified cases aged 15 or over. Of these, 5 (5.6%) worked in the meat processing industry.

Of the 264 cases for which hospitalisation status was recorded, 30 (11.4%) were hospitalised.

Overseas travel information was recorded for 214 cases. Of these, 9 (4.2%) were recorded as having travelled overseas during the incubation period for this disease. The countries/regions visited was recorded for eight of the nine cases. The countries visited were: Australia, Chile, Norfolk Island, Noumea, Pitcairn Island, Samoa, South East Asia, and United Kingdom (1 each).

One yersiniosis outbreak was reported in 2003. This occurred in Auckland and involved two cases.

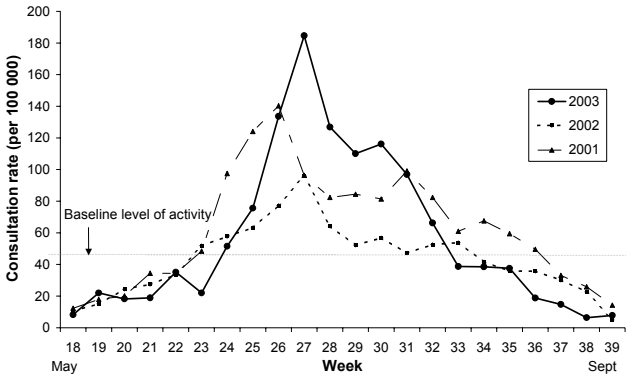
NON NOTIFIABLE DISEASES

INFLUENZA

National influenza surveillance in 2003 was undertaken between May and September using a sentinel network of 89 general practices. On average 85 practices, with a total patient roll of 281 228 participated each week.

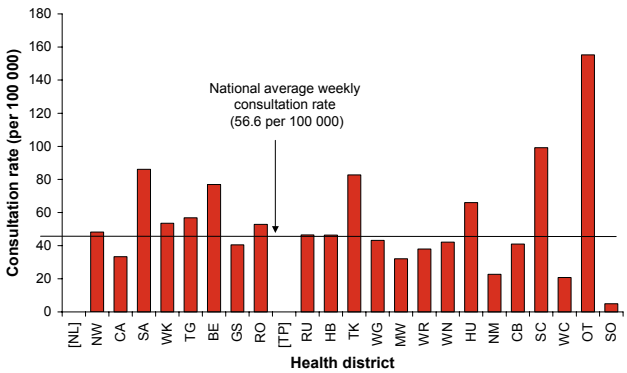
During the surveillance period, 3470 consultations for influenza-like illness were reported, and the average weekly consultation rate was 56.6 per 100 000 patient population. This rate is the fifth lowest rate recorded by the sentinel surveillance system, which began in 1991. The 2003 rate was higher than the 2002 rate of 43.2 but lower than the 2001 rate of 62.8. The consultation rate remained relatively low throughout the sentinel surveillance period but peaked in week 27 (at the beginning of July). This pattern was consistent with isolations of influenza virus in the five regional virus laboratories, where peak activity appeared a week later in week 28, and considerable activity continued almost until the end of the sentinel surveillance period. Figure 40 compares the weekly consultation rates for influenza-like illness in 2003 with 2002 and 2001.

Figure 40. Weekly sentinel surveillance consultation rates for influenza-like illness, 2001-2003



Consultation rates varied between health districts, with rates above the national average in seven of the 22 health districts and rates of more than twice the national average in Otago (155.3 per 100 000) and almost twofold in South Canterbury (99.2) health districts. Figure 41 shows the average weekly consultation rates by health district for the influenza season.

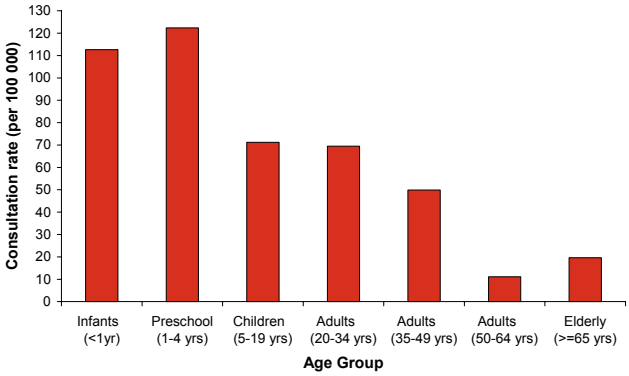
Figure 41. Sentinel average weekly consultation rates for influenza-like illness by health districts, 2003[a]



[a] Northland and Taupo health districts did not participate in 2003

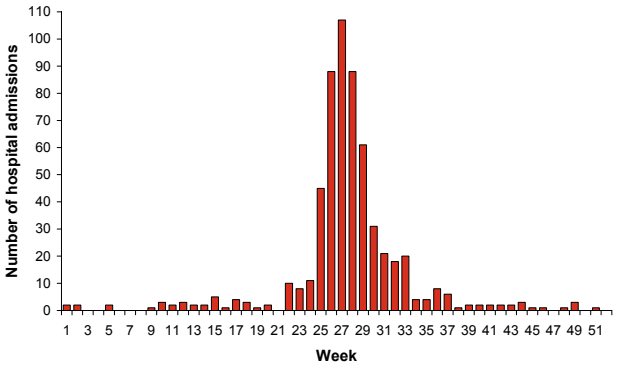
Pre-schoolers (aged 1-4 years) and infants (less than one year) were the most likely to be seen by a general practitioner for an influenza-like illness, with respective age-specific average weekly consultation rates of 122.3 and 112.6 per 100 000 population. The lower rate of 19.6 per 100 000 in those aged 65 years or over was likely to be due, at least in part, to higher levels of vaccination in this age group. Figure 42 shows the average weekly consultation rate in 2003 by age group.

Figure 42. Sentinel average weekly consultation rates for influenza-like illness by age group 2003



In 2003, there was a total of 586 hospital admissions for influenza. This compares with 484 admissions in 2002 and 379 in 2001. Figure 43 shows these admissions by week, 92% (539) of which occurred during May to September. The highest number of admissions (303) occurred in July.

Figure 43. Influenza hospitalisation by week admitted, 2003



A total of 1 108 influenza isolates were identified in 2003 - higher than the 702 isolates in 2002 and 654 in 2001. Of the 2003 isolates, 230 came from sentinel practice surveillance during May to September. This is lower than the 241 sentinel isolates identified in 2002 and 313 in 2001. There were 878 non-sentinel isolates identified in 2003, compared to 461 in 2002, and 341 in 2001.

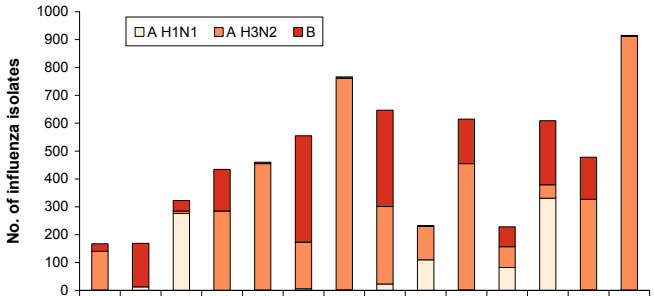
The increased number of influenza isolates over previous years may be due in part to increased vigilance secondary to the SARS threat.

During 2003, the majority of influenza isolates (1105 or 99.7% of all isolates) were characterised as influenza A. There were only three influenza B isolates identified in 2003,

representing 0.3% of typed and subtyped isolates. Influenza B made up 32% of all isolates in 2002, and 35% in 2001.

Figure 44 shows the number and percentage of typed and subtyped influenza isolates from 1990 to 2003.

Figure 44. Influenza isolates by type, 1990 - 2003



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
B	27	156	37	149	5	382	5	346	2	160	71	230	151	3
A H3N2	139	0	9	285	454	167	759	278	120	453	75	48	325	911
A H1N1	1	13	276	0	1	6	2	23	110	2	82	331	2	1

Three noticeable changes in predominant patterns are described below.

Influenza A(H1N1)

During 1990 to 1999, influenza A(H1N1) predominated or co-dominated only in 1992 (86% of typed/subtyped isolates) and 1998 (47% of typed/subtyped isolates). However in 2001 and 2000, influenza A(H1N1) predominated consecutively, which is an unusual feature. There were 82 A(H1N1) isolates in 2000 (36% of typed/subtyped isolates) and 331 in 2001 (54% of typed/subtyped isolates). This is in contrast to 2003, when only one A/New Caledonia/20/99-like (H1N1) was isolated.

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 peak of deaths, 94 in 1996, in New Zealand was recorded during an A(H3N2) epidemic *(28)*. During 1993 to 2000, A(H3N2) had been the predominant or co-dominant strain for each year. In 2001, A(H3N2) constituted only 8% of typed/subtyped isolates. However, in 2002 A(H3N2) had predominated with 68% of typed/subtyped isolates, and 100% in 2003 (530 or 58.2% as A/Fujian/411/02-like (H3N2) and 381 or 41.8% as A/Moscow/10/99-like (H3N2) strains).

Influenza B

Influenza B predominates or co-dominates every second year. In New Zealand, influenza B predominated or co-dominated in 1991, 1993, 1995, 1997, 1999, 2001 and 2002. When influenza B was not the predominant or co-dominant strain, it consisted of a small proportion during 1990 to 1999: 16% in 1990, 11% in 1992, 1% in 1994, 1% in 1996, 1% in 1998. However, in 2000, even though influenza B was not the predominant or co-dominant strain, it consisted of 31% of typed/subtyped isolates. In 2001 (38%) and 2002 (32%), influenza B has been the co-predominant strain consecutively, which is another unusual feature. In 2003, three influenza B were isolated (two B/Sichuan/379/99-like and one B/Hong Kong/330/01-like strains).

