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2011

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May 2012

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ANNUAL REPORT
CONCERNING FOODBORNE DISEASE
IN NEW ZEALAND
2011

Prepared for Ministry for Primary Industries under
project MRP/11/02 – Systematic reporting of epidemiology of potentially
foodborne disease in New Zealand for year 2011,
as part of overall contract for scientific services

by

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INTRODUCTION

INTRODUCTION

One of the aims of the Ministry for Primary Industries (MPI) is to protect New Zealand from biological risks, including reducing food-related risks to human health. Human health surveillance is an essential element of the monitoring and review component of its risk management framework. In addition, evidence from notifications, case enquiries, outbreak investigations and other epidemiological studies of human enteric diseases are used as sources of data for risk profiles and assessments. There is ongoing interest in foodborne disease statistics within MPI and its stakeholders.

This report for the calendar year 2011 is intended to be part of a series providing a consistent source of data and method of presentation to allow monitoring of foodborne illness in New Zealand.

Human health surveillance data and foodborne disease

The information in this report concerns reported cases of notifiable disease and reported outbreaks collected in the EpiSurv database (for a description of EpiSurv, see Methods section of this report). There are a number of notifiable illnesses which may be caused by transmission of pathogens in foods, but it is important to remember that most of the information concerns the illness, not the mode of transmission. The information needs to be considered with two caveats:

1. Notified cases of illness and reported outbreaks represent a subset of all the cases and outbreaks that occur in New Zealand each year. Many sick individuals do not visit a GP or otherwise come to the attention of the medical system. By using these data as indicators, we are assuming that they are representative of all the cases and outbreaks that occur (see section on the Acute Gastrointestinal Illness study for a further discussion of this issue).

2. Foodborne transmission is only one of the routes by which humans are exposed to pathogens; other routes include water, animal contact and person to person. There are a number of indicators from which we can get information on the proportion of cases caused by foodborne transmission:

    - Reported risk factors: for a proportion of the notified cases, supplemental information is obtained by public health units (PHUs) on risk factors. This information should be interpreted with some caution as it is self reported by cases, no external validation of this information is undertaken, and often the cases will report several potentially important risk factors. The quality of information from notifiable disease surveillance as an indication for foodborne disease transmission has been reviewed in more detail [1].
    - Outbreak reports: the circumstances of an outbreak (multiple cases from a single event) mean that an investigation is more likely to identify a source of exposure to the pathogen than investigation of sporadic cases. However, only a small proportion of outbreaks are reported, and experience shows that outbreaks associated with foodservice premises are more likely to be reported and investigated than outbreaks associated with other settings.
    - Expert opinion: based on their experience in laboratories and epidemiological investigations, as well as knowledge of factors influencing the risk, experts can provide estimates of the proportion of cases caused by foodborne transmission. Estimates for New Zealand have been developed for some foodborne diseases [2], as presented in relevant report sections. These are not fixed values; changes to the New Zealand food chain may require the values to be amended.

- Overseas analyses and estimates: information for countries with similar food supplies to New Zealand can be helpful, especially for illnesses where a foodborne estimate was not developed. Four sets of published estimates are given in Table 1, for the USA [3], Australia [4], England and Wales [5] and the Netherlands [6]. The estimates for Australia and the Netherlands are based on expert opinion, the estimates for England and Wales are based on outbreak analysis, while the US estimates are based on data from surveillance, risk factor studies and a literature review. It is worth noting that, although for most of the diseases included in this report foodborne transmission is considered significant, there are several illnesses (shigellosis, giardiasis, cryptosporidiosis, hepatitis A) where it is considered to be only a small proportion of the total.

Table 1. Overseas estimates of the food attributable proportion of selected illnesses due to microbial hazards

Hazard	Percentage foodborne (%)			
	USA (2011)	Australia (2005)	England and Wales (2002)	Netherlands[a] (2008)
Bacteria				
Bacillus cereus	100	100	100	90
Campylobacter spp.	80	75	80	42
Clostridium perfringens	100	100	94	91
Shiga toxin-producing *Escherichia coli* (STEC) O157:H7	68	65	63	40
STEC non-O157	82	NE	63	42
Listeria monocytogenes	99	98	99	69
Salmonella non-typhoidal	94	87	92	55
Shigella spp.	31	10	8	NE
Staphylococcus aureus	100	100	96	87
Yersinia enterocolitica	90	75	90	NE
Parasites				
Cryptosporidium parvum	8	10	6	12
Giardia lamblia	7	5	10	13
Viruses				
Hepatitis A virus	7	10	11	11
Norovirus	26	25	NE	17

[a] the Dutch study also collected opinions on the proportion of disease due to travel. A proportion of this will also be foodborne
NE = not estimated

This report considers information for the 2011 calendar year. Information from the scientific literature and other sources concerning food safety for that year has been summarised. However, the time taken to publish scientific information is often lengthy, and it may be that additional information becomes available in the future.

Conditions included in this report

The conditions that have been selected for inclusion in the report are those that have:

1. The potential to be caused by foodborne transmission; and,
2. Available historical and current national data sources.

The potentially foodborne conditions that were included in this report are listed in Table 2. Data have been drawn from a number of sources including disease notification, hospitalisation, outbreak reports and laboratory surveillance databases.

The notifiable conditions were selected for inclusion in the report where it was considered that a significant proportion would be expected to be foodborne or the disease organism has been reported as the cause of foodborne outbreaks. Typhoid and paratyphoid fever are not included as the majority of cases acquire their infection overseas.

For some diseases (intoxications from the bacteria *Bacillus*, *Clostridium* and *Staphylococcus*, and norovirus infection) not every case is notifiable; only those that are part of a common source outbreak or from a person in a high risk category (e.g. food handler, early childhood service worker, etc.). Such cases are notified under the heading of acute gastroenteritis.

For some conditions (campylobacteriosis, listeriosis, salmonellosis, VTEC/STEC infection, yersiniosis) the attribution of disease incidence to foodborne transmission was estimated by an expert consultation held on 24 May 2005 [2]. In the current report these food-attributable proportions have been used to estimate the number of food-associated cases of relevant diseases. Travel-associated cases were subtracted from the total cases before application of the food-associated proportion. Travel-associated cases are those where the individual reported being outside New Zealand during the incubation period for the disease.

Table 2. Potentially foodborne conditions included in the report

Disease	Type	Source(s)	ICD-10 code[a]
Bacillus cereus intoxication	Bacterium	N, O, H	A05.4 Foodborne *Bacillus cereus* intoxication
Campylobacteriosis	Bacterium	N, O, H	A04.5 *Campylobacter* enteritis
Ciguatera fish poisoning	Toxin	N, O, H	T61.0 Toxic effect: Ciguatera fish poisoning
Clostridium perfringens intoxication	Bacterium	N, O, H	A05.2 Foodborne *Clostridium perfringens* [*Clostridium welchii*] intoxication
Cryptosporidiosis	Protozoan	N, O, H	A07.2 Cryptosporidiosis
Giardiasis	Protozoan	N, O, H	A07.1 Giardiasis [lambliasis]
Histamine (scombroid) fish poisoning	Toxin	N, O, H	T61.1 Toxic effect: scombroid fish poisoning
Hepatitis A	Virus	N, O, H	B15 Acute hepatitis A
Listeriosis (total and perinatal)	Bacterium	N, O, H	A32 Listeriosis
Norovirus infection	Virus	N, O, H, L	A08.1 Acute gastroenteropathy due to Norwalk agent
Salmonellosis	Bacterium	N, O, H, L	A02.0 Salmonella enteritis
Shigellosis	Bacterium	N, O, H, L	A03 Shigellosis
Staphylococcus aureus intoxication	Bacterium	N, O, H	A05.0 Foodborne staphylococcal intoxication
Toxic shellfish poisoning	Toxin	N, O, H	T61.2 Other fish and shellfish poisoning
VTEC/STEC infection	Bacterium	N, O, H, L	A04.3 Enterohaemorrhagic *Escherichia coli* infection
Yersiniosis	Bacterium	N, O, H, L	A04.6 Enteritis due to *Yersinia enterocolitica*

Data sources: EpiSurv notifications (N), EpiSurv outbreaks (O), Ministry of Health hospitalisations (H), ESR laboratory data (L)
VTEC = Verotoxin-producing *Escherichia coli* STEC = Shiga toxin-producing *Escherichia coli*
[a] International statistical classification of disease and related health problems 10th revision [7]

This report includes both notifiable diseases in the form of acute gastrointestinal illness, and sequelae which are considered to result from these preceding infections (Table 3). The two sequelae included in the report, haemolytic uraemic syndrome (HUS) and Guillain-Barré Syndrome (GBS) are severe illnesses and occasionally life threatening.

Table 3. Sequelae to potentially foodborne conditions included in the report

Disease	Source(s)	Comment
Guillain-Barré syndrome (GBS)	H (G61.0 Guillain-Barré syndrome)	Sequela to infection with *Campylobacter* [a]
Haemolytic uraemic syndrome (HUS)	H (D59.3 Haemolytic-uraemic syndrome)	Sequela to infection with VTEC / STEC

Data Sources: MoH hospitalisations (H)

[a] While there is evidence that GBS can be triggered by other microbial infections (e.g. cytomegalovirus, Epstein-Barr virus, *Mycoplasma pneumonia*), *Campylobacter* infection is the only recognised triggering organism that is potentially foodborne.

The data sources above have been selected on the basis of availability of data for the specified reporting period and their accessibility within the timeframe required for the report.

Some data, such as official cause of death, are not published until several years after the end of the year in which the event occurred (although deaths may be reported as part of the case notification data recorded in EpiSurv). For this reason these data are not available for inclusion in a report published soon after the end of the calendar year.

METHODS

METHODS

This section includes descriptions of the data sources, analytical methods used and comments on quality of data, including known limitations.

The report uses the calendar year, 1 January to 31 December 2011, for the reporting period.

Data sources

The key sources of data used in this report are detailed in the following sections.

EpiSurv - the New Zealand notifiable disease surveillance system

Under the Health Act 1956 health professionals are required to inform their local medical officer of health of any suspected or diagnosed notifiable disease. Since December 2007, laboratories have also been required to report notifiable disease cases to their local medical officer of health.

Notification data are recorded using a web-based application (EpiSurv) available to staff at each of the 20 public health units (PHUs) in New Zealand. The EpiSurv database is maintained and developed by the Institute of Environmental Science and Research (ESR) Ltd., who are also responsible for the collation, analysis and reporting of disease notifications on behalf of the Ministry of Health (MoH). Further information about notifiable diseases can be found in the Notifiable and Other Diseases in New Zealand: Annual Report 2011 [8].

Laboratory-based surveillance

For a number of organisms (e.g. *Salmonella* spp, *Escherichia coli*), clinical laboratory isolates are forwarded to reference laboratories at ESR for confirmation and typing. The number of isolates forwarded differs by DHB and organism (e.g. almost all isolates are forwarded for *Salmonella* typing but not all *Yersinia* isolates are forwarded).

Prior to the introduction of processes for matching notifications and laboratory records, the number of laboratory-reported salmonellosis cases had always exceeded the number of notifications. The implementation of integration processes in 2004 for notifications and laboratory results at ESR has addressed this problem.

Ministry of Health (MoH)

MoH collates national data on patients admitted and discharged from publicly funded hospitals. These data are stored as part of the National Minimum Dataset (NMDS). Cases are assigned disease codes using the tenth revision of the International Classification of Diseases (ICD-10) coding system [7]. Up to 99 diagnostic, procedure, and accident codes may be assigned to each admission. The first of these is the principal or primary diagnosis, which is the condition that actually led to admission. This may differ from the underlying diagnosis.

Hospital admission data are only added to NMDS after the patient is discharged. The number of hospitalisations presented for the reported year may be under-reported due to the delay in receiving discharge summaries.

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

In this report hospitalisations, including readmissions, have been reported for all primary diseases. For the disease sequelae (GBS and HUS) there is potential for multiple readmissions. Readmissions within the calendar year were removed with reported case numbers representing unique cases, rather than total admissions.

Outbreak surveillance

ESR has operated an outbreak surveillance system as an additional module in EpiSurv since mid-1997. This enables PHUs to record and report outbreaks for national reporting and analysis. In particular, it should be noted that not all cases associated with outbreaks are recorded as individual cases of notifiable disease in EpiSurv. The terms 'setting' and 'suspected vehicle' are both used in outbreak reporting to describe likely implicated sources found in epidemiological or environmental investigations.

A new outbreak report form was introduced in October 2010. As a result, some variables reported previously are no longer available for analysis. For example, coding indicating the strength of evidence for concluding that an outbreak is foodborne was changed. It is important to note that a single outbreak may have multiple pathogens, modes of transmission, settings where exposure occurred, or settings where preparation of food was conducted. More information about the outbreak reporting system can be found in the Annual Summary of Outbreaks in New Zealand 2010 [9].

Laboratory investigation of outbreaks

PHUs may submit clinical, food or environmental samples associated with single cases or outbreaks of suspected food poisoning to ESR's Public Health Laboratory (PHL). Wherever possible, samples are linked to associated EpiSurv records. Samples are analysed for possible causative agents, based on information on symptoms and incubation period. In the current report, laboratory investigations are reported only for outbreaks classified as foodborne in EpiSurv.

Statistics New Zealand

Data from the Statistics New Zealand website www.stats.govt.nz were used to calculate notification and hospitalisation population rates of disease. See analytical methods section for further details.

MPI project reports and other publications

MPI project reports, prepared by ESR or other providers, and publications from the general literature were used to provide specific contextual information on the prevalence of selected pathogens in specific food types.

Risk attribution

Information from a project on risk ranking was used to estimate the proportion of disease due to specific pathogens that can be attributed to transmission by food [2]. Attributable proportions were determined by expert consultation, using a modified double-pass Delphi, with a facilitated discussion between passes. Each expert was asked to provide a minimum ('at least'), a most likely and a maximum ('not more than') estimate of the proportion of a number of microbial diseases that were due to transmission by food. Estimates presented in the current report are mean values from the second pass.

Analytical methods

Key analytical methods used include:

Dates

Notification and outbreak data contained in this report are based on information recorded in EpiSurv as at 21 February 2012 and 24 April 2012, respectively. Changes made to EpiSurv data by PHU staff after this date will not be reflected in this report. Consequently, future analyses of these data may produce revised results. 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

All population rates use Statistics New Zealand 2011 mid-year population estimates and are crude rates unless otherwise stated. Rates have not been calculated where there are fewer than five notified cases or hospitalisations in any category. Calculating rates from fewer than five cases produces unstable rates.

Geographical breakdown

This report provides rates for current district health boards (DHBs). The DHB populations have been derived from the Statistics New Zealand mid-year population estimates for Territorial Authorities in New Zealand.

Map classification scheme

The map classification for the disease rates is a combination of quantiles and equal intervals i.e. break points have been selected to divide the data into three bands to show the range of rates among DHBs. The darkest colour represents the highest rates and the lightest colour the lowest rates. The grey colour shows where there are insufficient data to calculate a rate (fewer than 5 cases).

Risk factors and source of infection

For many diseases an analysis of exposure to risk factors for the cases is reported. These risk factors are those included in the current EpiSurv case report forms. Often more than one risk factor is reported for each case. The high number of unknown outcomes associated with the risk factors should be noted.

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

Statistical tests

Confidence intervals have been calculated for the disease rates and displayed on the graphs. The historical mean is calculated from the previous three years data (2008-2010).

Interpreting data

Data in this report may differ from those published in other reports depending on:

- the date of extraction of data
- the date used to aggregate data (e.g. date reported or date of onset of illness)
- filters used to extract the data

The information in this report shows disease trends by age group, sex, and place of residence (district health board).

Because of the low numbers of cases for some conditions and age groups, etc. the rates calculated in this report may be highly variable from year to year and it is necessary to interpret trends with caution.

THE AGI STUDY

THE ACUTE GASTROINTESTINAL ILLNESS (AGI) STUDY

The Acute Gastrointestinal Illness (AGI) Study was a set of three linked surveys, with the following objectives:

- To determine the magnitude and distribution of self reported AGI in the New Zealand population;
- To estimate the burden of disease associated with AGI;
- To describe and estimate the magnitude of under-ascertainment of AGI at each stage in the national communicable disease surveillance process; and,
- To identify modifiable factors affecting under-ascertainment that, if altered, could reduce case loss throughout the AGI component of the surveillance system.

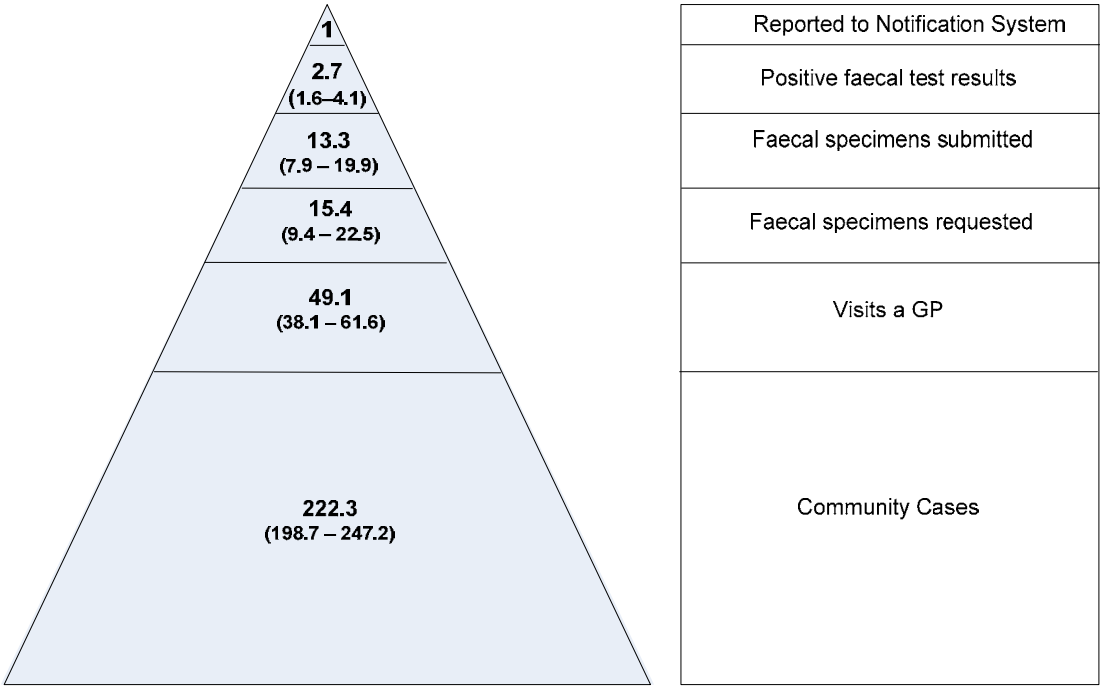
The three study elements were completed during 2005-2007 and each has been reported separately:

- Community study: a twelve month telephone survey conducted from February 2006–January 2007 and reported as "Acute Gastrointestinal Illness (AGI) Study: Community Survey" [10],
- General practice study: a nationwide incidence study conducted over seven weeks from May – July 2006, using selected practices via a computer network practice management system, supplemented by a postal survey conducted in July 2006. This study has been reported as "Acute Gastrointestinal Illness (AGI) Study: General Practice Study" [11], and
- Laboratory study: a postal survey of 45 community and hospital laboratories conducted in June 2006, and reported as "Acute Gastrointestinal Illness (AGI) Study: Laboratory Survey" [12].

The results from the community survey indicated that the incidence of AGI was 1.1 per person year, representing 4.66 million cases in New Zealand in one year. These illnesses are caused by microbial hazards that may be transmitted by a number of routes, including foods. However, at this stage it is not possible to identify the total fraction of AGI caused by foodborne transmission.

A final report amalgamating results from the three studies was produced to construct a reporting pyramid for AGI in New Zealand, as shown in Figure 1 [13]. It is important to recognise that this pyramid applies to AGI in its entirety, and cannot be applied to AGIs caused by individual pathogens, which may have quite different ratios.

Figure 1. Reporting pyramid (areas to scale) for New Zealand showing ratios of cases in the community, general practice, and clinical laboratory levels relative to notifiable diseases, 2006 (mean, 5th and 95th percentiles)



The reporting pyramid is constructed from data reported from the community survey [10]; GP survey [11]; and laboratory survey [12]. Note that not all positive faecal test results will be for diseases that are notifiable.

REPORTING

REPORTING

Reporting against targets

In 2007, the New Zealand Food Safety Authority (now incorporated into MPI) established three performance goals for potentially foodborne illnesses.

Performance goals

- Campylobacteriosis: 50% reduction in foodborne component after a period of 5 years
- Salmonellosis: 30% reduction in foodborne component after a period of 5 years
- Listeriosis: no increase in the foodborne component after a period of 5 years

Rationale

The above diseases include the two most commonly notified, potentially foodborne illnesses in New Zealand plus listeriosis, one of the most severe. This selection is based, in part, on the ESR foodborne illness attribution work which identified campylobacteriosis and listeriosis as creating the highest human health burden within New Zealand [14]. The inclusion of salmonellosis will also allow for New Zealand comparability with US and UK monitoring programmes. For the period 2004-2007 there were approximately 13 600 notified cases of campylobacteriosis, 1 150 of salmonellosis and 23 of listeriosis annually in New Zealand. Foodborne illness due to VTEC/STEC infections is not included as there are only about 10 cases per year that could be attributable to foodborne sources. Norovirus is not incorporated at this stage because of the large fluctuations that occur in annual statistics (norovirus infection is not a notifiable disease but may be notified as acute gastroenteritis during investigation of a common source outbreak) and, for most cases, the causality (e.g. person-to-person) is likely to be outside of the influence of MPI.

The performance goals for the foodborne diseases were determined by the NZFSA Board and aligned with expectations arising from regulatory priorities and programmes. Notwithstanding yearly variations, a robust performance monitoring system should be able to measure trends in risk reduction over time e.g. for *Campylobacter*.

Methodology, tools and reporting

Historical baseline data on the number of reported cases of the targeted foodborne diseases are available and MPI is supporting projects to increase the quality of data. The source of the data is the *Notifiable and Other Diseases in New Zealand Annual Report,* by ESR. MPI is funding active surveillance projects that provide primary information on food attribution such as the advanced attribution study conducted by Massey University and Mid-Central Health within the Manawatu.

The measurement is adjusted for the proportion of cases reported as having travelled overseas during the likely incubation period. It is adjusted also for the proportion of disease estimated to be due to foodborne transmission.

The annual incidence of campylobacteriosis and salmonellosis is reported in terms of calendar year totals of cases per 100 000-people (*Notifiable and Other Diseases in New Zealand Annual Report*, ESR) [8]. This allows for demographic changes within the New Zealand population to be appropriately captured. The proportion of cases acquired abroad is estimated through the EpiSurv programme administered by ESR and MoH[*]. Estimates of the foodborne proportion of selected communicable diseases have been determined by expert elicitation and are approximately 0.6, 0.6 and 0.9 respectively for campylobacteriosis, salmonellosis and listeriosis.

[*] Assuming that the cases for which travel information was provided are representative of all cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases

From year to year, fluctuations in disease rates may occur due to modifications in clinical, laboratory and notification practices as well as changes in food exposure. These are highlighted and corrected for where possible.

Campylobacteriosis

1. Performance goal

- 50% reduction in reported annual incidence of foodborne campylobacteriosis after five years (2008-2012)

2. Measurement

The measurement used is the annual (calendar year) number (per 100 000 mid-year population estimate) of notified cases of human campylobacteriosis, with the baseline year being average of 2004-2007. The measurement is adjusted for the proportion of cases reported as having travelled overseas during likely incubation period; and for the proportion of disease estimated to be due to foodborne transmission (Table 4).

Table 4. Estimated proportion of foodborne campylobacteriosis for 2011

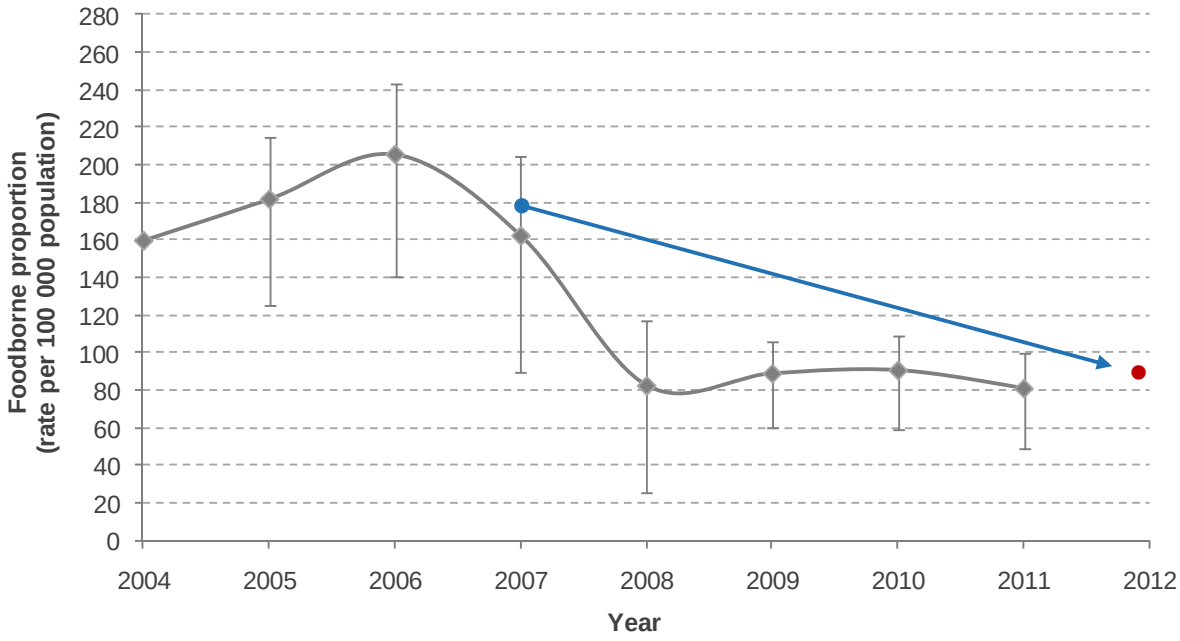
	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	6 692		151.9
Estimated not travelled overseas	6 205	92.7	140.8
Estimated foodborne transmission proportion	3 568	57.5 (37.1-69.6)[a]	81.0 (52.2-98.0)[b]

[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation
[b] Most likely (minimum – maximum) estimates of foodborne rate

3. Presentation

The trend in relative rates (and ranges) compared with the baseline and five year goal is shown in Figure 2.

Figure 2. Foodborne proportion of campylobacteriosis



The blue arrowed line represents the trend line from the baseline year (average of 2004-2007) to the five year target (red dot)

Salmonellosis

1. Performance target

- 30% reduction in reported annual incidence of foodborne salmonellosis after five years (2008-2012)

2. Measurement

The measurement used is the annual (calendar year) number (per 100 000 mid year population estimate) of notified cases of human salmonellosis, with the baseline being 2004-2007. The measurement is adjusted for the proportion of cases reported as having travelled overseas during likely incubation period; and for the proportion of disease estimated to be due to foodborne transmission (Table 5).

Table 5. Estimated proportion of foodborne salmonellosis for 2011

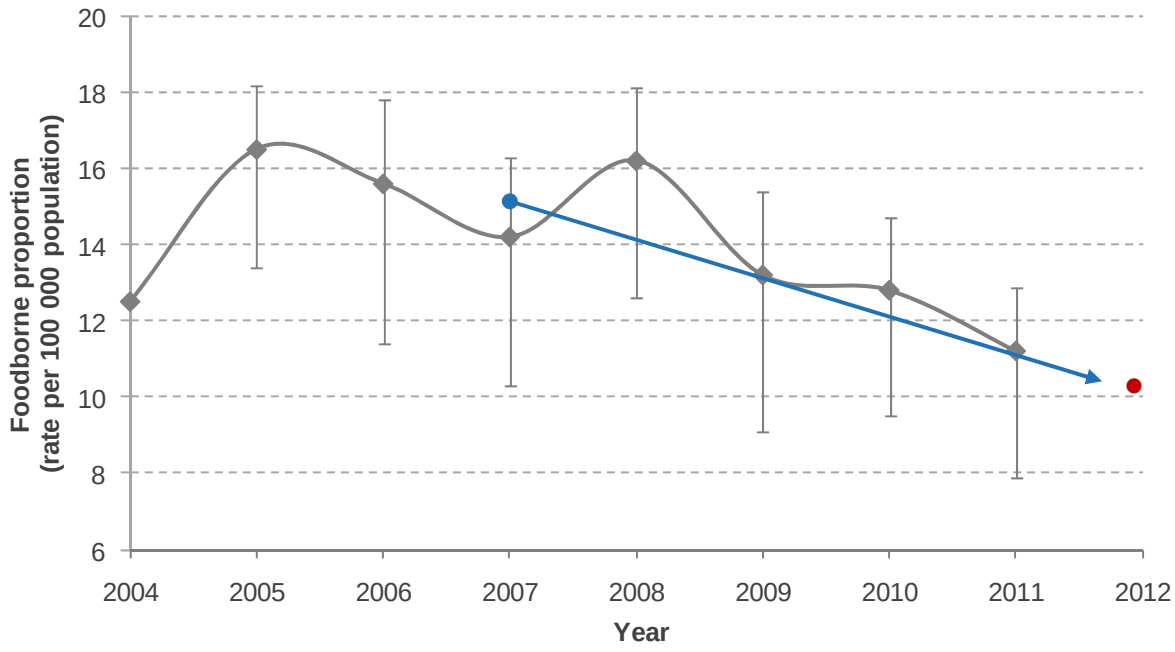
	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	1 056		24.0
Estimated not travelled overseas	813	76.9	18.5
Estimated foodborne transmission proportion	493	60.7 (45.4-68.9)[a]	11.2 (8.4-12.7)[b]

[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation
[b] Most likely (minimum – maximum) estimates of foodborne rate

3. Presentation

The trend in relative rates (and ranges) compared with the baseline and five year goal is shown in Figure 3.

Figure 3. Foodborne proportion of salmonellosis



The blue arrowed line represents the trend line from the baseline year (average of 2004-2007) to the five year target (red dot)

Listeriosis

1. Performance target

- No increase in reported annual incidence of foodborne listeriosis after five years (2008-2012)

2. Measurement

The measurement used is the annual (calendar year) number (per 100 000 population) of notified cases of human listeriosis, with the baseline being 2004-2007. The measurement is adjusted for the proportion of cases reported as having travelled overseas during likely incubation period; and for the proportion of disease estimated to be due to foodborne transmission (Table 6).

Table 6. Estimated proportion of foodborne listeriosis for 2011

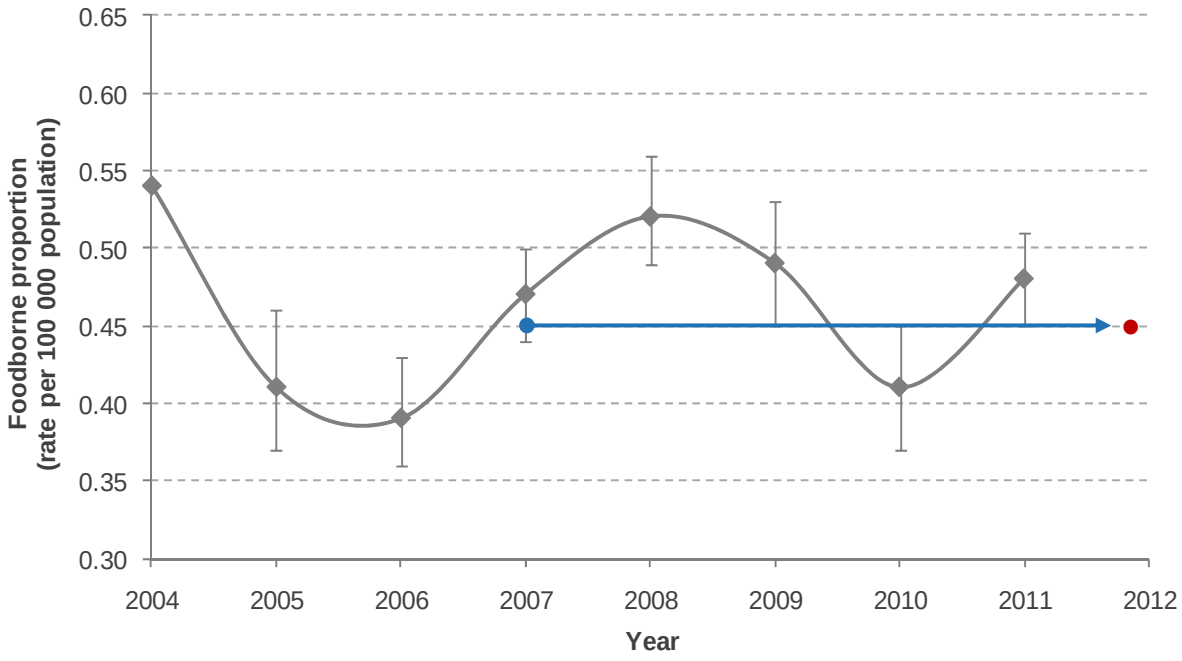
	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	26		0.59
Estimated not travelled overseas	25	96.2	0.57
Estimated foodborne transmission proportion	21	84.9 (78.4-92.1)[a]	0.48 (0.44-0.52)[b]

[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation
[b] Most likely (minimum – maximum) estimates of foodborne rate

3. Presentation

The trend in relative rates (and ranges) compared with the baseline and five year goal is shown in Figure 4.

Figure 4. Foodborne proportion of listeriosis



The blue arrowed line represents the trend line from the baseline year (average of 2004-2007) to the five year target (red dot)

Incidence and severity of selected foodborne diseases

This section includes a summary for each potentially foodborne condition. For conditions with sufficient numbers (approximately 100 cases or more per year) a full analysis, drawn from notification, hospitalisation, mortality, and laboratory data, has been carried out. For diseases with a small number of cases a more limited examination has been performed.

These data are followed by contextual information on the foodborne proportion of the overall incidence of illness. This section will include information on the following topics, where available:

- Statement of estimated foodborne percentage and range provided by an expert elicitation process conducted in 2004-2005. Note that these estimates are only available for some of the illnesses included in this report;
- Statement of estimated foodborne percentage and range for any specific foods provided by the same expert elicitation process;
- Information on pathogen typing (principally from data generated by ESR's Enteric Reference Laboratory), where it is available and informative about foodborne disease;
- Comments on specific food related incidents or outbreaks of the disease that were reported to the notification system during the calendar year;
- Studies on foodborne attribution for the specific disease conducted or published during the calendar year;
- Information on the prevalence of the chemical or microbial hazard in particular foods as a result of surveys conducted during the calendar year; and,
- Regulatory or other risk management actions in New Zealand that might be expected to affect the foodborne disease data.

Bacillus cereus intoxication

Case definition

Clinical description:	Gastroenteritis where either vomiting or profuse watery diarrhoea dominate
Laboratory test for diagnosis:	Isolation of ≥10^3/g *Bacillus cereus* from a clinical specimen or ≥10^4 *B. cereus* from leftover food or detection of diarrhoeal toxin in a faecal sample
Case classification:	
Probable	A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak
Confirmed	A clinically compatible illness that is laboratory confirmed

Bacillus cereus intoxication cases reported in 2011 by data source

During 2011, one notification of *B. cereus* intoxication was reported in EpiSurv.

The ICD-10 code A05.4 was used to extract *B. cereus* intoxication hospitalisation data from the MoH NMDS database. There was one hospital admission recorded in 2011 with *B. cereus* intoxication as the primary diagnosis.

Expert consultation estimated that 97% (minimum = 90%, maximum = 99%) of *B. cereus* intoxication will be due to foodborne transmission. The expert consultation also estimated that approximately 60% of the foodborne transmission would be due to consumption of rice.

Outbreaks reported as caused by *Bacillus cereus*

During 2011, one outbreak of *B. cereus* was reported in EpiSurv, involving two cases (Table 7).

Table 7. *Bacillus cereus* outbreak reported, 2011

Measure	Foodborne *Bacillus cereus* outbreaks	All *Bacillus cereus* outbreaks
Outbreaks	1	1
Cases	2	2
Hospitalised cases	0	0

From 2004 to 2011, fewer outbreaks were reported each year in EpiSurv than in either of the two years prior to 2004 (Figure 5).

Table 8 contains details of the food-associated *B. cereus* outbreak reported in 2011

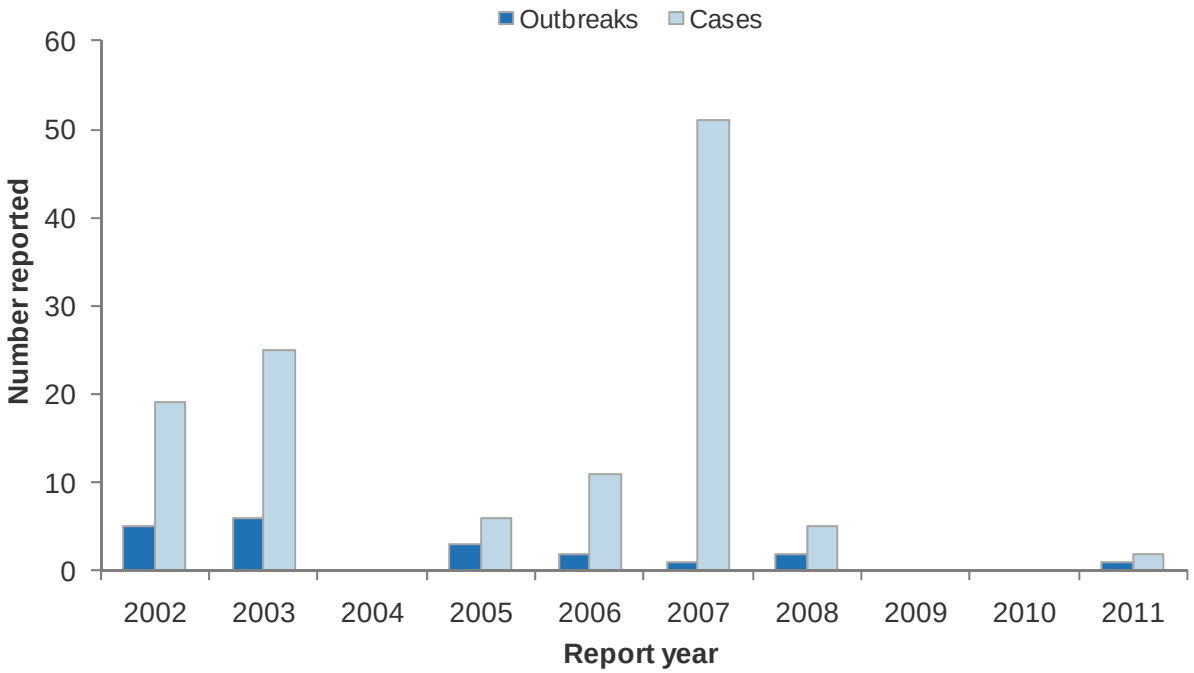
Table 8. Details of food-associated *Bacillus cereus* outbreak, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
West Coast	Apr	Fish fillet (sole)	Private home	Private home	2C

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *B. cereus* outbreaks.

Figure 5. Foodborne *B. cereus* outbreaks and associated cases reported by year, 2002–2011



Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Campylobacteriosis

Summary data for campylobacteriosis in 2011 are given in Table 9.

Table 9. Summary of surveillance data for campylobacteriosis, 2011

Parameter	Value in 2011	Source
Number of cases	6 692	EpiSurv
Rate (per 100 000)	151.9	EpiSurv
Hospitalisations (%)	574 (8.6%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	487 (7.3%)	EpiSurv
Estimated food-related cases (%)*	3 568 (57.5%)	Expert consultation

* For estimation of food-related cases it was assumed that the proportions derived from expert consultation would exclude travel-related cases

Case definition

Clinical description: An illness of variable severity with symptoms of abdominal pain, fever and diarrhoea, and often bloody stools

Laboratory test for diagnosis: Isolation of *Campylobacter* from a clinical specimen

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Campylobacteriosis cases reported in 2011 by data source

During 2011, 6 692 notifications (151.9 per 100 000 population) of campylobacteriosis and no resulting deaths were reported in EpiSurv.

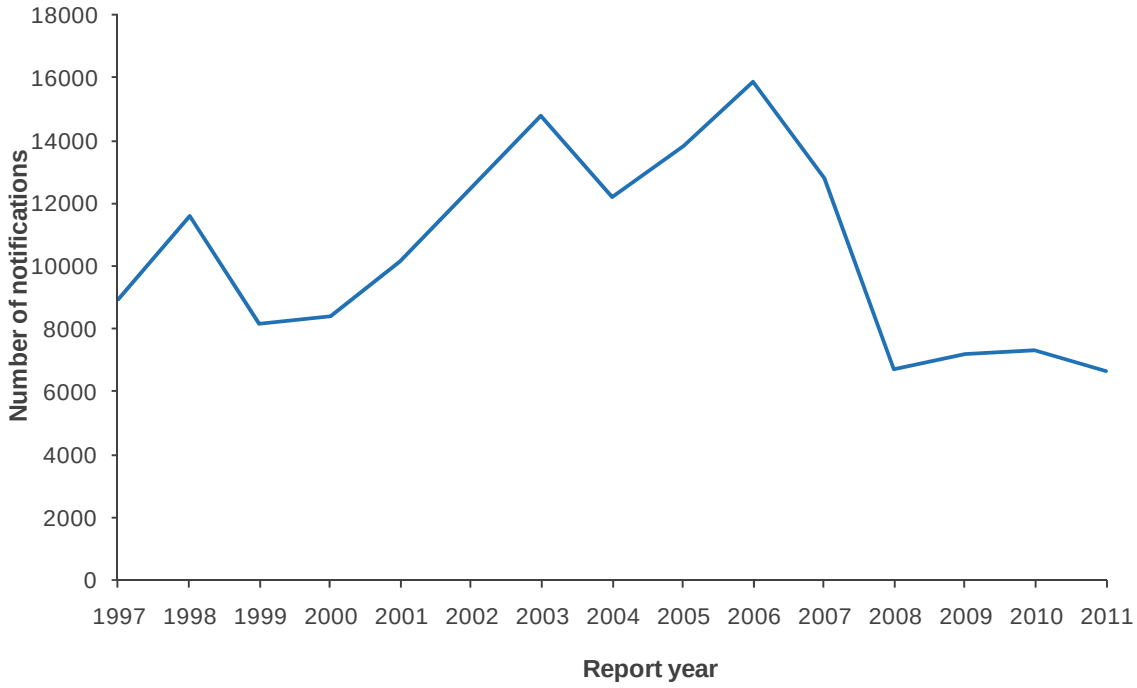
The ICD-10 code A04.5 was used to extract campylobacteriosis hospitalisation data from the MoH NMDS database. Of the 574 hospital admissions (13.0 admissions per 100 000 population) recorded in 2011, 443 were reported with campylobacteriosis as the primary diagnosis and 131 with campylobacteriosis as another relevant diagnosis.

It has been estimated by expert consultation that 57.5% (minimum = 37.1%, maximum = 69.6%) of campylobacteriosis incidence is due to foodborne transmission. It was further estimated that 53% of foodborne transmission would be due to transmission via poultry.

Notifiable disease data

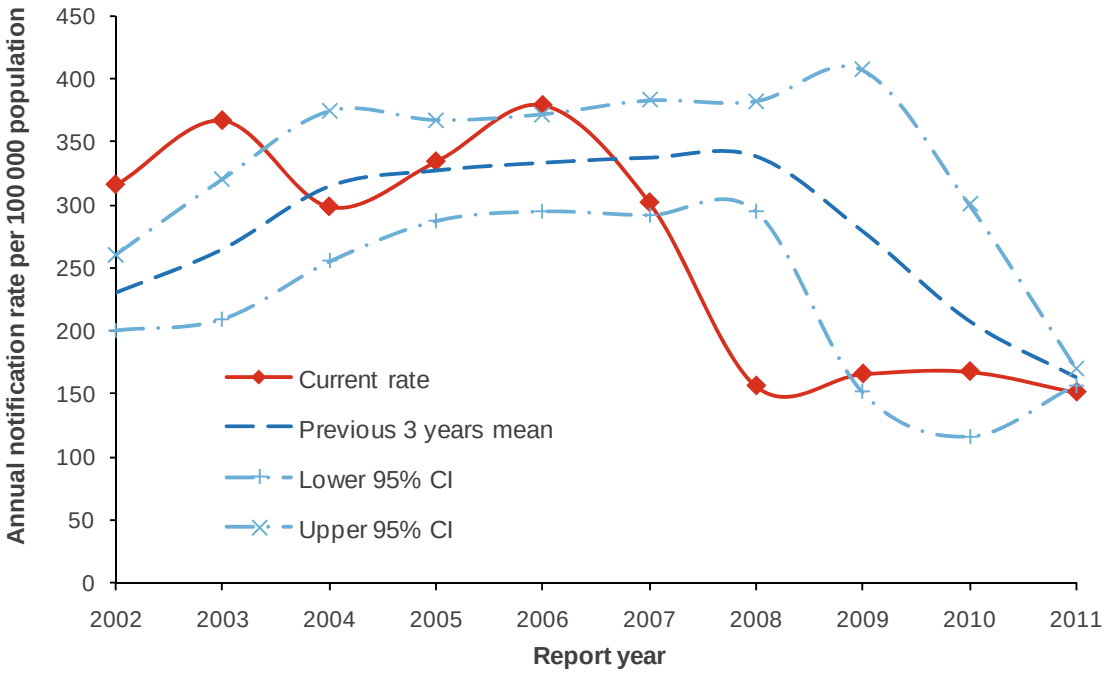
The number of campylobacteriosis notifications reported each year generally increased from 1996, with the highest number recorded in 2006 (15 873 cases). Since 2006, there has been a significant decrease in the number of cases reported (Figure 6). The number of notifications has remained fairly stable each year since 2008.

Figure 6. Campylobacteriosis notifications by year, 1997–2011



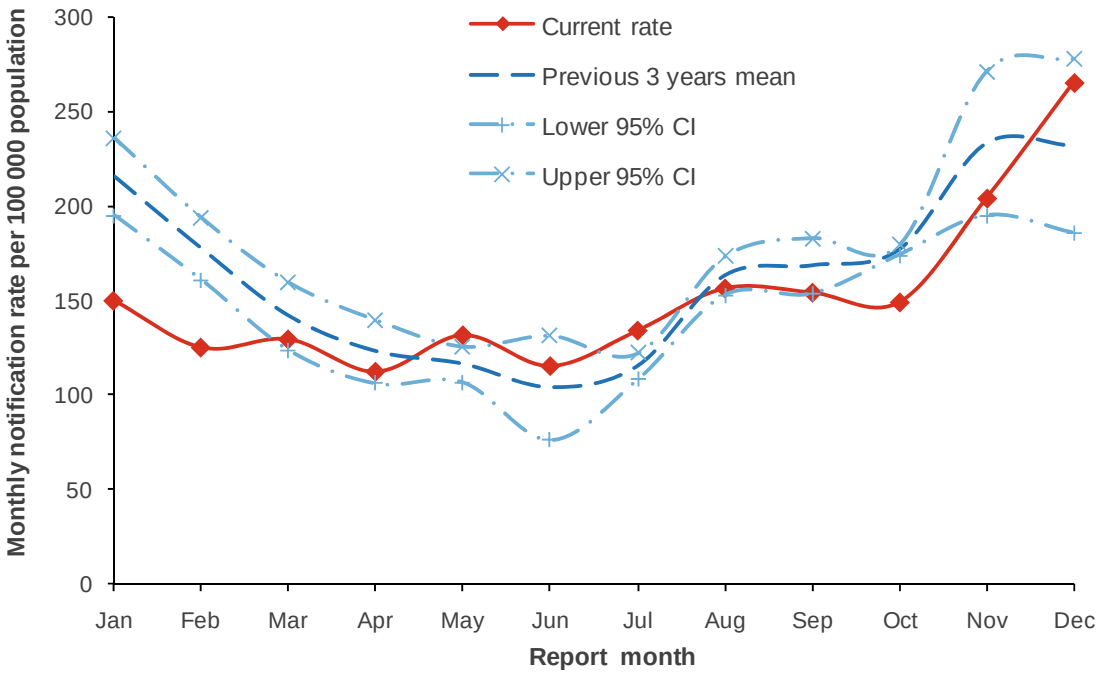
The campylobacteriosis annual rate trend (Figure 7) was very similar to the corresponding annual notification trend; with a general increase in the notification rate observed over the period 2002-2006 followed by a sudden reduction in 2007. The notification rate has been fairly stable since 2008.

Figure 7. Campylobacteriosis notification rate by year, 2002–2011



The number of notified cases of campylobacteriosis per 100 000 population by month for 2011 is shown in Figure 8. The monthly number of notifications in 2011 ranged from 411 notifications (April) to 973 notifications (December).

Figure 8. Campylobacteriosis monthly rate (annualised), 2011



Campylobacteriosis rates varied throughout the country as shown in Figure 9. The highest rates were in South Canterbury (223.5 per 100 000 population, 126 cases), Wairarapa (219.3 per 100 000 population, 89 cases) and Hawke's Bay (208.6 per 100 000 population, 325 cases) DHBs. The lowest rates were in Counties Manukau (100.6 per 100 000 population, 503 cases), Auckland (118.9 per 100 000 population, 543 cases), and Whanganui (118.9 per 100 000 population, 75 cases) DHBs. Hutt Valley, Capital and Coast and South Canterbury DHBs have frequently featured in the highest quantile of campylobacteriosis notification rates between 2008 and 2011.

In 2011, the number and rate of notifications and hospitalisations for campylobacteriosis was approximately 50% higher in males (173.2 per 100 000 population, 3 748 cases) than females (128.4 per 100 000, 2 876 cases) (Table 10).

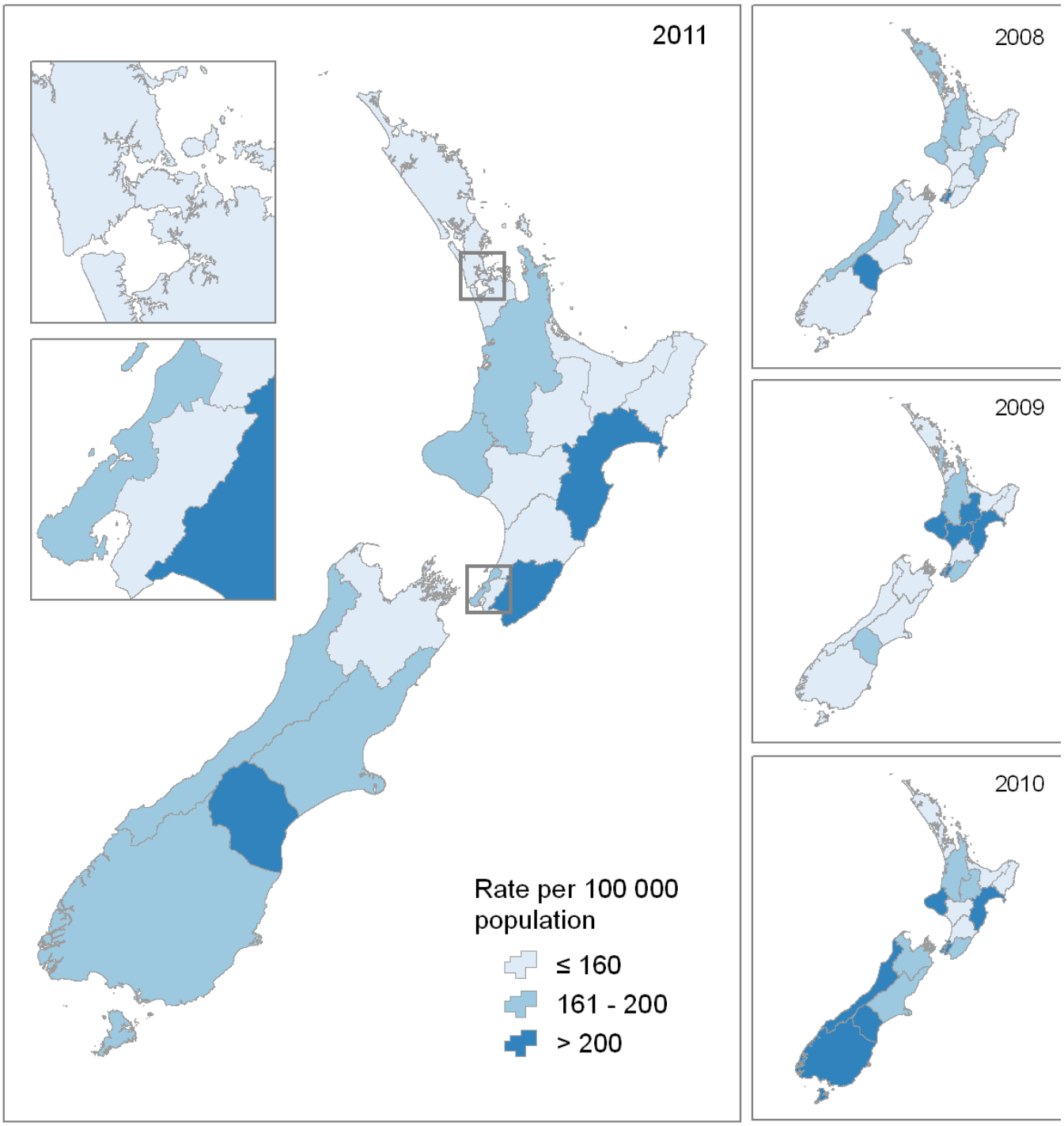
Table 10. Campylobacteriosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	3 748	173.2	331	15.3
Female	2 876	128.4	243	10.8
Unknown	68		0	
Total	**6 692**	**151.9**	**574**	**13.0**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 population

Figure 9. Geographic distribution of campylobacteriosis notifications, 2008–2011



The highest age-specific notification rates for campylobacteriosis in 2011 were in the 1 to 4 years (289.4 per 100 000 population, 729 cases) and the less than 1 year (248.5 per 100 000, 155 cases) age groups. The highest hospitalisation rate was in the 70 years and over age group and was almost 3-times the rate in any other age group (Table 11).

Table 11. Campylobacteriosis cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	155	248.5	8	12.8
1 to 4	729	289.4	27	10.7
5 to 9	339	118.0	15	5.2
10 to 14	251	85.7	18	6.1
15 to 19	452	142.4	42	13.2
20 to 29	1 076	173.9	87	14.1
30 to 39	724	128.6	46	8.2
40 to 49	821	130.0	46	7.3
50 to 59	761	136.9	63	11.3
60 to 69	683	163.7	57	13.7
70+	689	169.4	165	40.6
Unknown	12		0	
Total	**6 692**	**151.9**	**574**	**13.0**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

The risk factors recorded for campylobacteriosis notifications in 2011 are shown in Table 12. The most common risk factors reported were consumption of food from retail premises (42.1%) and contact with farm animals (36.4%).

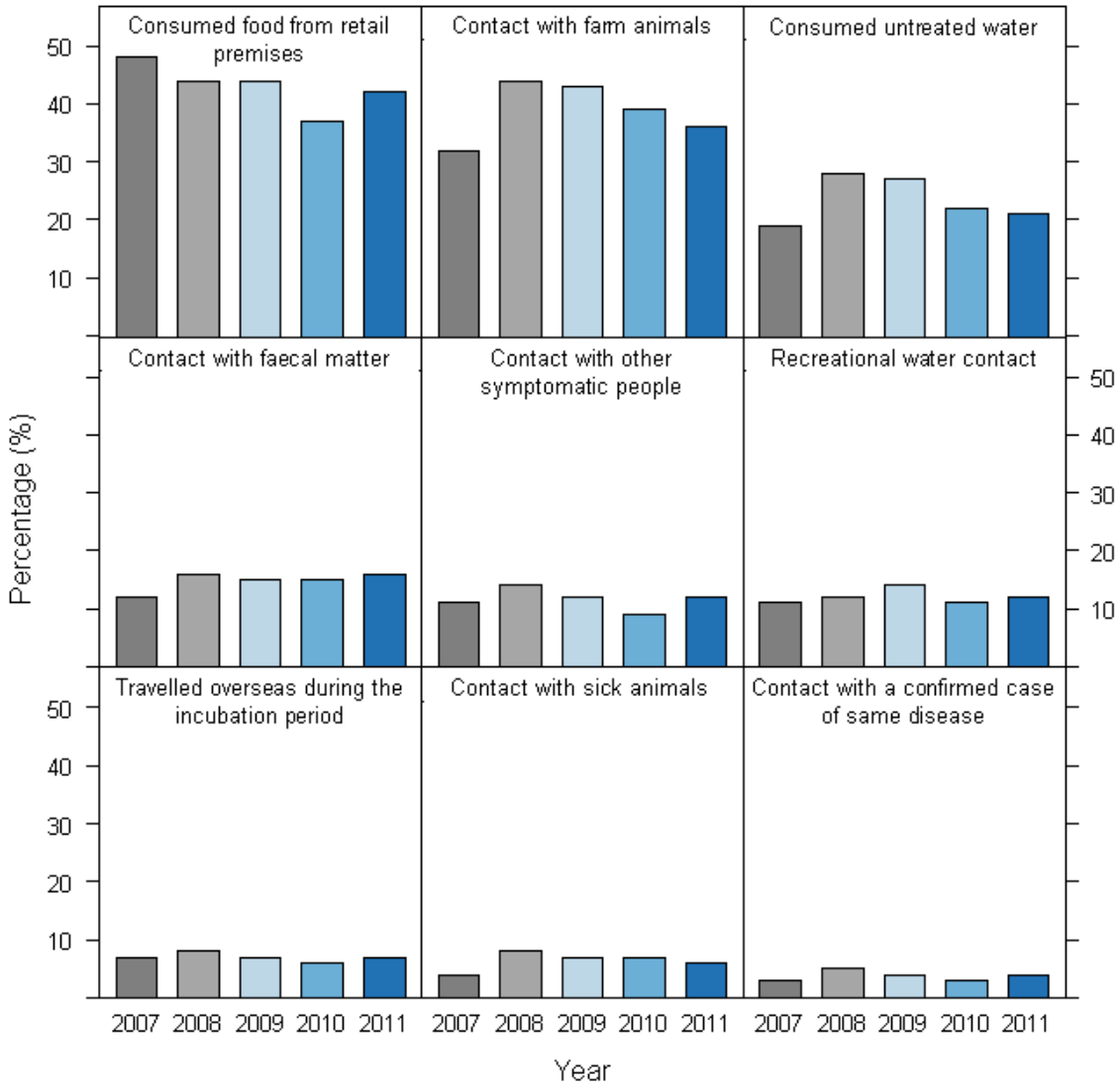
Table 12. Exposure to risk factors associated with campylobacteriosis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	1 013	1 392	4 287	42.1
Contact with farm animals	933	1 628	4 131	36.4
Consumed untreated water	483	1 764	4 445	21.5
Contact with faecal matter	396	2 006	4 290	16.5
Contact with other symptomatic people	297	2 163	4 232	12.1
Recreational water contact	284	2 130	4 278	11.8
Travelled overseas during the incubation period	211	2 690	3 791	7.3
Contact with sick animals	125	2 109	4 458	5.6
Contact with a confirmed case of same disease	88	2 172	4 432	3.9

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

Between 2007 and 2011, contact with farm animals, consumption of food from retail premises, and consumption of untreated water were consistently the most commonly reported risk factors for campylobacteriosis. There has been a decreasing trend in percentage of reported contact with farm animals and consumption of untreated water in the past four years (Figure 10).

Figure 10. Percentage of cases by exposure to risk factors associated with campylobacteriosis and year, 2007–2011



For cases where information on travel was provided in 2011, 7.3% (95% CI 6.4-8.3%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all campylobacteriosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of campylobacteriosis in 2011. The resultant distribution has a mean of 487 cases (95% CI 411-568).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 7.2% (95% CI 6.7-7.7%).

Outbreaks reported as caused by *Campylobacter* spp.

In this section only *Campylobacter* spp. outbreaks with a suspected or known foodborne source are included unless otherwise stated.

In 2011, 11 (37.9%) of the *Campylobacter* outbreaks and 53 (43.1%) of the associated cases were reported as foodborne (Table 13). *Campylobacter* outbreaks accounted for 5.0% (29/581) of all outbreaks and 1.6% (123/7796) of all associated cases.

Table 13. *Campylobacter* spp. outbreaks reported, 2011

Measure	Foodborne *Campylobacter* spp. outbreaks	All *Campylobacter* spp. outbreaks
Outbreaks	11	29
Cases	53	123
Hospitalised cases	1	2

From 2002 to 2006 the number of foodborne *Campylobacter* spp. outbreaks reported ranged from 17 to 35 with the number of annual outbreak associated cases ranging from 81 to 196. Since 2007 the annual number of reported foodborne *Campylobacter* spp. outbreaks has decreased markedly, ranging from 7 to 14 outbreaks with between 36 and 62 annual outbreak associated cases reported (Figure 11). In 2011, 11 outbreaks (53 cases) were reported, representing a small decrease compared to 2010 (14 outbreaks, 62 cases).

Figure 11. Foodborne *Campylobacter* spp. outbreaks and associated cases reported by year, 2002–2011

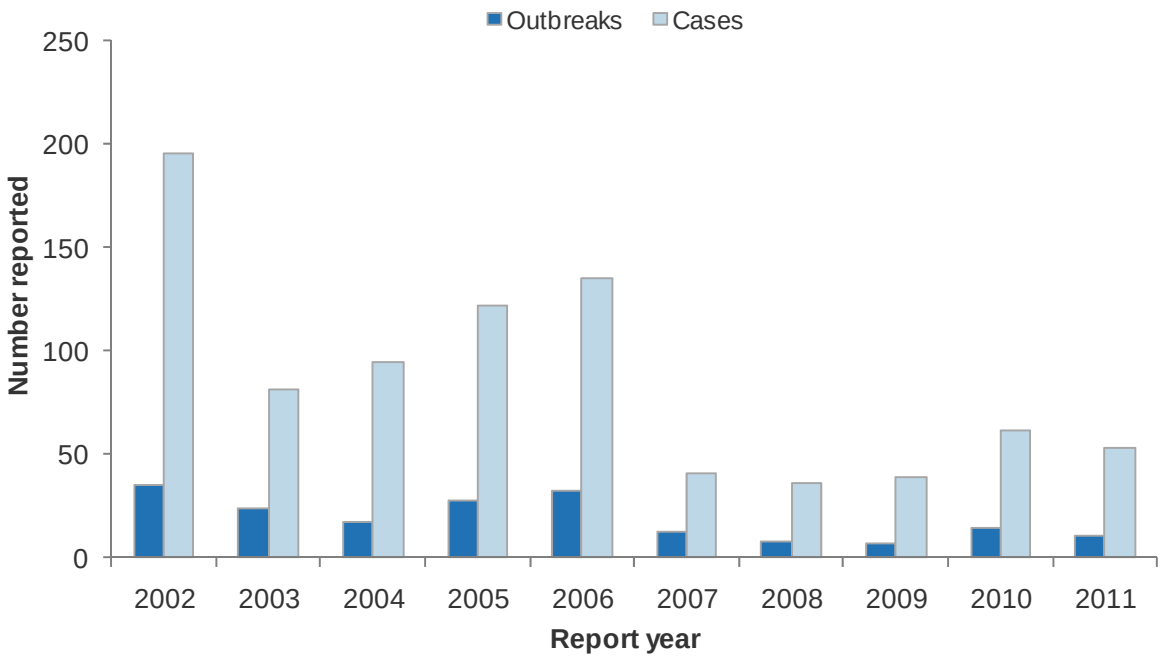


Table 14 contains details of the 11 food-associated *Campylobacter* spp. outbreaks reported in 2011.

Table 14. Details of food-associated *Campylobacter* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Wellington	Mar	Unknown	Restaurant/cafe/bakery		7C
Waikato	Apr	Unknown	Private home	Private home	3C, 1P
Wellington	May	Chicken liver pâté	Restaurant/cafe/bakery	Restaurant/cafe/bakery	3C, 2P
Otago	May	Undercooked lamb's fry	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 1P
Waikato	Jul	Unknown			1C, 1P
Waikato	Jul	Unknown	Marae	Marae	2C
Wellington	Jul	Lamb's fry	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C
Auckland	Aug	Unknown	Other setting	Commercial food manufacturer	2C, 5P
Wellington	Aug	Chicken liver mousse	Supermarket/delicatessen	Supermarket/delicatessen	9C
Waikato	Sep	Raw milk	Private home	Private home	1C, 3P
Manawatu	Dec	Raw milk	Other food outlet	Other food outlet	8C

PHU: Public Health Unit, C: confirmed, P: probable

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2011, *Campylobacter* was isolated from chicken liver mousse associated with the August outbreak in Wellington (Table 14).

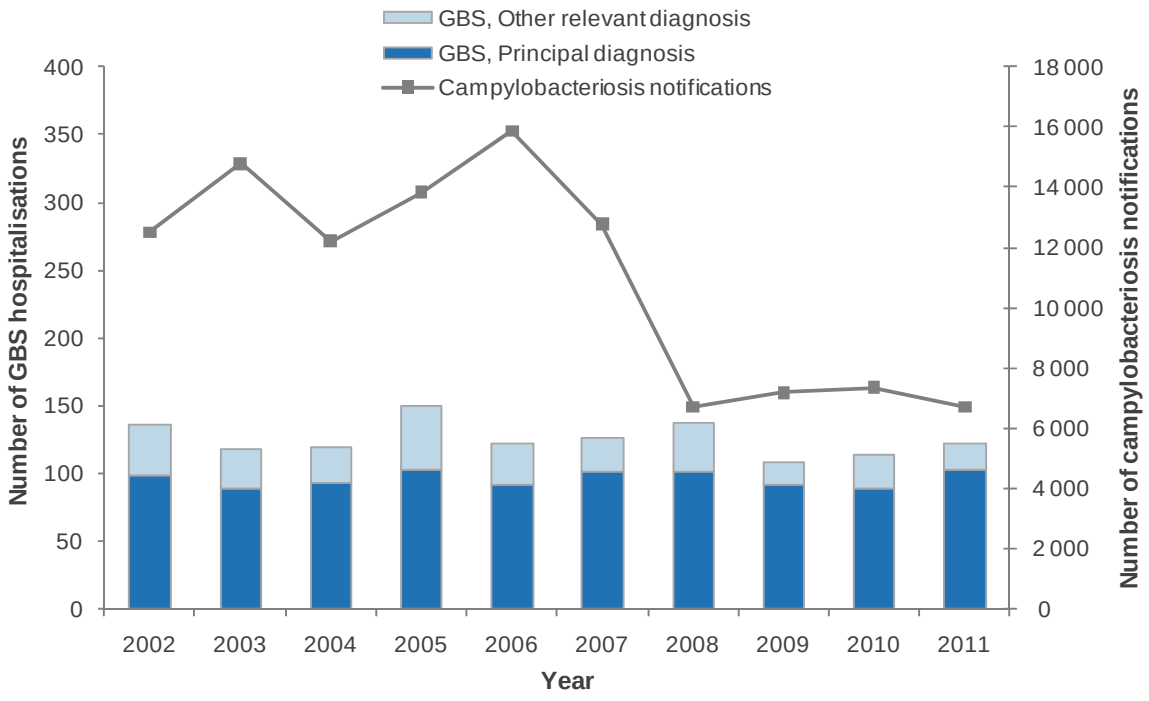
Disease sequelae - Guillain-Barré syndrome

Guillain-Barré syndrome (GBS) may be preceded by an infection with *Campylobacter jejuni*. Other respiratory or intestinal illnesses and other triggers may also precede an episode of GBS.

The ICD-10 code G61.0 was used to extract GBS hospitalisation data from the MoH NMDS database. There were 122 hospitalisations recorded in 2011 (2.8 admissions per 100 000 population), 103 were reported with GBS as the primary diagnosis and 19 with this condition as another relevant diagnosis.

Between 2002 and 2011, the number of hospitalised cases (any diagnosis code) for GBS ranged from 108 to 150 (Figure 12). The numbers of campylobacteriosis notifications during the same period are also included in Figure 12 for comparison.

Figure 12. Guillain-Barré syndrome hospitalisations, 2002–2011



In 2011, the highest rate of hospitalisation for GBS was in the 70 years and over age group, followed by the 50 to 59 years age group (Table 15).

Table 15. Guillain-Barré syndrome hospitalisations by age group, 2011

Age group (years)	Hospitalisations	
	No.	Rate[b]
<5	1	
5 to 9	4	
10 to 14	3	
15 to 19	5	1.6
20 to 29	13	2.1
30 to 39	14	2.5
40 to 49	21	3.3
50 to 59	22	4.0
60 to 69	14	3.4
70+	25	6.1
Total	**122**	**2.8**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

Recent surveys

1. *Campylobacter* in selected poultry products

This project determined the concentrations of *Campylobacter*, generic *Escherichia coli*, coagulase-positive staphylococci and Aerobic Plate Count (APC) in poultry mechanically separated meat (MSM), and *Campylobacter* and generic *E. coli* contamination on heart, liver, gizzard and neck samples [15]. Samples were collected over the period February to mid-August 2010 from processing lines that were known to be, or anticipated as highly likely to be, positive for *Campylobacter*.

A total of 145 MSM samples were collected from three different processing plants. *Campylobacter* was countable in 87%, 66% and 33% of the three processors' samples, while coagulase-positive staphylococci were countable in 44%, 2% and 36% of the processors' samples. These values show that *Campylobacter* spp. can persist through processing and be detectable in MSM, and that coagulase-positive staphylococci can also be present in MSM.

The distribution of bacteria varied with the processor. The median counts (5^{th} to 95^{th} percentile) for *Campylobacter* in MSM at the three processors were 1.74 (not detected (ND) to 3.17) $\log_{10}$ CFU g^{-1}, 1.18 (ND to 2.55) $\log_{10}$ CFU g^{-1} and ND (ND to 2.08) $\log_{10}$ CFU g^{-1}. The median counts (5^{th} to 95^{th} percentile) for coagulase-positive staphylococci in MSM at the three processors were ND (ND to 3.52) $\log_{10}$ CFU g^{-1}, ND (ND to 1) $\log_{10}$ CFU g^{-1} and ND (ND to 2.72) $\log_{10}$ CFU g^{-1}.

Ninety-five samples of heart, liver, gizzard and neck were sampled from two processors. *Campylobacter* was countable in 86% of heart rinsates, 99% of liver rinsates, 97% of gizzard rinsates and 99% of neck rinsates. The distribution of counts on these products differed between the two processors. The median (5^{th} to 95^{th} percentile) of the counts were:

- Heart: Processor A, 2.5 (ND to 4.7) and Processor B, 3.8 (2.1 to 4.9) $\log_{10}$ CFU $rinsate^{-1}$.
- Liver: Processor A, 3.8 (2.2 to 5.5) and Processor B, 4.5 (3.7 to 5.4) $\log_{10}$ CFU $rinsate^{-1}$.
- Gizzard: Processor A, 3.3 (ND to 4.8) and Processor B, 3.9 (3.0 to 5.0) $\log_{10}$ CFU $rinsate^{-1}$.
- Neck: Processor A, 4.1 (2.2 to 5.0) and Processor B, 4.0 (2.7 to 4.8) $\log_{10}$ CFU $rinsate^{-1}$.

The whole carcass rinsate results did not provide a consistent indicator of the presence of *Campylobacter* spp. on the heart, gizzard, neck and liver samples. There were some sampling days, where *Campylobacter* spp. were not detectable from the whole carcass rinsates, but were detected at high numbers in the heart, liver, gizzard and neck rinsates. No significant correlation ($P \geq 0.07$, $r \leq 0.28$) was evident between the *Campylobacter* and *E. coli* counts for the heart, liver and gizzard products. The neck samples taken from one processor show some positive correlation of the counts, with a correlation coefficient of 0.47 ($P < 0.05$). However, this observation was not repeated for the neck samples from Processor A ($P = 0.28$, $r = -0.16$).

Forty-five liver samples were taken over the sampling period from a single processor. Of these livers, 22% had *Campylobacter* spp. only on the surface of the liver, 76% had the bacteria on the surface and in the internal tissues and 2% of the livers had no countable *Campylobacter* spp.

The distribution of the estimated count in internal liver tissue had median (5^{th} -95^{th} percentile) of 2.9 (ND to 4.5) $\log_{10}$ CFU whole liver^{-1}, compared to the counts obtained from the external liver rinsate; 3.8 (2.2 to 5.5) $\log_{10}$ CFU rinsate^{-1}. A strong positive correlation was seen between the internal and external presence of *Campylobacter* spp. of the liver samples.

Washing the livers at the processors will not remove *Campylobacter* spp. from the interior of the organ. Any *Campylobacter* spp. remaining in the internal tissues of raw livers after chilling or freezing would need to be killed by appropriate cooking practices.

Relevant New Zealand studies and publications

1. Reports

Final reports were published on a three-year project funded under the Cross-Departmental Research Pool (CDRP) entitled ‘”*Campylobacter* in food and the environment. Examining the link to public health” [16-21]. The main outputs from the project are the following models:

- source attribution, using genotype information (Massey)
- pathway attribution, including various exposures (ESR)
- carriage and transmission by farmed animals (Massey)
- catchment dynamics and associated risk model (NIWA).

A report was published on the impact of including caprylic acid in poultry feed formulations on the *Campylobacter* concentration in the caeca of artificially infected broilers [22]. The treatment did not have a significant effect on the *Campylobacter* concentrations in the caeca.

2. Journal papers

A paper was published on the use of Bayesian hierarchical modelling to identify potential outbreaks of campylobacteriosis [23]. An outbreak was characterised as a spatially-localised period of increased disease incidence. When applied to notification data from 2001-2007, the model correctly identified known outbreaks and identified a further number of potential outbreaks.

Notification, hospitalisation and other data were examined to explore the decrease in notified campylobacteriosis that was observed during 2007-2008 [24]. The decrease in notifications was paralleled by a decrease in hospitalisations. Source attribution studies showed a 74% reduction in the cases attributed to poultry that coincided with a range of interventions aimed at reducing *Campylobacter* spp. contamination of poultry. This observed decrease in campylobacteriosis notifications was further characterised using a combination of spatial, temporal and molecular tools, including minimum spanning trees, risk surfaces, rarefaction analysis and dynamic source attribution modelling [25]. The interventions applied were shown to have had a greater effect in urban areas where poultry sources were a more dominant source of human campylobacteriosis.

Campylobacteriosis surveillance data from three countries (New Zealand, Australia, Canada) were analysed [26]. The disease was shown to have a stable age-related pattern over a highly seasonal trend.

The authors questioned the "popular assumption that poultry is the primary source of human campylobacteriosis". A letter was published in response to this paper, reviewing available surveillance and attribution data to support the role of poultry in human campylobacteriosis in New Zealand and the role of interventions in the poultry industry [27].

An investigation into an increase in campylobacteriosis notifications in the Wellington region during May-August 2011 was reported [28]. Risk factor analysis identified consumption of mammalian and poultry liver products as a probable contributing factor.

Faecal samples were collected from lambs at slaughter (n = 105) and sheep at pasture (n = 220) in New Zealand [29]. *Campylobacter* spp. were detected in 80.9% of lamb faecal samples and 30.4% of sheep faecal samples.

Relevant regulatory developments

During 2011, consultation was carried out on proposed changes to the *Campylobacter* Performance Targets for poultry, included in the National Microbiological Database (NMD) requirements [30]. Proposed changes included:

- Reduction in very low throughput (VLT) facility sampling and testing.
- Clarification of participation in NMD.
- Increase flexibility in responses to non-compliances.

Ciguatera fish poisoning

Case definition

Clinical description:	Gastroenteritis, possibly followed by neurologic symptoms
Laboratory test for diagnosis:	Demonstration of ciguatoxin in implicated fish
Case classification:	Not applicable

Ciguatera fish poisoning cases reported in 2011 by data source

During 2011, two notifications of ciguatera fish poisoning were reported in EpiSurv.

The ICD-10 code T61.0 was used to extract ciguatera fish poisoning hospitalisation data from the MoH NMDS database. Seven hospital admissions were recorded in 2011, five with ciguatera fish poisoning as the primary diagnosis and two with ciguatera fish poisoning as another relevant diagnosis. It should be noted that EpiSurv and the MoH NMDS database are separate systems and hospital admission can occur without cases being notified.

Outbreaks reported as caused by ciguatera fish poisoning

One foodborne ciguatera fish poisoning outbreak with two associated cases was reported in 2011 (Table 16).

Table 16. Ciguatera fish poisoning outbreaks reported, 2011

Measure	Foodborne ciguatera fish poisoning outbreaks	All ciguatera fish poisoning outbreaks
Outbreaks	1	1
Cases	2	2
Hospitalised cases	0	0

Over the 10 year period from 2002 to 2011, very few outbreaks of ciguatera fish poisoning have been reported, with no more than two outbreaks of ciguatera fish poisoning reported in any year (Figure 13).

Figure 13. Foodborne to ciguatera fish poisoning outbreaks and associated cases reported by year, 2002–2011

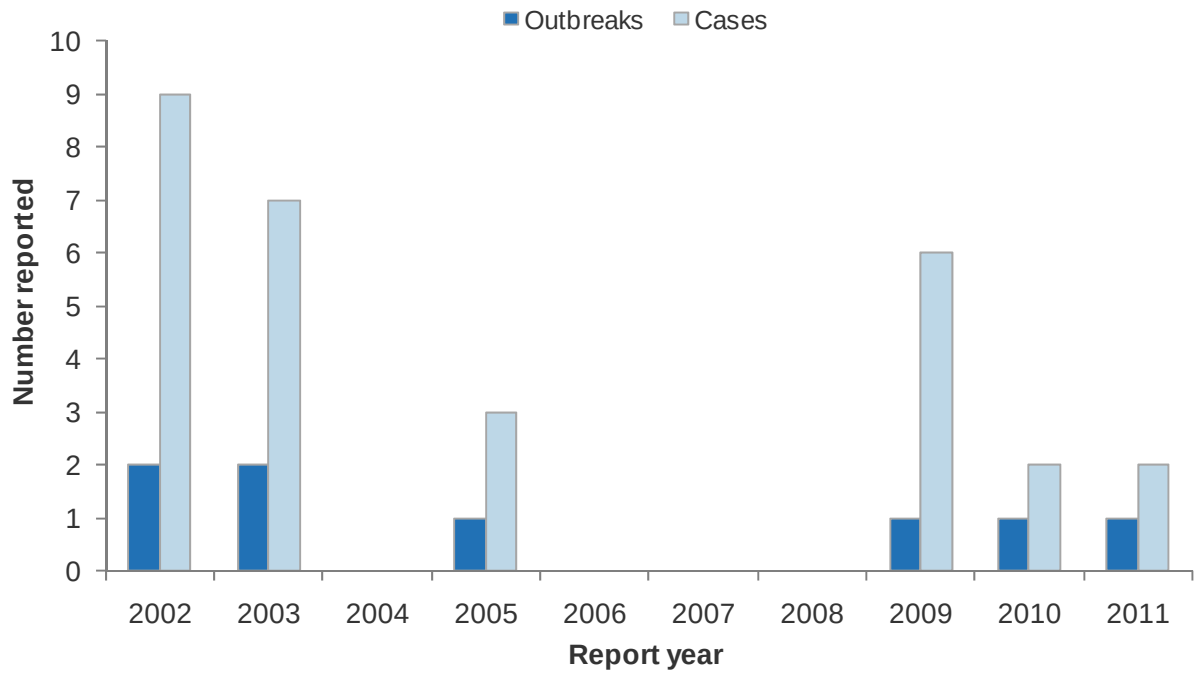


Table 17 contains details of the food-associated ciguatera fish poisoning outbreak reported in 2011.