Characterisation of the influenza viruses isolated during the 2003 winter indicated a need for a change in the Influenza A component of the vaccine for the 2003 winter. Accordingly, the 2004 Southern Hemisphere winter influenza vaccine has the following composition:

- A(H1N1) - an A/New Caledonia/20/99-like strain
- A(H3N2) - an A/Fujian/411/02-like strain
- B - a B/Hong Kong/330/01-like strain

This composition differs from the vaccine used in the 2003 Southern Hemisphere winter, during which the influenza A component was the A/Moscow/19/99-like (H3N2) strain.

Influenza immunisation is recommended for those at increased risk of complications from influenza due to either age or medical condition *(30)*. Influenza vaccination has been free for people ≥65 years of age 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 2003 can be found at www.surv.esr.cri.nz .

SEXUALLY TRANSMITTED INFECTIONS

Sexually Transmitted Infections (STIs) are not notifiable in New Zealand. Data on STIs of public health importance, chlamydia, gonorrhoea, genital herpes, genital warts, non-specific urethritis and syphilis are submitted voluntarily from sexual health clinics (SHCs), family planning clinics (FPCs), student and youth health clinics (SYHCs). This is supplemented by data on chlamydia and gonorrhoea from two thirds of the diagnostic laboratories in Auckland, Waikato and Bay of Plenty. This brief report summarises the epidemiology of sexually transmitted infections for the year 2003, and examines trends since 1999. A more detailed account is to be found in the STI Annual Report for 2003 *(21)*.

The Aids Epidemiology Group carries out HIV/AIDS surveillance and a summary of the figures for 2003 may be found in AIDS section of this report.

It is important to be aware of the different denominators used to calculate the rates in the clinical as compared to the laboratory settings. Data from the clinics uses the total number of clinic visits. 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 more than double that 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 an important source of STI incidence data.

CLINIC BASED SURVEILLANCE

Chlamydia

In 2003, genital *Chlamydia trachomatis* infection was the most commonly reported STI in New Zealand.

Table 20. Number and rate of chlamydia cases by sex and health care setting, 2003

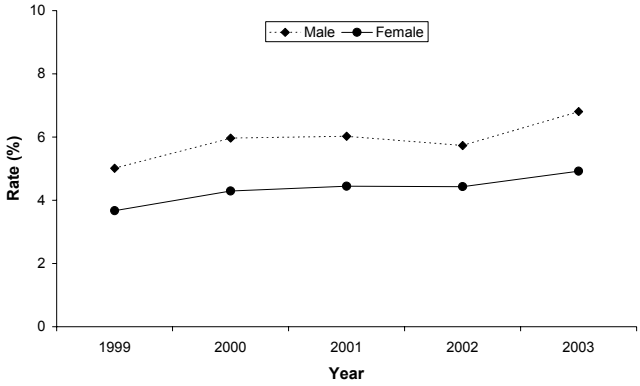
Clinic type	Sex	SHC	FPC	SYHC
No. of confirmed cases	Female	2107	1475	246
	Male	1750	253	66
	Total	3857	1728	312
Total number of cases[a]	Female	2327	1772	250
	Male	2158	450	71
	Total	4485	2222	321
Rate[b] (% of clinic visits)	Female	4.9%	1.0%	0.3%
	Male	6.8%	5.9%	0.2%
	Total	5.7%	1.2%	0.2%

[a] total number of confirmed and probable cases
[b] total confirmed and probable cases/number of clinic visits

Between 2002 and 2003, the number of confirmed chlamydia cases increased by 13.4% in SHCs (3857 compared to 3401), 25.9% in FPCs (1728 compared to 1373) and decreased by 20.0% in SYHCs (312 compared to 390). In 2003 the number of probable cases accounted for a further 628 cases in SHCs, 494 in FPCs and nine in SYHCs.

Over the past five years, the total number of chlamydia cases (confirmed and probable) has increased by 53.8% in SHCs. This represents a 35.8% and 34.2% increase in the rate of chlamydia diagnosed in males and females, respectively (see Figure 45).

Figure 45. Rates[a] of chlamydia diagnosed at SHCs, 1999 - 2003



[a] Denominator is the number of clinic visits

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.

Gonorrhoea

Between 2002 and 2003, the number of confirmed cases of gonorrhoea increased by 12.9% in SHCs (603 compared to 534), 11.4% in FPCs (205 compared to 184) and 33.3% in SYHCs (24 compared to 18). In 2003 the number of probable cases accounted for a further 70 cases in SHCs, 24 in FPCs and one in SYHCs.

Table 21. Number and rate of gonorrhoea cases by sex and health care setting, 2003

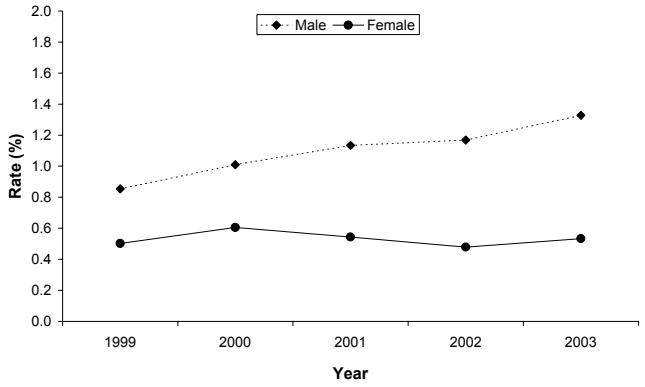
Clinic type	Sex	SHC	FPC	SYHC
No. of confirmed cases	Female	228	179	16
	Male	375	26	8
	Total	603	205	24
Total number of cases[a]	Female	252	191	17
	Male	421	38	8
	Total	673	229	25
Rate[b] (% of clinic visits)	Female	0.5%	0.1%	<0.1%
	Male	1.3%	0.5%	<0.1%
	Total	0.9%	0.1%	<0.1%

[a] total number of confirmed and probable cases
[b] total confirmed and probable cases/number of clinic visits

In 2003, over 55% of the gonorrhoea cases (confirmed and probable) diagnosed in SHCs were in those aged less than 25 years of age, this increased to over 80% of cases diagnosed in FPCs and SYHCs. Rates of gonorrhoea were highest in females aged 15 to 19 years attending FPCs and SHCs, and in males aged 15 to 19 years attending SHCs and those aged 20 to 24 years in FPCs.

Over the past five years, the total number of gonorrhoea cases reported by SHCs has increased by 50.6%. This represents a 55.6% and 6.3% increase in the rate of gonorrhoea diagnosed in males and females, respectively.

Figure 46. Rates[a] of gonorrhoea diagnosed at SHCs, 1999 - 2003



[a] Denominator is the number of clinic visits

Genital Herpes (first infection)

Between 2002 and 2003, the number of cases of genital herpes increased by 5.4% in SHCs (756 compared to 717). Over the same period the number of cases has decreased in both FPCs by 4.1% (163 compared to 170) and SYHCs by 42.5% (23 compared to 40).

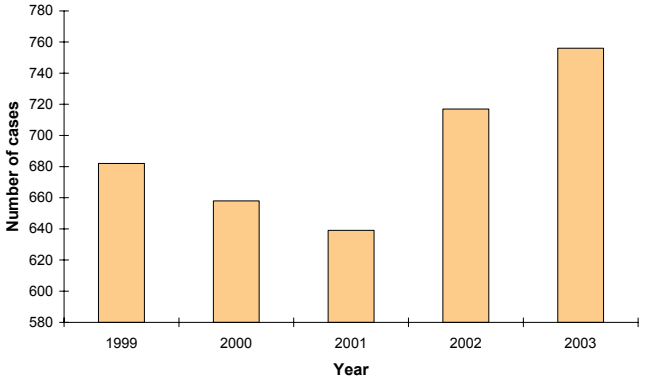
Table 22. Number and rate of genital herpes (first presentation) cases by sex and health care setting, 2003

Clinic type	Sex	SHC	FPC	SYHC
Total number of cases	Female	416	132	17
	Male	340	31	6
	Total	756	163	23
Rate[a] (% of clinic visits)	Female	0.9%	0.1%	<0.1%
	Male	1.1%	0.4%	<0.1%
	Total	1.0%	0.1%	<0.1%

[a] number of cases/number of clinic visits

Over the past five years, the total number of genital herpes cases reported has fluctuated considerably in SHCs, increasing markedly over the last two years.

Figure 47. Number of cases of genital herpes (first presentation) diagnosed at SHCs, 1999 - 2003



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.

Genital Warts (first presentation)

Between 2002 and 2003, the number of cases of genital warts decreased by 0.6% in SHCs (3525 compared to 3545), 7.9% in FPCs (503 compared to 546). Over the same period, there was no change in the number of cases reported by SYHCs (81 cases).

Table 23. Number and rate of genital warts (first presentation) cases by sex and health care setting, 2003

Clinic type	Sex	SHC	FPC	SYHC
Total number of cases	Female	1835	407	65
	Male	1690	96	16
	Total	3525	503	81
Rate[a] (% of clinic visits)	Female	3.9%	0.2%	0.1%
	Male	5.3%	1.3%	<0.1%
	Total	4.5%	0.3%	0.1%

[a] number of cases/number of clinic visits

From 1999 to 2002 the number of genital warts cases reported by SHC has increased but this trend did not continue into 2003. Over the same period the rate of genital warts diagnosed at the SHC has remained stable around 5.2% in males and 3.8% in females.

Infectious Syphilis

In 2003, a total of 30 syphilis cases was reported by SHCs, representing a decrease of 36.2% compared to 2002. In 2003, the rate of syphilis at SHCs was 0.04%. There were no cases reported by FPCs or SYHCs. Over the last five years the total number of cases has varied but the numbers are small; 23 (1999), 15 (2000), 20 (2001), 49 (2002), 30 (2003).