Table 17. Details of food-associated ciguatera fish poisoning outbreak, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Nov	Kawakawa fish privately imported from Fiji	Private home	Private home	2C

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to ciguatera fish poisoning outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Clostridium perfringens intoxication

Case definition

Clinical description: Gastroenteritis with profuse watery diarrhoea

Laboratory test for diagnosis: Detection of enterotoxin in faecal specimen or faecal spore count of ≥10^6/g or isolation of ≥10^5/g *Clostridium perfringens* in leftover food

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Clostridium perfringens intoxication cases reported in 2011 by data source

During 2011, five notifications of *C. perfringens* intoxication and no resulting deaths were reported in EpiSurv.

The ICD-10 code A05.2 was used to extract foodborne *C. perfringens* intoxication hospitalisation data from the MoH NMDS database. There were no hospital admissions recorded in 2011 with *C. perfringens* intoxication as a primary or other relevant diagnosis.

Outbreaks reported as caused by *Clostridium perfringens*

There were four *C. perfringens* outbreaks in 2011, all were associated with a suspected or known foodborne source (Table 18).

Table 18. *C. perfringens* outbreaks reported, 2011

Measure	Foodborne *C. perfringens* outbreaks	All *C. perfringens* outbreaks
Outbreaks	4	4
Cases	56	56
Hospitalised cases	0	0

Between 2002 and 2011, the number of foodborne outbreaks associated with *C. perfringens* ranged from three (in 2009) to 13 outbreaks (in 2006) (Figure 14). The number of cases associated with *C. perfringens* outbreaks has also varied over time. The highest number of cases associated with foodborne outbreaks due to *C. perfringens* occurred in 2008 (215 cases). The second highest number of cases (168 cases) was reported in 2010.

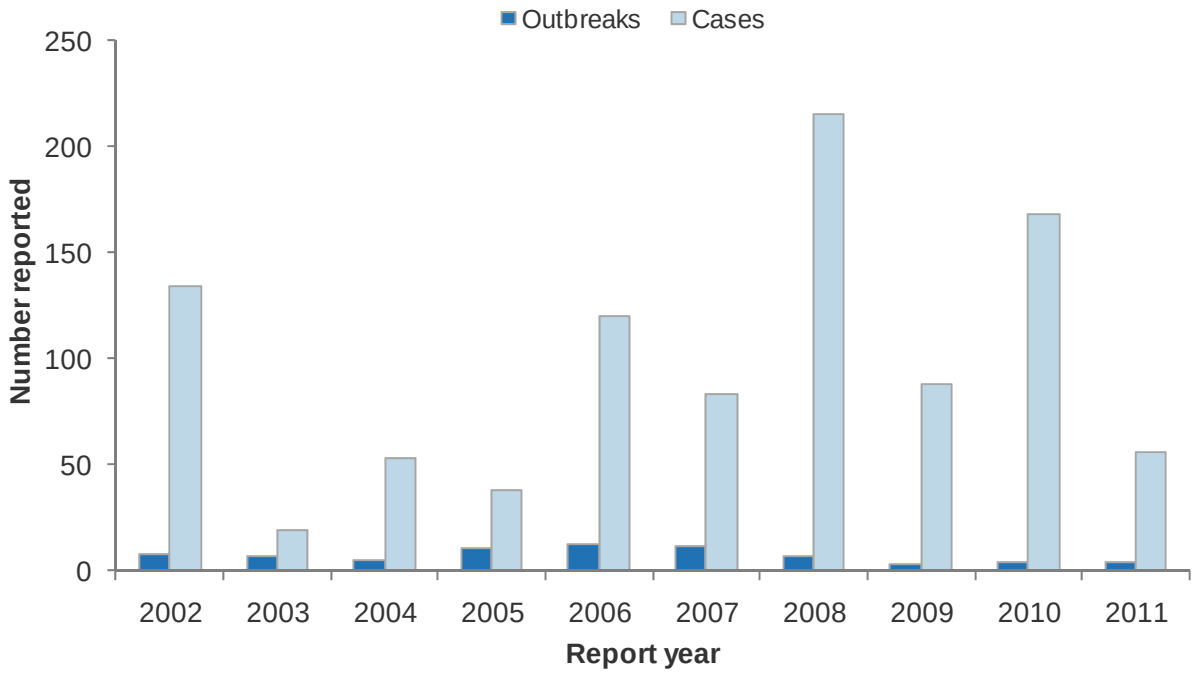
Table 19 contains details of the four food–associated *C. perfringens* outbreaks reported in 2011.

Table 19. Details of food-associated *C. perfringens* outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
West Coast	Apr	Fish fillet (sole)	Private home	Private home	2C
Tauranga	Sep	Unknown	Caterers	Caterers, private home	5C, 4P
Southland	Nov	Unknown	Restaurant/cafe/bakery, camp		1C, 9P
Auckland	Dec	Goat curry	Fast food restaurant, other setting	Fast food restaurant	4C, 31P

PHU: Public Health Unit, C: confirmed, P: probable

Figure 14. Foodborne *C. perfringens* outbreaks and associated cases reported by year, 2002–2011



During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2011, *C. perfringens* and/or its toxin was detected in clinical samples from three of the four outbreaks identified in Table 18. No food samples were submitted in relation to these outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Cryptosporidiosis

Summary data for cryptosporidiosis in 2011 are given in Table 20.

Table 20. Summary of surveillance data for cryptosporidiosis, 2011

Parameter	Value in 2011	Source
Number of cases	610	EpiSurv
Rate (per 100 000)	13.8	EpiSurv
Hospitalisations (%)	18 (3.0%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	47 (7.7%)	EpiSurv
Estimated food-related cases (%)	NA	Expert consultation

NA = not applicable, no information is available on the food attributable proportion of cryptosporidiosis in New Zealand

Case definition

Clinical description: An illness with diarrhoea and abdominal pain. The infection may be asymptomatic

Laboratory test for diagnosis: Detection of *Cryptosporidium parvum* oocysts in a faecal specimen

Case classification:

Probable A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed A clinically compatible illness that is laboratory confirmed

Cryptosporidiosis cases reported in 2011 by data source

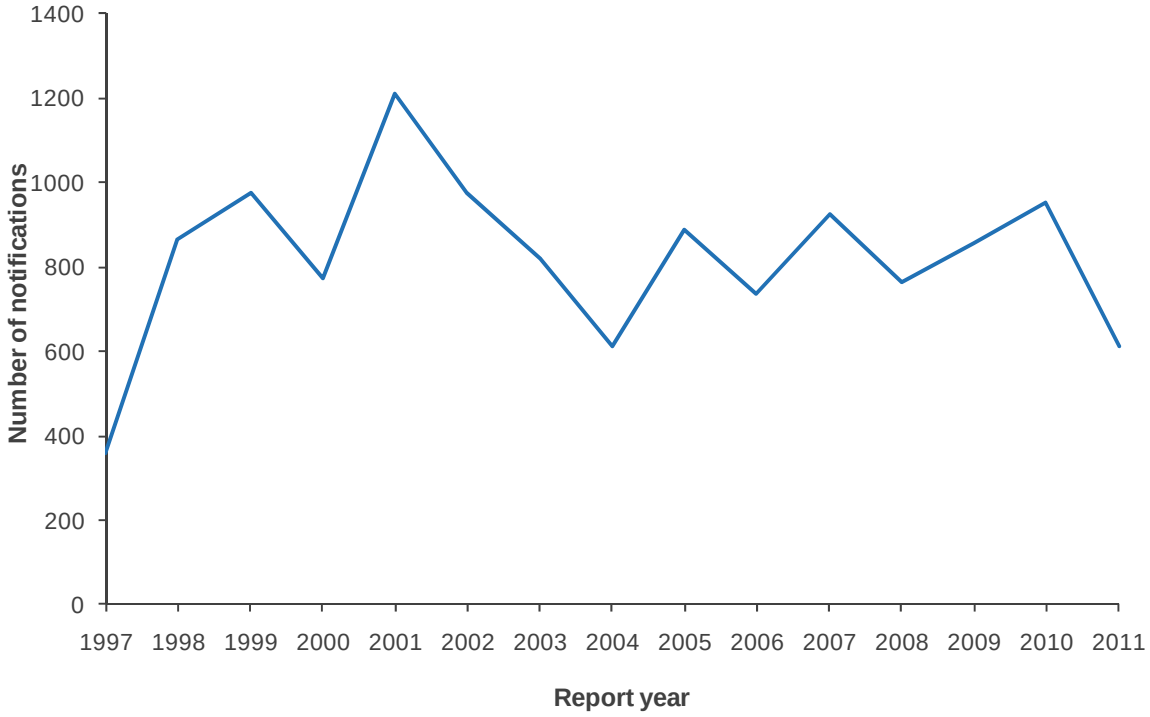
During 2011, 610 notifications (13.8 cases per 100 000 population) of cryptosporidiosis and no resulting deaths were reported in EpiSurv.

The ICD-10 code A07.2 was used to extract cryptosporidiosis hospitalisation data from the MoH NMDS database. Of the 18 hospital admissions (0.4 admissions per 100 000 population) recorded in 2011, 16 were reported with cryptosporidiosis as the primary diagnosis and two with cryptosporidiosis as another relevant diagnosis.

Notifiable disease data

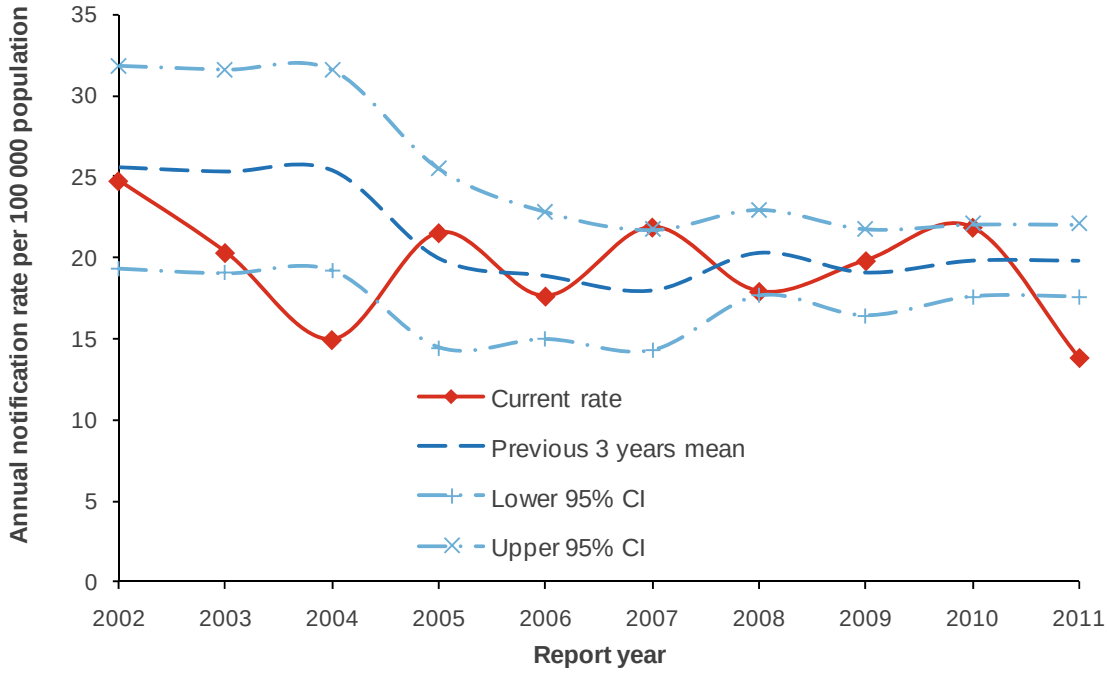
Cryptosporidiosis became a notifiable disease in 1996. The number of notifications peaked at 1 208 cases in 2001 and then decreased to 611 in 2004. Since 2004, the number of notifications has ranged between 610 and 954 notifications each year (Figure 15).

Figure 15. Cryptosporidiosis notifications by year, 1997–2011



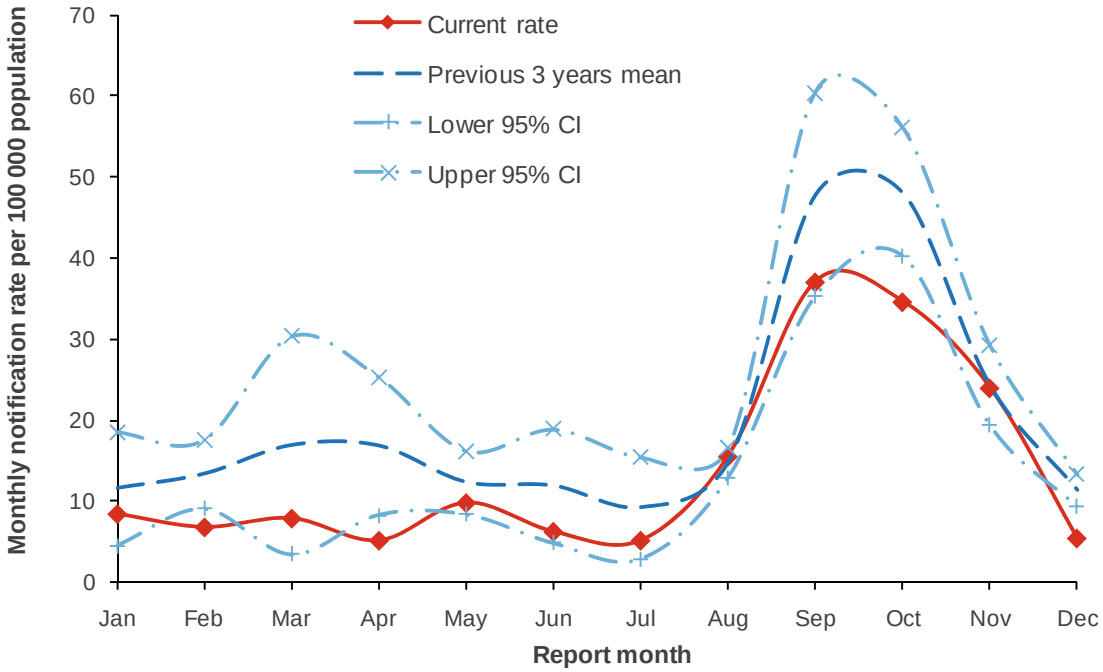
The cryptosporidiosis annual population rate trend is very similar to the corresponding annual notification trend. In the ten year period, 2002 to 2011, the highest cryptosporidiosis annual notification rate was in 2002. Notification rates in 2011 were the lowest in the ten year period with the previous lowest rate in 2004 (Figure 16).

Figure 16. Cryptosporidiosis notification rate by year, 2002–2011



Consistent with the low notification rate in 2011, the number of notified cases of cryptosporidiosis reported per 100 000 population by month for 2011 was generally lower than in previous years. Cryptosporidiosis has a consistent spring peak that occurs each year in September or October (Figure 17).

Figure 17. Cryptosporidiosis monthly rate (annualised), 2011



There have been consistently higher population rates of cryptosporidiosis notifications in the predominantly rural DHBs compared to the more urban DHBs (Figure 18). In 2011, the highest rates were in South Canterbury (51.4 per 100 000 population, 29 cases) and Waikato (38.3 per 100 000, 141 cases) DHBs. The lowest rates were in Auckland (6.6 per 100 000, 30 cases) and Counties Manukau (7.0 per 100 000, 35 cases) DHBs.

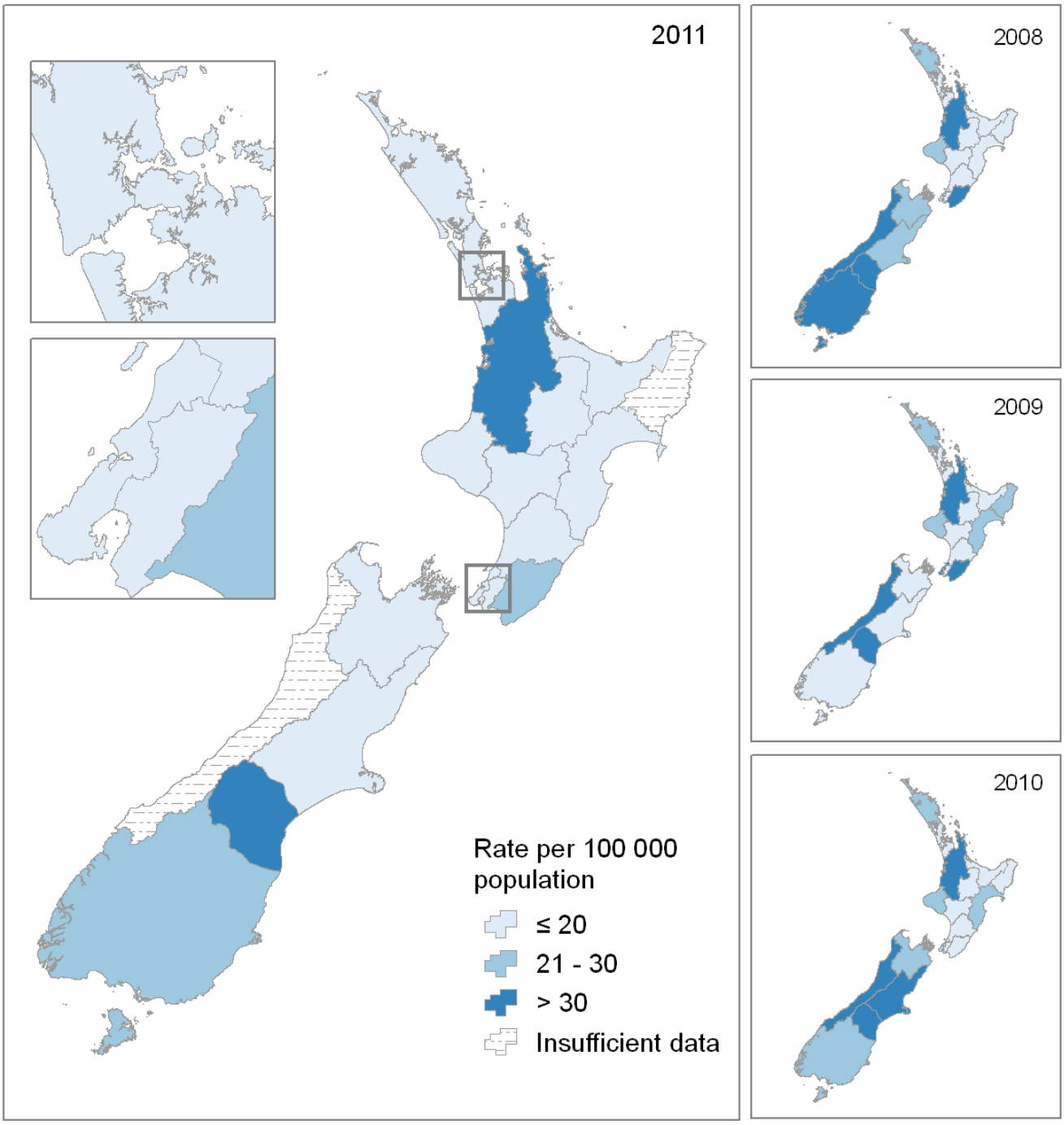
In 2011, the number of notifications and rates for cryptosporidiosis were slightly higher for females (14.1 per 100 000 population, 315 cases) compared to males (13.4 per 100 000, 290 cases). However the number and rate of hospitalisations were slightly lower for females compared to males (Table 20).

Table 21. Cryptosporidiosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	290	13.4	11	0.5
Female	315	14.1	7	0.3
Unknown	5		0	
Total	**610**	**13.8**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

Figure 18. Geographic distribution of cryptosporidiosis notifications, 2008-2011



During 2011, the highest cryptosporidiosis age specific notification rates were in the 1 to 4 years age group (74.6 per 100 000 population, 188 cases), followed by the 5 to 9 years (27.2 per 100 000, 78 cases) and the less than 1 year (24.1 per 100 000, 15 cases) age groups (Table 22). The hospitalisation rate was not defined for most age groups due to the small number of hospitalisations.

Table 22. Cryptosporidiosis cases by age group, 2011

Age group	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	15	24.1	0	
1 to 4	188	74.6	6	2.4
5 to 9	78	27.2	2	
10 to 14	56	19.1	0	
15 to 19	40	12.6	4	
20 to 29	84	13.6	1	
30 to 39	55	9.8	0	
40 to 49	46	7.3	2	
50 to 59	26	4.7	0	
60 to 69	15	3.6	2	
70+	5	1.2	1	
Unknown	2		0	
Total	**610**	**13.8**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

During 2011, the most commonly reported risk factors for cryptosporidiosis were contact with farm animals (67.5%), consumption of untreated water (46.3%), and contact with faecal matter (37.0%) (Table 23).

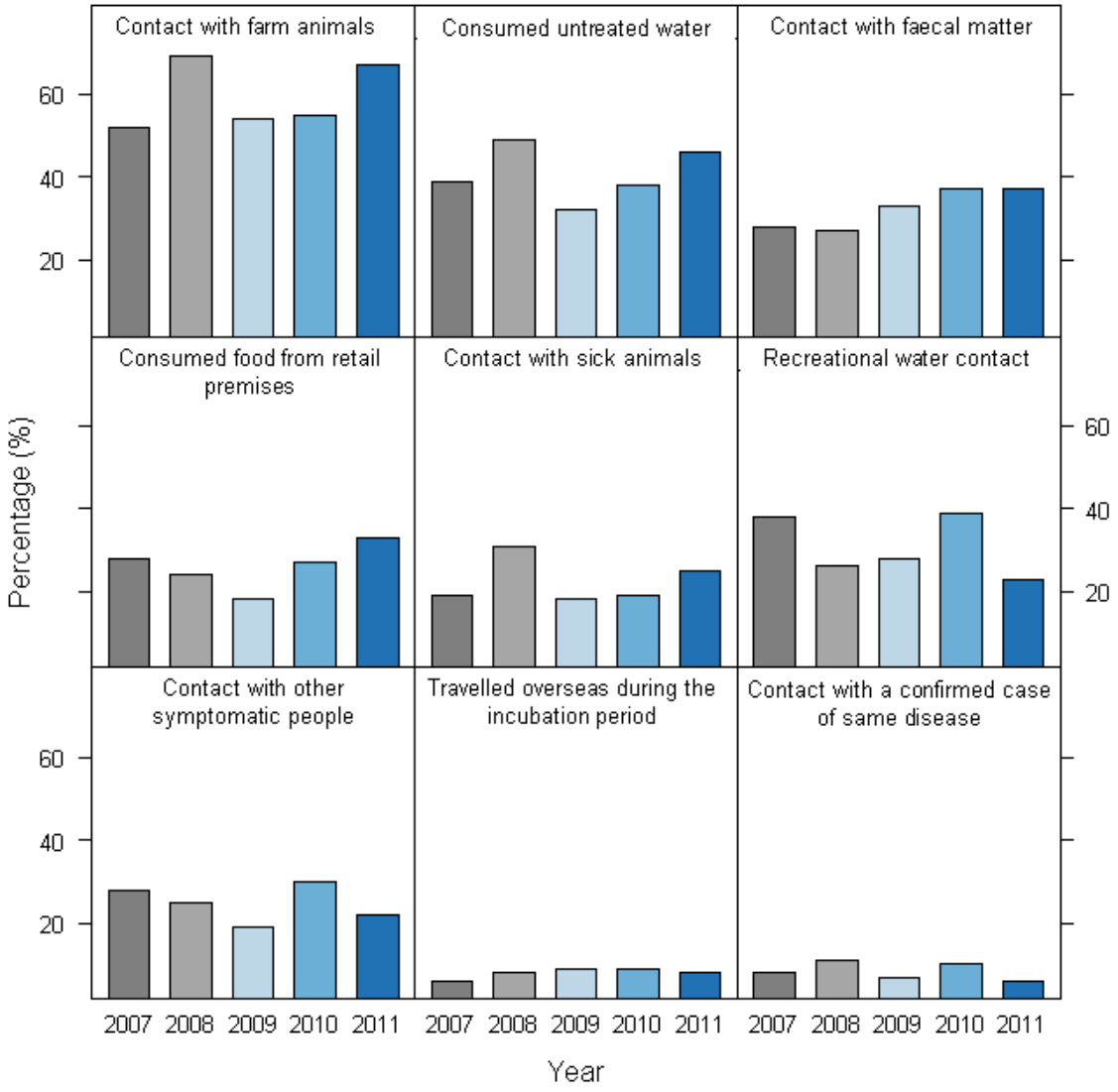
Table 23. Exposure to risk factors associated with cryptosporidiosis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Contact with farm animals	278	134	198	67.5
Consumed untreated water	163	189	258	46.3
Contact with faecal matter	134	228	248	37.0
Consumed food from retail premises	118	240	252	33.0
Contact with sick animals	81	245	284	24.8
Recreational water contact	89	295	226	23.2
Contact with other symptomatic people	80	288	242	21.7
Travelled overseas during the incubation period	32	383	195	7.7
Contact with a confirmed case of same disease	20	293	297	6.4

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

Between 2007 and 2011, the most consistently reported risk factors for cryptosporidiosis were contact with farm animals, consumption of untreated water, and contact with faecal matter (Figure 19). The percentage of reported recreational water contact was lowest in 2011, compared to the previous four years. There was also an increasing trend in the percentage of reported contact with faecal matter between 2007 and 2011.

Figure 19. Percentage of cases by exposure to risk factors associated with cryptosporidiosis and year, 2007–2011



For cases where information on travel was provided, 7.7% (95% CI 5.3-10.7%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all cryptosporidiosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of cryptosporidiosis in 2011. The resultant distribution has a mean of 47 cases (95% CI 28-70).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 8.2% (95% CI 7.0-9.5%). The proportion of travel-associated cases in 2011 was less than, but not a significant difference from, 2010 (8.7% (95% CI 6.6-11.3)).

Outbreaks reported as caused by *Cryptosporidium* spp.

In 2011, three (10.3%) of the *Cryptosporidium* spp. outbreaks and nine (8.7%) of the associated cases were reported as foodborne (Table 24). *Cryptosporidium* spp. outbreaks accounted for 5.0% (29/581) of all outbreaks and 1.3% (103/7796) of all associated cases.

Table 24. *Cryptosporidium* spp. outbreaks reported, 2011

Measure	Foodborne *Cryptosporidium* spp. outbreaks	All *Cryptosporidium* spp. outbreaks
Outbreaks	3	29
Cases	9	103
Hospitalised cases	0	1

Foodborne *Cryptosporidium* spp. outbreaks are rare, with not more than one outbreak reported each year in the nine year period, (2002-2009), two outbreaks reported in 2010 and three in 2011 (Figure 20). The largest outbreak, with nine associated cases, was reported in 2011.

Figure 20. Foodborne *Cryptosporidium* spp. outbreaks and associated cases reported by year, 2002–2011

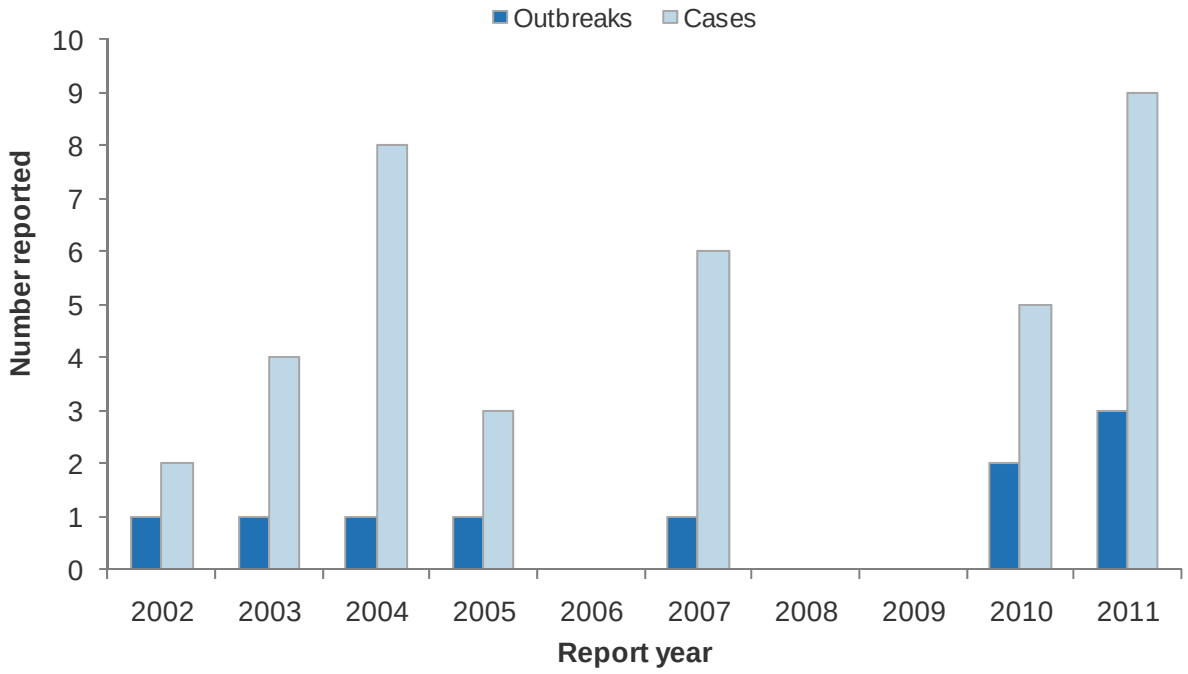


Table 24 contains details of the three food–associated *Cryptosporidium* spp. outbreaks reported in 2011.

Table 25. Details of food-associated *Cryptosporidium* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	Jul	Unknown	Private home	Private home	2C, 1P
Waikato	Sep	Unknown	Private home	Private home	2C
Waikato	Oct	Unknown	Overseas (Rarotonga)	Commercial food manufacturer	4C

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Cryptosporidium* spp. outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Faecal samples were collected from lambs at slaughter (*n* = 105) and sheep at pasture (*n* = 220) in New Zealand [29]. *Cryptosporidium* spp. were detected in 28.6% of lamb faecal samples and 3.6% of sheep faecal samples.

Relevant regulatory developments

Nil.

Giardiasis

Summary data for giardiasis in 2011 are given in Table 26.

Table 26. Summary of surveillance data for giardiasis, 2011

Parameter	Value in 2011	Source
Number of cases	1 935	EpiSurv
Rate (per 100 000)	43.9	EpiSurv
Hospitalisations (%)	60 (3.1%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	344 (17.8%)	EpiSurv
Estimated food-related cases (%)	NA	Expert consultation

NA = not applicable, no information is available on the food attributable proportion of giardiasis in New Zealand

Case definition

Clinical description: An illness characterised by diarrhoea, abdominal cramps, bloating, weight loss or malabsorption. The infection may be asymptomatic

Laboratory test for diagnosis: Detection of *Giardia* cysts or trophozoites in a specimen from the human intestinal tract OR detection of *Giardia* antigen in faeces

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Giardiasis cases reported in 2011 by data source

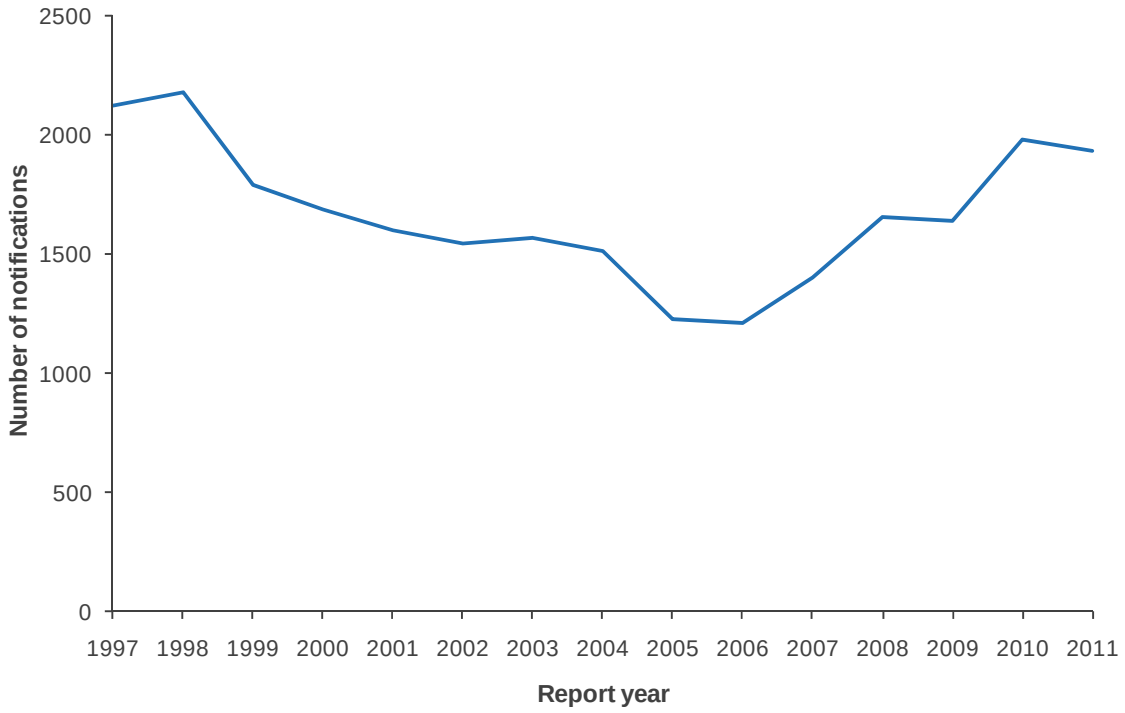
During 2011, 1 935 notifications (43.9 cases per 100 000 population) of giardiasis and no resulting deaths were reported in EpiSurv.

The ICD-10 code A07.1 was used to extract giardiasis hospitalisation data from the MoH NMDS database. Of the 60 hospital admissions (1.4 admissions per 100 000 population) recorded in 2011, 35 were reported with giardiasis as the primary diagnosis and 25 with giardiasis as another relevant diagnosis.

Notifiable disease data

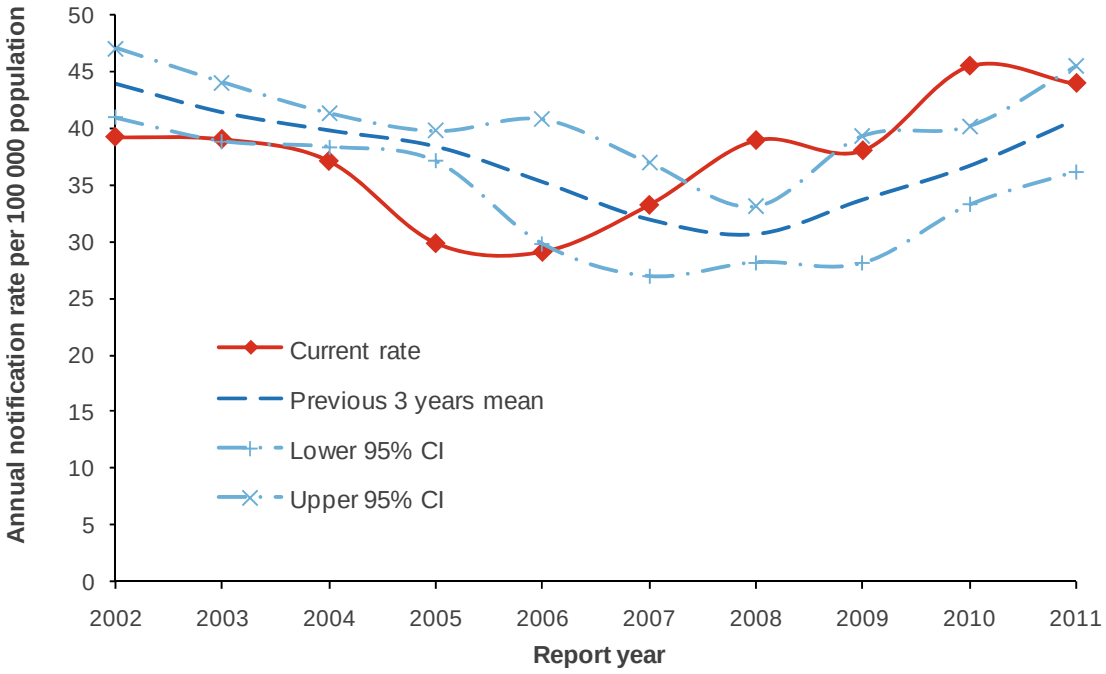
There was a steady decrease in the number of giardiasis cases reported each year from 1998 to 2006. Since 2006, there has been an increasing trend in the number of notifications. The highest number of notifications since 1999 was reported in 2010 (1 985 cases), followed by 2011 (1 935 cases) (Figure 21).

Figure 21. Giardiasis notifications by year, 1997–2011



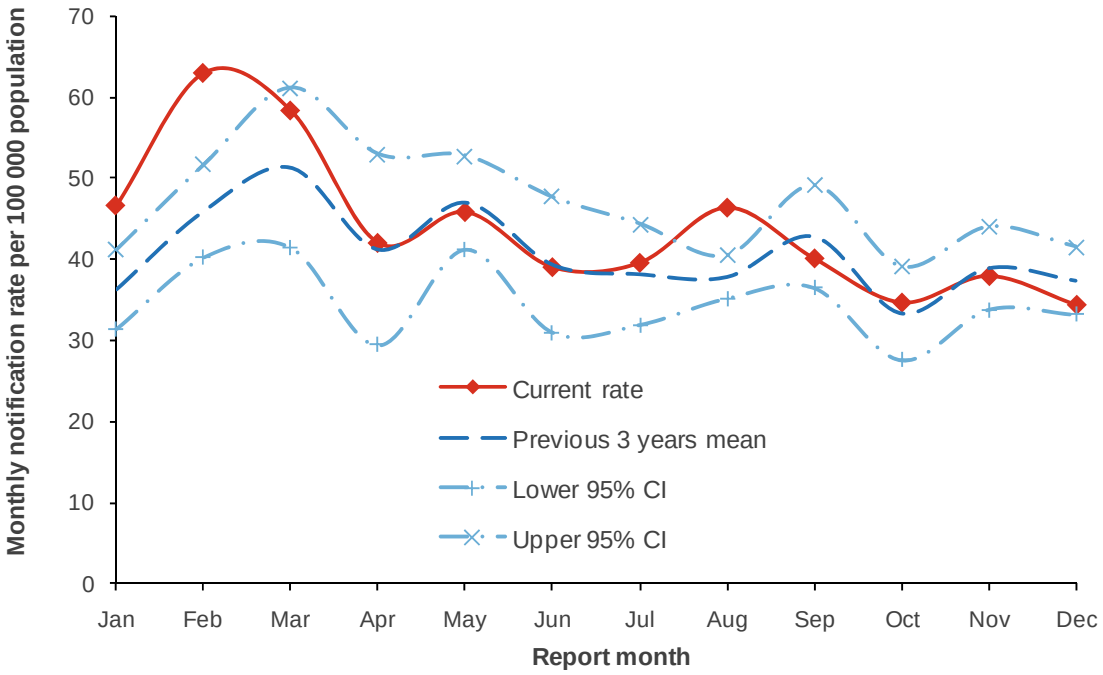
The giardiasis annual population rate trend is very similar to the corresponding annual notification trend. The giardiasis notification rate had been decreasing steadily from 2002 to 2006, but has shown an increasing trend since 2006 (Figure 22). The 2011 notification rate was similar to the 2010 rate, which was the highest rate reported between 2002 and 2011.

Figure 22. Giardiasis notification rate by year, 2002–2011



There was no strong seasonal pattern in the population rate of giardiasis notifications reported by month either historically or in 2011. There were more notifications reported in February and August 2011 compared to previous years (Figure 23).