The mean age of syphilis cases was 39.1 years (range 19-75 years). Of the 30 syphilis cases reported in 2002, 19 (63%) were male and 11 (37%) 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 2003, there were nine reported cases of NSU in FPCs, 8 cases in SYHCs and 1061 cases in SHCs. Over the last five years the total numbers have tended to increase; 881 (1999), 831 (2000), 1064 (2001), 1132 (2002), 1078 (2003).

LABORATORY SURVEILLANCE

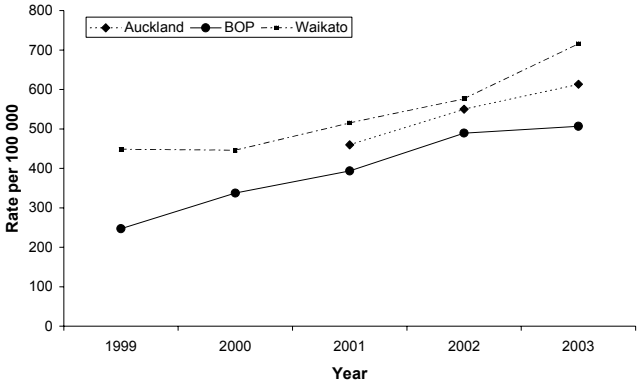
Chlamydia

In 2003, chlamydia rates were significantly higher than 2002 in both the Waikato (in 2003, 716 per 100 000 population; in 2002, to 576 per 100 000 population) and Auckland regions (in 2003, 613 per 100 000 population; in 2002, 550 per 100 000 population). Whereas, in the BOP region chlamydia rates in 2003 (507 per 100 000 population) were similar to the previous year (489 per 100 000 population.

Increasing trends in chlamydia from 1999 to 2001 can, in part, be explained by increasing testing volumes and the introduction of more sensitive diagnostic techniques, e.g. nucleic acid amplification tests. From 2001 to 2003, chlamydia rates have increased by over 25% in all regions. Although there has been a slight increase in the number of

specimens tested over the three years, this alone cannot explain the increases reported.

Figure 48. Chlamydia trends in the Auckland, Waikato and BOP regions: 1999 – 2003



[a] denominator is the population in each region

Gonorrhoea

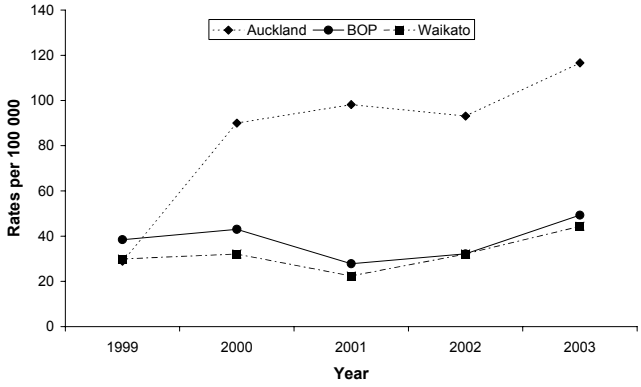
The rates of gonorrhoea diagnosed by participating laboratories across all regions over the past five years are shown in Figure 49.

In 2003, gonorrhoea rates were significantly higher than in 2002 across all regions; Waikato 44 per 100 000 compared to 32 per 100 000, BOP 49 per 100 000 compared to 32 per 100 000, and Auckland 117 per 100 000 compared to 93 per 100 000.

Trends in gonorrhoea rates from 1999 to 2003 vary by geographical region. In Auckland, the dramatic increase in rates between 1999 and 2001 may be due to increases in the number of laboratories reporting to the surveillance system over this period. From 2001 to 2003 the number of laboratories reporting has remained constant.

In Waikato and BOP regions, the number of laboratories reporting has not changed from 1999 to 2003. From 2001 to 2003, data suggests a true increase in the rate of gonorrhoea in these regions.

Figure 49. Gonorrhoea trends in the Auckland, Waikato and BOP regions: 1999 – 2003



[a] denominator is the population in each region

The above data suggests that there has been a general increase in chlamydia, gonorrhoea and syphilis over recent years. Limited laboratory-based data also indicates that the population rates are significantly higher than those from clinic-based sources. Overall New Zealand reported rates of STIs are high compared with most other developed countries. In an attempt to increase the validity and robustness of the data it is planned to extend laboratory-based reporting in the future.

OUTBREAK SURVEILLANCE

INTRODUCTION

Since July 1996, ESR has collected data on all outbreaks of infectious disease in New Zealand. This data is collected by Public Health Units (PHU's), and forwarded to ESR for collation.

The information gathered by the PHU's is used to estimate the burden of illness caused by outbreaks, identify high-risk groups in the population and estimate the workload involved in the management of outbreaks. This information can be used to inform public health personnel about the causes and factors contributing to outbreaks, prevention strategies and the effectiveness of such strategies.

OUTBREAK DEFINITION

Two or more cases thought to be linked by a common exposure except when this common source is well established as a national epidemic and reporting it as a discrete event is no longer appropriate.

It is not an outbreak where a single secondary case has resulted from person-to-person transmission from a primary case.

RESULTS

During 2003, 340 outbreaks of infectious disease were identified in New Zealand, resulting in illness in 2 789 people, 89 hospitalisations and four deaths. This was similar to the number of outbreaks (333) and cases (2890) in 2002.

GEOGRAPHY

Table 24 shows the regional distribution of outbreaks during 2003 by public health unit.

Table 24. Number of outbreaks of infectious disease and total number of cases in each public health unit, 2003

PHU	Outbreaks	Cases
Auckland	204	951
Canterbury	36	818
Gisborne	1	20
Hawke's Bay	5	26
Manawatu	8	65
Nelson	4	69
Northland	3	33
Otago	11	87
Rotorua	11	50
South Canterbury	8	59
Southland	11	83
Taranaki	4	53
Tauranga	1	3
Waikato	2	77
Wanganui	3	25
Wellington	19	326
West Coast	9	44

PATHOGENS

Table 25. Pathogens causing outbreaks and cases in 2003

Pathogen	Number of Outbreaks	Number of Cases	Average Number of Cases per Outbreak
Unidentified	117	795	6.8
Anti-cholinergic poisoning	1	4	4.0
Bacillus cereus	6	25	4.2
Bordetella pertussis	6	16	2.6
Campylobacter spp.	42	140	3.3
Clostridium perfringens	7	19	2.7
Cryptosporidium parvum	7	102	14.6
Escherichia coli	2	5	2.5
Giardia spp.	27	89	3.3
Hepatitis A virus	4	14	3.5
Histamine	1	13	13.0
Influenza virus	1	35	35.0
Lead Absorption	3	10	3.3
Legionella spp.	1	3	3.0
Leptospira spp.	1	4	4.0
Measles	2	23	11.5
Morbillivirus	1	2	2.0
Mycobacterium tuberculosis	1	10	10.0
Neisseria meningitidis	2	4	2.0
Norovirus	73	1368	18.7
Rotavirus	2	13	6.5
Rubella	1	2	2.0
Salmonella spp.	19	49	2.6
Salmonella Paratyphi	1	2	2.0
Salmonella Typhimurium	4	10	2.5
Shigella spp.	3	15	5.0
Staphylococcus aureus	2	11	5.5
VTEC/STEC	2	4	2.0
Yersinia enterocolitica	1	2	2.0
TOTAL	340	2789	8.2

Unidentified Pathogens

A large proportion of the outbreaks in 2003 were caused by unidentified pathogens (117 outbreaks, 34.4%). Of these outbreaks, 111 were 'gastroenteritis' outbreaks (94.9%).

Enteric Bacteria

Enteric bacteria caused a total of 74 outbreaks (21.8%). There was a total of 42 outbreaks caused by *Campylobacter* spp., 12 of which occurred within the home, nine had no setting reported, and 8 were caused by consumption of a food source prepared in a café. Similarly, ten of the total 24 outbreaks caused by *Salmonella* spp. occurred within the home, seven had no setting reported and six were linked to a café. *E. coli* O157 accounted for one outbreak in a household involving a total of three cases. Two waterborne *Shigella* spp. outbreaks occurred within the home during 2003. The outbreak of *Y. enterocolitica* was caused by consumption of food in the workplace (brought in by another worker).

Enteric Protozoa

Sixteen of the 27 outbreaks caused by *Giardia* spp. were spread by person-to-person transmission, and occurred within the home. Three of the seven outbreaks caused by *Cryptosporidium* spp. were transmitted through the environment, with two of them linked to a swimming pool and the remaining one linked to a childcare centre.

Enteric Viruses

Fifty one of the 73 norovirus outbreaks were spread by person-to-person transmission, and 33 of these took place in rest homes and hospitals. Three of the four Hepatitis A outbreaks were caused by person-to-person transmission, two within the home, one in an 'other' setting (undefined). The fourth was a waterborne outbreak the occurred in travellers who visited a Fijian village. The two rotavirus outbreaks were caused by person-to-person transmission within a hospital.

Toxins

All seven *C. perfringens* outbreaks were foodborne, three were linked to a café, three to a takeaway and the remainder had no identified setting. All of the six outbreaks caused by *B. cereus* were foodborne, three were linked to a café, and two were linked to takeaway food and the remainder to a hostel. Both *S. aureus* outbreaks were also foodborne, but linked to a supermarket. The outbreak caused by histamine poisoning was also foodborne, and linked to an 'other food outlet', while the foodborne anticholinergic poisoning outbreak, occurred within the home.