Figure 23. Giardiasis monthly rate (annualised), 2011



Giardiasis rates varied throughout the country during 2011 (Figure 24). The highest rate was in Capital and Coast DHB (74.0 per 100 000 population, 218 cases), followed by South Canterbury (63.9 per 100 000, 36 cases) and Auckland (58.9 per 100 000, 269 cases) DHBs. The lowest rate was in Whanganui DHB (12.7 per 100 000 population, 8 cases). Auckland and Capital and Coast DHBs have consistently been in the highest quantile in the last four years.

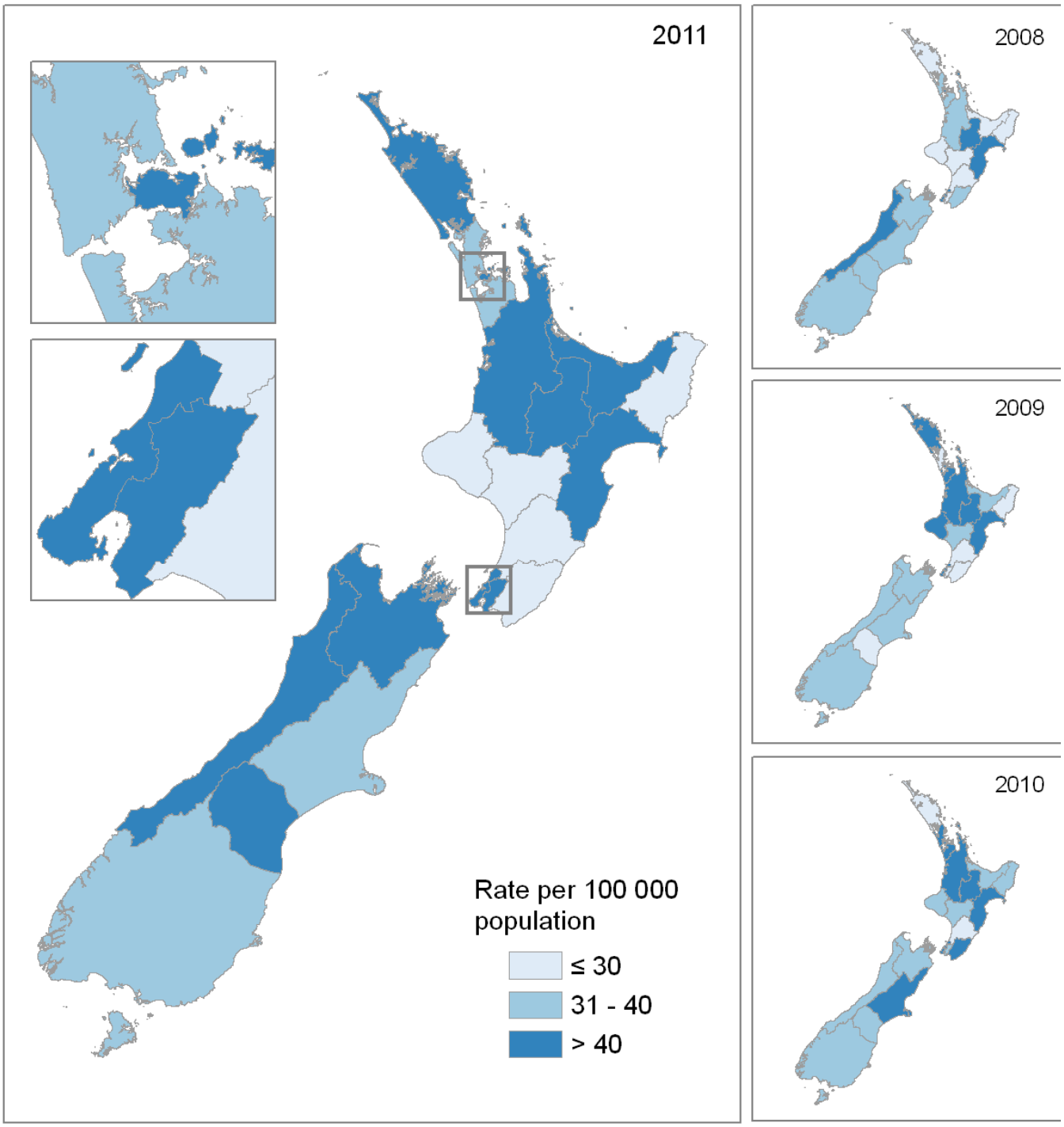
The 2011 number and rate for both notifications and hospitalisations were slightly higher for females compared to males (Table 27).

Table 27. Giardiasis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	933	43.1	27	1.2
Female	984	43.9	33	1.5
Unknown	18		0	
Total	**1 935**	**43.9**	**60**	**1.4**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

Figure 24. Geographic distribution of giardiasis notifications, 2008–2011



In 2011, the highest age-specific giardiasis notification rates were in the 1 to 4 years age group (162.0 per 100 000, 408 cases) followed by the 30 to 39 years (78.7 per 100 000, 443 cases) and the less than 1 year (60.9 per 100 000, 38 cases) age groups (Table 28). The number of hospitalisations was highest in the 30 to 39 years age group.

Table 28. Giardiasis cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	38	60.9	1	
1 to 4	408	162.0	9	3.6
5 to 9	139	48.4	8	2.8
10 to 14	48	16.4	2	
15 to 19	26	8.2	1	
20 to 29	175	28.3	2	
30 to 39	443	78.7	16	2.8
40 to 49	287	45.4	2	
50 to 59	168	30.2	7	1.3
60 to 69	149	35.7	3	
70+	52	12.8	9	2.2
Unknown	2		0	
Total	**1 935**	**43.9**	**60**	**1.4**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

In 2011, the most commonly reported risk factors for notified giardiasis cases were contact with faecal matter (42.2%), contact with other symptomatic people (38.5%), and consumption of untreated water (32.7%) (Table 29).

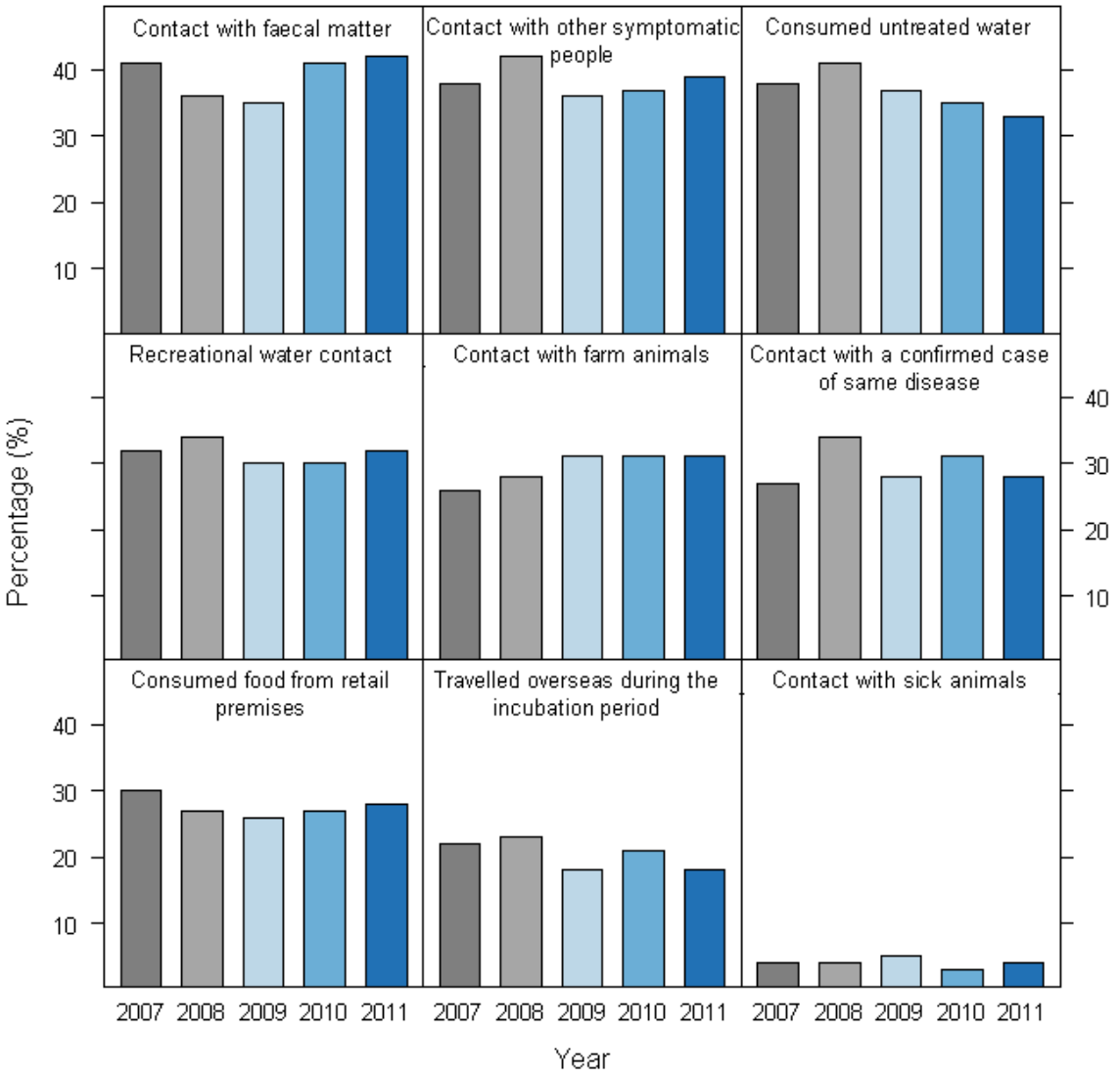
Table 29. Exposure to risk factors associated with giardiasis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Contact with faecal matter	345	472	1 118	42.2
Contact with other symptomatic people	315	503	1 117	38.5
Consumed untreated water	240	495	1 200	32.7
Recreational water contact	262	556	1 117	32.0
Contact with farm animals	274	598	1 063	31.4
Contact with a confirmed case of same disease	185	443	1 307	29.5
Consumed food from retail premises	209	526	1 200	28.4
Travelled overseas during the incubation period	170	785	980	17.8
Contact with sick animals	31	736	1 168	4.0

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

Between 2007 and 2011, the most commonly reported risk factors for giardiasis were contact with faecal matter, contact with other symptomatic people, and consumption of untreated water (Figure 25). The percentage of reported contact with faecal matter has been increasing in the past four years while the percentage of reported consumption of untreated water has been decreasing.

Figure 25. Percentage of cases by exposure to risk factors associated with giardiasis and year, 2007-2011



For cases where information on travel was provided, 17.8% (95% CI 15.4-20.4%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all giardiasis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of giardiasis in 2011. The resultant distribution has a mean of 344 cases (95% CI 293-399).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 20.4% (95% CI 19.0-21.9%). The proportion of travel-associated cases in 2011 was less than, but not a significant difference from, 2010 (21.7% (95% CI 20.2-23.4%)).

Outbreaks reported as caused by *Giardia* spp.

In 2011, there were 72 *Giardia* spp. outbreaks reported. Six of these were associated with a suspected or known foodborne source (Table 30).

Table 30. *Giardia* spp. outbreaks reported, 2011

Measure	Foodborne *Giardia* spp. outbreaks	All *Giardia* spp. outbreaks
Outbreaks	6	72
Cases	24	242
Hospitalised cases	0	1

Since 2002, between one and four foodborne *Giardia* spp. outbreaks have been reported in EpiSurv each year, with the exception of 2002 and 2009 when no outbreaks were reported (Figure 26). These outbreaks involved small numbers of cases. In 2011, six outbreaks were reported involving 24 cases, which represented the greatest number of foodborne *Giardia* spp. outbreaks and associated cases reported in the period 2002-2011.

Figure 26. Foodborne *Giardia* spp. outbreaks and associated cases of reported by year, 2002–2011

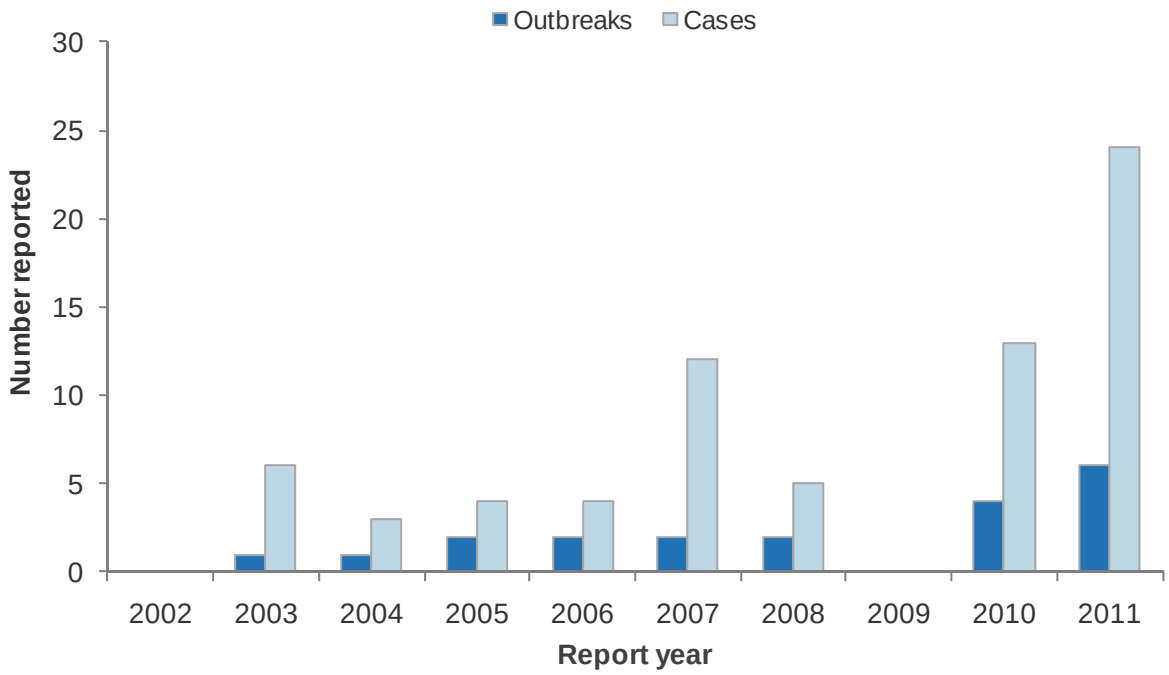


Table 31 contains details of the six food–associated *Giardia* spp. outbreaks reported in 2011.

Table 31. Details of food-associated *Giardia* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	Jan	Unknown	Overseas (India)	Overseas manufacturer, Other food outlet	2C
Waikato	Mar	Unknown	Private home	Private home	1C, 5P
Waikato	May	Unknown	Private home	Private home	1C, 2P
Waikato	Jun	Unknown	Private home	Private home	2C, 1P
Waikato	Jul	Unknown	Private home	Private home	3C, 5P
Waikato	Sep	Unknown	Overseas (Australia)	Private home	2C

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Giardia* spp. outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Faecal samples were collected from lambs at slaughter (*n* = 105) and sheep at pasture (*n* = 220) in New Zealand [29]. *Giardia* spp. were detected in 37.1% of lamb faecal samples.

Relevant regulatory developments

Nil.

Hepatitis A

Summary data for hepatitis A in 2011 are given in Table 32.

Table 32. Summary of surveillance data for hepatitis A, 2011

Parameter	Value in 2011	Source
Number of cases	26	EpiSurv
Rate (per 100 000)	0.6	EpiSurv
Hospitalisations (%)	18 (69.2%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	17 (66.7%)	EpiSurv
Estimated food-related cases (%)	NA	Expert consultation

NA = not applicable, no information is available on the food attributable proportion of hepatitis A in New Zealand

Case definition

Clinical description: An illness with a discrete onset of symptoms (fever, malaise, anorexia, nausea, or abdominal discomfort) with jaundice and/or elevated serum aminotransferase levels

Laboratory test for diagnosis: Positive anti HAV IgM in serum

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Hepatitis A cases reported in 2011 by data source

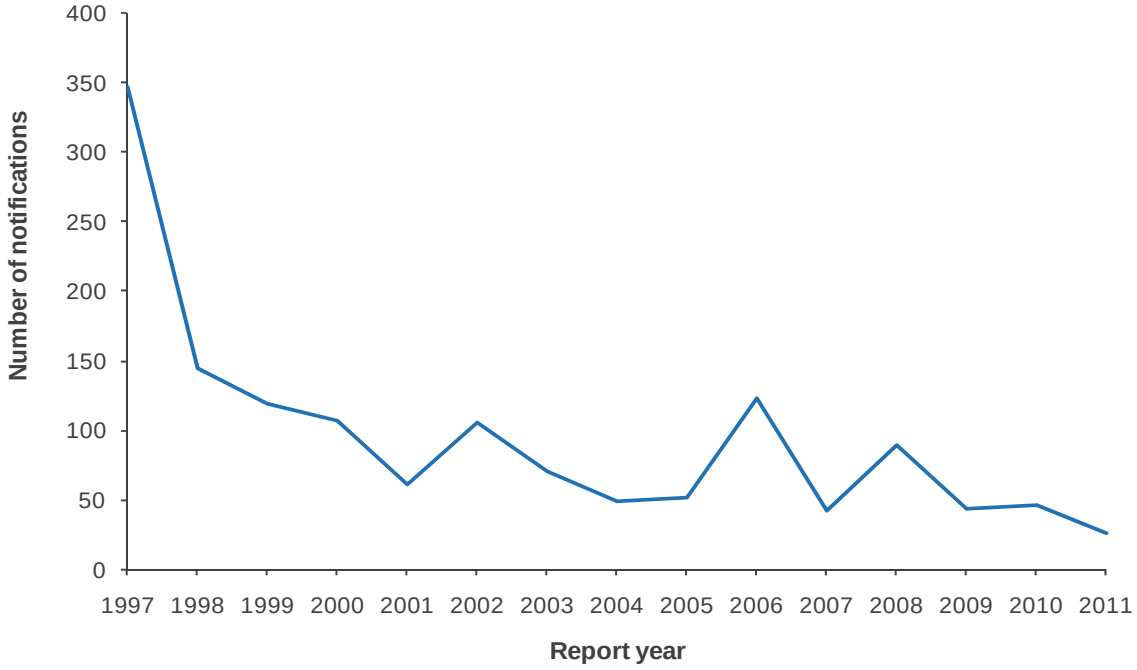
During 2011, 26 notifications (0.6 cases per 100 000 population) of hepatitis A and no resulting deaths were reported in EpiSurv.

The ICD-10 code B15 was used to extract hepatitis A hospitalisation data from the MoH NMDS database. Of the 18 hospital admissions (0.4 admissions per 100 000 population) recorded in 2011, 7 were reported with hepatitis A as the primary diagnosis and 11 with hepatitis A as another relevant diagnosis.

Notifiable disease data

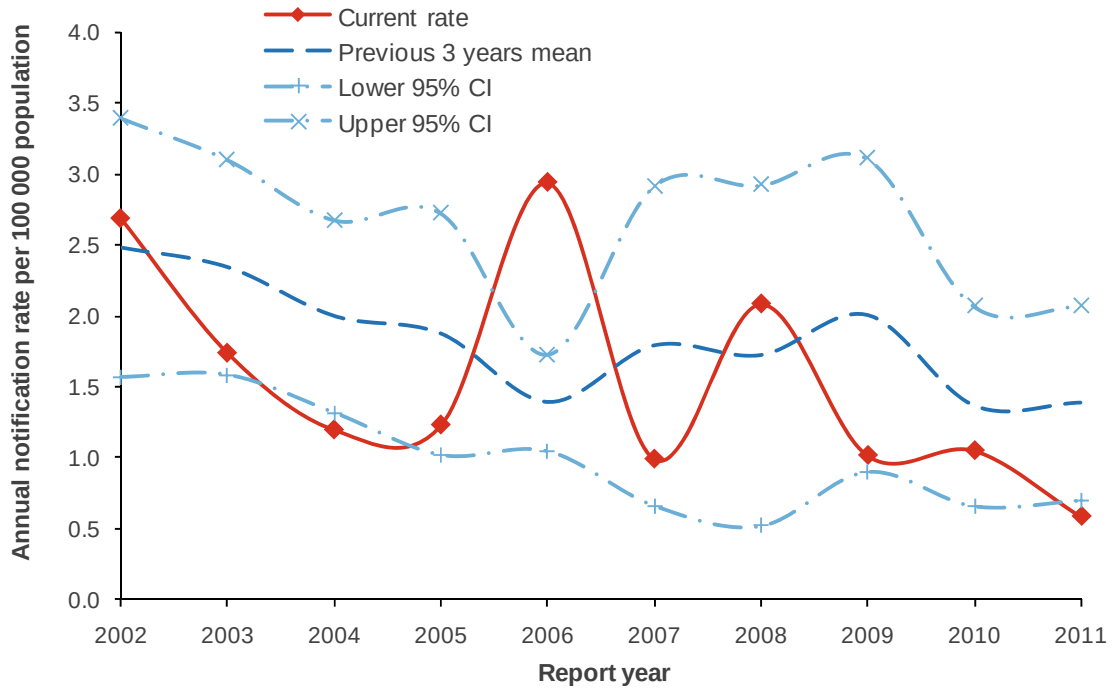
Between 1997 and 2011, there has been an overall downward trend in the number of notifications of hepatitis A, although an increase in notifications was observed in 2002, 2006 and 2008, corresponding to large numbers of hepatitis A cases associated with an outbreak in each of those years (Figure 27).

Figure 27. Hepatitis A notifications by year, 1997–2011



Hepatitis A notification rates varied throughout the ten-year period, 2002–2011 (Figure 28). The notification rate trend is very similar to the corresponding annual notification trend, showing peaks in 2006 and 2008. The highest hepatitis A notification rate was in 2006 (2.9 per 100 000 population).

Figure 28. Hepatitis A notification rate by year, 2002–2011



In 2011, hepatitis A notifications were higher in males (0.7 per 100 000 population, 16 cases) compared to females (0.4 per 100 000, 9 cases). Hospitalisation rates were the same for males as females (0.4 per 100 000, 9 admissions) (Table 33).

Table 33. Hepatitis A cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	16	0.7	9	0.4
Female	9	0.4	9	0.4
Unknown	1		0	
Total	**26**	**0.6**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

In 2011, the highest number of hepatitis A notifications were in the 20 years and under age group (11 cases), followed by the 20 to 39 years age group (8 cases). The number of hospitalisations was highest in the 20 to 39 years age group (Table 34).

Table 34. Hepatitis A cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<20	11	0.9	5	0.4
20 to 39	8	0.7	6	0.5
40 to 59	3		5	0.4
60+	4		2	
Total	**26**	**0.6**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

The most commonly reported risk factor for hepatitis A in 2011 was overseas travel during the incubation period (66.7%) (Table 35).

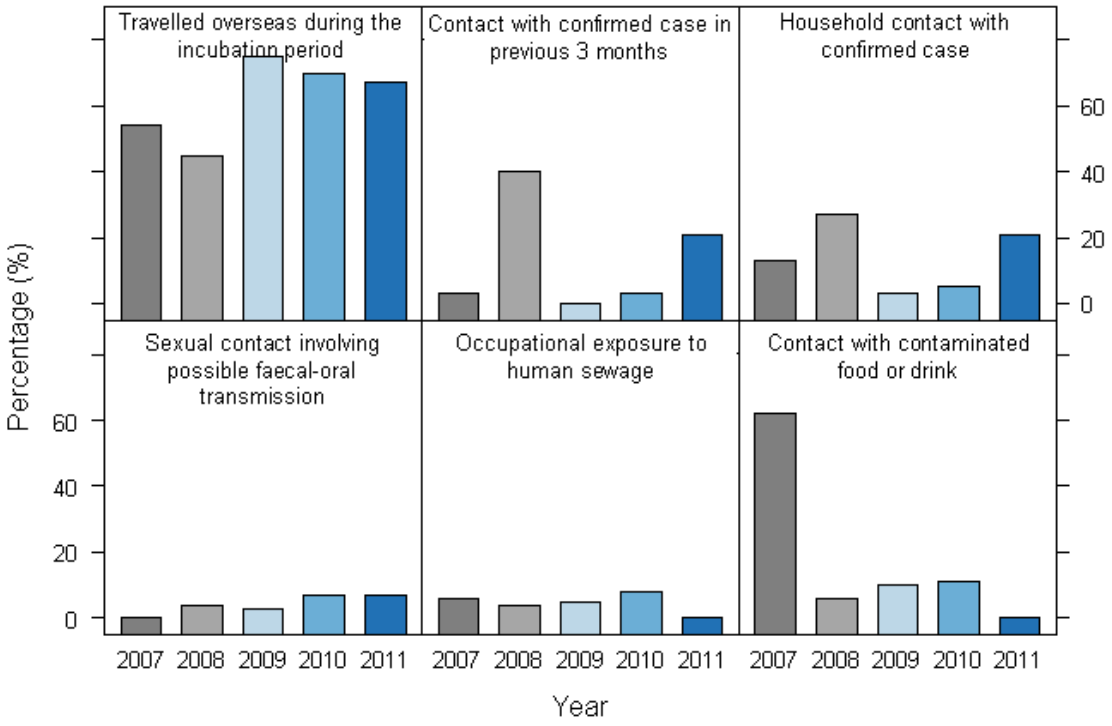
Table 35. Exposure to risk factors associated with hepatitis A, 2011

Risk Factor	Notifications			
	Yes	No	Unknown	%[a]
Travelled overseas during the incubation period	16	8	2	66.7
Contact with confirmed case in previous 3 months	3	11	12	21.4
Household contact with confirmed case	3	11	12	21.4
Sexual contact involving possible faecal-oral transmission	1	13	12	7.1
Contact with contaminated food or drink	0	6	20	0.0
Occupational exposure to human sewage	0	17	9	0.0

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

Since 2008, overseas travel during the incubation period has been the most frequently reported risk factor and contact with contaminated food or drink has been reported by only a small proportion of cases each year (Figure 29). In 2011, there was an increase in the percentage of reported contact with a confirmed case in the previous three months and reported household contact with a confirmed case compared to the previous two years.

Figure 29. Hepatitis A risk factors by percentage of cases and year, 2007–2011



For cases where information on travel was provided, 66.7% (95% CI 44.7-84.4%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all hepatitis A cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of hepatitis A in 2011. The resultant distribution has a mean of 17 cases (95% CI 8-28).

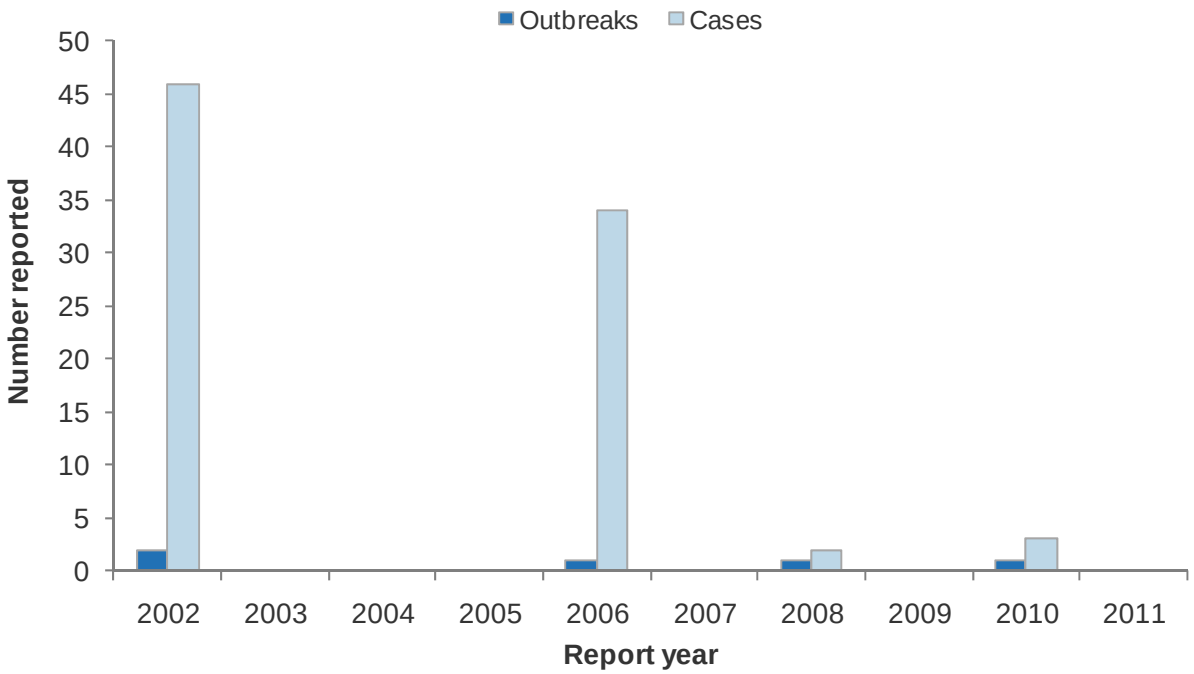
If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 60.6% (95% CI 53.4-67.6%).

Outbreaks reported as caused by hepatitis A virus

No hepatitis A virus outbreaks were reported in 2011.

Foodborne hepatitis A virus outbreaks are rare with only five outbreaks reported in the period 2002 to 2011 (2002, 2006, 2008 and 2010) (Figure 30). Two outbreaks were reported during the 2002 year. Although occurring infrequently, foodborne outbreaks of hepatitis A virus can be associated with many cases (43 cases and 34 cases respectively for outbreaks reported in 2002 and 2006), although this was not so for the food-associated outbreak in 2008 and 2010 (2 cases and 3 cases respectively) or the smaller of the two in 2002 (3 cases).

Figure 30. Foodborne hepatitis A virus outbreaks and associated cases reported by year, 2002–2011



In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated hepatitis A virus outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Histamine (scombroid) fish poisoning

Case definition

Clinical description:	Tingling and burning sensation around mouth, facial flushing, sweating, nausea and vomiting, headache, palpitations, dizziness and rash
Laboratory test for diagnosis:	Detection of histamine levels ≥ 50mg/100 g fish muscle
Case classification:	Not applicable

Histamine (scombroid) fish poisoning cases reported in 2011 by data source

One case of histamine (scombroid) fish poisoning and no resulting deaths were reported in EpiSurv during 2011.

The ICD-10 code T61.1 was used to extract scombroid fish poisoning hospitalisation data from the MoH NMDS database. All six hospital admissions recorded in 2011 were reported with scombroid fish poisoning as the primary diagnosis. It should be noted that EpiSurv and the MoH NMDS database are separate systems and hospital admission can occur without cases being notified.

Outbreaks reported as caused by histamine (scombroid) fish poisoning

One histamine (scombroid) fish poisoning outbreak was reported in 2011 involving nine associated cases, with one case hospitalised (Table 34).

Table 36. Histamine (scombroid) fish poisoning outbreaks reported, 2011

Measure	Foodborne histamine fish poisoning outbreaks	All histamine fish poisoning outbreaks
Outbreaks	1	1
Cases	9	9
Hospitalised cases	1	1

Between 2002 and 2010 the number of foodborne histamine (scombroid) fish poisoning outbreaks reported each year has ranged from one to six (Figure 31). The highest number of outbreaks was reported in 2006 (6 outbreaks, 21 cases) and the highest total number of associated cases was reported in 2002 (32 cases, 5 outbreaks).

Figure 31. Foodborne histamine (scombroid) fish poisoning outbreaks and associated cases reported by year, 2002–2011

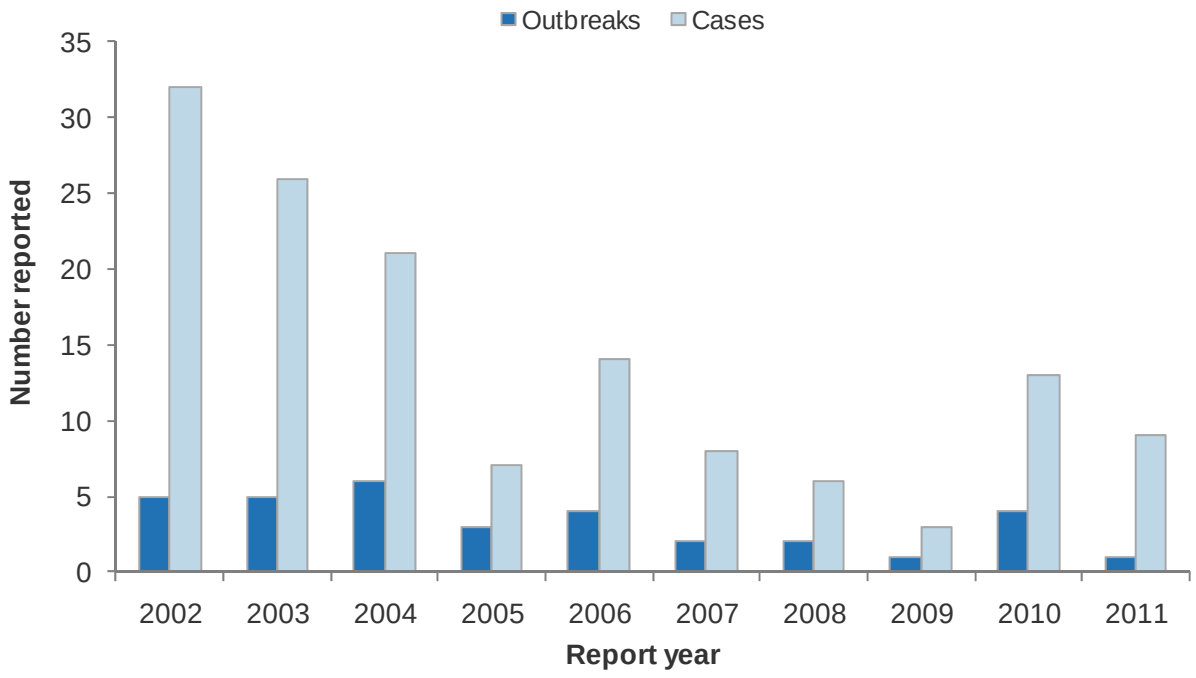


Table 37 contains details of the one histamine fish poisoning outbreak reported in 2011.

Table 37. Details of food-associated histamine (scombroid) fish poisoning outbreak, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Wellington	Apr	Fish (warehou)	Takeaways	Takeaways	9C

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated histamine fish poisoning outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Listeriosis

Summary data for listeriosis in 2011 are given in Table 38.

Table 38. Summary of surveillance data for listeriosis, 2011

Parameter	Value in 2011	Source
Number of cases	26	EpiSurv
Rate (per 100 000)	0.6	EpiSurv
Hospitalisations (%)	29 (111.5%)	MoH NMDS
Deaths (%)	1 (3.8%)	EpiSurv
Estimated travel-related cases (%)	1 (3.8%)	EpiSurv
Estimated food-related cases (%)*	21 (84.9%)	Expert consultation

* For estimation of food-related cases it was assumed that the proportions derived from expert consultation would exclude travel-related cases

Case definition

Clinical description: An infection which produces several clinical syndromes including stillbirths, listeriosis of the newborn, meningitis, bacteraemia, or localised infections. Pregnant women, the immunosuppressed and the frail elderly are at greatest risk

Laboratory test for diagnosis: Isolation of *Listeria monocytogenes* from a site that is normally sterile, including the foetal gastrointestinal tract

Case classification:

Probable — Not applicable

Confirmed — A clinically compatible illness that is laboratory confirmed

Listeriosis cases reported in 2011 by data source

During 2011, 26 notifications (0.6 cases per 100 000 population) of listeriosis were reported in EpiSurv, of which four were perinatal. Twenty-six cultures of *L. monocytogenes* were received by the ESR Special Bacteriology Laboratory.

The ICD-10 code A32 was used to extract listeriosis hospitalisation data from the MoH NMDS database. Of the 29 hospital admissions (0.7 admissions per 100 000 population) recorded in 2011, 11 were reported with listeriosis as the primary diagnosis and 18 with listeriosis as another relevant diagnosis.

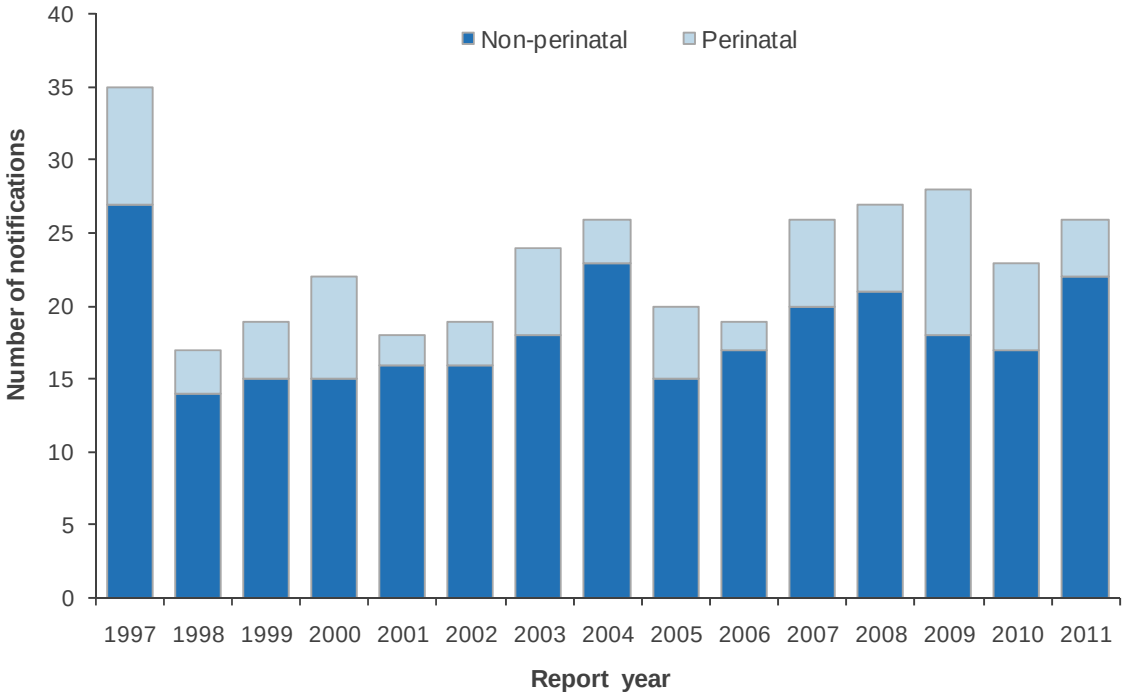
One death resulting from non-perinatal listeriosis was recorded in EpiSurv in 2011.

It has been estimated by expert consultation that 84.9% (minimum = 78.4%, maximum = 92.1%) of listeriosis incidence is due to foodborne transmission. It was further estimated that approximately 50% of foodborne transmission was due to consumption of ready-to-eat meats.

Notifiable disease data

Between 1997 and 2011, the total number of listeriosis notifications has generally fluctuated between 17 notifications (1998) and 28 notifications (2009), with the exception of 35 notifications reported in 1997 (Figure 32). In 2011, four of the notifications were reported as perinatal, similar to recent years.

Figure 32. Listeriosis non-perinatal and perinatal notifications by year, 1997–2011



In 2011, the rate of notifications for listeriosis was the same for males (0.6 per 100 000 population, 12 cases) and females (0.6 per 100 000, 14 cases). The number and rate of hospitalisations were higher for females than males (Table 39). The non-perinatal death reported in 2011 was male.

Table 39. Listeriosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	12	0.6	12	0.6
Female	14	0.6	17	0.8
Total	**26**	**0.6**	**29**	**0.7**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

In 2011, the age-specific listeriosis rates were highest in the 60 years and over age group for both the notifications (1.8 per 100 000 population, 15 cases) and hospitalisations (2.2 per 100 000, 18 admissions) (Table 40). The non-perinatal death reported in 2011 was in the 40 to 59 years age group.

Table 40. Listeriosis cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<20	1		0	
20 to 39	5	0.4	6	0.5
40 to 59	5	0.4	5	0.4
60+	15	1.8	18	2.2
Total	**26**	**0.6**	**29**	**0.7**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

During 2011, the most common risk factors reported for non-perinatal listeriosis cases were an underlying illness (71.4%) and being admitted to hospital for treatment of another illness (52.4%) (Table 41).