Respiratory Diseases

Five of the six outbreaks caused by *B. pertussis* were spread by person-to-person transmission, two within a school and the remainder within the home. There was one outbreak of influenza virus, which occurred within a refugee settlement centre, and was spread by person-to-person transmission. The outbreak of *M. tuberculosis* was also spread by person-to-person transmission, within a school.

Other Viruses

The two measles outbreaks were spread by person-to-person transmission, one was imported from overseas, and the other occurred within a school. The rubella outbreak was transmitted in the same way, but occurred within the home. The morbillivirus outbreak was spread by person-to-person transmission, but no setting was identified.

Other Diseases

The three outbreaks of lead absorption occurred within the home, caused by environmental transmission. Both outbreaks of *N. meningitidis* were spread by person-to-person transmission; one was set in a hostel, the other in a childcare centre. The outbreak of legionellosis was linked to a display spa pool in a shop, which two of the cases had visited.

Table 26. Pathogen types causing outbreaks, 2003

Pathogen Type	Number of Outbreaks
Unidentified	117
Toxins *(B. cereus, S. aureus*, Histamine, Anti-cholinergic, *C. perfringens*)	17
Enteric Bacteria (Campylobacter, Salmonella, Shigella, *E.coli*, *Y. enterocolitica*)	74
Enteric Protozoa (*Giardia, Cryptosporidium*)	34
Enteric Viruses (Rotavirus, Norovirus, Hep A)	79
Other Viruses (Measles, Rubella, Morbillivirus)	4
Respiratory Diseases (Influenza virus, *M. tuberculosis*, Pertussis)	8
Other Diseases (Lead Absorption, Legionella, *N. meningitidis*)	7
	340

MODE OF TRANSMISSION

In 2003, Table 27 shows that the majority of outbreaks were associated with foodborne or foodborne and waterborne spread (130 outbreaks). However, when the number of cases is examined, a person-to-person mode of transmission was seen to account for the majority of cases (1611 cases, 57.8%). The route of transmission was unknown for 17.9% of outbreaks.

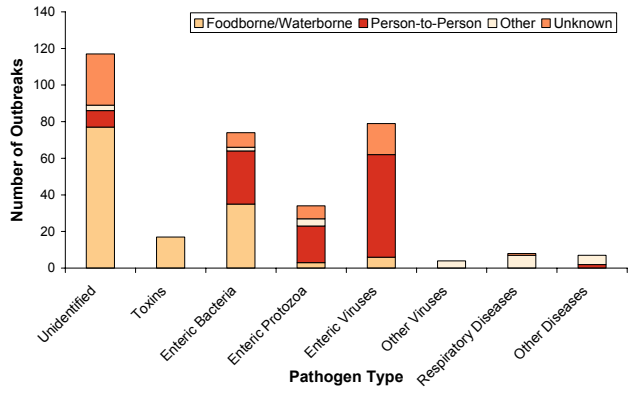
Table 27. Number of cases arising as a result of outbreaks of infectious disease by mode of transmission, 2003

Transmission Mode	Number of Outbreaks	Number of Cases
Person-to-person	103	1393
Foodborne	125	467
Waterborne	7	36
Foodborne/waterborne	5	20
Other	17	160
Person-to-person & Foodborne	11	101
Person-to-person & Waterborne	2	11
Person-to-person & Environment	8	104
Person-to-person & Zoonotic	1	2
Unknown	61	495
Total	340	2789

When the mode of transmission was examined by pathogen (Figure 50), the principle mode of transmission causing outbreaks of unidentified pathogens appeared to be foodborne/waterborne, whereas for enteric virus outbreaks, the principal mode of transmission was person-to-person.

Foodborne/waterborne transmission and person-to-person transmission was associated with approximately the same amount of enteric bacteria outbreaks.

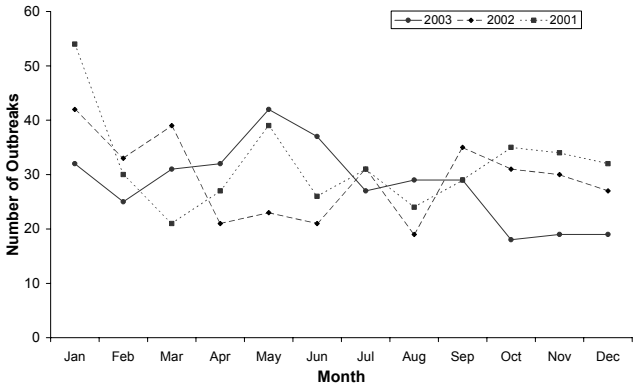
Figure 50. Number of outbreaks of infectious disease by pathogen and mode of transmission, 2003



SEASONALITY

When the outbreaks are analysed in terms of seasonality, it is noted that the largest number of outbreaks in 2003 occurred in the winter months (May, June, July) with a peak in May, as shown in Figure 51.

Figure 51. Number of outbreaks of infectious disease reported by month, 2001-2003



LOCATION

Excluding private households, restaurants or cafes were the most commonly cited location of outbreaks of infectious disease during 2003 (Table 28). Rest/retirement home outbreaks were responsible for the greatest number of cases. Hospitals were the next most common outbreak setting.

Table 28. Number of cases arising as a result of outbreaks of infectious disease by location, 2003

Outbreak Setting	Number of Outbreaks	Number of Cases
Commercial Food Operators	130	582
Restaurant or café	76	342
Takeaway	31	95
Special event/catered function	2	31
Hotel	4	56
Supermarket/deli	10	33
Other food outlet[a]	7	25
Institutions	66	1381
School	7	64
Hostel	4	20
Hospital Acute	15	299
Hospital Continuing	4	124
Rest/Retirement Home	27	810
Tangi	1	7
Camp	3	20
Childcare centre/Pre-school	5	37
Community Groups	3	83
Swim/Spa pool	2	73
Community	1	10
Workplace	8	63
Workplace	3	35
Farm	4	24
Abattoir	1	4
Household (home)	92	352
Other	30	461
Other Setting	30	461
TOTAL	329	2922

[a] Other food outlets included food courts, service stations and the likes

A full report on outbreaks in New Zealand for 2003 can be found at www.surv.esr.cri.nz.

ANTIBIOTIC RESISTANCE

ANTIMICROBIAL RESISTANCE

The prevalence of resistance among common, important clinical pathogens, which have been continuously monitored since 1988, is shown in the appendices to this report. Most antimicrobial resistance data are only available in a complete analysed form up to the end of 2002. Of particular note are the following trends:

- An increasing prevalence of MRSA generally, an increasing proportion of which is multiresistant (that is, resistant to at least two antibiotic classes in addition to β-lactams)
- A high prevalence of mupirocin-resistant *Staphylococcus aureus* since the mid-1990s
- *Streptococcus pneumoniae* identified in cases of invasive disease showed a decrease in the prevalence of penicillin resistance since 1999 and an increase in resistance to third-generation cephalosporins (such as ceftriaxone) since 2001
- Stable levels of trimethoprim resistance among urinary *E. coli,* and continuing low levels of nitrofurantoin and fluoroquinolone resistance
- An increasing prevalence of ciprofloxacin resistance in *Neisseria gonorrhoeae*, with a four-fold increase in resistance in 2001.

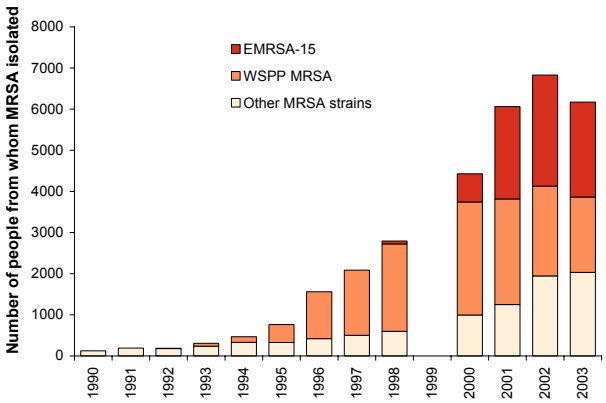
However, some other important resistances emerging in other countries remain uncommon in New Zealand. Of particular note, vancomycin-resistant enterococci (VRE), while isolated in small numbers, have not become established in New Zealand hospitals. In addition, multidrug-resistant tuberculosis (MDR-TB) isolates remain 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 all methicillin-resistant *Staphylococcus aureus* (MRSA), that is, multiresistant and non-multiresistant isolates, has been based on annual one-month surveys. Up until 1998 there was continuous surveillance of all MRSA. The 2003 survey was conducted in August 2003.

In August 2003, MRSA were referred from 513 people (492 patients and 21 staff). This number of referrals equates to an annual incidence rate of 164.7 per 100 000; a 9.9 % decrease on the rate in 2002 (182.7 per 100 000) (Figure 52). Among the 492 patients with MRSA, 52.0% were categorised as hospital patients and 48.0% 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 to be causing infection in 82.1% of the 313 patients for whom this information was provided.

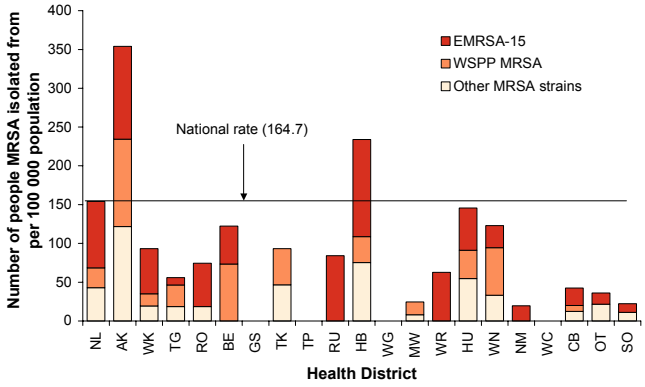
Figure 52. MRSA isolations, 1990-2003



Data for 1990 to 1998 are based on continuous surveillance of all MRSA isolations. Data for 2000 to 2003 are annualised and based on one-month surveys conducted in these years. No survey was undertaken in 1999.

The wide geographic variation in the incidence of MRSA observed in previous years was again evident in 2003, with the highest annualised incidence rates in the Auckland (353.9 per 100 000), Hawke's Bay (234.1), Northland (154.1), Hutt (145.6), Wellington (123.0) and Eastern Bay of Plenty (122.3) Health Districts (Figure 53). All South Island districts had rates below 50 per 100 000.

Figure 53. Annualised incidence of MRSA by health district, 2003



Three strains were predominant in 2003:

- EMRSA-15, a British epidemic MRSA strain, accounted for 37.4% of the MRSA isolations. In recent years, this strain has become increasingly common. It is typically isolated from elderly patients in hospital or other healthcare facilities. In 2003, 70.3% of the EMRSA-15 isolations were from healthcare staff or patients classified as hospital patients.
- WSPP MRSA, a non-multiresistant community strain of MRSA, accounted for 29.8% of the MRSA isolations, with the majority (75.8%) being isolated from community patients. 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 2000 the WSPP MRSA has represented a decreasing proportion of the MRSA isolations, and

since 2001 the actual number of WSPP MRSA isolations has also decreased (Figure 52).

- AKh4 MRSA strain, which is a multiresistant MRSA typical of multiresistant MRSA isolated in Australia, accounted for 8.9% of the MRSA isolations. Like EMRSA-15, this strain is most commonly isolated from hospital patients, with 69.6% of the isolations in 2003 being from healthcare staff or patients classified as hospital patients.

The typical antimicrobial resistance patterns of the three MRSA strains most commonly isolated in 2003 are shown in Table 29. Overall, 43.7% of the MRSA tested were multiresistant, that is, resistant to ≥2 classes of antibiotics in addition to β-lactams.

Table 29. Typical resistance patterns of the most common MRSA strains, 2003

Strain	Resistant to:
EMRSA-15	ciprofloxacin and erythromycin[a]
WSPP MRSA	not usually resistant to any antibiotics other than β-lactams
AKh4 MRSA	ciprofloxacin, clindamycin, co-trimoxazole, erythromycin, gentamicin, tetracycline

[a] some isolates of EMRSA-15 are erythromycin-susceptible; in 2003, 34.0% of the EMRSA-15 isolates tested were erythromycin susceptible. Erythromycin-resistant isolates of EMRSA-15 have inducible clindamycin resistance.

APPENDIX: NATIONAL SURVEILLANCE DATA AND TRENDS

A. COMPARISON OF NOTIFIABLE DISEASE CASES AND RATES FOR 2003 AND 2002

Table 30. Cases and rates per 100 000 population of notifiable diseases in New Zealand during 2003 and 2002

Disease	2003		2002		Change
	Cases	Rates	Cases	Rates	
AIDS	33	0.9	17	0.5	↑
Brucellosis	1	0.0	2	0.1	↓
Campylobacteriosis	14786	395.6	12494	334.3	↑
Cholera	1	0.0	1	0.0	--
Creutzfeldt-Jakob disease	6	0.2	3	0.1	↑
Cryptosporidiosis	818	21.9	975	26.1	↓
Dengue fever	55	1.5	70	1.9	↓
Diphtheria	0	0.0	1	0.0	↓
Gastroenteritis[b]	1023	27.4	1087	29.1	↓
Giardiasis	1569	42.0	1547	41.4	↑
H. influenzae type b disease	13	0.3	3	0.1	↑
Hepatitis A	70	1.9	106	2.8	↓
Hepatitis B[c]	61	1.6	68	1.8	↓
Hepatitis C[c]	41	1.1	53	1.4	↓
Hydatid disease	0	0.0	2	0.1	↓
Lead absorption	119	3.2	91	2.4	↑
Legionellosis	78	2.1	49	1.3	↑
Leprosy	4	0.1	4	0.1	--
Leptospirosis	115	3.1	141	3.8	↓
Listeriosis	24	0.6	19	0.5	↑
Malaria	46	1.2	61	1.6	↓
Measles	66	1.8	21	0.6	↑
Meningococcal disease	543	14.5	555	14.9	↓
Mumps	57	1.5	64	1.7	↓
Paratyphoid	18	0.5	16	0.4	↑
Pertussis	589	15.8	1068	28.6	↓
Rheumatic fever	143	3.8	93	2.5	↑
Rickettsial disease	1	0.0	6	0.2	↓
Ross River virus infection	1	0.0	1	0.0	--
Rubella	28	0.7	33	0.9	↓
Salmonellosis	1401	37.5	1880	50.3	↓
Shigellosis	87	2.3	112	3.0	↓
Tetanus	2	0.1	1	0.0	↑
Toxic shellfish poisoning	4	0.1	1	0.0	↑
Tuberculosis disease	418	11.2	382	10.2	↑
Typhoid	20	0.5	23	0.6	↓
VTEC/STEC Infection	105	2.8	73	2.0	↑
Yersiniosis	439	11.7	476	12.7	↓

[a] No cases of the following notifiable diseases were reported in 2003: anthrax, botulism, plague, poliomyelitis, rabies, cysticercosis, trichinosis, primary amoebic meningoencephalitis

[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 tests used to determine statistical significance were chi-square or Fisher's exact test where relevant. P-values less than or equal to 0.05 are considered to be significant at the 95% level of confidence.

B. INTERNATIONAL DISEASE RATE COMPARISION FOR 2002

Table 31. Incidence rates of notifiable diseases in New Zealand during 2002, compared with rates in other developed countries for the same year

Disease	New Zealand	Australia [a,b]	USA [c,d]	Canada [e,f]	England / Wales [g,h]
AIDS[c]	0.5	-	14.3	0.6	-
Campylobacteriosis	334.3	75.1	-	38.4	-
Cholera	0	0	0	0	0
Cryptosporidiosis	26.1	17.2	1.1	1.9	-
Dengue fever	1.9	1.1	-	-	-
Giardiasis	41.4	-	7.5	15.2	-
H. influenzae type b disease	0.1	0.2	0	0.2	-
Hepatitis A	2.8	2.0	3.1	1.4	2.7
Hepatitis B	1.8	1.2	2.9	2.0	2.1
Hepatitis C	1.4	1.7	0.7	53.6	2.6
Legionellosis	1.3	1.4	0.5	0.2	-
Leptospirosis	3.8	0.8	-	-	0
Listeriosis	0.5	0.3	0.2	-	-
Malaria	1.6	2.5	0.5	1.2	1.6
Measles	0.6	0.1	0	0	6.1
Meningococcal disease	14.9	3.5	0.6	0.7	1.4
Mumps	1.7	0.4	0.1	0.7	3.8
Paratyphoid	0.4	-	-	-	0.2
Pertussis	28.6	28.5	3.5	11.0	1.7
Ross River virus infection	0	7.7	-	-	-
Rubella	0.9	1.3	0	0.1	3.2
Salmonellosis	50.3	41.3	15.7	19.9	-
Shigellosis	3.0	2.6	8.4	4.5	-
Tetanus	0	0	0	0	0
Tuberculosis	10.2	5.1	5.0	-	13.0
Typhoid	0.6	0.4	0.1	0.3	0.2
VTEC/STEC infection	2.0	0.3	1.4	4.1	-

- Disease not notifiable or information was not available.

[a] preliminary 2002 disease numbers *(7)*.

[b] population figure (18 769 249), 2001 census usual residence *(9)*.

[c] preliminary "cumulative" 2002 data (only up to 28 December 2002) published report *(47)*.

[d] Population figure (281 421 906) census 2000 *(46)*.

[e] Preliminary notifiable disease data *(5)*.

[f] Population (30 007 094) provided by Statistics Canada *(3)*.

[g] NOIDS Report *(35)*.

[h] Population figure 52 041 916 (England 49 138 831, Wales 2 903 085) census 2001 *(2)* .

Note that data presented as international comparisons should be interpreted with caution due to differences in the surveillance systems from which the figures are obtained. Differences in data collection methods (e.g. through laboratory diagnosis and/or doctor notification) and data collected according to different case definitions (especially those diseases involving both acute and chronic cases such as hepatitis C), will result in rates of disease that are not necessarily comparable.

C. FATALITIES FOR 2002 AND 2003

Table 32. Fatal cases of notifiable diseases in 2002 and 2003 recorded in EpiSurv

Disease	2003			2002		
	No. of fatal cases	Total notified cases	Case-fatality rate	No. of fatal cases	Total notified cases	Case-fatality rate
AIDS	6	33	-	5	17	-
Campylobacter	0	14786	0%	1	12494	0.01%
Gastroenteritis	0	1023	0%	1	1087	0.1%
Creutzfeldt-Jakob disease	4	6	66.6%	3	3	100%
H. influenzae type b disease	2	13	15.4%	1	3	33.3%
Hepatitis B	0	61	0%	0	68	0%
Legionellosis	1	78	1.3%	3[b]	49	5.9%
Listeriosis	4[a]	23	17.4%	3[c]	19	15.8%
Meningococcal disease	13	543	2.4%	18	555	3.2%
Pertussis	1	589	0.2%	1	1068	0.1%
Salmonellosis	0	1401	0%	1	1880	0.1%
Tetanus	0	2	0%	0	1	0%
Tuberculosis disease	6	418	1.4%	6	382	1.6%
Total	25	-	-	43	-	-

[a] Two deaths occurred in perinatal cases and two in non perinatal cases.
[b] One further death occurred in a laboratory-reported but non-notified case.
[c] All three fatalities occurred in perinatal cases.