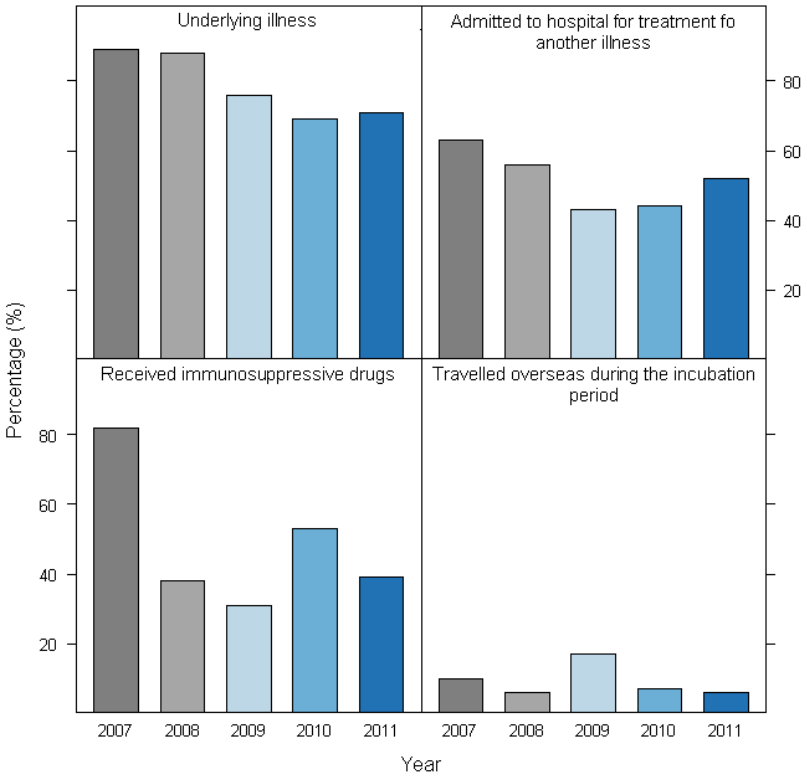
Table 41. Exposure to risk factors associated with listeriosis (non-perinatal), 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Underlying illness	15	6	1	71.4
Admitted to hospital for treatment of another illness	11	10	1	52.4
Received immunosuppressive drugs	7	11	4	38.9
Travelled overseas during the incubation period	1	17	4	5.6

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

Between 2007 and 2011 the risk factors associated with listeriosis generally occurred in the same order of importance each year with a highest percentage of cases reporting an underlying illness, followed by admission to hospital for treatment of another illness (Figure 33).

Figure 33. Percentage of cases by exposure to risk factors associated with listeriosis (non-perinatal) and year, 2007–2011



For cases where information on travel was provided, 5.6% (95% CI 0.1-27.3%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all listeriosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of listeriosis in 2011. The resultant distribution has a mean of 1 case (95% CI 0-5).

It should be noted that this analysis applies to non-perinatal cases only.

Outbreaks reported as caused by *Listeria* spp.

No *Listeria* spp. outbreaks were reported in 2011.

An outbreak reported in 2009 associated with two cases is the only *Listeria* spp. outbreak to be reported for the period 2002 to 2011.

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Listeria monocytogenes* outbreaks.

Listeria monocytogenes types commonly reported

ESR's Special Bacteriology Laboratory reported a total of 26 cases infected with *L. monocytogenes* during 2011.

Table 42 shows the number of cases and percentage of *L. monocytogenes* serotypes reported by the Special Bacteriology Laboratory at ESR between 2008 and 2011.

Table 42. *L. monocytogenes* serotypes identified by the Special Bacteriology Laboratory, 2008–2011

Serotype	2008		2009		2010		2011	
	No.	%	No.	%	No.	%	No.	%
4	16	69.6	25	86.2	16	72.7	15	57.7
1/2	7	30.4	4	13.8	6	27.3	11	42.3
Total	**23**		**29**		**22**		**26**	

Recent surveys

1. A survey of ready-to-eat (RTE) hot and cold smoked salmon available at retail in New Zealand

A survey was carried out to identify any differences in the effectiveness of controls for *L. monocytogenes* between ready-to-eat (RTE) hot and cold smoked salmon producers operating under the Animal Products Act 1999 (APA) and the Food Act 1981 (FA), as reflected in compliance with Standard 1.6.1 of the Australia New Zealand Food Standards Code [31].

Representative sampling of RTE smoked salmon products manufactured by food businesses operating under the APA (1999) or the Food Act regime (Food Hygiene Regulations 1974 (FHR) and Food Safety Plans (FSP)) was performed over a 12 month period in two tranches, obtaining approximately 200 samples from each regulatory regime and type of process (hot and cold smoking); in total 1 212 RTE smoked salmon samples were analysed. Initial analysis was for the presence or absence of *L. monocytogenes* in a 25g sample. If *L. monocytogenes* was detected, enumeration was performed and positive samples confirmed by conventional biochemical assays, gene typed by Pulsed Field Gel Electrophoresis (PFGE) and serotyping.

There were eight samples positive for *L. monocytogenes* (0.7%, 95th percentile confidence interval 0.3-1.3%), all of which were cold smoked salmon. Four were obtained from premises operating under the FA and the FHR , three premises operating under FSPs and one under the APA. However, calculated confidence intervals indicate that there is overlap in the probability of detecting similar numbers of positive samples between these regimes, suggesting a lack of statistical significance in the differences detected between the prevalences recorded for the three regimes.

All samples that were positive for *L. monocytogenes* were re-sampled for enumeration. Only three samples (all from one producer, FHR regime) gave counts greater than the lower limit of detection (5.0×10^{0}), with concentrations of 4.0×10^{3}, 9.5×10^{4} and 3.6×10^{4} *L. monocytogenes* g^{-1}. Standard 1.6.1 allows for 1 sample in 5 to have a maximum number of 1.0×10^{2} *L. monocytogenes* g^{-1}; and although five samples were not obtained from each producer for each type of product, the concentrations in three of the samples were above the maximum allowable limit specified in Standard 1.6.1. This producer changed from a FHR programme to a FSP, and when subsequently retested in tranche 2, the two samples tested were negative.

2. Validation of the uncooked comminuted fermented meats (UCFM) standard under commercial conditions

The Food (Uncooked Comminuted Fermented Meat) Standard 2008 (UCFM Standard) came into force in New Zealand on 1 December 2008. The standard applies to all UCFM manufacturers, whether they are operating under the Food Act 1981, the Food Hygiene Regulations 1984 or the Animal Products Act 1999.

This study describes the results of a microbiological survey to determine compliance with *Escherichia coli, Salmonella* and coagulase-positive staphylococci microbiological limits as specified in the Australia New Zealand Food Standards Code (the Code). In addition, testing was performed to determine whether samples contained *Listeria monocytogenes* and Shiga toxin-producing *Escherichia coli* (STEC) and, where present, to estimate the concentration of *L. monocytogenes*.

Data were obtained from 108 lots of five samples (540 samples tested individually or as 108 pooled samples), with thirty lots yielding *Listeria* spp. in at least one sample and of these, six lots (5.6%) were confirmed as containing *L. monocytogenes*. When *L. monocytogenes* was present the concentration was low, with the maximum recorded concentration being 23 MPN g^{-1}, which is not a concentration of concern as *L. monocytogenes* cannot grow in this food.

Most samples had both a pH <5.2 and a_w <0.95. Some samples did not meet one of these criteria, but when the pH and a_w data were used in the Augustin predictive model none of these combinations produced a "growth' prediction. However, for four samples the pH of the salami was high and the model predicted growth at 7.7°C. These samples harboured *Listeria* spp., but not *L. monocytogenes*. Two samples had particularly high pH values (6.36 and 6.27).

Relevant New Zealand studies and publications

1. Journal papers

A review of New Zealand regulatory experiences with *Listeria monocytogenes* was published [32]. This included a summary of foods that had been implicated in food-associated outbreaks of listeriosis including seafood, raw fish and shellfish, mussels and RTE meats.

A survey of *Listeria monocytogenes* in mussel processing facilities from August 2007 to June 2009 confirmed the presence of the organism in raw and processed product [33]. The importance of cross-contamination from both plant internal and external environments was also confirmed.

Relevant regulatory developments

During 2011, the Ministry of Agriculture and Forestry (MAF, now MPI) released a series of guidance documents for the control of *Listeria monocytogenes* in ready-to-eat foods [34].

Norovirus infection

Case definition

Clinical description:	Gastroenteritis usually lasting 12-60 hours
Laboratory test for diagnosis:	Detection of norovirus in faecal or vomit specimen or leftover food
Case classification:	
Probable	A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak
Confirmed	A clinically compatible illness that is laboratory confirmed

Norovirus infection cases reported in 2011 by data source

During 2011, 72 notifications (1.6 cases per 100 000 population) of norovirus and no resulting deaths were reported in EpiSurv. It should be noted that not every case of norovirus infection is notifiable; only those that are part of a common source outbreak or from a person in a high risk category.

The ICD-10 code A08.1 was used to extract norovirus infection hospitalisation data from the MoH NMDS database. Of the 160 hospital admissions (3.6 admissions per 100 000 population) recorded in 2011, 37 were reported with norovirus infection as the primary diagnosis and 123 with norovirus infection as another relevant diagnosis.

An expert consultation estimated that 40% of norovirus infections were due to foodborne transmission and of these 40% were due to consumption of molluscan shellfish.

Outbreaks reported as caused by norovirus

During 2011, there were 181 norovirus outbreaks reported in EpiSurv and of these 20 were associated with a suspected or known foodborne source (Table 43). In total, 206 cases were associated with these foodborne outbreaks.

Table 43. Norovirus outbreaks reported, 2011

Measure	Foodborne norovirus infection outbreaks	All norovirus infection outbreaks
Outbreaks	20	181
Cases	206	4 014
Hospitalised cases	2	34

Between 2002 and 2011 the number of foodborne norovirus outbreaks reported each year ranged from 10 (2007) to 30 (2009) (Figure 34).The total number of cases associated with these outbreaks each year ranged from 131 (in 2005) to 602 cases (in 2008). The number of outbreaks and associated cases in 2011 (20 outbreaks and 206 cases) was very similar to 2010.

Figure 34. Foodborne norovirus outbreaks and associated cases reported by year, 2002–2011

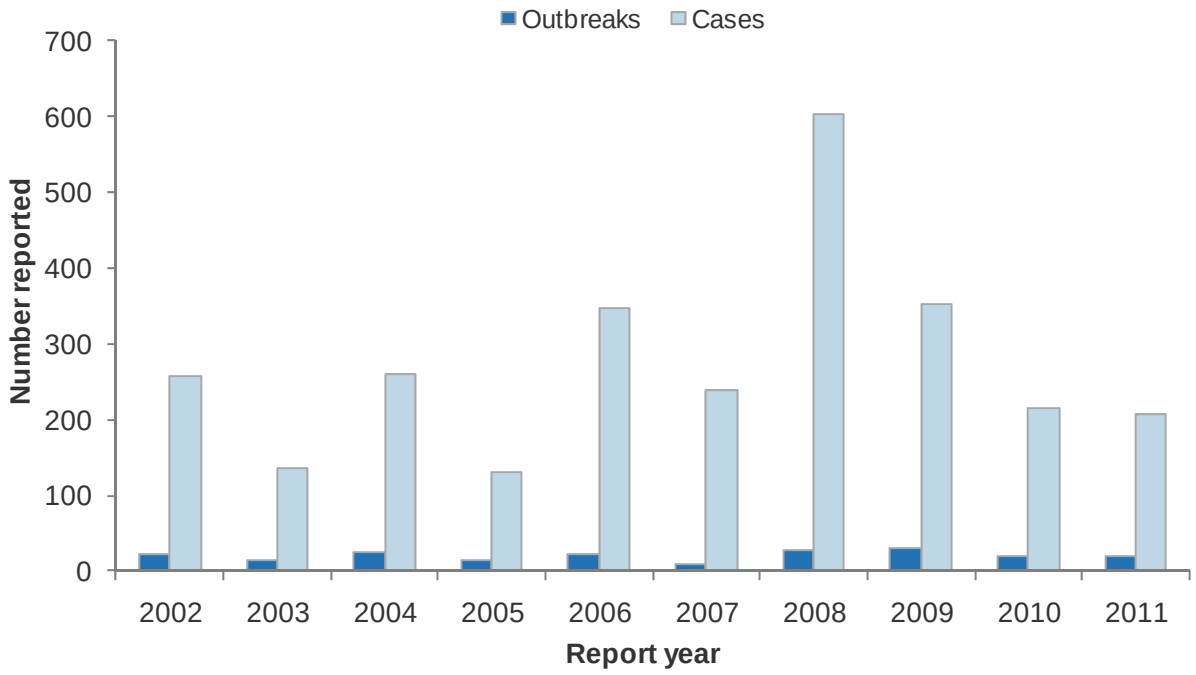


Table 44 contains details of the 20 food-associated norovirus outbreaks reported in 2011.

Table 44. Details of food-associated norovirus outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Jan	Unknown	Takeaway	Restaurant/cafe/bakery	2C
Auckland	Jan	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C
Auckland	Feb	Unknown	Restaurant/cafe/bakery, private home	Restaurant/cafe/bakery, private home	2C
West Coast	Feb	Unknown	Long term care facility	Long term care facility	13C
Otago	Mar	Turkish kebabs	Takeaway	Takeaway	2C, 4P
Taranaki	Apr	Unknown	Private home	Private home	7P
Auckland	Apr	Fresh fruit salad	Restaurant/cafe/bakery	Restaurant/cafe/bakery	31C
Auckland	May	Unknown	Community gathering	Community gathering	1C, 9P
Tauranga	Jun	Unknown	Takeaway	Takeaway	2P
Auckland	Aug	Unknown	Overseas (Rarotonga)		3C, 5P
Auckland	Aug	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 6P
Auckland	Sep	Unknown	Private home	Private home	2C
Wellington	Sep	Buffet meal	Restaurant/cafe/bakery		2C, 8P
Hawke's Bay	Sep	Crispy pork belly and pork brawn on warm potato salad with pickled vegetables	Restaurant/cafe/bakery	Restaurant/cafe/bakery	13C
Auckland	Nov	Chicken roll	Restaurant/cafe/bakery	Restaurant/cafe/bakery	1C, 2P
Auckland	Nov	Unknown	Restaurant/cafe/bakery, caterers	Restaurant/cafe/bakery, caterers	2P
Auckland	Dec	Unknown	Other institution		3C, 27P
Gisborne	Dec	Unknown	Caterers, long term care facility	Caterers	5C, 26P
Taranaki	Dec	Unknown	Home, takeaways	Home, takeaways	2C, 1P
Wellington	Dec	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 19P

PHU: Public Health Unit, C: confirmed, P: probable

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2011, samples were received relating to 15/20 food-associated norovirus outbreaks identified in Table 44. Norovirus was detected in faecal samples from 13 foodborne outbreaks. Food samples were submitted for two of these outbreaks, but norovirus was not isolated from any food sample analysed.

Norovirus types commonly reported

Norovirus genotyping data from ESR's Norovirus Reference Laboratory are shown in Table 45. Note that these data relate to outbreaks not individual cases.

In 2011, GII.4 was the predominant norovirus genotype identified in outbreaks (109/160 outbreaks, 68.1%), followed by recombinant genotype GII.12/GII.3 (14/160 outbreaks, 8.7%).

Over the period 2008 to 2011, GII.4 was the predominant norovirus genotype identified and was identified in at least four times as many outbreaks as any other genotype each year. GII.6 was the second most commonly identified genotype over this period but showed a decreasing trend from 16 outbreaks in 2008 to three outbreaks in 2011. Other genotypes were identified in between 0 and 16 outbreaks each year and showed no consistent pattern across the four-year period.

Table 45. Norovirus genotypes identified in outbreaks by the Norovirus Reference Laboratory, 2008–2011

Genotype	2008	2009	2010	2011
Genogroup I	**17**	**20**	**16**	**10**
GI.3	14	0	3	3
GI.4	1	16	0	1
GI.6	0	4	10	4
Other types	2	0	3	2
Genogroup II	**104**	**235**	**95**	**124**
GII.2	0	11	2	3
GII.3	0	1	9	2
GII.4	79	210	58	109
GII.6	16	10	5	3
GII.7	8	1	14	4
Other types	1	2	7	3
Recombinant types	**22**	**2**	**0**	**22**
GII.12/GII.3	0	0	0	14
GII.b/GII.3	8	1	0	3
GII.c/GII.12	13	1	0	2
Other types	1	0	0	3
Other	**16**	**7**	**5**	**4**
Total	**159**	**264**	**116**	**160**

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Two papers were published reporting outbreaks of norovirus infection related to consumption of oysters. The first paper related to outbreaks in Auckland and Waikato [35], Retrospective cohort studies and microbiological analyses strongly suggested oysters and a particular growing region. A leaking effluent pipe was found draining into the growing area and was a probable cause of the contamination. The second paper reported investigation of an outbreak involving guests at a birthday party [36]. A retrospective cohort study and microbiological analysis of faecal and oyster samples resulted in identification of South Korean oysters as the probable cause of the outbreak.

Relevant regulatory developments

Nil.

Salmonellosis

Summary data for salmonellosis in 2011 are given in Table 46.

Table 46. Summary of surveillance data for salmonellosis, 2011

Parameter	Value in 2011	Source
Number of cases	1 056	EpiSurv
Rate (per 100 000)	24.0	EpiSurv
Hospitalisations (%)	135 (12.8%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	243 (23.1%)	EpiSurv
Estimated food-related cases (%)*	493 (60.7%)	Expert consultation

* For estimation of food-related cases it was assumed that the proportions derived from expert consultation would exclude travel-related cases

Case definition

Clinical description: Salmonellosis presents as gastroenteritis. Asymptomatic infections may occur

Laboratory test for diagnosis: Isolation of *Salmonella* species (excluding *S.* Typhi and *S.* Paratyphi) from any clinical specimen

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Salmonellosis cases reported in 2011 by data source

The salmonellosis cases presented here exclude disease caused by *S.* Paratyphi and *S.* Typhi.

During 2011, 1 056 notifications (24.0 cases per 100 000 population) of salmonellosis and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 1 039 cases infected with non-typhoidal *Salmonella* (23.6 cases per 100 000).

The ICD-10 code A02.0 was used to extract salmonellosis hospitalisation data from the MoH NMDS database. Of the 135 hospital admissions (3.1 admissions per 100 000 population) recorded in 2011, 106 were reported with salmonellosis as the primary diagnosis and 29 with salmonellosis as another relevant diagnosis.

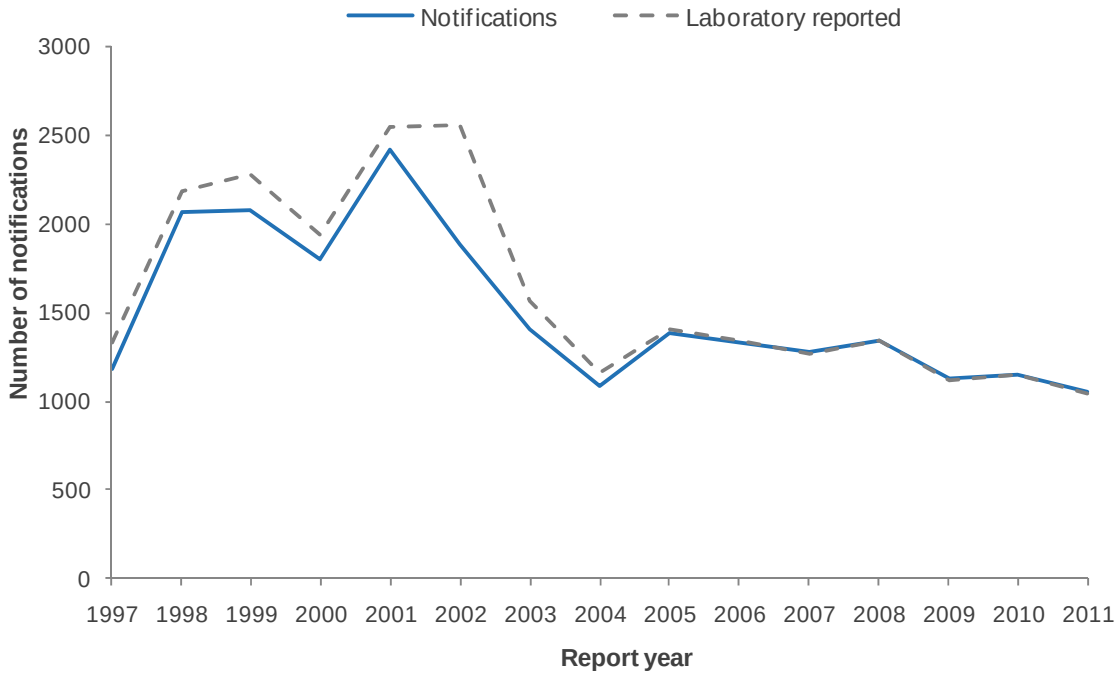
It has been estimated by expert consultation that 60.7% (minimum = 45.4%, maximum = 68.9%) of salmonellosis incidence is due to foodborne transmission. It was further estimated that 36% of foodborne transmission was due to transmission via poultry.

Notifiable disease data

From 1997 to 2001 there was a general trend of increasing salmonellosis notifications with the highest number reported in 2001 (2 417 cases) (Figure 35). After a sharp fall in notifications between 2001 and 2004 the decreasing notification trend has continued with a smaller slope since 2005 and the lowest number of notifications reported in 2011 (1 056 cases).

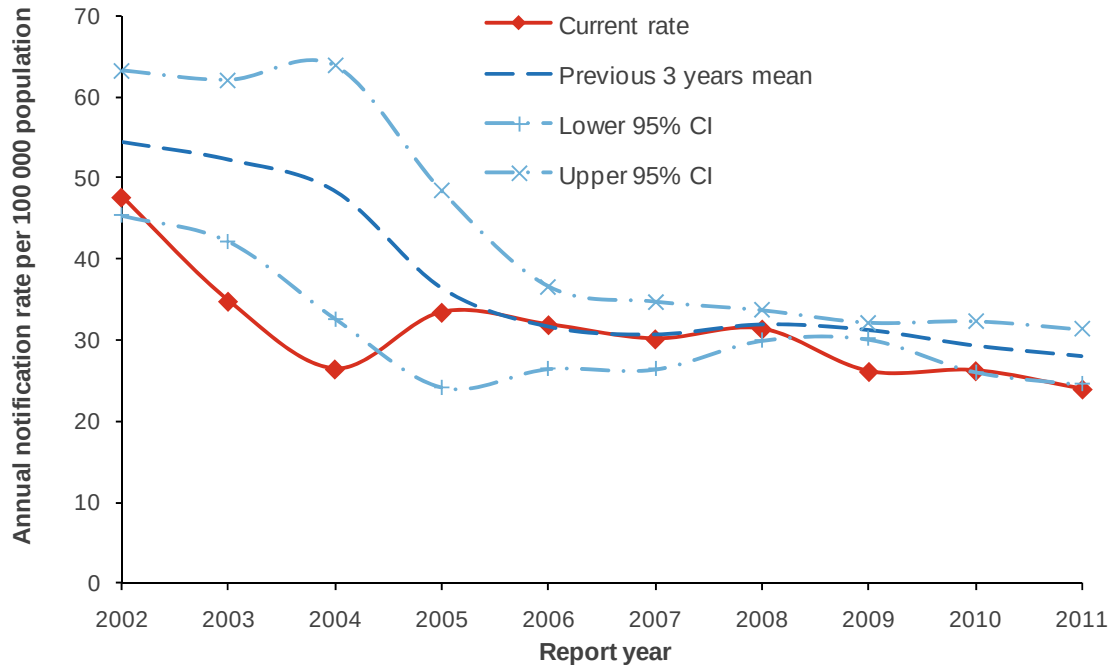
Integration of notification and laboratory data at ESR has reduced the differences between the number of notifications and laboratory reported cases seen prior to 2005.

Figure 35. Salmonellosis notifications and laboratory-reported cases by year, 1997–2011



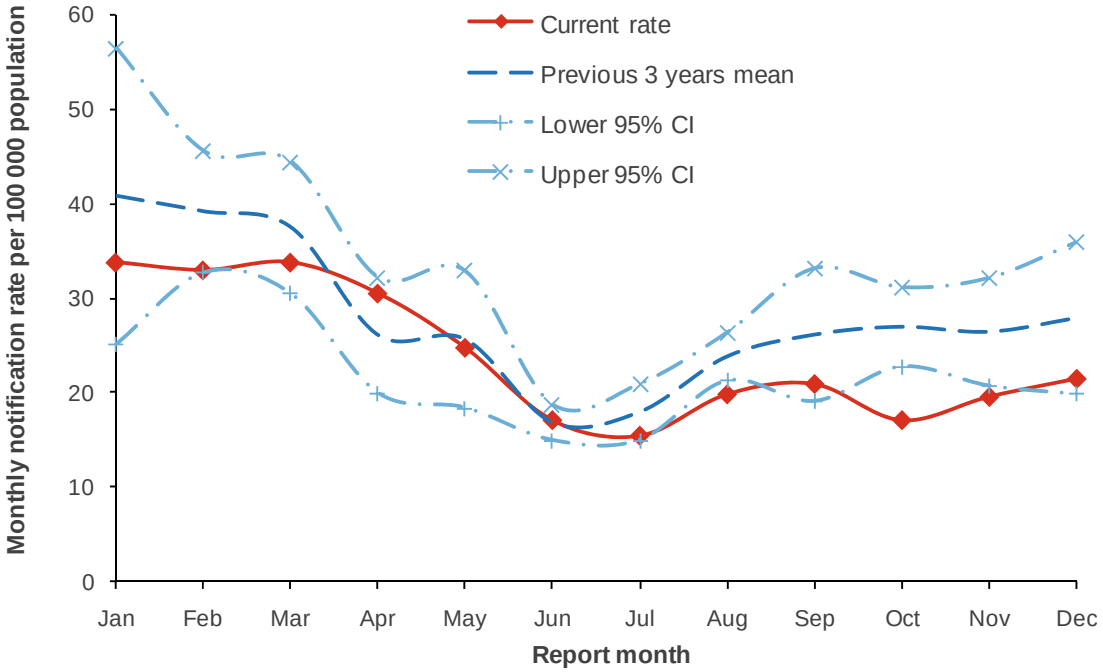
Between 2002 and 2011, the salmonellosis annual notification rate followed a generally decreasing trend with the lowest notification rate in 2011 (24.0 per 100 000) (Figure 36).

Figure 36. Salmonellosis notification rate by year, 2002–2011



The number of notified cases of salmonellosis per 100 000 population by month for 2011 is shown in Figure 37. The overall pattern is similar to the historical mean but with a lower rate seen in spring and summer.

Figure 37. Salmonellosis monthly rate (annualised), 2011



Rates of salmonellosis varied throughout the country as illustrated in Figure 38. The highest salmonellosis notification rate in 2011 was in South Canterbury DHB (58.5 per 100 000 population, 33 cases), followed by Southern DHB (48.9 per 100 000, 150 cases). South Canterbury DHB featured in the highest quantile of salmonellosis notification rates between 2008 and 2011.

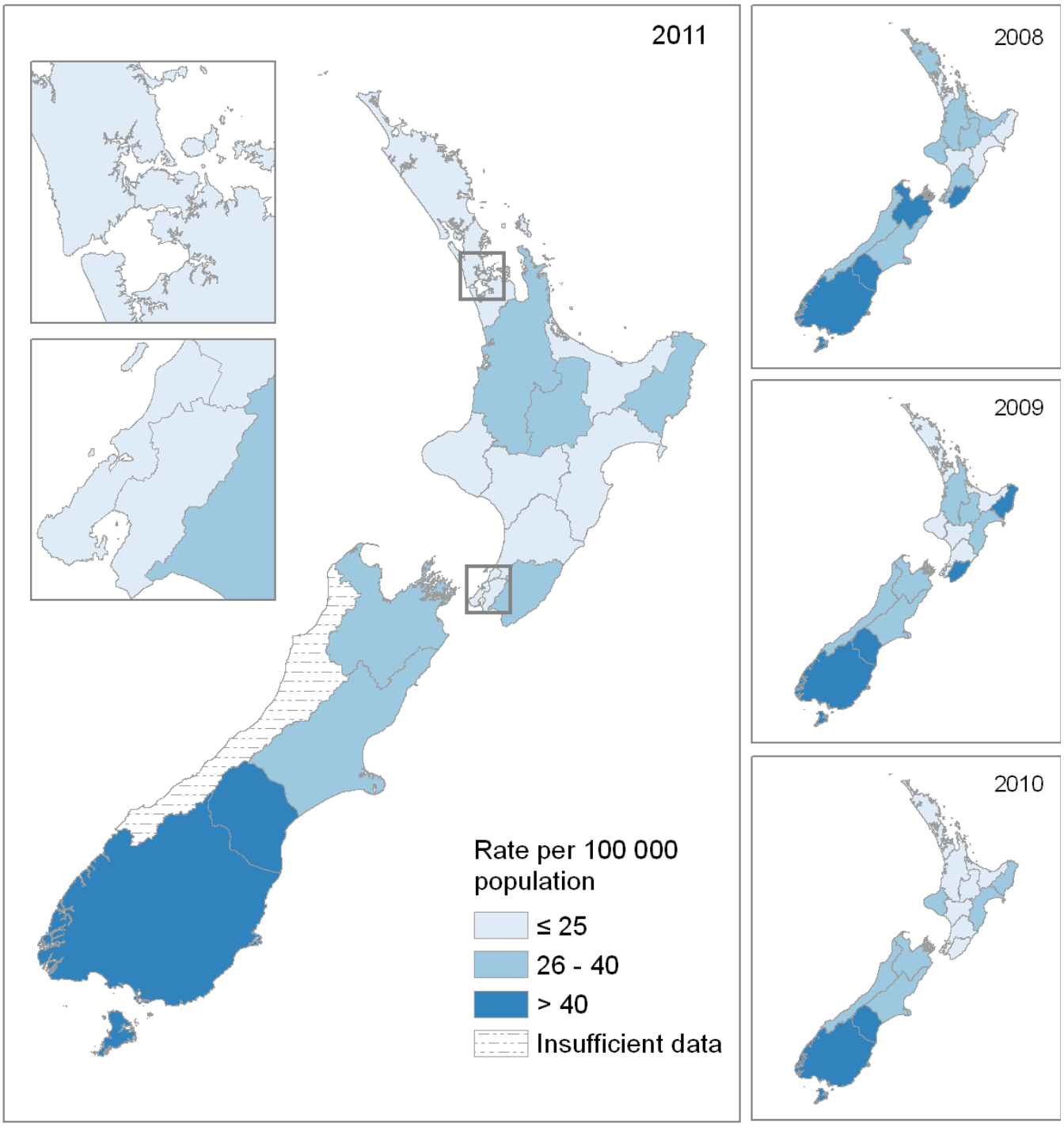
In 2011, the numbers and rates of notifications and hospitalisations for salmonellosis were higher in males compared to females (Table 47).

Table 47. Salmonellosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	560	25.9	70	3.2
Female	488	21.8	65	2.9
Unknown	8		0	
Total	**1 056**	**24.0**	**135**	**3.1**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

Figure 38. Geographic distribution of salmonellosis notifications, 2008–2011



In 2011, age-specific salmonellosis rates were highest in the less than 1 year age group for both the notifications (115.4 per 100 000 population, 72 cases) and hospitalisations (20.8 per 100 000, 13 admissions) (Table 48). Those in the 1 to 4 years age group also reported high salmonellosis notification rates compared to other age groups.

Table 48. Salmonellosis cases by age group, 2011

Age group	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	72	115.4	13	20.8
1 to 4	175	69.5	7	2.8
5 to 9	55	19.1	4	
10 to 14	34	11.6	5	1.7
15 to 19	61	19.2	9	2.8
20 to 29	162	26.2	17	2.7
30 to 39	90	16.0	16	2.8
40 to 49	122	19.3	11	1.7
50 to 59	116	20.9	15	2.7
60 to 69	90	21.6	13	3.1
70+	77	18.9	25	6.1
Unknown	2		0	
Total	**1 056**	**24.0**	**135**	**3.1**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

The most commonly reported risk factors for salmonellosis cases notified during 2011 were consumption of food from retail premises (43.7%), contact with farm animals (34.9%), and consumption of untreated water (27.4%) (Table 49).

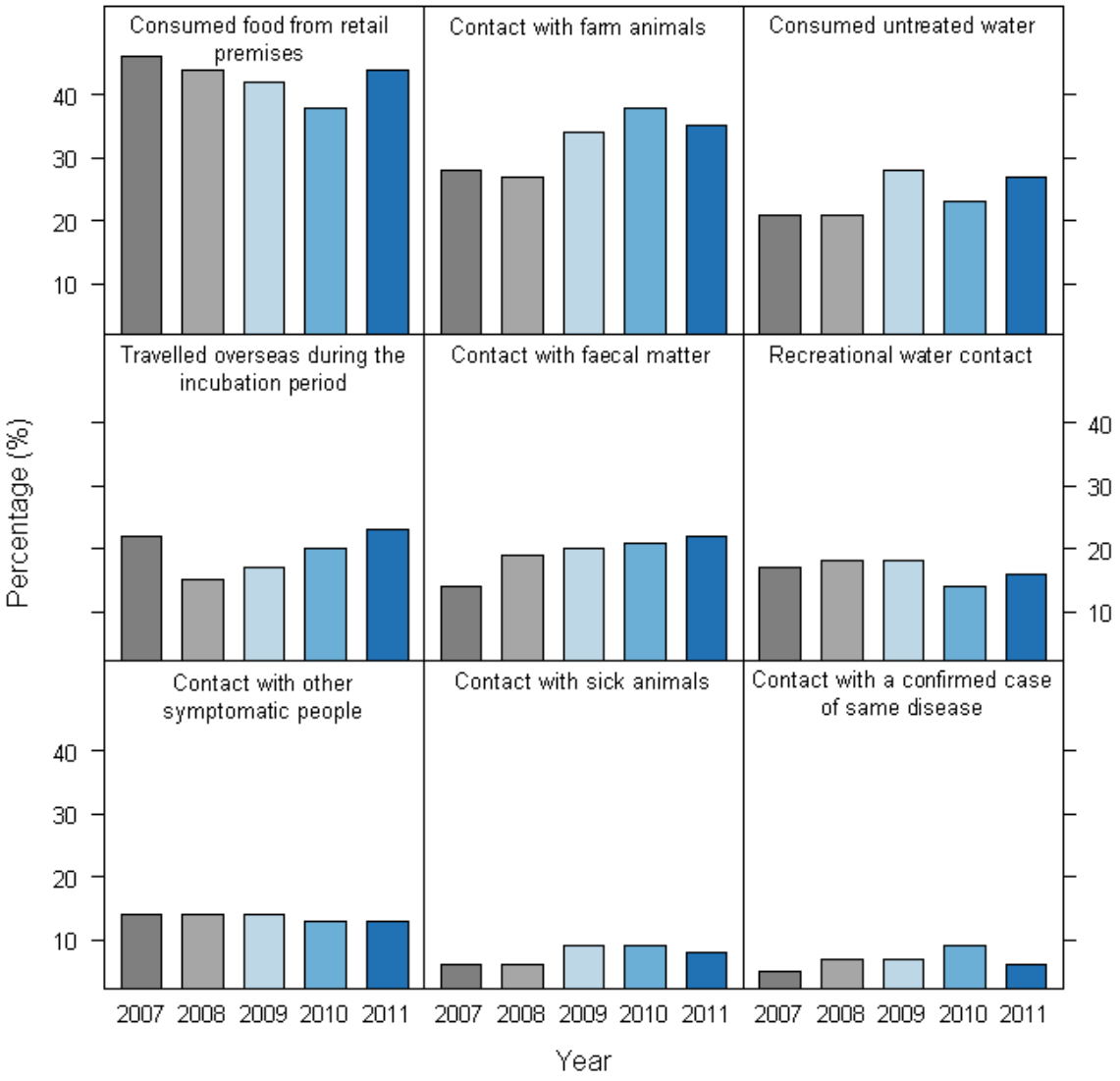
Table 49. Exposure to risk factors associated with salmonellosis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	226	291	539	43.7
Contact with farm animals	196	366	494	34.9
Consumed untreated water	138	365	553	27.4
Travelled overseas during the incubation period	142	474	440	23.1
Contact with faecal matter	120	421	515	22.2
Recreational water contact	89	463	504	16.1
Contact with other symptomatic people	68	474	514	12.5
Contact with sick animals	44	474	538	8.5
Contact with a confirmed case of same disease	30	437	589	6.4

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

Between 2007 and 2011 the risk factors associated with salmonellosis, except contact with farm animals, have generally occurred in the same order of importance and to a similar magnitude each year (Figure 39). The most commonly reported risk factors for salmonellosis cases each year were consumption of food from retail premises, contact with farm animals and consumption of untreated water. However, in the past four years there have been increasing trends in the percentage of cases reporting overseas travel during the incubation period and contact with faecal matter.

Figure 39. Percentage of cases by exposure to risk factors associated with salmonellosis and year, 2007–2011



For cases where information on travel was provided, 23.1% (95% CI 19.8-26.6%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all salmonellosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of salmonellosis in 2011. The resultant distribution has a mean of 243 cases (95% CI 202-287).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 18.4% (95% CI 16.9-19.9%).\

Outbreaks reported as caused by *Salmonella* spp.

In 2011, there were 15 *Salmonella* spp. outbreaks reported and eight of these were reported to be foodborne (Table 50). Both hospitalisations due to *Salmonella* spp. were associated with foodborne outbreaks.

Table 50. *Salmonella* spp. foodborne outbreaks reported, 2011

Measure	Foodborne *Salmonella* spp. outbreaks	All *Salmonella* spp. outbreaks
Outbreaks	8	15
Cases	42	77
Hospitalised cases	2	2

The number of foodborne outbreaks associated with *Salmonella* spp. reported between 2002 and 2010 ranged from zero (2004) to 18 (2005) and have generally decreased over time (Figure 40). The total number of cases associated with the outbreaks has also generally decreased over the period with the exception of 2008, which had the second highest number of annual outbreak-associated cases reported in the period.

Figure 40. Foodborne *Salmonella* spp. outbreaks and associated cases reported by year, 2002–2011

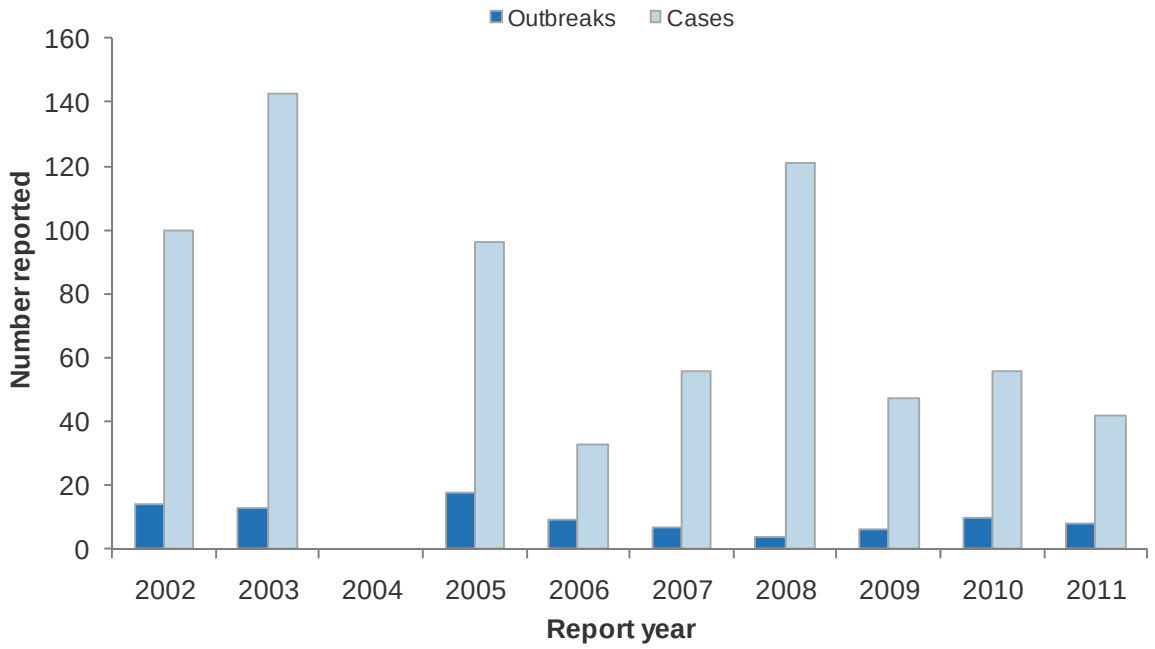


Table 51 contains details of the eight food–associated *Salmonella* spp. outbreaks reported in 2011.

Table 51. Details of food-associated *Salmonella* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Mar	Left over pork bones, mussel shells, loose fish scales and sediment in umu	Other setting	Other setting	8C, 17P
Auckland	Apr	Unknown	Overseas (India)		1C, 3P
Auckland	Apr	Raw fish salad, chop suey, palusmi (taro leaves and corn beef), cooked mussels, roast pig (whole), potato salad	Private home	Private home	2C, 1P
Waikato	Apr	Unknown	Private home	Private home	2C
Waikato	May	Unknown	Overseas (Cambodia)	Overseas manufacturer	1C, 1P
Waikato	Jun	Unknown	Overseas (Samoa)	Overseas manufacturer	1C, 1P
Auckland	Aug	Unknown	Overseas (Fiji)	Overseas manufacturer	1C, 1P
Waikato	Nov	Unknown	Private home	Private home	2C

PHU: Public Health Unit, C: confirmed, P: probable

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2011, samples were submitted relating to two of the foodborne *Salmonella* spp. outbreaks identified in Table 51. *Salmonella* spp. were detected in faecal samples from both outbreaks. *Salmonella* spp. were also detected from food remains (mussel shells, fish scales, pork bones) associated with the March outbreak in Auckland (Table 51).

Salmonella types commonly reported

1. Human isolates

A total of 1 039 cases infected with non-typhoidal *Salmonella* were reported by the ESR Enteric Reference Laboratory during 2011. Of these cases, 495 (49.6%) were *Salmonella* Typhimurium.

Table 52 shows the number of cases by *Salmonella* types reported by the Enteric Reference Laboratory at ESR. The percentages of all *S.* Typhimurium phage types show a decreasing trend between 2008 and 2011 (Figure 41). There has been a noticeable increase in the percentage of cases infected with *S.* Typhimurium phage type RDNC-May 06, with a higher percentage of this type than of *S.* Typhimurium phage type 160 (most commonly reported serotype between 2008 and 2010). *S.* Typhimurium phage type RDNC-May 06 was first confirmed in New Zealand in 2006 and has since become one of the most common serotypes identified each year in New Zealand.

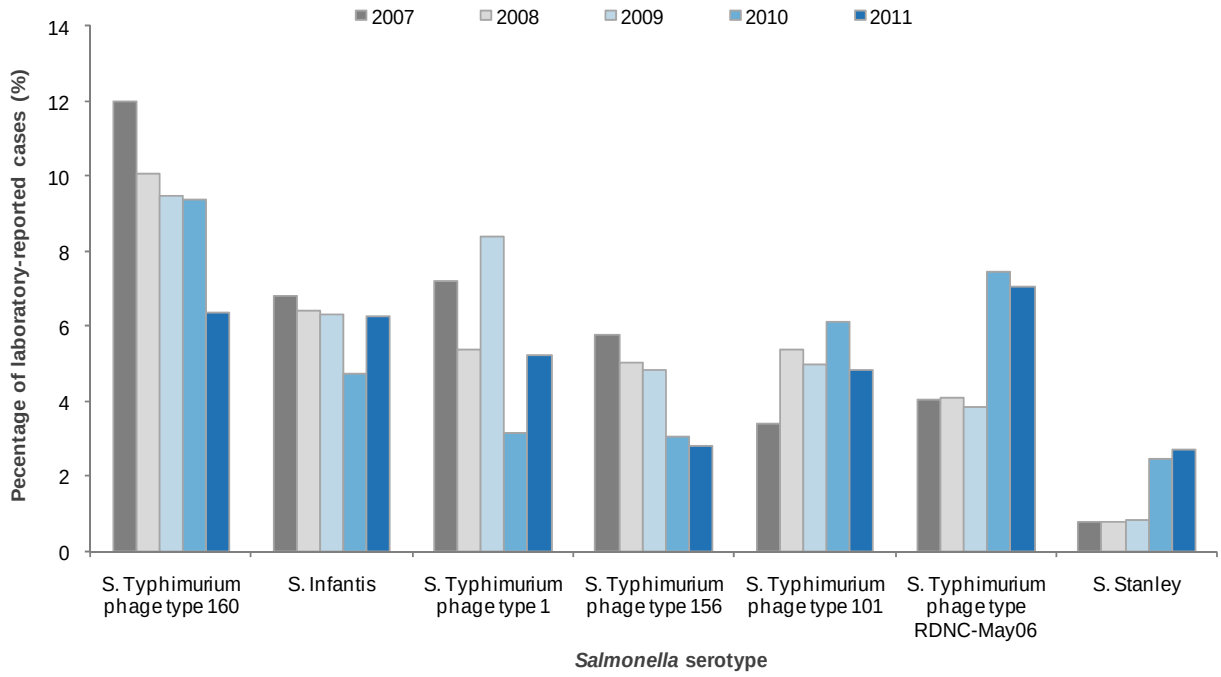
Table 52. *Salmonella* serotypes and subtypes identified by the Enteric Reference Laboratory, 2008–2011

Serotype[a]	2008	2009	2010	2011
***S.* Typhimurium**	**729**	**661**	**594**	**495**
phage type 160	135	106	107	66
phage type 101	72	56	70	50
phage type 1	72	94	36	54
phage type 135	27	20	48	47
phage type 156	67	54	35	29
phage type 42	93	40	26	14
phage type RDNC[b]-May 06	55	43	85	73
Other or unknown phage types	235	268	235	209
***S.* Enteritidis**	**124**	**95**	**113**	**134**
phage type 9a	45	39	49	56
phage type 1b	19	4	5	8
phage type 26	10	2	1	2
Other or unknown phage types	50	50	58	68
Other serotypes	**486**	**366**	**437**	**410**
S. Infantis	86	71	54	65
S. Brandenburg	33	36	47	34
S. Saintpaul	35	26	34	31
S. Stanley	10	9	28	28
S. Agona	10	10	12	20
S. Virchow	14	12	16	18
S. Mississippi	10	14	9	13
Other or unknown serotypes	298	197	265	229
Total	**1 339**	**1 122**	**1 144**	**1 039**

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

[b] RDNC - reacts but does not conform to a known phage type pattern

Figure 41. Percentage of laboratory-reported cases for selected *Salmonella* types by year, 2007–2011



2. Non-human isolates

A total of 1 439 non-human *Salmonella* isolates were typed by the Enteric Reference Laboratory during 2011 (Table 53).

Table 53. *Salmonella* serotypes and subtypes from non-human sources identified by the Enteric Reference Laboratory, 2008-2011

Serotype	2008	2009	2010	2011	Major sources, 2011
S. Typhimurium	**727**	**388**	**574**	**656**	
phage type12a	39	32	84	100	Bovine (95)
phage type101	146	48	88	91	Bovine (85)
phage type RDNC	104	67	80	80	Bovine (37)
phage type 8	64	13	37	73	Bovine (67)
phage type 156	55	31	33	53	Bovine (48)
phage type 1	63	42	57	39	Bovine (35)
phage type 42	37	21	17	29	Bovine (25)
phage type 191	0	0	1	23	Poultry environmental (13)
Other or unknown phage types	219	134	177	168	
Other serotypes	**622**	**500**	**646**	**783**	
S. Brandenburg	92	137	238	203	Environmental (91), bovine (45), ovine (42)
S. Infantis	51	30	34	78	Bovine (28), poultry environmental (19)
S. Agona	26	36	25	77	Meat and bone meal (40)
S. Hindmarsh	34	46	56	65	Ovine (60)
Other or unknown serotypes	419	251	293	360	
Total	**1 349**	**888**	**1 220**	**1 439**	

S. Brandenburg was the most commonly isolated serotype in non-human samples during 2011, with a slight decrease in numbers compared to 2010. Some caution should be exercised with respect to trends in non-human typing data as the basis for sample selection may differ from year to year.

3. Outbreak types

Table 54 shows the number of hospitalised cases and total cases by subtype for the eight foodborne *Salmonella* outbreaks reported during 2011. All outbreaks were associated with unique subtypes. The largest outbreak, due to *S.* Agona, was associated with 34 cases and one hospitalisation from the Auckland region.

Table 54. *Salmonella* subtypes reported in foodborne outbreaks, 2011

Pathogen and subtype	Outbreaks	Hospitalised cases	Total cases
S. Agona	1	1	34
S. Kentucky	1	0	4
S. Typhimurium phage type 23	1	0	3
S. Pensacola	1	0	2
S. Stanley	1	0	2
S. Typhimurium phage type 1	1	0	2
S. Typhimurium phage type 135	1	0	2
S. Weltevreden	1	1	2

Recent surveys

1. Validation of the uncooked comminuted fermented meats (UCFM) standard under commercial conditions

The Food (Uncooked Comminuted Fermented Meat) Standard 2008 (UCFM Standard) came into force in New Zealand on 1 December 2008. The standard applies to all UCFM manufacturers, whether they are operating under the Food Act 1981, the Food Hygiene Regulations 1974 or the Animal Products Act 1999. Products manufactured under the UCFM Standard must meet the *Escherichia coli*, *Salmonella* and coagulase-positive staphylococci microbiological limits of the Australian New Zealand Food Standards Code (the Code) Standard 1.6.1.

Data were obtained from 108 lots of five samples (540 samples tested individually or as 108 pooled samples) [37]. Three lots did not comply with the microbiological limits specified in Standard 1.6.1; one (0.9%) containing *Salmonella* Derby and two (1.9%) with generic *E. coli* counts that exceeded the "m" value of 3.6 MPN g^{-1} in more than 1/5 samples.

Relevant New Zealand studies and publications

1. Journal papers

Information was reviewed from 204 New Zealand outbreaks of non-typhoidal salmonellosis [38]. While foodborne transmission was reported for 63% of outbreaks, only 22 outbreaks had laboratory evidence for a potential source. Seven of these were foodborne, with a diverse array of foods identified.

Faecal samples were collected from lambs at slaughter (n = 105) and sheep at pasture (n = 220) in New Zealand [29]. *Salmonella* spp. were detected in 1.9% of lamb faecal samples and no sheep faecal samples.

Relevant regulatory developments

Nil.

Shigellosis

Summary data for shigellosis in 2011 are given in Table 55.

Table 55. Summary of surveillance data for shigellosis, 2011

Parameter	Value in 2011	Source
Number of cases	101	EpiSurv
Rate (per 100 000)	2.3	EpiSurv
Hospitalisations (%)	28 (27.7%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	76 (75.6%)	EpiSurv
Estimated food-related cases (%)	NA	Expert consultation

NA = not applicable, no information is available on the food attributable proportion of shigellosis in New Zealand

Case definition

Clinical description: Shigellosis presents as gastroenteritis

Laboratory test for diagnosis: Isolation of *Shigella* spp. from a clinical specimen

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Shigellosis cases reported in 2011 by data source

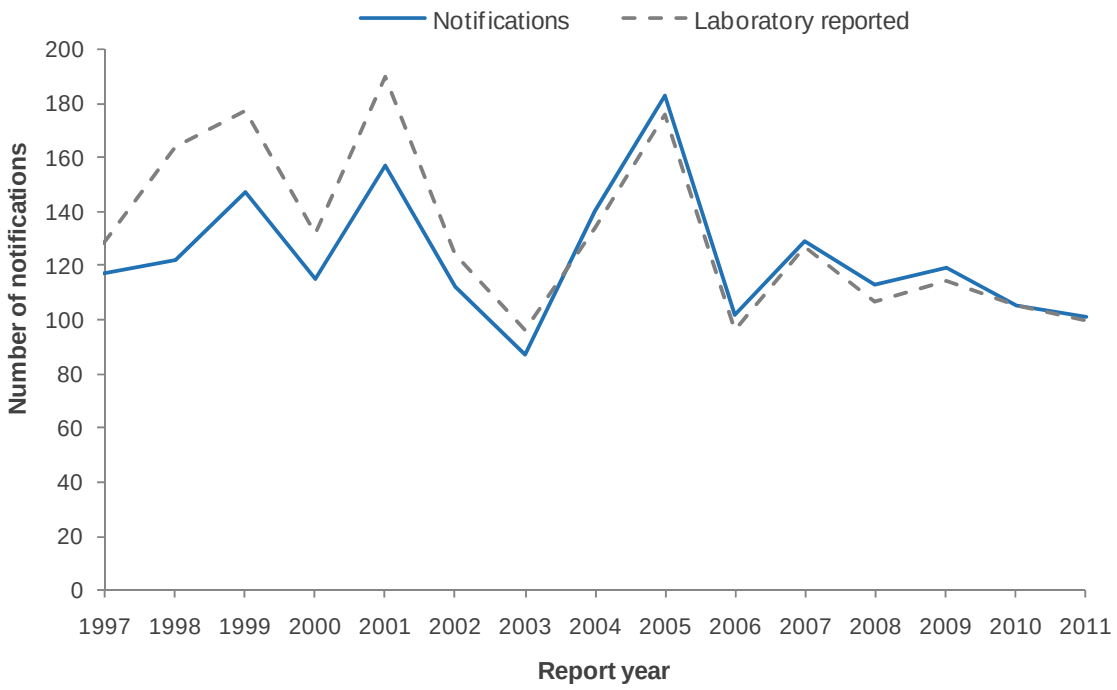
During 2011, 101 notifications (2.3 cases per 100 000 population) of shigellosis and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 100 cases (2.3 per 100 000 population) infected with *Shigella* in 2011.

The ICD-10 code A03 was used to extract shigellosis hospitalisation data from the MoH NMDS database. Of the 28 hospital admissions (0.6 admissions per 100 000 population) recorded in 2011, 22 were reported with shigellosis as the primary diagnosis and six with shigellosis as another relevant diagnosis.

Notifiable disease data

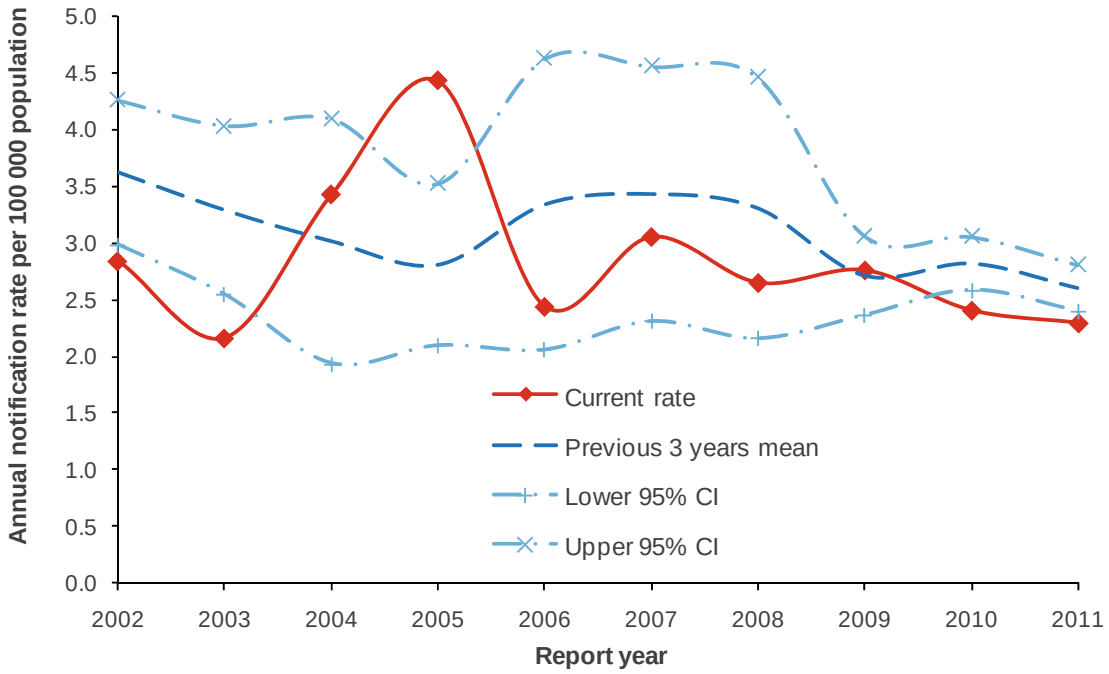
The number of notifications and laboratory reported cases of shigellosis fluctuates from year to year, but there has been a slight decreasing trend since the peak of 183 cases in 2005 (Figure 42).

Figure 42. Shigellosis notifications and laboratory-reported cases by year, 1997–2011



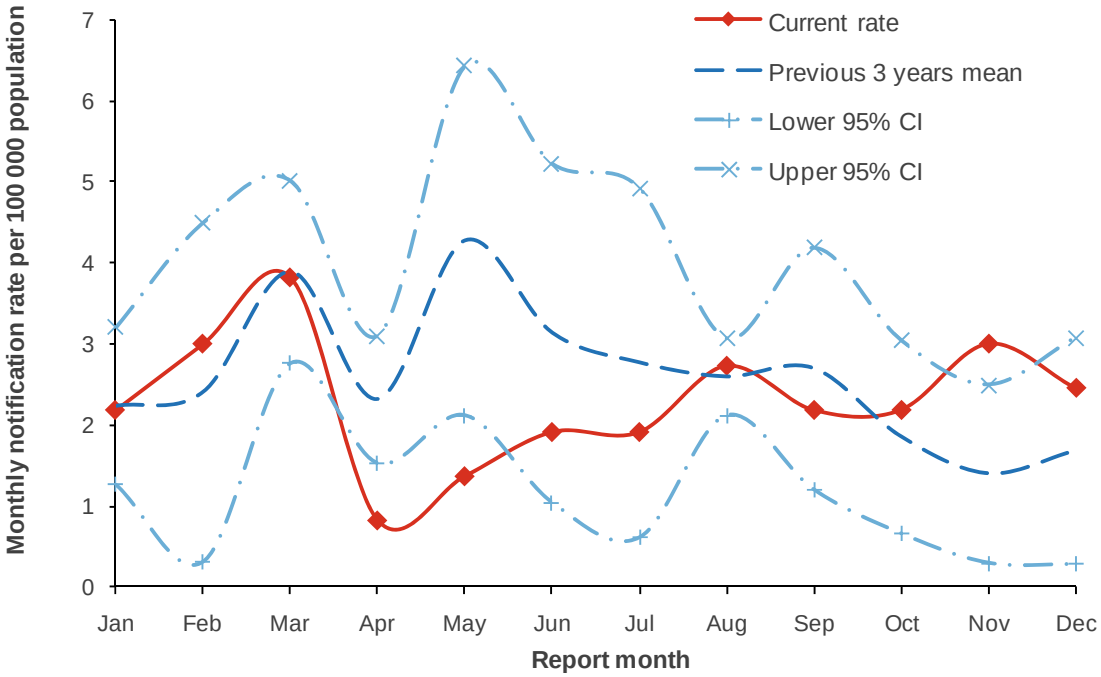
Between 2002 and 2006, the shigellosis annual notification rate ranged between 2.2 per 100 000 population in 2003 and 4.4 per 100 000 in 2005. Since 2007 the annual notification rate has followed a generally decreasing pattern (Figure 43).

Figure 43. Shigellosis notification rate by year, 2002–2011



The number of notified cases of shigellosis per 100 000 population by month for 2011 is shown in Figure 44. In 2011, the shigellosis notification rate was highest in March and lowest in April.

Figure 44. Shigellosis monthly rate (annualised), 2011



In 2011, the numbers and rates of notifications and hospitalisations for shigellosis were similar for males and females (Table 56).

Table 56. Shigellosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	49	2.3	13	0.6
Female	50	2.2	15	0.7
Unknown	2		0	
Total	**101**	**2.3**	**28**	**0.6**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

Age-specific shigellosis notification and hospitalisation rates were highest for those in the 1 to 4 years and the 20 to 29 years age groups. The hospitalisation rates were not defined for any of the other age groups due to the small number of cases (Table 57).

Table 57. Shigellosis cases by age group, 2011

Age group	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	0		1	
1 to 4	17	6.7	5	2.0
5 to 9	9	3.1	4	
10 to 14	3		0	
15 to 19	3		1	
20 to 29	22	3.6	5	0.8
30 to 39	17	3.0	3	
40 to 49	7	1.1	1	
50 to 59	11	2.0	2	
60 to 69	9	2.2	3	
70+	3		3	
Total	**101**	**2.3**	**28**	**0.6**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

The most commonly reported risk factor for shigellosis in 2011 was overseas travel during the incubation period (75.6%), followed by consumption of food from retail premises (48.1%) (Table 58).

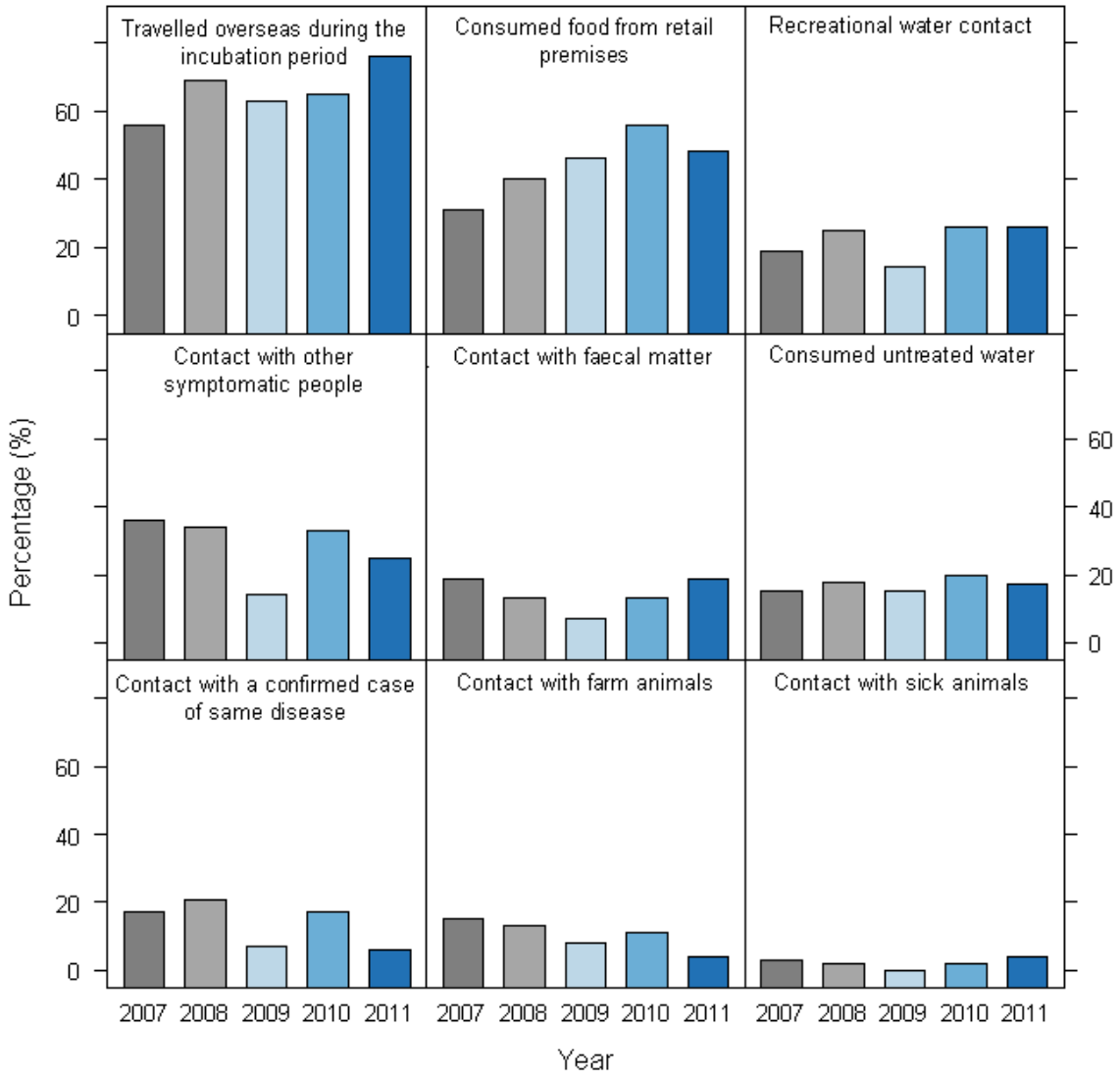
Table 58. Exposure to risk factors associated with shigellosis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Travelled overseas during the incubation period	34	11	56	75.6
Consumed food from retail premises	13	14	74	48.1
Recreational water contact	7	20	74	25.9
Contact with other symptomatic people	6	18	77	25.0
Contact with faecal matter	5	21	75	19.2
Consumed untreated water	4	19	78	17.4
Contact with a confirmed case of same disease	1	16	84	5.9
Contact with farm animals	1	25	75	3.8
Contact with sick animals	1	25	75	3.8

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

Between 2007 and 2011, overseas travel during the incubation period and consumption of food from retail premises were the two most commonly reported risk factors for shigellosis each year, both showing a general increasing trend over the five-year period (Figure 45).

Figure 45. Percentage of cases by exposure to risk factors associated with shigellosis and year, 2007–2011



For cases where information on travel was provided, 75.6% (95% CI 60.5-87.1%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all shigellosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of shigellosis in 2011. The resultant distribution has a mean of 76 cases (95% CI 52-104).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 69.7% (95% CI 63.8-75.2%).

Outbreaks reported as caused by *Shigella* spp.

In 2011, there were 11 *Shigella* spp. outbreaks reported and four of these were reported to be foodborne (Table 59). Three of the five hospitalisations due to *Shigella* spp. were associated with foodborne outbreaks.

Table 59. *Shigella* spp. outbreaks reported, 2011

Measure	Foodborne *Shigella* spp. outbreaks	All *Shigella* spp. outbreaks
Outbreaks	4	11
Cases	27	77
Hospitalised cases	3	5

Foodborne shigellosis outbreaks are rare with not more than two outbreaks being reported each year from 2002 to 2010 (Figure 46). The highest number of outbreaks was reported in 2011 (4 outbreaks, 27 cases).

Figure 46. Foodborne *Shigella* spp. outbreaks and associated cases reported by year, 2002–2011

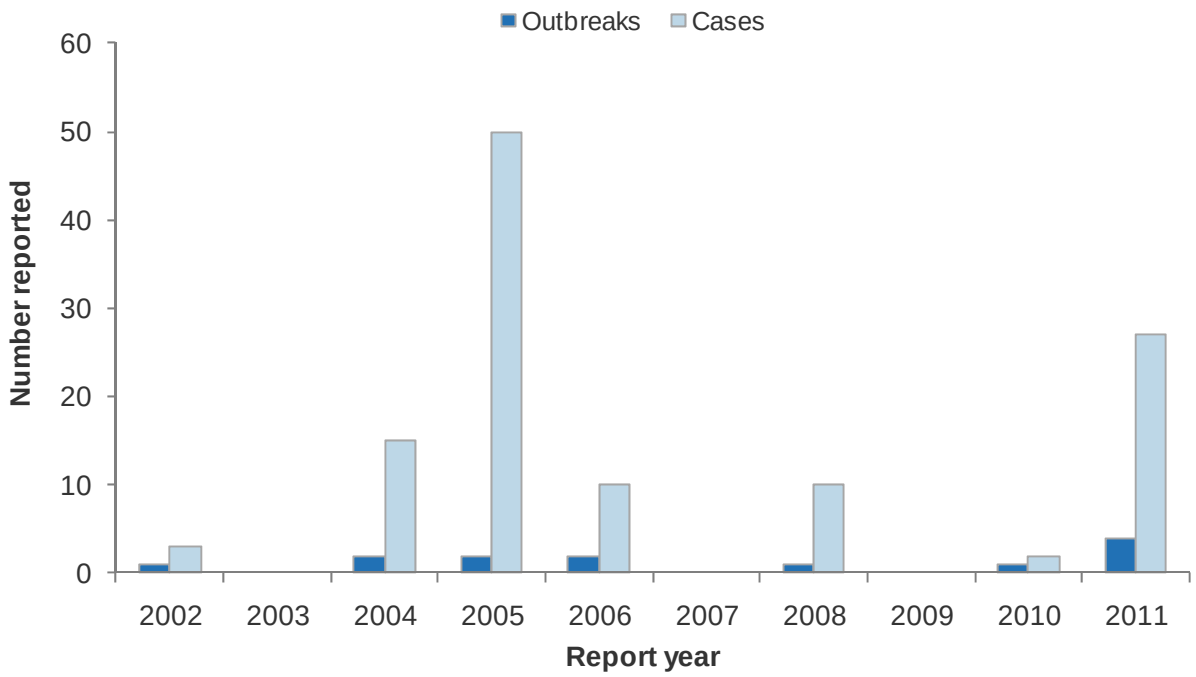


Table 60 contains details of the *Shigella* spp. outbreaks reported in 2011.

Table 60. Details of food-associated *Shigella* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Jan	Unknown	Private home		2C, 4P
Auckland	Feb	Unknown	Private home		2C, 2P
Auckland	Jun	Unknown	Overseas (Tonga)	Overseas manufacturer	2C, 1P
Tauranga	Nov	Black mussels	Overseas (North-West Europe)		6C, 8P

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Shigella* spp. outbreaks.

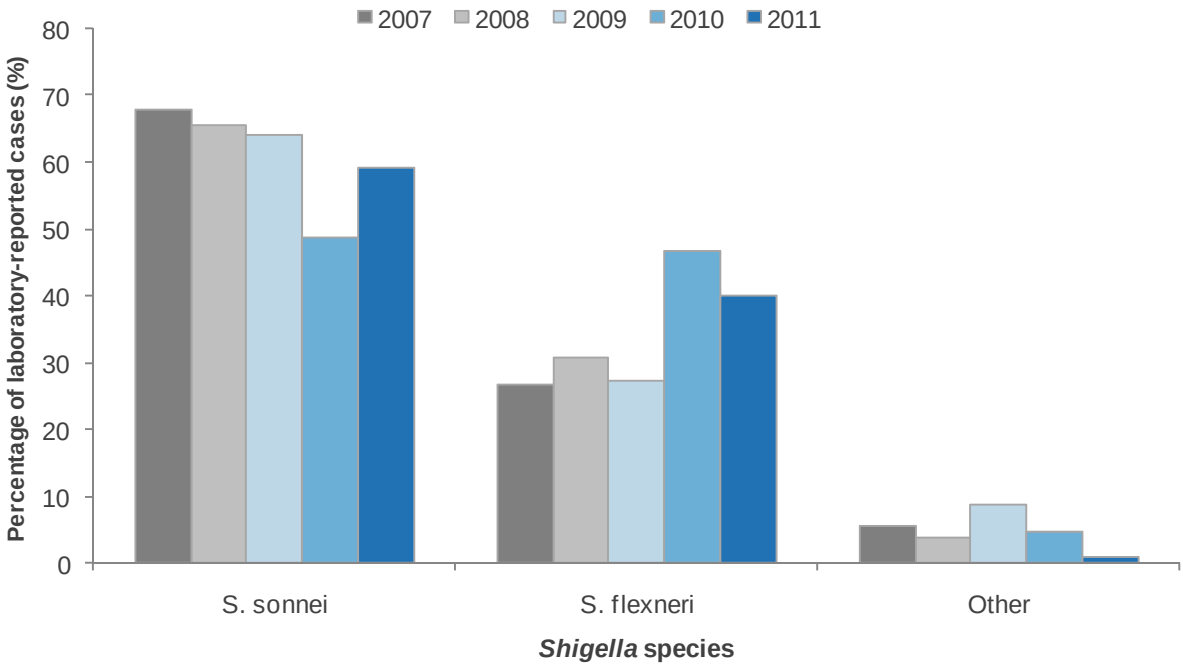
Shigella types commonly reported

There were 100 cases infected with *Shigella* spp. reported by the Enteric Reference Laboratory at ESR in 2011. The species and major serogroups identified in 2011 were distributed as follows: *S. sonnei* biotypes (59 cases, including 38 of biotype a and 20 of biotype g) and *S. flexneri* (40 cases, including 15 of type 2a) (Table 61). There was a decreasing trend in the percentage of cases infected with *S. sonnei* between 2007 and 2010, and an increase in the percentage of *S. flexneri* cases (Figure 47).

Table 61. *Shigella* species and subtypes identified by the Enteric Reference Laboratory, 2008–2011

Species	2008	2009	2010	2011
S. sonnei	**70**	**73**	**51**	**59**
biotype a	28	33	27	38
biotype f	1	4	1	1
biotype g	41	36	23	20
S. flexneri	**33**	**31**	**49**	**40**
2a	12	13	21	15
2b	0	2	10	1
3a	4	6	6	5
6	6	3	4	6
Other	11	7	8	13
Other	**4**	**10**	**5**	**1**
S. boydii	3	8	4	0
S. dysenteriae	0	0	1	1
Shigella species not identified	1	2	0	0
Total	**107**	**114**	**105**	**100**

Figure 47. Percentage of laboratory-reported cases by *Shigella* species and year, 2007–2011



Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Staphylococcus aureus intoxication

Case definition

Clinical description:	Gastroenteritis with sudden severe nausea and vomiting
Laboratory test for diagnosis:	Detection of enterotoxin in faecal or vomit specimen or in leftover food or isolation of ≥10^3/gram coagulase-positive *S. aureus* from faecal or vomit specimen or ≥10^5 from leftover food
Case classification:	
Probable	A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak
Confirmed	A clinically compatible illness that is laboratory confirmed

Staphylococcus aureus intoxication cases reported in 2011 by data source

During 2011, there were three notifications of *S. aureus* intoxication and no resulting deaths reported in EpiSurv.

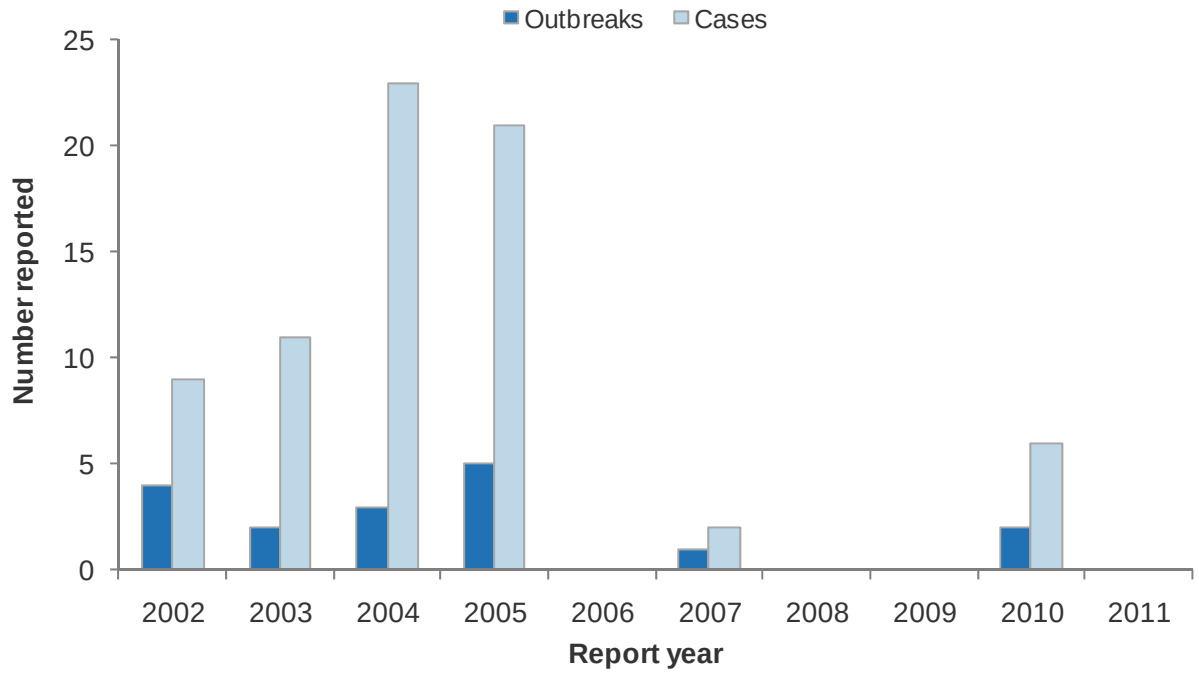
The ICD-10 code A05.0 was used to extract foodborne staphylococcal intoxication hospitalisation data from the MoH NMDS database. All four hospitalisations recorded were reported with foodborne staphylococcal intoxication as the primary diagnosis. It should be noted that EpiSurv and the MoH NMDS database are separate systems and hospital admission can occur without cases being notified.

Outbreaks reported as caused by *Staphylococcus aureus*

No foodborne *S. aureus* outbreaks were reported in 2011.

The number of foodborne outbreaks associated with *S. aureus* reported between 2002 and 2011 ranged from zero to five (Figure 48). No *S. aureus* outbreaks were reported in EpiSurv in four of the last six years, including 2011.

Figure 48. Foodborne *S. aureus* outbreaks and associated cases reported by year, 2002–2011



In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *S. aureus* outbreaks.

Recent surveys

1. Validation of the uncooked comminuted fermented meats (UCFM) standard under commercial conditions

The Food (Uncooked Comminuted Fermented Meat) Standard 2008 (UCFM Standard) came into force in New Zealand on 1 December 2008. The standard applies to all UCFM manufacturers, whether they are operating under the Food Act 1981, the Food Hygiene Regulations 1974 or the Animal Products Act 1999. Products manufactured under the UCFM Standard must meet the *Escherichia coli*, *Salmonella* and coagulase-positive staphylococci microbiological limits of the Australian New Zealand Food Standards Code (the Code) Standard 1.6.1.

Data were obtained from 108 lots of five samples (540 samples tested individually or as 108 pooled samples). Coagulase-positive staphylococci were present at concentrations below "m" for 99.1% of samples. One sample yielded a 2500 CFU g^{-1} count which is below the "M" value of 10,000 CFU g^{-1}.

2. Contamination of Selected Poultry Products

This project determined the concentrations of coagulase-positive staphylococci in mechanically separated meat (MSM). Samples were collected over the period February to mid-August 2010.

A total of 145 MSM samples were collected from three different processing plants. Coagulase-positive staphylococci were countable in 44%, 2% and 36% of the processors' samples. The median counts (5^{th} to 95^{th} percentile) for coagulase-positive staphylococci in MSM at the three processors were ND (ND to 3.52) $\log_{10}$ CFU g^{-1}, ND (ND to 1) $\log_{10}$ CFU g^{-1} and ND (ND to 2.72) $\log_{10}$ CFU g^{-1}.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Toxic shellfish poisoning

Case definition

Due to the diverse nature of toxins that may cause toxic shellfish poisoning, no consistent clinical description is provided for this condition. Depending on the toxin involved, toxic shellfish poisoning may result in various combinations of gastrointestinal, neurosensory, neurocerebellar/neuromotor, general neurological and other symptoms.

Suspected:

Amnesic shellfish poisoning (ASP): Vomiting or diarrhoea occurring within 24 hours of consuming shellfish AND no other probable cause identified by microbiological examination of faecal specimen from the case or microbiological testing of leftover food AND/OR one or more of the neurological symptoms from group C (see below) occurring within 48 hours of consuming shellfish.

Diarrhoeic shellfish poisoning (DSP): Vomiting or diarrhoea occurring within 24 hours of consuming shellfish AND no other probable cause identified by microbiological examination of faecal specimen from the case or microbiological testing of leftover food.