Note : The numbers in this table are those recorded in EpiSurv. Each case is checked to ensure the notifiable disease was the primary cause of death. Information on deaths is only known by Public Health Services when it occurs close to the time of notification and investigation.

D. NOTIFIABLE DISEASE CASES AND RATES BY ETHNICITY, 2003

Table 33. Cases and rates per 100 000 population in 2003 by ethnic group

	Ethnicity								
	European		Maori		Pacific Peoples		Other Ethnicity		Unknown
Disease	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases
Campylobacteriosis	10110	387.3	705	134.0	176	87.9	599	239.8	3196
Cryptosporidiosis	602	23.1	59	11.2	10	5.0	20	8.0	127
Dengue fever	25	1.0	0	0.0	5	2.5	12	4.8	13
Gastroenteritis	686	26.3	59	11.2	12	6.0	44	17.6	222
Giardiasis	1032	39.5	73	13.9	13	6.5	120	48.0	331
Haemophilus influenzae type b	8	0.3	3	0.6	1	0.5	0	0.0	1
Hepatitis A	29	1.1	4	0.8	16	8.0	18	7.2	3
Hepatitis B	25	1.0	17	3.2	9	4.5	9	3.6	1
Hepatitis C	26	1.0	9	1.7	0	0.0	3	1.2	3
Lead absorption	93	3.6	5	1.0	1	0.5	0	0.0	20
Legionellosis	52	2.0	6	1.1	4	2.0	1	0.4	15
Leptospirosis	76	2.9	13	2.5	1	0.5	5	2.0	20
Listeriosis	14	0.5	2	0.4	5	2.5	2	0.8	1
Malaria	22	0.8	1	0.2	2	1.0	17	6.8	4
Measles	45	1.7	6	1.1	4	2.0	6	2.4	5
Meningococcal disease	248	9.5	171	32.5	112	55.9	12	4.8	0
Mumps	35	1.3	8	1.5	3	1.5	4	1.6	7
Paratyphoid	9	0.3	0	0.0	0	0.0	7	2.8	2
Pertussis	435	16.7	62	11.8	25	12.5	13	5.2	54
Rheumatic fever	4	0.2	70	13.3	58	29.0	6	2.4	5
Rubella	19	0.7	4	0.8	2	1.0	2	0.8	1
Salmonellosis	907	34.7	140	26.6	27	13.5	71	28.4	256
Shigellosis	32	1.2	3	0.6	27	13.5	6	2.4	19
Tuberculosis disease	41	1.6	55	10.5	104	51.9	205	82.1	13
Typhoid	2	0.1	0	0.0	7	3.5	9	3.6	2
VTEC/STEC Infection	76	2.9	12	2.3	0	0.0	3	1.2	14
Yersiniosis	249	9.5	36	6.8	6	3.0	43	17.2	105

E. NOTIFIABLE DISEASE CASES AND RATES BY SEX, 2003

Table 34. Cases and rates per 100 000 population in 2003 by sex

	Sex				
	Male		Female		Unknown
Disease	Cases	Rate	Cases	Rate	Cases
Campylobacteriosis	7815	428.7	6769	353.6	202
Cryptosporidiosis	432	23.7	382	20.0	4
Dengue fever	34	1.9	20	1.0	1
Gastroenteritis	423	23.2	588	30.7	12
Giardiasis	852	46.7	689	36.0	28
Haemophilus influenzae type b	6	0.3	6	0.3	1
Hepatitis A	35	1.9	35	1.8	0
Hepatitis B	37	2.0	24	1.3	0
Hepatitis C	29	1.6	12	0.6	0
Lead absorption	100	5.5	18	0.9	1
Legionellosis	48	2.6	29	1.5	1
Leprosy	2	0.1	2	0.1	0
Leptospirosis	100	5.5	12	0.6	3
Listeriosis[a]	12	0.7	6	0.3	0
Malaria	32	1.8	14	0.7	0
Measles	33	1.8	33	1.7	0
Meningococcal disease	292	16.0	247	12.9	4
Mumps	27	1.5	30	1.6	0
Paratyphoid	8	0.4	10	0.5	0
Pertussis	267	14.6	316	16.5	6
Rheumatic fever	71	3.9	44	2.3	28
Rubella	14	0.8	13	0.7	1
Salmonellosis	721	39.6	659	34.4	21
Shigellosis	38	2.1	47	2.5	2
Tuberculosis	209	11.5	207	10.8	2
Typhoid	6	0.3	14	0.7	0
VTEC/STEC Infection	52	2.9	53	2.8	0
Yersiniosis	237	13.0	195	10.2	7

[a] Excludes perinatal cases

F. NOTIFIABLE DISEASE CASES AND RATES BY AGE GROUP, 2003

Table 35. Cases and rates per 100 000 population in 2003 by age group

Disease	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
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases
Campylobacteriosis	261	477.5	1294	598.7	761	265.9	641	220.5	994	374.7	2683	551.3	2306	399.9	1956	364.0	1741	416.1	1070	378.8	998	309.4	81
Cryptosporidiosis	33	60.4	337	155.9	157	54.9	57	19.6	34	12.8	66	13.6	74	12.8	33	6.1	11	2.6	10	3.5	4	1.2	2
Dengue fever	0	0.0	1	0.5	0	0.0	2	0.7	6	2.3	17	3.5	8	1.4	11	2.0	9	2.2	1	0.4	0	0.0	0
Gastroenteritis	15	27.4	41	19.0	38	13.3	29	10.0	57	21.5	128	26.3	191	33.1	157	29.2	126	30.1	62	21.9	122	37.8	57
Giardiasis	28	51.2	309	143.0	129	45.1	38	13.1	24	9.0	181	37.2	403	69.9	212	39.4	128	30.6	74	26.2	34	10.5	9
Haemophilus influenzae type b	6	11.0	3	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.2	1	0.2	1	0.4	1	0.3	0
Hepatitis A	0	0.0	8	3.7	10	3.5	2	0.7	7	2.6	10	2.1	7	1.2	6	1.1	9	2.2	4	1.4	7	2.2	0
Hepatitis B	0	0.0	2	0.9	0	0.0	0	0.0	3	1.1	20	4.1	23	4.0	8	1.5	4	1.0	1	0.4	0	0.0	0
Hepatitis C	1	1.8	0	0.0	0	0.0	0	0.0	2	0.8	13	2.7	13	2.3	9	1.7	3	0.7	0	0.0	0	0.0	0
Lead absorption	1	1.8	14	6.5	3	1.0	3	1.0	1	0.4	9	1.8	23	4.0	32	6.0	18	4.3	14	5.0	0	0.0	1
Legionellosis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.4	13	2.3	12	2.2	23	5.5	11	3.9	17	5.3	0
Leptospirosis	0	0.0	0	0.0	0	0.0	0	0.0	4	1.5	17	3.5	30	5.2	42	7.8	17	4.1	4	1.4	1	0.3	0
Listeriosis [a]	2	3.7	2	0.9	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0	2	0.5	6	2.1	5	1.6	0
Malaria	0	0.0	0	0.0	0	0.0	5	1.7	1	0.4	21	4.3	10	1.7	1	0.2	5	1.2	3	1.1	0	0.0	0
Measles	12	22.0	29	13.4	14	4.9	3	1.0	1	0.4	2	0.4	4	0.7	1	0.2	0	0.0	0	0.0	0	0.0	0
Meningococcal disease	68	124.4	130	60.1	69	24.1	47	16.2	86	32.4	63	12.9	24	4.2	27	5.0	13	3.1	6	2.1	10	3.1	0
Mumps	0	0.0	17	7.9	15	5.2	5	1.7	4	1.5	2	0.4	5	0.9	3	0.6	6	1.4	0	0.0	0	0.0	0
Paratyphoid	0	0.0	1	0.5	0	0.0	1	0.3	2	0.8	5	1.0	2	0.3	5	0.9	1	0.2	1	0.4	0	0.0	0
Pertussis	91	166.5	112	51.8	121	42.3	77	26.5	34	12.8	25	5.1	42	7.3	45	8.4	15	3.6	18	6.4	9	2.8	0
Rheumatic fever	1	1.8	1	0.5	27	9.4	82	28.2	17	6.4	8	1.6	6	1	0	0.0	1	0.2	0	0.0	0	0.0	
Rubella	9	16.5	13	6.0	3	1.0	1	0.3	0	0.0	1	0.2	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	0
Salmonellosis	84	153.7	293	135.6	121	42.3	75	25.8	86	32.4	181	37.2	174	30.2	145	27.0	106	25.3	73	25.8	59	18.3	4
Shigellosis	2	3.7	19	8.8	9	3.1	2	0.7	3	1.1	16	3.3	7	1.2	12	2.2	10	2.4	2	0.7	4	1.2	1
Tuberculosis	8	14.6	19	8.8	14	4.8	19	6.5	31	11.7	91	18.7	66	11.5	57	10.6	32	7.6	44	15.6	37	11.4	0
Typhoid	0	0.0	1	0.5	1	0.3	4	1.4	0	0.0	5	1.0	4	0.7	1	0.2	2	0.5	0	0.0	1	0.3	1
VTEC/STEC Infection	11	20.1	55	25.4	10	3.5	3	1.0	0	0.0	6	1.2	5	0.9	2	0.4	3	0.7	4	1.4	5	1.6	1
Yersiniosis	41	75.0	91	42.1	22	7.7	18	6.2	18	6.8	43	8.8	39	6.8	56	10.4	49	11.7	29	10.3	31	9.6	2

[a] Excludes perinatal cases

G. NOTIFIABLE DISEASE CASES AND RATES BY DISTRICT HEALTH BOARD, 2003

Table 36. Disease notifications and incidence rates per 100 000 population by District Health Board, 2003

Disease	Campylobacteriosis		Cryptosporidiosis		Dengue fever		Gastroenteritis		Giardiasis		Hepatitis A		Hepatitis B		Hepatitis C		Lead absorption		Legionellosis		Leptospirosis		Listeriosis		Malaria		Measles		Meningococcal disease		Mumps		Paratyphoid		Pertussis		Rheumatic fever		Rubella		Salmonellosis		Shigellosis		Tuberculosis disease		Typhoid		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	292	208	20	14.3	2	1.4	25	17.8	21	15.0	1	0.7	2	1.4	2	1.4	2	1.4	0	0.0	7	5.0	2	1.4	1	0.7	0	0.0	37	26.4	8	5.7	1	0.7	10	7.1	8	5.7	1	0.7	37	26.4	1	0.7	12	8.6	0	0.0	10	7.1	3	2.1
Waitemata	1767	411	16	3.7	9	2.1	98	22.8	183	42.6	13	3.0	9	2.1	2	0.5	5	1.2	16	3.7	2	0.5	4	0.9	7	1.6	5	1.2	55	12.8	3	0.7	5	1.2	57	13.3	11	2.6	1	0.2	136	31.6	15	3.5	72	16.8	0	0.0	4	0.9	78	18.1
Auckland	1456	396	15	4.1	23	6.3	127	34.5	239	65.0	17	4.6	10	2.7	5	1.4	15	4.1	12	3.3	1	0.3	4	1.1	3	0.8	3	0.8	68	18.5	1	0.3	4	1.1	39	10.6	30	8.2	1	0.3	141	38.3	27	7.3	90	24.5	7	1.9	2	0.5	56	15.2
Counties Manukau	1230	328	17	4.5	5	1.3	75	20.0	134	35.7	11	2.9	6	1.6	2	0.5	4	1.1	11	2.9	3	0.8	2	0.5	6	1.6	3	0.8	107	28.5	1	0.3	2	0.5	27	7.2	55	14.6	1	0.3	148	39.4	14	3.7	81	21.6	8	2.1	10	2.7	23	6.1
Waikato	1521	479	140	44.1	1	0.3	69	21.7	193	60.7	3	0.9	5	1.6	1	0.3	14	4.4	2	0.6	20	6.3	2	0.6	4	1.3	1	0.3	43	13.5	3	0.9	1	0.3	72	22.7	7	2.2	0	0.0	164	51.6	2	0.6	19	6.0	0	0.0	19	6.0	42	13.2
Lakes	426	444	39	40.6	2	2.1	32	33.3	55	57.3	2	2.1	4	4.2	1	1.0	1	1.0	0	0.0	1	1.0	0	0.0	1	1.0	0	0.0	27	28.1	0	0.0	0	0.0	6	6.3	4	4.2	0	0.0	24	25.0	0	0.0	4	4.2	0	0.0	3	3.1	10	10.4
Bay of Plenty	569	319	28	15.7	2	1.1	3	1.7	79	44.3	1	0.6	2	1.1	5	2.8	1	0.6	5	2.8	5	2.8	2	1.1	0	0.0	1	0.6	42	23.6	2	1.1	0	0.0	22	12.3	7	3.9	2	1.1	58	32.6	1	0.6	15	8.4	0	0.0	7	3.9	13	7.3
Tairawhiti	148	337	7	15.9	0	0.0	2	4.6	11	25.0	1	2.3	2	4.6	1	2.3	2	4.6	0	0.0	4	9.1	0	0.0	0	0.0	0	0.0	4	9.1	1	2.3	0	0.0	7	15.9	2	4.6	1	2.3	21	47.8	0	0.0	0	0.0	0	0.0	0	0.0	15	34.1
Taranaki	414	402	11	10.7	0	0.0	9	8.7	9	8.7	0	0.0	2	1.9	0	0.0	5	4.9	2	1.9	5	4.9	0	0.0	0	0.0	0	0.0	7	6.8	1	1.0	0	0.0	5	4.9	0	0.0	0	0.0	24	23.3	0	0.0	10	9.7	0	0.0	9	8.7	5	4.9
Hawke's Bay	635	442	51	35.5	0	0.0	3	2.1	84	58.5	3	2.1	4	2.8	3	2.1	8	5.6	1	0.7	14	9.8	0	0.0	2	1.4	3	2.1	18	12.5	5	3.5	1	0.7	63	43.9	7	4.9	6	4.2	71	49.5	1	0.7	20	13.9	1	0.7	0	0.0	14	9.8
Whanganui	201	316	14	22.0	0	0.0	9	14.1	17	26.7	1	1.6	0	0.0	2	3.1	2	3.1	1	1.6	3	4.7	0	0.0	3	4.7	1	1.6	18	28.3	2	3.1	0	0.0	19	29.9	1	1.6	0	0.0	23	36.2	0	0.0	1	1.6	0	0.0	0	0.0	5	7.9
MidCentral	357	230	43	27.7	0	0.0	41	26.5	51	32.9	0	0.0	2	1.3	4	2.6	12	7.7	1	0.6	9	5.8	4	2.6	0	0.0	16	10.3	9	5.8	1	0.6	0	0.0	14	9.0	2	1.3	1	0.6	37	23.9	0	0.0	9	5.8	0	0.0	4	2.6	8	5.2
Hutt	663	503	19	14.4	2	1.5	29	22.0	36	27.3	1	0.8	3	2.3	0	0.0	0	0.0	5	3.8	0	0.0	1	0.8	3	2.3	6	4.6	13	9.9	2	1.5	0	0.0	15	11.4	6	4.6	0	0.0	40	30.3	1	0.8	16	12.1	1	0.8	0	0.0	17	12.9
Capital and Coast	1521	619	121	49.2	5	2.0	92	37.4	154	62.6	8	3.3	3	1.2	3	1.2	13	5.3	9	3.7	0	0.0	1	0.4	2	0.8	3	1.2	21	8.5	5	2.0	1	0.4	20	8.1	2	0.8	5	2.0	90	36.6	7	2.8	42	17.1	3	1.2	1	0.4	34	13.8
Wairarapa	155	406	11	28.8	0	0.0	13	34.0	8	20.9	0	0.0	1	2.6	1	2.6	3	7.9	2	5.2	0	0.0	0	0.0	0	0.0	1	2.6	2	5.2	1	2.6	0	0.0	0	0.0	0	0.0	1	2.6	16	41.9	2	5.2	0	0.0	0	0.0	0	0.0	9	23.6
Nelson Marlborough	323	264	26	21.2	0	0.0	33	26.9	51	41.6	0	0.0	2	1.6	0	0.0	3	2.4	0	0.0	13	10.6	0	0.0	1	0.8	8	6.5	1	0.8	4	3.3	0	0.0	52	42.5	0	0.0	1	0.8	40	32.7	1	0.8	3	2.4	0	0.0	5	4.1	8	6.5
West Coast	99	327	11	36.3	0	0.0	1	3.3	13	43.0	0	0.0	0	0.0	3	9.9	0	0.0	1	3.3	2	6.6	0	0.0	0	0.0	3	9.9	1	3.3	1	3.3	0	0.0	11	36.3	0	0.0	4	13.2	4	13.2	0	0.0	1	3.3	0	0.0	1	3.3	13	43.0
Canterbury	1916	449	89	20.8	2	0.5	218	51.0	159	37.2	4	0.9	1	0.2	6	1.4	14	3.3	5	1.2	15	3.5	1	0.2	9	2.1	7	1.6	33	7.7	8	1.9	2	0.5	79	18.5	1	0.2	1	0.2	181	42.4	10	2.3	13	3.0	0	0.0	11	2.6	58	13.6
South Canterbury	217	411	49	92.8	0	0.0	16	30.3	9	17.1	1	1.9	1	1.9	0	0.0	2	3.8	0	0.0	1	1.9	0	0.0	0	0.0	2	3.8	3	5.7	0	0.0	0	0.0	30	56.8	0	0.0	0	0.0	34	64.4	0	0.0	2	3.8	0	0.0	9	17.1	8	15.2
Otago	577	339	62	36.3	0	0.0	34	19.9	45	26.4	3	1.8	2	1.2	0	0.0	11	6.4	3	1.8	4	2.3	0	0.0	3	1.8	0	0.0	23	13.5	7	4.1	1	0.6	25	14.6	0	0.0	2	1.2	65	38.1	4	2.3	6	3.5	0	0.0	7	4.1	15	8.8
Southland	299	289.3	29	28.1	2	1.9	94	91.0	18	17.4	0	0.0	0	0.0	0	0.0	2	1.9	2	1.9	6	5.8	1	1.0	1	1.0	3	2.9	11	10.6	1	1.0	0	0.0	16	15.5	0	0.0	0	0.0	47	45.5	1	1.0	2	1.9	0	0.0	3	2.9	5	4.8