Neurotoxic shellfish poisoning (NSP): Two or more of the neurological symptoms from groups A and B (see below) occurring within 24 hours of consuming shellfish.

Paralytic shellfish poisoning (PSP): Paraesthesia occurring within 12 hours of consuming shellfish AND one of the neurological symptoms from group B (see below).

Toxic shellfish poisoning type unspecified (TSP): Vomiting or diarrhoea occurring within 24 hours of consuming shellfish AND no other probable cause identified by microbiological examination of faecal specimen from the case or microbiological testing of leftover food OR any of the neurological symptoms from groups A and B (see below) occurring within 24 hours of consuming shellfish OR one or more of the neurological signs/symptoms from group C (see below) occurring within 48 hours of consuming shellfish.

Clinical symptoms for assigning status

Group A

- paraesthesia - i.e. numbness or tingling around the mouth, face or extremities
- alteration of temperature sensation

Group B

- weakness such as trouble rising from seat or bed
- difficulty swallowing
- difficulty breathing
- paralysis
- clumsiness
- unsteady walking
- dizziness/vertigo
- slurred/unclear speech
- double vision

Group C

- confusion
- memory loss
- disorientation
- seizure
- coma

Probable:

Meets case definition for suspect case AND detection of relevant biotoxin at or above the regulatory limit in shellfish obtained from near or same site (not leftovers) within seven days of collection of shellfish consumed by case. Current levels are as follows:

ASP: 20 ppm domoic acid/100 g shellfish
DSP: 20 g/100 g or 5 MU/100 g shellfish
(MU = mouse units)
NSP: 20 MU/100 g shellfish
PSP: 80 g/100 g shellfish

Confirmed:

Meets case definition for suspect case AND detection of TSP biotoxin in leftover shellfish at a level resulting in the case consuming a dose likely to cause illness. Current dose levels are as follows:

ASP: 0.05 mg/kg body weight
DSP: ingestion of 48 µg or 12 MU
NSP: 0.3 MU/kg body weight
PSP: 10 MU/kg body weight (≅ 2µg/kg body weight)

Toxic shellfish poisoning cases reported in 2011

During 2011, three notifications of toxic shellfish poisoning and no resulting deaths were reported in EpiSurv. The poisoning occurred after the consumption of tuatuas collected from Papamoa Beach for two of the cases. The third case had purchased and consumed mussel fritters from a food premise in Auckland. The three cases were separately classified as diarrhoeic shellfish poisoning, neurologic shellfish poisoning and paralytic shellfish poisoning.

The ICD-10 code T61.2 was used to extract hospitalisation data for ‘other fish and shellfish poisoning’ from the MoH NMDS database. Of the 15 hospital admissions reported in 2011, 14 were reported with ‘other fish and shellfish poisoning’ as the primary diagnosis and one with this condition as another relevant diagnosis. Note that this ICD-10 code includes shellfish and other fish. It should be noted that EpiSurv and the MoH NMDS database are separate systems and hospital admission can occur without cases being notified.

Outbreaks reported as caused by toxic shellfish poisoning

No outbreaks due to TSP were reported in 2011.

In 2011, no food or clinical samples were submitted to ESR’s Public Health Laboratory relating to food-associated toxic shellfish poisoning outbreaks.

VTEC/STEC infection

Summary data for VTEC/STEC infection in 2011 are given in Table 62.

Table 62. Summary of surveillance data for VTEC/STEC infection, 2011

Parameter	Value in 2011	Source
Number of cases	154	EpiSurv
Rate (per 100 000)	3.5	EpiSurv
Hospitalisations (%)	18 (11.7%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	5 (3.4%)	EpiSurv
Estimated food-related cases (%)*	59 (39.6%)	Expert consultation

* For estimation of food-related cases it was assumed that the proportions derived from expert consultation would exclude travel-related cases

Case definition

Clinical description: An illness of variable severity characterised by diarrhoea (often bloody) and abdominal cramps. Illness may be complicated by haemolytic uraemic syndrome (HUS), or thrombotic thrombocytopaenic purpura (TTP)

Laboratory test for diagnosis: Isolation of Shiga toxin (verotoxin) producing *Escherichia coli* OR detection of the genes associated with the production of Shiga toxin in *E. coli*

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

VTEC/STEC infection cases reported in 2011 by data source

During 2011, 154 notifications (3.5 cases per 100 000 population) of VTEC/STEC infection and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 153 cases (3.2 per 100 000) infected with VTEC/STEC in 2011.

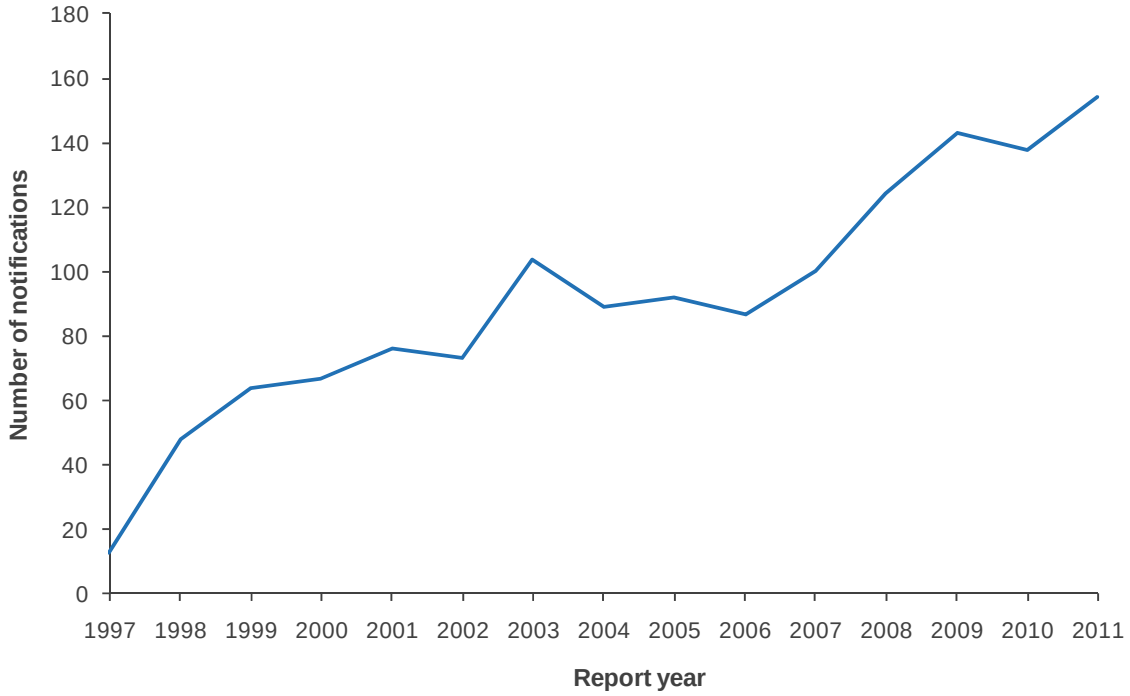
The ICD-10 code A043 was used to extract enterohaemorrhagic *E. coli* infection hospitalisation data from the MoH NMDS database. Of the 18 hospital admissions (0.5 admissions per 100 000 population) recorded in 2011, 12 were reported with enterohaemorrhagic *E. coli* infection as the primary diagnosis and six with this condition as another relevant diagnosis.

It has been estimated by expert consultation that 39.6% (minimum = 27.0%, maximum = 51.4%) of VTEC/STEC incidence is due to foodborne transmission. The expert consultation also estimated that approximately 30% of foodborne VTEC/STEC transmission was due to red meat of which two-thirds was considered to be due to consumption of uncooked, fermented, comminuted meat.

Notifiable disease data

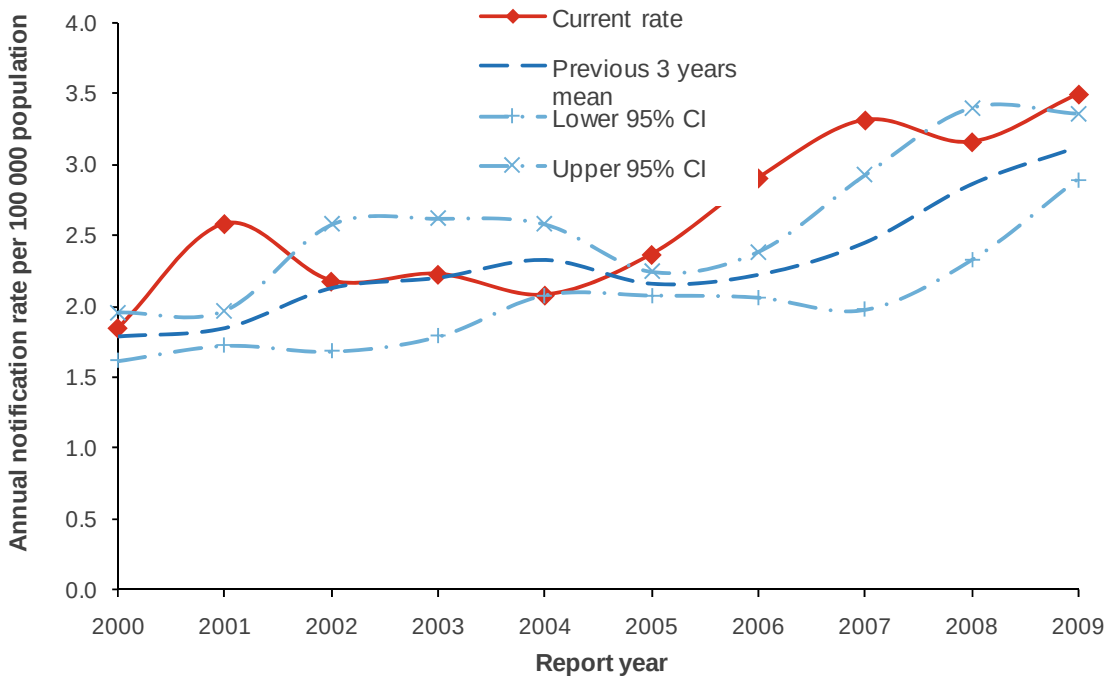
There has been a general increase in the notifications of VTEC/STEC infection since 1997, with the highest number of notifications in 2011 (154 cases) (Figure 49).

Figure 49. VTEC/STEC infection notifications by year, 1997–2011



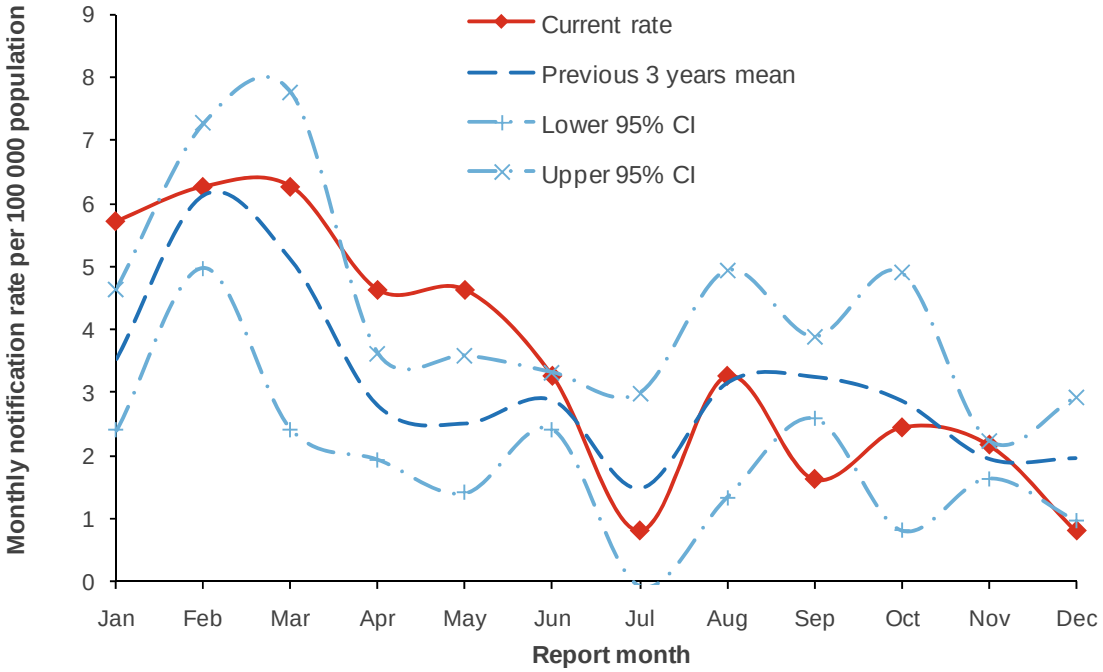
The VTEC/STEC infection annual rate trend (Figure 50) was very similar to the corresponding annual notification trend, showing a gradual increasing trend with a peak in 2003 The highest notification rate was in 2011 (3.5 per 100 000 population).

Figure 50. VTEC/STEC infection notification rate by year, 2002–2011



The number of notified cases of VTEC/STEC infection per 100 000 population by month for 2011 are shown in Figure 51. The 2011 monthly notification rate trend was similar to the trend in previous years showing a peak in late summer and a winter trough.

Figure 51. VTEC/STEC infection monthly rate (annualised), 2011



Rates of VTEC/STEC infection varied throughout the country as illustrated in Figure 52. In 2011, the highest rates of VTEC/STEC infection were in Waikato and Taranaki DHBs. Northland, Waikato, Lakes, Bay of Plenty, Tairawhiti and Taranaki DHBs had high notification rates between 2008 and 2011. Note that rates were not calculated for nine DHBs where there were insufficient (less than 5) cases notified in 2011.

In 2011, the sex-specific notification and hospitalisation rates were higher in females than in males (Table 63).

Table 63. VTEC/STEC infection cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	68	3.1	7	0.3
Female	85	3.8	11	0.5
Unknown	1		0	
Total	**154**	**3.5**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population

In 2011, the age specific VTEC/STEC infection notification rates were highest in the 1 to 4 years age group (23.8 per 100 000 population, 60 cases), followed by the less than 1 year age group (14.4 per 100 000, 9 cases). The 70 years and over age group had the highest number of hospitalisations (5 cases) (Table 64).

Figure 52. Geographic distribution of VTEC/STEC infection notifications, 2008–2011

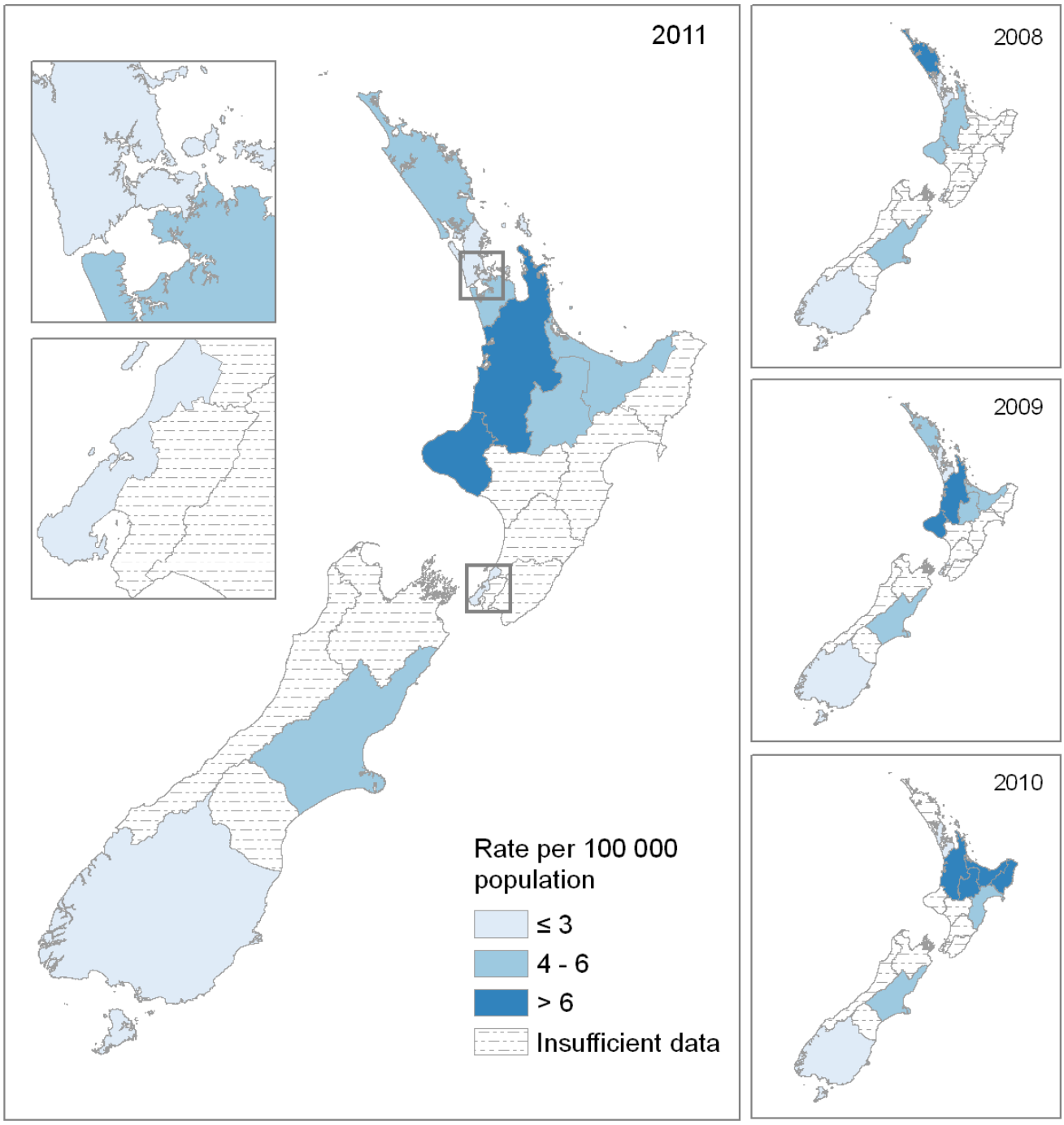


Table 64. VTEC/STEC infection cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	9	14.4	0	
1 to 4	60	23.8	3	
5 to 9	13	4.5	1	
10 to 14	10	3.4	0	
15 to 19	5	1.6	1	
20 to 29	14	2.3	3	
30 to 39	11	2.0	1	
40 to 49	8	1.3	2	
50 to 59	2		0	
60 to 69	7	1.7	2	
70+	15	3.7	5	1.2
Total	**154**	**3.5**	**18**	**0.4**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

In 2011, the most commonly reported risk factors for VTEC/STEC infection were contact with household pets (92.1%), consumption of raw fruit/vegetables (85.5%), consumption of dairy products (79.8%), and consumption of beef products (75.4%) (Table 65).

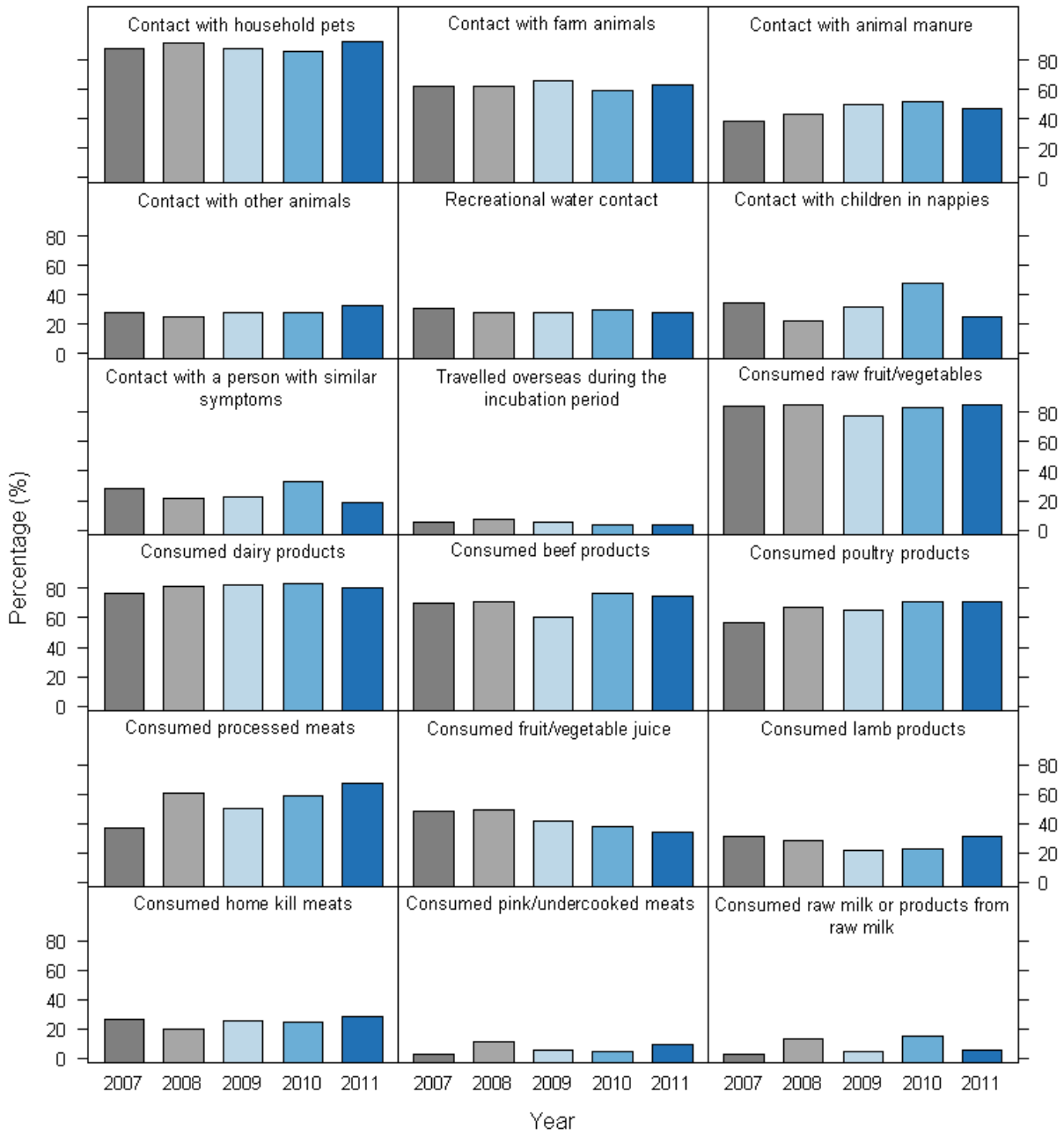
Table 65. Exposure to risk factors associated with VTEC/STEC infection, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Contact with household pets	70	6	78	92.1
Consumed raw fruit/vegetables	94	16	44	85.5
Consumed dairy products	91	23	40	79.8
Consumed beef products	86	28	40	75.4
Consumed poultry products	79	33	42	70.5
Consumed processed meats	75	37	42	67.0
Contact with farm animals	45	27	82	62.5
Contact with animal manure	27	30	97	47.4
Consumed fruit/vegetables juice	35	67	52	34.3
Contact with other animals	19	39	96	32.8
Consumed lamb products	32	70	52	31.4
Consumed home killed meats	31	77	46	28.7
Recreational water contact	32	82	40	28.1
Contact with children in nappies	27	79	48	25.5
Contact with persons with similar symptoms	21	92	41	18.6
Consumed pink or undercooked meats	9	90	55	9.1
Consumed raw milk or products from raw milk	7	104	43	6.3
Travelled overseas during the incubation period	4	115	35	3.4

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

Between 2007 and 2011, the risk factors associated with VTEC/STEC infection generally occurred in the same order of importance and to the similar magnitude (Figure 53). The most commonly reported risk factors excluding food consumption were contact with household pets and contact with farm animals. The foods with the highest percentage of consumption by cases were poultry products, processed meats and fruit/vegetable juice.

Figure 53. Percentage of cases by exposure to risk factors associated with VTEC/STEC infection and year, 2007–2011



For cases where information on travel was provided, 3.4% (95% CI 0.9-8.4%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all VTEC/STEC infection cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of VTEC/STEC infection in 2011. The resultant distribution has a mean of 5 cases (95% CI 1-12).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 4.4% (95% CI 2.6-6.9%).

Outbreaks reported as caused by VTEC/STEC

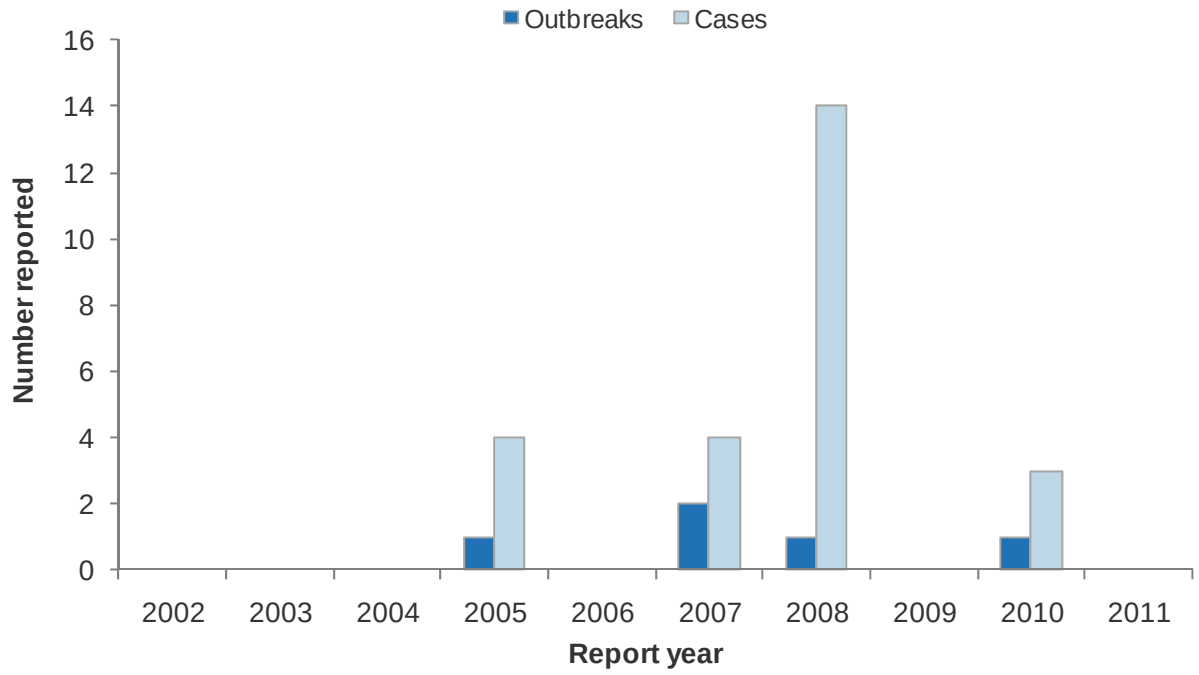
No foodborne outbreak due to VTEC/STEC was reported in 2011 (Table 66).

Table 66. VTEC/STEC outbreaks reported, 2011

Measure	Foodborne VTEC/STEC outbreaks	All VTEC/STEC outbreaks
Outbreaks	0	2
Cases	0	7
Hospitalised cases	0	1

Over the 10-year period from 2002 to 2011 no more than two foodborne outbreaks of VTEC/STEC were reported each year with no outbreaks reported for six of the years (Figure 54). With the exception of an outbreak in 2008 with 14 associated cases, no outbreak in this period had more than four associated cases.

Figure 54. Foodborne VTEC/STEC outbreaks and associated cases reported by year, 2002–2011



In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated VTEC/STEC outbreaks.

VTEC/STEC types commonly reported

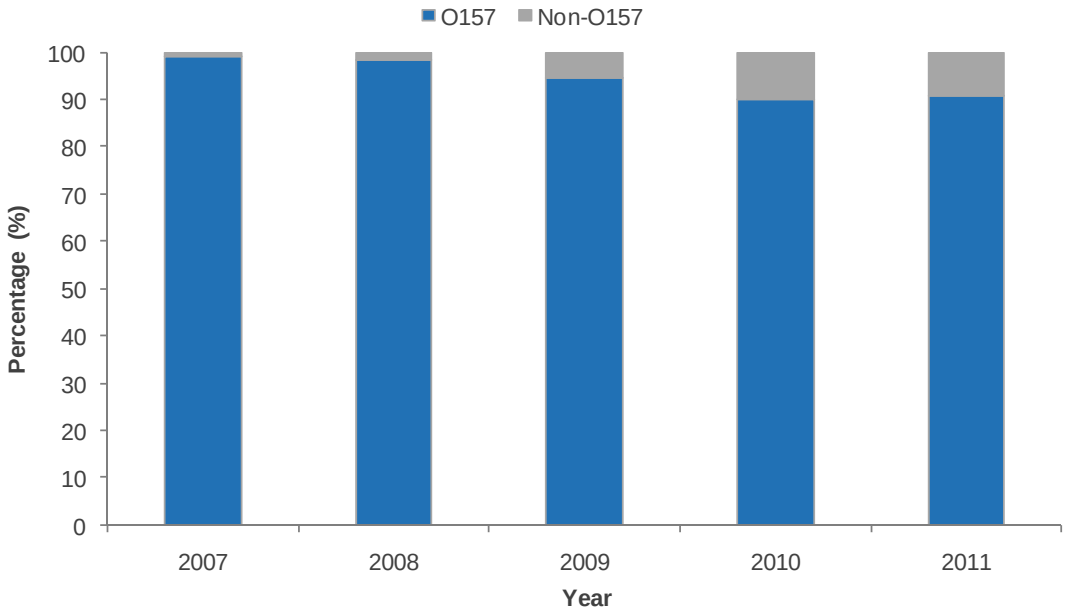
A total of 153 cases infected with VTEC/STEC were reported by the ESR Enteric Reference Laboratory in 2011. Of these, 139 (90.8%) were identified as *E. coli* O157:H7, and 14 as non-O157:H7. Of the 14 non-O157:H7, two were typed as O128:H2 and a further two as O84:H2, while the remaining 10 serotypes were all unique (Table 67). Between 2007 and 2011, there has been an increasing percentage of cases infected with non-O157 VTEC/STEC (Figure 55).

Table 67. VTEC/STEC subtypes identified by the Enteric Reference Laboratory, 2008–2011

Serotype	2008	2009	2010	2011
O157	**120**	**137**	**115**	**139**
O157:H7	120	137	115	139
Non-O157	**2**	**8**	**13**	**14**
O128:H2			1	2
O84:H2			1	2
O176:HNM	1		2	1
ONT:HNM		3		
Other types[a]	1	5	9	9
Total	**122**	**145**	**128**	**153**

[a] Single cases following types were identified
2008: O130:H11
2009: O22:H16, O103:H25, O174:H21, O26:H11, O103:H2
2010: ONT:H21, ONT:H23, ORough:HNT, ORough:H7, O77:HNM, O123:H8, ONT:HRough, O68:HNM, ONT:H2
2011: O103:H2, O123:HNM, O131:HRough, O146:H21, O178:H23, O26:H11, O84:HNM, ONT:H2, ORough:H2

Figure 55. Percentage of *E.coli* O157 and non-O157 laboratory-reported cases by year, 2007–2011



Most human isolates of O157:H7 are further genotyped by pulsed-field gel electrophoresis (PFGE). Table 68 summarises PFGE typing of human O157:H7 isolates for 2008-2011.

Table 68. PFGE genotypes of human *E. coli* O157:H7 isolates, 2008-2011

Genotype	Number of isolates			
	2008	2009	2010	2011
Xb0040	9	33	29	41
Xb0049	6	10	25	16
Xb0168	12	8	8	11
Xb0014	0	3	1	5
Xb0040a	0	6	7	4
Xb0040g	1	2	2	4
Xb0048	1	1	1	4
Xb0138	1	0	0	3
Xb0105	1	0	0	3
Xb0202	0	0	1	3
Other types	45	74	41	44
Total	**76**	**137**	**115**	**138**

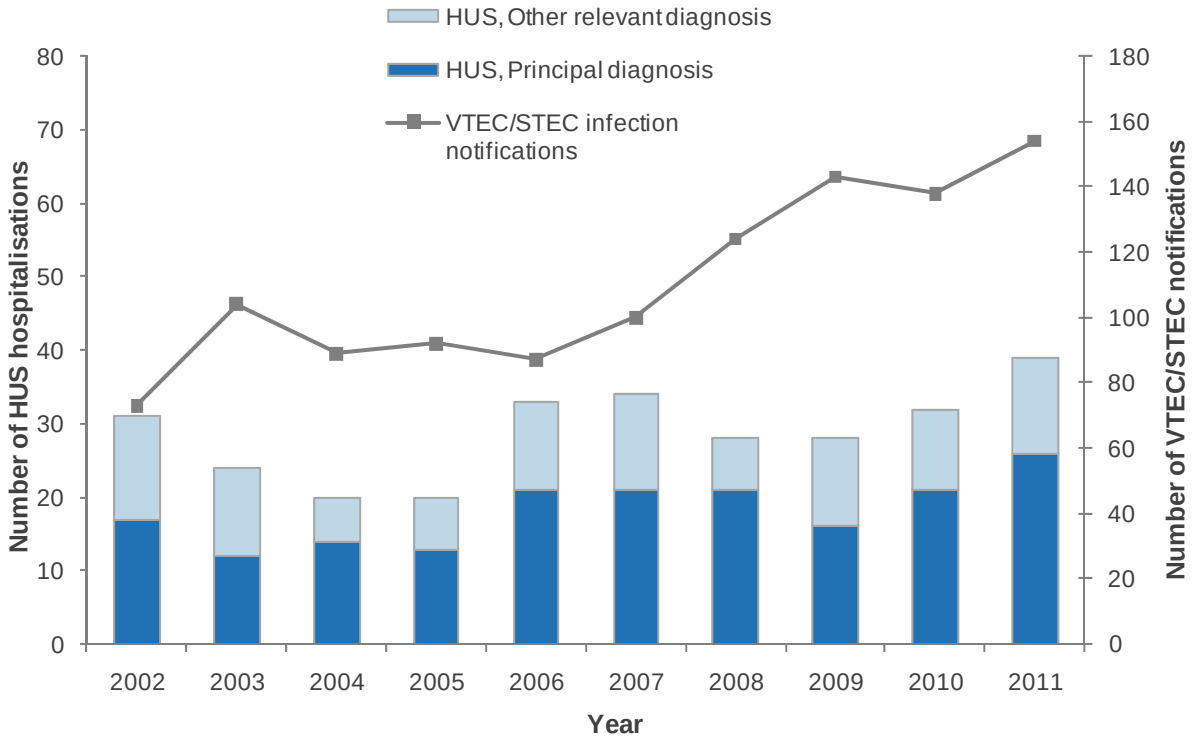
Disease sequelae - haemolytic-uraemic syndrome (HUS)

HUS is a serious sequela of a VTEC/STEC infection.

The ICD-10 code D59.3 was used to extract HUS hospitalisation data from the MoH NMDS database. There were 39 hospitalisations recorded in 2011 (0.9 per 100 000 population), 26 were reported with HUS as the primary diagnosis and 13 with HUS as another relevant diagnosis.

Between 2002 and 2011, the number of hospitalisations (any diagnosis code) for HUS ranged from 20 to 39 (Figure 56). There is little evidence for a correlation between VTEC/STEC notifications and HUS hospitalisations although there has been an increasing trend in both notifications and hospitalisations in the past three years.

Figure 56. HUS hospitalisations, 2002–2011



In 2011, the number of hospitalisations due to HUS was higher for females than males (Table 69).

Table 69. HUS hospitalisations by sex, 2011

Sex	Hospitalisations[a]	
	No.	Rate[b]
Male	16	0.7
Female	23	1.0
Total	39	0.9

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

In 2011, the highest age-specific rate of hospitalisation due to HUS was in the less than 5 years age group (Table 70).

Table 70. HUS hospitalisations by age group, 2011

Age group (years)	Hospitalisations[a]	
	No.	Rate[b]
<5	14	4.5
5 to 9	4	
10 to 14	2	
15 to 19	1	
20 to 29	3	
30 to 39	3	
40 to 49	3	
50 to 59	5	0.9
60 to 69	2	
70+	2	
Total	**39**	**0.9**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

Haemolytic uraemic syndrome cases reported to the New Zealand Paediatric Surveillance Unit (NZPSU)

During 2011, 15 cases of HUS were reported to the NZPSU, of which 13 had a diarrhoeal prodome. The median age at presentation of cases was 2.8 years (range 1.5 to 14 years). Six cases had *E. coli* O157:H7 isolated from their stools.

Note: the details given above are from an advance excerpt from the NZPSU Annual Report, which had not been published at the time of finalisation of the current report. The source reference provided here is to the website where NZPSU Annual Reports are published:

http://dnmeds.otago.ac.nz/departments/womens/paediatrics/research/nzpsu/annual_rpts.html

Recent surveys

1. Validation of the uncooked comminuted fermented meats (UCFM) standard under commercial conditions

The Food (Uncooked Comminuted Fermented Meat) Standard 2008 (UCFM Standard) came into force in New Zealand on 1 December 2008. The standard applies to all UCFM manufacturers, whether they are operating under the Food Act 1981, the Food Hygiene Regulations 1984 or the Animal Products Act 1999.

This study describes the results of a microbiological survey to determine compliance with *Escherichia coli*, *Salmonella* and coagulase-positive staphylococci microbiological limits as specified in the Code [37]. In addition, testing was performed to determine whether samples contained *Listeria monocytogenes* and Shiga toxin-producing *Escherichia coli* (STEC) and, where present, to estimate the concentration of *L. monocytogenes*.

Data were obtained from 108 lots of five samples (540 samples tested individually or as 108 pooled samples). All samples were negative for the presence of shiga-toxin genes *stx*1 and *stx*2 by multiplex-PCR, indicating that viable STEC carrying either of these genes were not present in the enrichment cultures of the UCFM samples.

2. PFGE analysis of meat isolates of *E. coli* O157:H7 in New Zealand

In responses to US initiatives to further control *E. coli* O157:H7 in the US beef supply, MAF and the New Zealand industry agreed in January 2008 to molecular genotype (PFGE) all *E. coli* O157:H7 isolates detected under the New Zealand monitoring programme and provide a summary to US agencies on a regular basis. A total of 63 isolates collected during 2010 were genotyped, with all of PFGE patterns from New Zealand meat isolates found to be distinguishable from 2009-2011 US genotypes [39].

Relevant New Zealand studies and publications

1. Journal papers

Faecal samples were collected from lambs at slaughter (n = 105) and sheep at pasture (n = 220) in New Zealand [29]. STEC were detected in 3.8% of lamb faecal samples and 0.9% of sheep faecal samples.

Relevant regulatory developments

Nil.

Yersiniosis

Summary data for yersiniosis in 2011 are given in Table 71.

Table 71 Summary of surveillance data for yersiniosis, 2011

Parameter	Value in 2011	Source
Number of cases	514	EpiSurv
Rate (per 100 000)	11.7	EpiSurv
Hospitalisations (%)	39 (7.6%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	34 (6.6%)	EpiSurv
Estimated food-related cases (%)*	270 (56.2%)	Expert consultation

* For estimation of food-related cases it was assumed that the proportions derived from expert consultation would exclude travel-related cases

Case definition

Clinical description: An acute illness with diarrhoea, fever and abdominal pain. Mesenteric adenitis may occur and complications include arthritis and systemic infection

Laboratory test for diagnosis: Isolation of *Yersinia enterocolitica* or *Y. pseudotuberculosis* from blood or faeces OR detection of circulating antigen by ELISA or agglutination test

Case classification:

Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease, or has had contact with the same common source i.e., is part of an identified common source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Yersiniosis cases reported in 2011 by data source

During 2011, 514 notifications (11.7 cases per 100 000 population) of yersiniosis and no resulting deaths were reported in EpiSurv.