H. NOTIFIABLE DISEASE CASES BY YEAR AND SOURCE, 1984 - 2003

Note: cell is blank where data are unavailable

Disease	Source	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
AIDS	Notification	3	11	19	28	38	59	73	78	50	70	44	50	76	43	29	33	27	26	17	33
Campylobacteriosis	Notification	1915	2390	2786	2921	2796	4187	3850	4148	5144	8101	7714	7442	7635	8924	11573	8161	8417	10146	12494	14786
Cholera	Notification	0	0	0	2	0	0	5	0	0	0	2	2	0	0	1	1	0	3	1	1
Creutzfeldt-Jakob disease	Notification													2	1	0	2	3	1	3	6
Cryptosporidiosis	Notification													119	357	866	977	775	1208	975	818
Dengue fever	Notification	1	1	3	0	1	3	2	3	1	1	0	6	23	14	26	9	7	93	70	55
Gastroenteritis	Notification													555	310	492	601	726	940	1087	1023
Giardiasis	Notification													1235	2127	2183	1793	1684	1603	1547	1569
H. influenzae serotype b	Laboratory				93	107	121	143	148	166	118	75	14	24	8	10	9	10	8	3	9
	Notification													26	9	11	10	13	11	3	13
Hepatitis A	Notification	539	380	251	158	176	134	150	224	288	257	179	338	311	347	145	119	107	61	106	70
Hepatitis B	Notification	609	530	488	474	370	309	242	227	221	145	133	125	104	138	88	94	79	56	68	61
Hepatitis C	Notification	29	31	17	18	20	13	11	25	89	91	79	88	59	92	102	96	80	59	53	41
Hydatid disease	Notification	6	4	5	2	2	0	4	0	4	4	1	5	3	2	2	8	3	7	2	0
Influenza	Sentinel isolates	9	6	8	18	136	119	343	183	317	423	441	521	673	743	127	425	73	313	241	230
Legionellosis	Notification	48	87	95	91	62	17	20	14	11	24	66	33	36	63	43	51	61	46	49	78
	Laboratory							21	42	60	76	121	76	60	109	107	65	56	56	53	82
Leprosy	Notification	9	5	7	8	2	4	1	4	5	3	1	1	10	3	3	10	4	3	4	4
Leptospirosis	Notification	201	174	139	129	99	90	117	106	70	116	70	65	56	52	75	59	98	105	141	115
	Laboratory					192	182	229	176	218	234	168	183	140	84	117	76	114	113	181	149
Listeriosis	Notification	6	6	6	12	7	10	16	26	16	11	8	13	10	35	17	19	22	18	19	24
Malaria	Notification	48	44	31	22	25	27	32	39	29	58	34	41	107	65	73	46	111	54	61	46
Measles	Notification													68	1984	164	107	64	83	21	66
	Laboratory	11	145	135	26	5	5	7	355	53	4	4	15	25	1220	35	2	9	21	6	15
Meningococcal disease	Notification	34	107	190	179	83	49	53	71	153	202	208	394	473	609	439	507	477	648	555	543
Mumps	Notification													76	90	85	56	50	56	64	57
	Laboratory	0	61	132	28	5	105	26	23	10	25	245	66	20	14	8	5	2	22	18	11
Paratyphoid	Laboratory					23	13	30	22	13	23	30	24	20	25	19	17	23	33	24	21
Pertussis	Notification													1022	284	153	1046	4140	1334	1068	589
Rheumatic fever (initial attack)	Notification			12	215	153	148	90	97	70	81	98	88	110	95	65	71	136	114	87	141
Rubella	Notification													306	80	53	35	26	30	33	28
	Laboratory	155	120	30	50	95	114	168	81	27	244	104	1581	339	21	2	0	0	3	4	3
Salmonellosis	Notification	1138	1234	1335	1140	1128	1860	1619	1244	1239	1340	1522	1334	1141	1177	2069	2077	1796	2417	1880	1401
Shigellosis	Notification	127	192	189	143	145	137	197	152	124	128	185	191	167	117	122	147	115	157	112	87
Tetanus	Notification	7	3	3	4	1	0	0	0	8	2	2	2	3	0	2	6	1	4	1	2
Tuberculosis	Notification	404	359	320	296	295	303	348	335	327	323	352	391	352	321	365	445	353	372	382	418
Typhoid	Notification	2	6	28	4	15	17	7	9	11	14	24	21	15	16	31	9	21	27	23	20
VTEC/STEC infection	Notification										3	3	6	7	12	48	64	67	76	73	105
Yersiniosis	Notification													330	488	546	503	396	429	476	439

I. PREVALENCE OF ANTIMICROBIAL RESISTANCE, 1988-2002

Pathogen	Antimicrobial	Percent resistance[a] (number tested)				
		1988-1990	1991-1993	1994-1996	1997-1999	2000-2002
S aureus[b]	methicillin	0.5 (37466)	0.6 (42839)	2.8 (58283)	4.9 (136356)	7.2 (251448)
	erythromycin	8.1 (34900)	6.8 (40425)	8.0 (54870)	10.8 (134350)	12.0 (221394)
	co-trimoxazole	1.0 (11783)	1.1 (27469)	0.8 (32926)	0.6 (91391)	1.2 (149166)
	mupirocin	NA[c]	0 (16)	10.1 (9291)	18.2 (37173)	20.0 (91555)
Methicillin-resistant *S aureus*[d]	erythromycin	52.9 (263)	58.2 (701)	31.5 (2249)	26.2 (1303)	40.0 (1409)
	co-trimoxazole	24.3 (263)	24.8 (701)	8.6 (2249)	1.8 (1303)	6.7 (1409)
	mupirocin	4.6 (263)	2.0 (701)	6.4 (2244)	6.0 (1303)	8.5 (1409)
	rifampicin	1.1 (263)	13.0 (701)	0.3 (2249)	0.8 (1303)	0.7 (1409)
S pneumoniae, non-invasive disease[b]	Penicillin[e]	1.8 (2372)	0.8 (3720)	9.5 (7076)	19.0 (10976)	22.8 (12047)
	erythromycin	1.8 (2334)	1.3 (3554)	8.3 (6832)	14.5 (11212)	18.6 (14404)
	tetracycline	5.6 (1760)	1.7 (3376)	10.5 (5019)	11.2 (5993)	15.4 (9476)
S pneumoniae, invasive disease[6]	penicillin[e]	1.0 (382)	1.4 (694)	3.4 (989)	15.0 (1182)	15.3 (1493)
	erythromycin	0.8 (382)	1.9 (694)	2.6 (989)	4.1 (853)	7.3 (1492)
	cefotaxime[e]	0.3 (382)	0.1 (694)	1.8 (989)	7.3 (1182)	6.1 (1493)
Enterococcus spp[b]	amoxicillin[g]	1.6 (6127)	2.3 (2573)	1.5 (7373)	2.4 (17548)	3.0 (22566)
	vancomycin	NA	0 (148)	0.2 (1141)	0.5 (4752)	0.3 (7505)
E coli, urinary isolates[b]	amoxicillin[g]	NA	56.2 (29394)	55.9(48706)	56.0(138712)	54.4 (194799)
	co-amoxiclav	NA	6.9 (27249)	10.6(42666)	12.2(136326)	9.6 (194950)
	trimethoprim	NA	18.8 (29340)	19.6(48098)	22.6(111710)	22.3 (207837)
	nitrofurantoin	NA	2.2 (28331)	1.6 (48123)	1.7 (124362)	1.5 (206149)
	fluoroquinolone	NA	0.2 (7014)	0.5 (40032)	0.6 (118917)	1.6 (201382)
E coli, non-urinary isolates[b]	co-amoxiclav	NA	18.3 (2318)	22.8 (7358)	21.8 (15948)	17.5 (11508)
	cefuroxime	NA	2.3 (1158)	3.2 (6309)	4.5 (6893)	4.2 (6576)
	gentamicin	NA	0.5 (3200)	0.8 (10352)	0.9 (13789)	2.4 (10392)
	fluoroquinolone	NA	0.1 (728)	0.5 (4717)	0.8 (10800)	2.4 (8821)
P aeruginosa[b]	gentamicin	6.5 (11832)	5.8 (5918)	12.5 (9556)	9.5 (20542)	10.5 (25561)
	tobramycin	1.4 (1759)	3.1 (2535)	3.9 (6757)	2.8 (11033)	3.6 (10421)
	ceftazidime	NA	6.6 (1006)	5.0 (4832)	5.2 (11147)	3.9 (13253)
	fluoroquinolone	NA	8.4 (1652)	8.8 (8123)	9.9 (16551)	9.3 (22869)
H influenzae, non-invasive disease[b]	amoxicillin[g]	10.2 (4347)	8.4 (4131)	12.0(12244)	19.3 (18852)	21.9 (28476)
	co-amoxiclav	0.9 (555)	1.1 (1136)	1.1 (9839)	0.6 (15040)	0.8 (16333)
	co-trimoxazole	NA	11.4 (1581)	11.9 (6605)	14.7 (13964)	17.3 (22443)
	tetracycline	NA	1.7 (2082)	1.0 (7810)	1.5 (13007)	1.2 (15633)
H influenzae, invasive disease[f]	amoxicillin[g]	14.9 (388)	13.2 (478)	21.8 (179)	11.5 (122)	19.2 (125)
	co-amoxiclav	0.3 (388)	0.2 (478)	3.4 (179)	1.6 (122)	1.6 (125)
	cefuroxime	0.3 (388)	0.8 (478)	3.4 (179)	4.9 (122)	0.8 (125)
N meningitidis, invasive disease[f]	Penicillin[h]	2.2 (139)	2.1 (291)	3.9 (659)	7.9 (431)	7.5 (796)
	rifampicin	0 (139)	0.3 (291)	0 (659)	0 (431)	0 (796)
N gonorrhoeae[b,i]	penicillin	NA	16.4 (85)	11.6 (879)	10.4 (1437)	7.1 (2782)
	fluoroquinolone	NA	0 (85)	0.7 (864)	1.8 (1437)	6.3 (2349)
M tuberculosis[b]	isoniazid	NA	NA	4.6 (438)	8.2 (757)	8.5 (811)
	rifampicin	NA	NA	0.7 (438)	1.3 (757)	0.7 (811)
	MDR[j]	NA	NA	0.7 (438)	0.9 (757)	0.5 (811)

[a] intermediate resistance not included in resistant category unless otherwise stated (refer footnotes 5 and 8 below)
[b] collated clinical laboratory data
[c] NA = not available
[d] MRSA isolates tested by ESR
[e] includes intermediate resistant and resistant isolates
[f] invasive disease isolates tested by ESR
[g] ampicillin used in laboratory testing
[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)

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