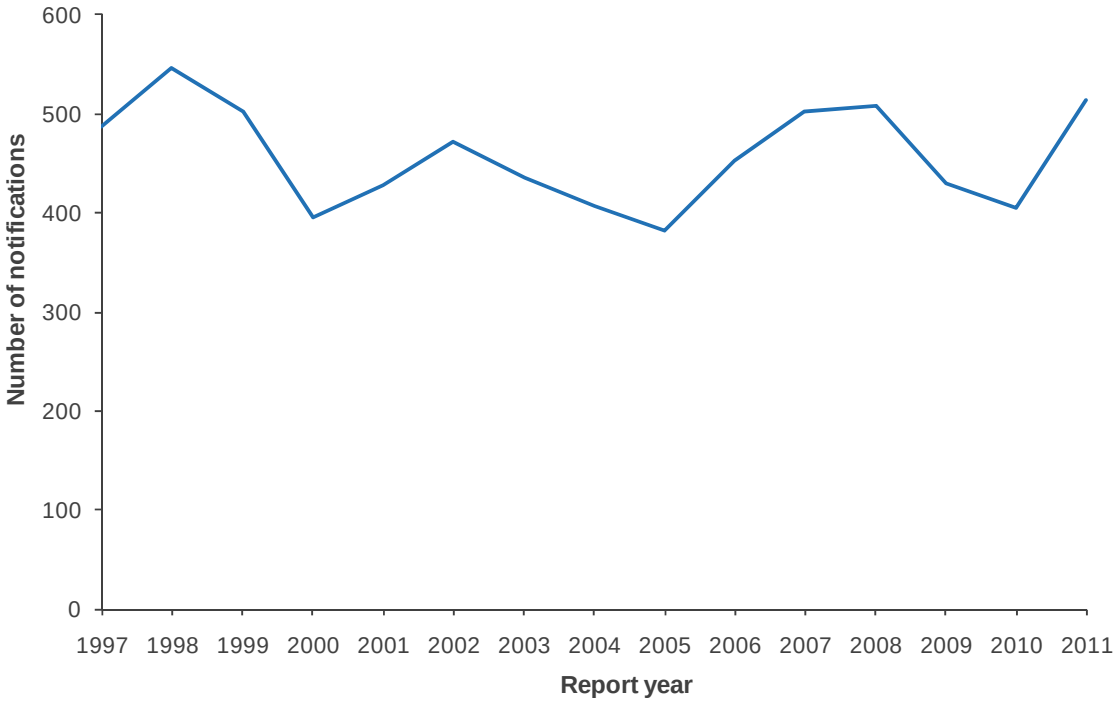
The ICD-10 code A04.6 was used to extract yersiniosis hospitalisation data from the MoH NMDS database. Of the 39 hospital admissions (0.9 admissions per 100 000 population) recorded in 2011, 16 were reported with yersiniosis as the primary diagnosis and 23 with yersiniosis as another relevant diagnosis.

It has been estimated by expert consultation that 56.2% (minimum = 41.5%, maximum = 70.8%) of yersiniosis incidence is due to foodborne transmission. Approximately 50% of foodborne transmission was estimated to be due to consumption of pork.

Notifiable disease data

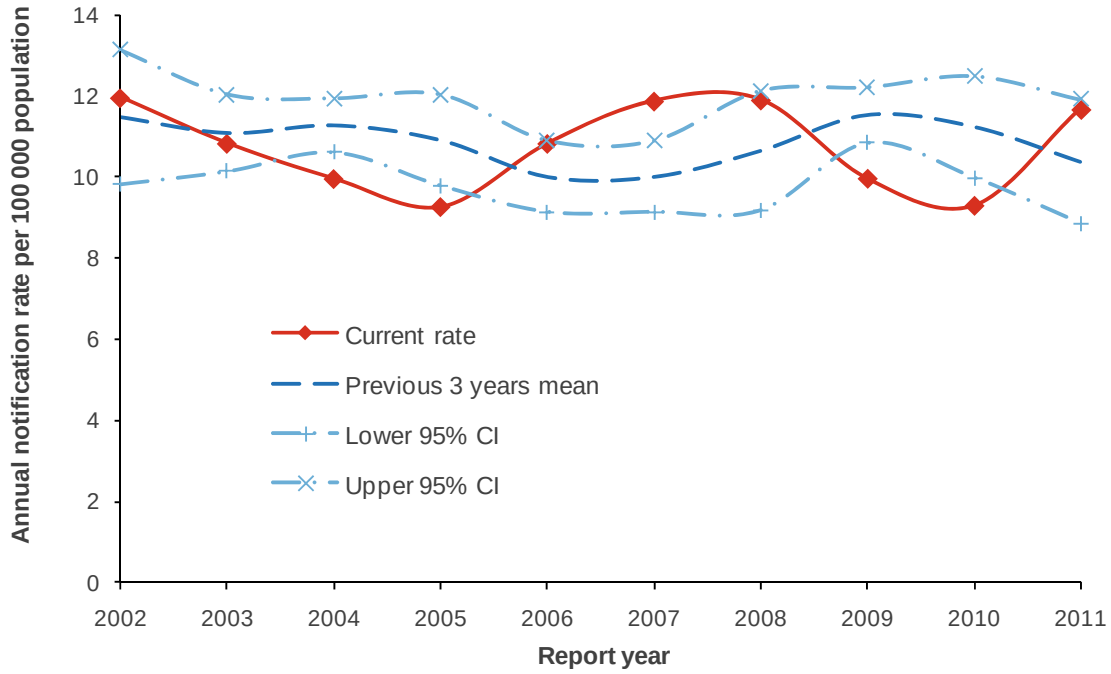
Yersiniosis became notifiable in 1996, with the highest number of notifications reported in 1998 (546 cases). Since 1998, the annual number of notifications has fluctuated slightly across the years between 383 notifications (2005) and 514 notifications (2011) (Figure 57).

Figure 57. Yersiniosis notifications by year, 1997–2011



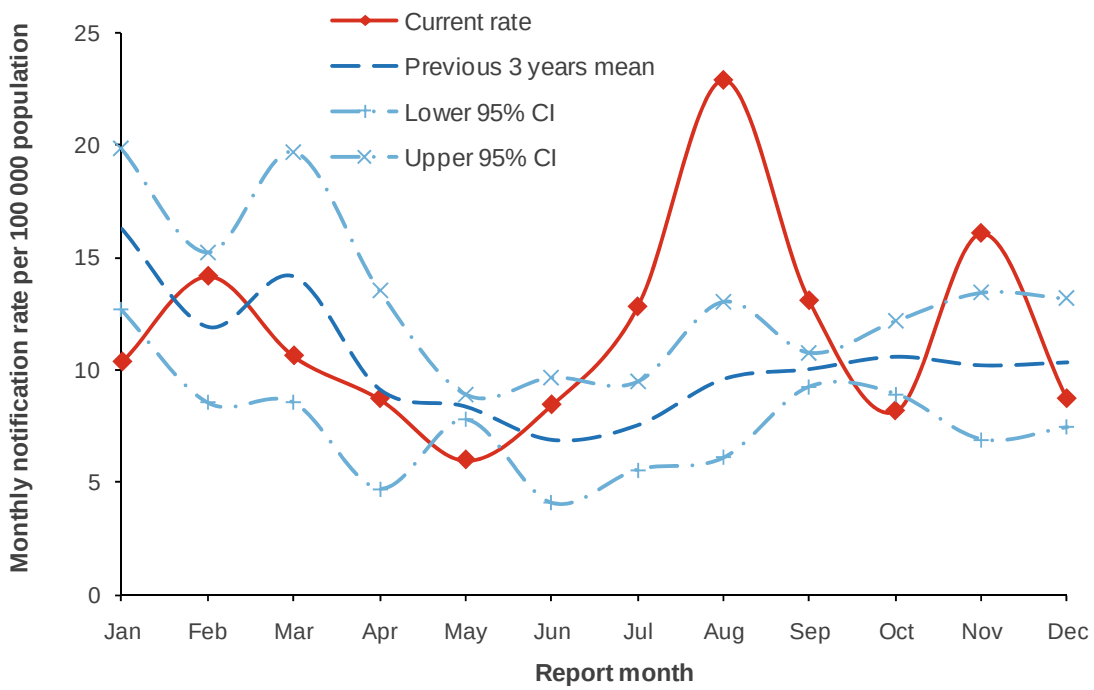
The yersiniosis annual notification rate has remained fairly stable between 2002 and 2011 (ranging from 9.3 to 12.0 per 100 000) (Figure 58).

Figure 58. Yersiniosis notification rate by year, 2002–2011



The number of notified cases of yersiniosis per 100 000 population by month for 2011 is shown in Figure 59. The 2011 notification rate trend differed from the seasonal historic mean rate trend present in previous years, showing peaks in August, November and February.

Figure 59. Yersiniosis monthly rate (annualised), 2011



Yersiniosis notification rates vary throughout New Zealand as illustrated in Figure 60. In 2011, the highest rates were in Waikato (22.8 per 100 000 population, 84 cases) and West Coast (18.2 per 100 000, 6 cases) DHBs. Hutt Valley, Capital and Coast, and West Coast DHBs have been in the highest quantile of yersiniosis notification rates for each of the last four years.

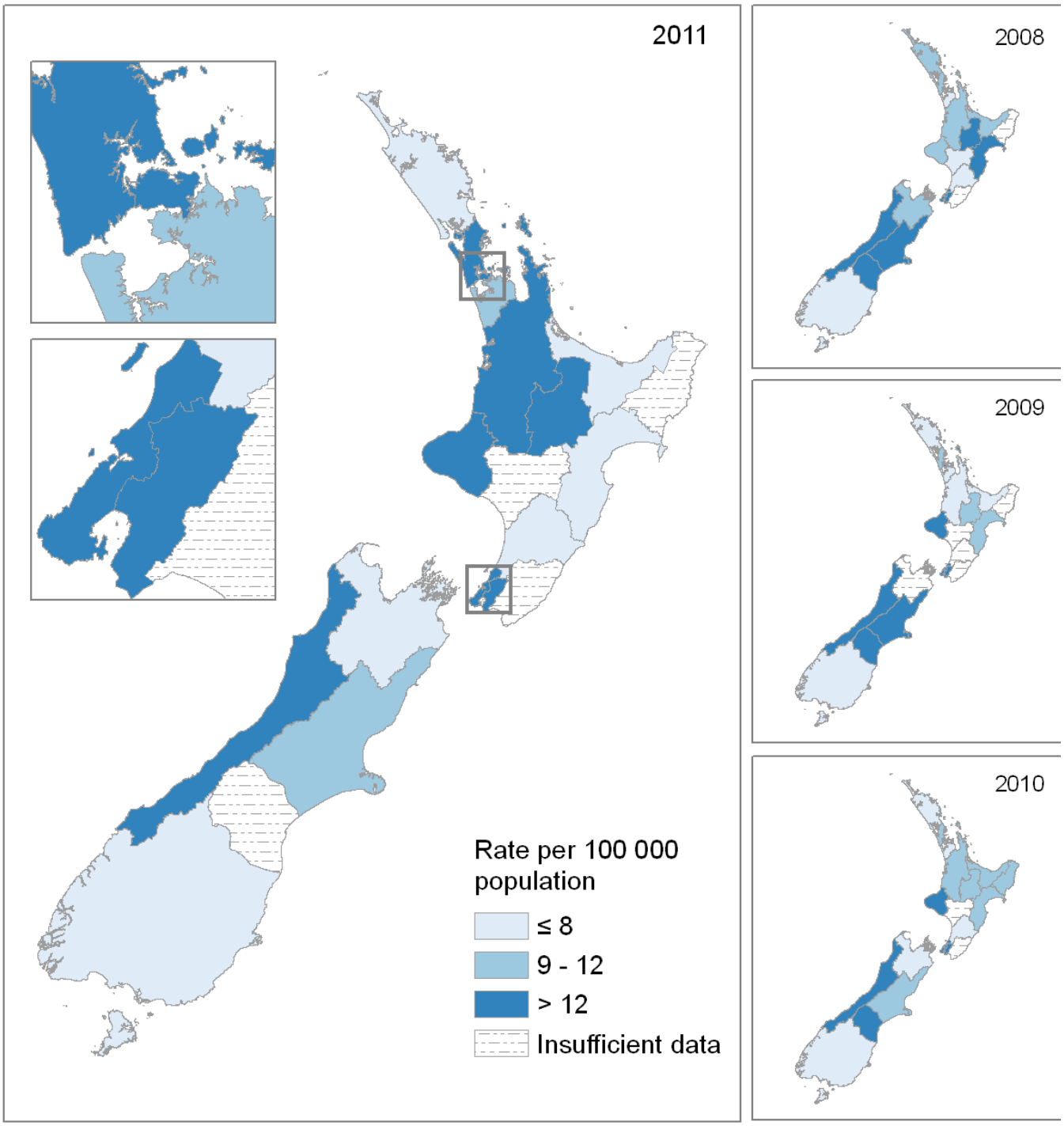
The yersiniosis notification rate was slightly higher for males (12.1 per 100 000 population, 261 cases) than for females (11.1 per 100 000, 248 cases) in 2011. However, the hospitalisation rate was slightly higher for females compared to males (Table 72).

Table 72. Yersiniosis cases by sex, 2011

Sex	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
Male	261	12.1	16	0.7
Female	248	11.1	23	1.0
Unknown	5		0	
Total	**514**	**11.7**	**39**	**0.9**

[a] MoH morbidity data for hospital admissions
[b] per 100 000 of population

Figure 60. Geographic distribution of yersiniosis notifications, 2008–2011



In 2011, the highest age-specific yersiniosis notification rates were in the less than 1 year (65.7 per 100 000 population, 41 cases) and 1 to 4 years (53.2 per 100 000, 134 cases) age groups. Age-specific notification rates were more than four times higher for those groups than for any other age group (Table 73). The highest hospitalisation rate was in the 70 years and over age group, although hospitalisation rates were not calculated for most age groups, due to the small numbers of cases.

Table 73. Yersiniosis cases by age group, 2011

Age group (years)	EpiSurv notifications		Morbidity[a]	
	No.	Rate[b]	No.	Rate[b]
<1	41	65.7	0	
1 to 4	134	53.2	3	
5 to 9	18	6.3	1	
10 to 14	24	8.2	0	
15 to 19	20	6.3	2	
20 to 29	50	8.1	2	
30 to 39	60	10.7	2	
40 to 49	46	7.3	6	0.9
50 to 59	49	8.8	7	1.3
60 to 69	40	9.6	4	
70+	31	7.6	12	2.9
Unknown	1		0	
Total	**514**	**11.7**	**39**	**0.9**

[a] MoH morbidity data for hospital admissions

[b] per 100 000 of population. Where fewer than five cases have been reported a rate has not been calculated.

In 2011, the most commonly reported risk factors for yersiniosis notifications were consumption of food from retail premises (50.4%) and contact with farm animals (33.8%) (Table 74).

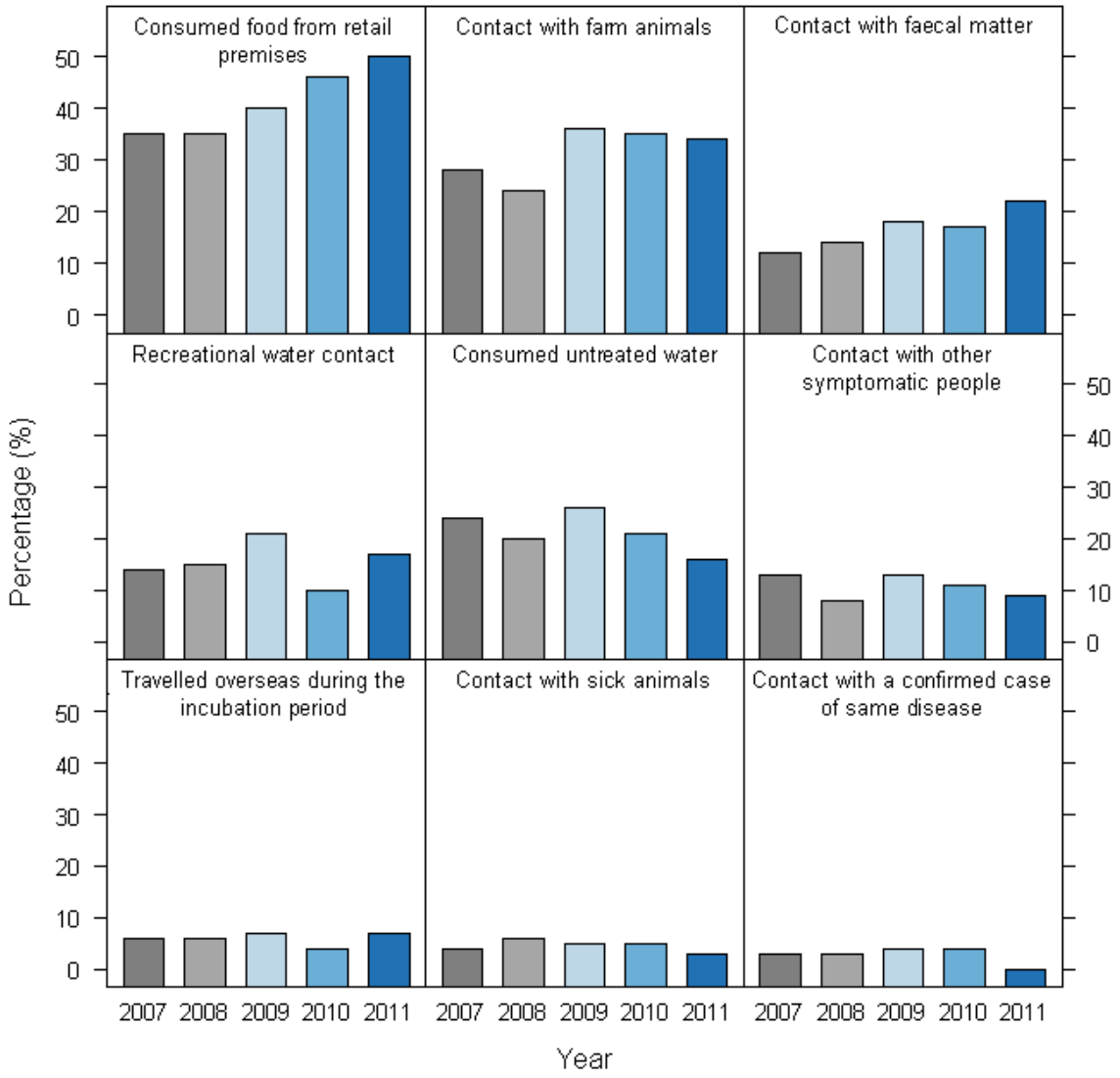
Table 74. Exposure to risk factors associated with yersiniosis, 2011

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	113	111	290	50.4
Contact with farm animals	81	159	274	33.8
Contact with faecal matter	52	184	278	22.0
Recreational water contact	39	197	278	16.5
Consumed untreated water	36	184	294	16.4
Contact with other symptomatic people	21	221	272	8.7
Travelled overseas during the incubation period	17	241	256	6.6
Contact with sick animals	7	213	294	3.2
Contact with a confirmed case of same disease	0	168	346	0.0

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

Between 2007 and 2011, the most commonly reported risk factor for yersiniosis was consumption of food from retail premises, followed by contact with farm animals (Figure 61). There was an increasing trend in the percentage of reported consumption of food from retail premises and contact with faecal matter.

Figure 61. Percentage of cases by exposure to risk factors associated with yersiniosis and year, 2007–2011



For cases where information on travel was provided, 6.6% (95% CI 3.9-10.3%) had travelled overseas during the incubation period. Assuming that the cases for which travel information was provided were representative of all yersiniosis cases, a Poisson distribution can be used to estimate the total number of potentially travel related cases of yersiniosis in 2011. The resultant distribution has a mean of 34 cases (95% CI 19-52).

If data from the last four years are considered, the estimated proportion of cases travelling overseas within the incubation period of the organism is 6.0% (95% CI 4.5-7.8%).

Outbreaks reported as caused by *Yersinia* spp.

During 2011, there were two *Yersinia* spp. outbreaks, with a total of four cases, reported in EpiSurv, one associated with a suspected foodborne source (Table 75).

Table 75. *Yersinia* spp. outbreaks reported, 2011

Measure	Foodborne Yersinia spp. outbreaks	All *Yersinia* spp. outbreaks
Outbreaks	1	2
Cases	2	4
Hospitalised cases	1	1

Between 2002 and 2011 very few foodborne *Yersinia* spp. outbreaks were reported in EpiSurv (two or less each year), with a small total number of associated cases (ranging from two to 13) (Figure 62).

Figure 62. Foodborne *Yersinia* spp. outbreaks and associated cases reported by year, 2002–2011

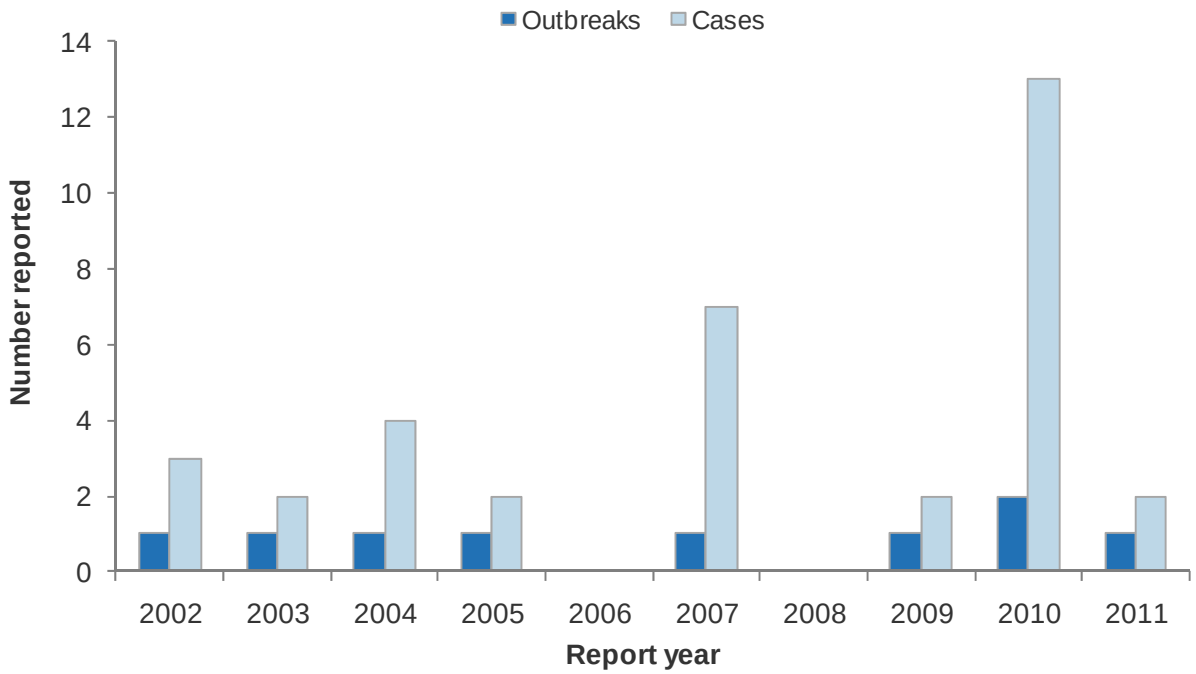


Table 76 contains details of the one food–associated *Yersinia* spp. outbreak reported in 2011.

Table 76. Details of the food-associated *Yersinia* spp. outbreaks, 2011

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	May	Unknown	Private home	Private home	1C, 1P

PHU: Public Health Unit, C: confirmed, P: probable

In 2011, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Yersinia* spp. outbreaks.

Yersinia types commonly reported

In 2011, clinical laboratories submitted 493 isolates for *Yersinia* spp. confirmation and typing to the Enteric Reference Laboratory at ESR. Notifiable *Yersinia* spp. (i.e. *Yersinia enterocolitica* (YE) and *Y. pseudotuberculosis (YTB)*) were identified in 90% of these isolates. Note that the case status in EpiSurv is changed to "not a case" for *Yersinia* isolates that are identified by ERL as non notifiable (i.e. not YE or YTB) and these cases no longer appear in the reported notification data.

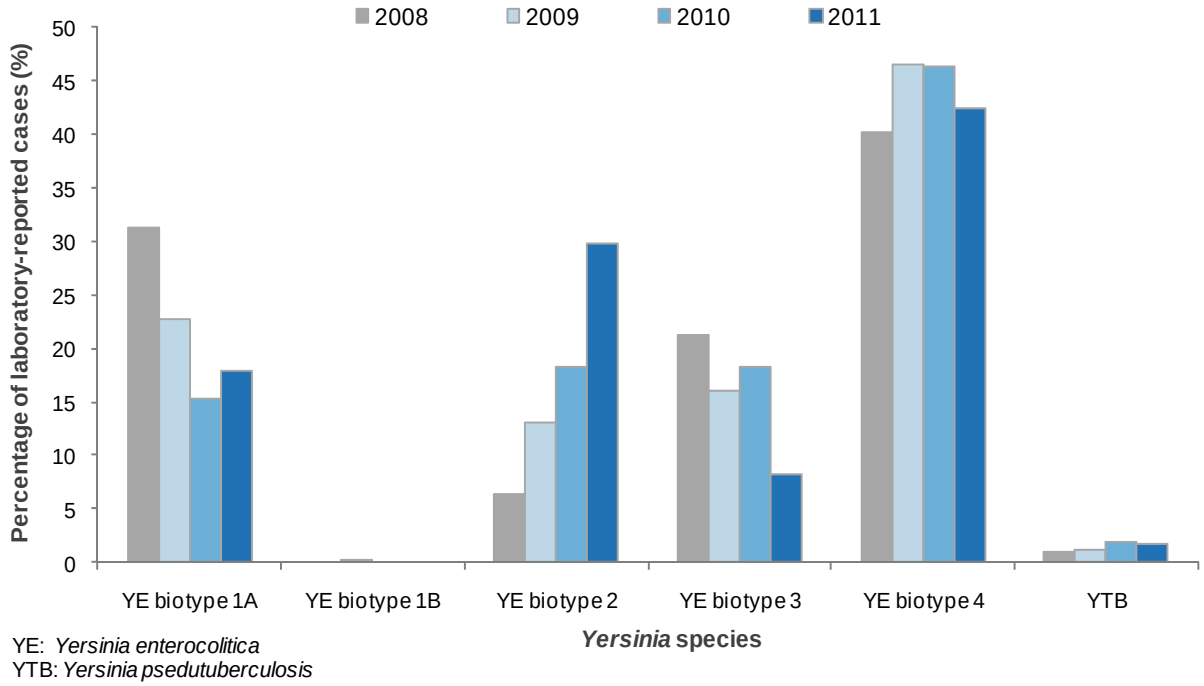
The number of notifiable *Yersinia* spp. cases identified by the Enteric Reference Laboratory at ESR each year is shown in Table 77. Over the period 2008 to 2011, the percentage of cases identified with YE biotype 2 has increased from 6.3% (in 2008) to 29.7% (in 2011) of the notifiable *Yersinia* isolates while the percentage of YE biotype 3 and YE biotype 1A cases have both decreased (Figure 63). The number of YTB cases identified has also increased (from 3 in 2008 to 8 in 2011).

These numbers need to be interpreted with some caution as a) not all clinical laboratories forward isolates to ERL for confirmation and biotyping and b) the number of isolates forwarded for confirmation and typing, as a percentage of all notifications, has changed during this period and c) the isolation and identification of *Yersinia* spp. are highly sensitive to the methods used by laboratories.

Table 77. Notifiable *Yersinia* spp. identified by the Enteric Reference Laboratory, 2008–2011

Species	2008	2009	2010	2011
Yersinia enterocolitica	**340**	**325**	**252**	**433**
biotype 1A	107	75	39	79
biotype 1B	0	1	0	0
biotype 2	22	43	47	131
biotype 3	73	53	47	36
biotype 4	138	153	119	187
Yersinia pseudotuberculosis	**3**	**4**	**5**	**8**
Total	**343**	**329**	**257**	**441**

Figure 63. Percentage of laboratory-reported cases of notifiable *Yersinia* spp. by species and year, 2008–2011



YE: *Yersinia enterocolitica*
YTB: *Yersinia psedutuberculosis*

Note: percentage was calculated using the number of cases for each species out of all notifiable *Yersinia* isolates (i.e. excludes *Y. frederiksenii*, etc)

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

SUMMARY TABLES

SUMMARY TABLES

This appendix brings together data from different sources as summary tables to facilitate comparisons between conditions.

Table 78. Number of cases and rate per 100 000 population of selected notifiable diseases in New Zealand, 2010–2011

Disease	2010		2011		Change [b,c]
	Cases	Rates	Cases	Rates	
Campylobacteriosis	7 346	168.2	6 692	151.9	↓
Cryptosporidiosis	954	21.8	610	13.8	↓
Gastroenteritis [a]	491	11.2	630	14.3	↑
Giardiasis	1 985	45.4	1 935	43.9	←
Hepatitis A	46	1.1	26	0.6	↓
Listeriosis	23	0.5	26	0.6	→
Salmonellosis	1 146	26.2	1 056	24.0	↓
Shigellosis	104	2.4	101	2.3	←
VTEC/STEC infection	138	3.2	154	3.5	→
Yersiniosis	406	9.3	514	11.7	↑

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

[b] ↓= Significant decrease, ↑ = Significant increase, ▫ = No change, ← = Not significant decrease, → = not significant increase, NA = not applicable

[c] Fisher's exact tests were used to determine statistical significance. P-values less than 0.05 are considered to be significant at the 95% level of confidence.

Table 79. Deaths due to selected notifiable diseases recorded in EpiSurv, 1997-2011

Disease	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Campylobacteriosis	2	2	1	3	1	1	0	0	1	1	1	0	0	0	0
Gastroenteritis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Giardiasis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Listeriosis - non perinatal	2	0	1	2	1	0	2	3	1	0	2	3	2	3	1
Listeriosis - perinatal	6	0	2	4	1	3	2	2	0	1	2	2	2	4	0
Salmonellosis	2	2	1	7	2	1	0	0	1	1	1	1	1	0	0
Shigellosis	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
VTEC/STEC infection	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Yersiniosis	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0

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

Table 80. MoH mortality data for selected notifiable diseases, 2007-2009

Disease	ICD 10 Codes	2007		2008		2009 [a]	
		Und[b]	Cont[c]	Und[b]	Cont[c]	Und[b]	Cont[c]
Campylobacteriosis	A04.5	1	0	0	4	1	0
Hepatitis A	B15	0	2	0	1	0	0
Listeriosis	A32	2	0	1	1	3	3
Salmonellosis	A02	0	0	1	2	1	4
Shigellosis	A03	0	0	1	0	0	0
Yersiniosis	A04.6	0	0	1	1	1	0

[a] Latest year that data are available
[b] Underlying – main cause of death
[c] Contributory – selected contributory cause of death (not main cause of death)

Table 81. MoH morbidity data for selected notifiable diseases, 2009-2011

Disease	ICD 10 Codes	2009		2010		2011	
		Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis
Campylobacteriosis	A04.5	473	101	518	106	443	131
Cryptosporidiosis	A07.2	19	4	16	14	16	2
Giardiasis	A07.1	21	13	18	15	35	25
Hepatitis A	B15	17	7	20	10	7	11
Listeriosis	A32	11	17	13	18	11	18
Salmonellosis	A02	130	28	120	49	106	29
Shigellosis	A03	14	5	21	4	22	6
Toxic shellfish poisoning	T61.2	19	4	22	4	14	1
VTEC/STEC infection	A04.3	6	1	10	3	12	6
Yersiniosis	A04.6	24	22	13	14	16	23

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

Table 82. Number of cases and rate per 100 000 population of selected notifiable diseases by ethnic group, 2011

Disease	Ethnic group											
	Maori		Pacific Peoples		Asian		MELAA[a]		European or Other		Total[b]	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	465	71.9	139	52.2	289	71.1	37	98.2	5 350	175.5	6 692	151.9
Cryptosporidiosis	59	9.1	5	1.9	17	4.2	3		509	16.7	610	13.8
Gastroenteritis[c]	49	7.6	21	7.9	25	6.2	3		488	16.0	630	14.3
Giardiasis	110	17.0	22	8.3	76	18.7	33	87.6	1 548	50.8	1 935	43.9
Hepatitis A	2		3		12	3.0	2		6	0.2	26	0.6
Listeriosis	3		3		5	1.2	0		15	0.5	26	0.6
Salmonellosis	84	13.0	41	15.4	60	14.8	10	26.5	801	26.3	1 056	24.0
Shigellosis	11	1.7	23	8.6	14	3.4	3		38	1.2	101	2.3
VTEC/STEC infection	13	2.0	2		4		1		131	4.3	154	3.5
Yersiniosis	31	4.8	23	8.6	127	31.2	5	13.3	300	9.8	514	11.7

[a] Middle Eastern/Latin American/African

[b] Total includes cases where ethnicity was unknown

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

Note: Denominator data used to determine disease rates for ethnic groups is based on the proportion of people in each ethnic group from the estimated resident 2006 census population applied to the 2011 mid year population estimates from Statistics New Zealand. Ethnicity is prioritised in the following order: Māori, Pacific Peoples, Asian, MELAA and European or Other Ethnicity (including New Zealander). Where fewer than five cases have been notified, a rate has not been calculated and the cell has been left blank.

Table 83. Number of cases and rates of selected notifiable diseases per 100 000 population by sex, 2011

Disease	Sex					
	Male		Female		Total[a]	
	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	3 748	173.2	2 876	128.4	6 692	151.9
Cryptosporidiosis	290	13.4	315	14.1	610	13.8
Gastroenteritis[b]	270	12.5	328	14.6	630	14.3
Giardiasis	933	43.1	984	43.9	1 935	43.9
Hepatitis A	16	0.7	9	0.4	26	0.6
Listeriosis – non perinatal	0		4		4	
Salmonellosis	560	25.9	488	21.8	1 056	24.0
Shigellosis	49	2.3	50	2.2	101	2.3
VTEC/STEC infection	68	3.1	85	3.8	154	3.5
Yersiniosis	261	12.1	248	11.1	514	11.7

[a] Total includes cases where ethnicity was unknown

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

Table 84. Number of cases and rates of selected notifiable diseases per 100 000 population by age group, 2011

	<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+		Total	
Disease	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
Campylobacteriosis	155	248.5	729	289.4	339	118.0	251	85.7	452	142.4	1 076	173.9	724	128.6	821	130.0	761	136.9	683	163.7	689	169.4	6 692	151.9
Cryptosporidiosis	15	24.1	188	74.6	78	27.2	56	19.1	40	12.6	84	13.6	55	9.8	46	7.3	26	4.7	15	3.6	5	1.2	610	13.8
Gastroenteritis	25	40.1	87	34.5	21	7.3	8	2.7	14	4.4	77	12.4	76	13.5	72	11.4	58	10.4	59	14.1	108	26.5	630	14.3
Giardiasis	38	60.9	408	162.0	139	48.4	48	16.4	26	8.2	175	28.3	443	78.7	287	45.4	168	30.2	149	35.7	52	12.8	1935	43.9
Hepatitis A	0		4		6	2.1	1		0		6	1.0	2		3		0		1		3		26	0.6
Listeriosis	1		0		0		0		0		2		3		2		3		5	1.2	10	2.5	26	0.6
Salmonellosis	72	115.4	175	69.5	55	19.1	34	11.6	61	19.2	162	26.2	90	16.0	122	19.3	116	20.9	90	21.6	77	18.9	1056	24
Shigellosis	0		17	6.7	9	3.1	3		3		22	3.6	17	3.0	7	1.1	11	2.0	9	2.2	3		101	2.3
VTEC/STEC infection	9	14.4	60	23.8	13	4.5	10	3.4	5	1.6	14	2.3	11	2.0	8	1.3	2		7	1.7	15	3.7	154	3.5
Yersiniosis	41	65.7	134	53.2	18	6.3	24	8.2	20	6.3	50	8.1	60	10.7	46	7.3	49	8.8	40	9.6	31	7.6	514	11.7

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

Note: Where fewer than five cases have been notified a rate has not been calculated and the cell has been left blank.
Rates for each disease have been divided into three bands and shaded to indicate the age groups with highest, medium and lowest rates of disease. Shadings used are:

- Fewer than 5 cases in a cell or less than a national total of 50 cases for the year
- First (lowest) band
- Second (middle) band
- Third (highest) band

Table 85. Number of cases of selected notifiable diseases by District Health Board, 2011

Disease	District Health Board																				
	Northland	Waitemata	Auckland	Counties Manukau	Waikato	Lakes	Bay of Plenty	Tairawhiti	Taranaki	Hawke's Bay	Whanganui	MidCentral	Hutt Valley	Capital and Coast	Wairarapa	Nelson Marlborough	West Coast	Canterbury	South Canterbury	Southern	Total
Campylobacteriosis	225	764	543	503	687	140	292	56	179	325	75	239	223	529	89	199	56	881	126	561	6 692
Cryptosporidiosis	28	41	30	35	141	16	23	4	21	16	6	25	26	26	11	11	4	53	29	64	610
Gastroenteritis[a]	0	61	60	47	15	12	24	3	11	1	10	98	44	91	3	4	6	119	4	17	630
Giardiasis	64	201	269	195	179	46	121	8	21	70	8	40	66	218	10	70	16	175	36	122	1 935
Hepatitis A	0	3	8	5	3	0	1	0	0	2	0	0	0	1	0	1	0	2	0	0	26
Listeriosis	1	3	3	5	2	1	2	0	0	0	0	0	2	1	0	0	1	3	0	2	26
Salmonellosis	36	97	99	65	108	31	32	16	17	24	10	33	32	69	12	45	4	143	33	150	1 056
Shigellosis	1	26	21	24	5	2	3	1	1	1	1	0	0	7	0	0	0	4	1	3	101
VTEC/STEC infection	8	9	10	16	30	5	8	2	9	4	0	3	4	5	1	3	3	24	4	6	154
Yersiniosis	8	77	67	53	84	17	17	3	14	7	4	5	25	52	3	7	6	48	4	13	514

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

Table 86. Rate per 100 000 population of selected notifiable diseases by District Health Board, 2011

District Health Board	Northland	Waitemata	Auckland	Counties Manukau	Waikato	Lakes	Bay of Plenty	Tairawhiti	Taranaki	Hawke's Bay	Whanganui	MidCentral	Hutt Valley	Capital and Coast	Wairarapa	Nelson Marlborough	West Coast	Canterbury	South Canterbury	Southern	Total
Campylobacteriosis	142.3	140.0	118.9	100.6	186.8	135.9	137.8	120.2	162.9	208.6	118.9	142.0	154.3	179.5	219.3	142.2	169.9	175.3	223.5	183.1	151.9
Cryptosporidiosis	17.7	7.5	6.6	7.0	38.3	15.5	10.9	"	19.1	10.3	9.5	14.9	18.0	8.8	27.1	7.9	"	10.5	51.4	20.9	13.8
Gastroenteritis[a]		11.2	13.1	9.4	4.1	11.7	11.3		10.0		15.9	58.2	30.4	30.9			18.2	23.7		5.5	14.3
Giardiasis	40.5	36.8	58.9	39.0	48.7	44.7	57.1	17.2	19.1	44.9	12.7	23.8	45.7	74.0	24.6	50.0	48.5	34.8	63.9	39.8	43.9
Hepatitis A			1.8	1.0																	0.6
Listeriosis				1.0																	0.6
Salmonellosis	22.8	17.8	21.7	13.0	29.4	30.1	15.1	34.3	15.5	15.4	15.9	19.6	22.1	23.4	29.6	32.2	"	28.4	58.5	48.9	24.0
Shigellosis		4.8	4.6	4.8	1.4									2.4							2.3
VTEC/STEC infection	5.1	1.6	2.2	3.2	8.2	4.9	3.8		8.2					1.7				4.8		2.0	3.5
Yersiniosis	5.1	14.1	14.7	10.6	22.8	16.5	8.0		12.7	4.5		3.0	17.3	17.6		5.0	18.2	9.5		4.2	11.7

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

Rates for each disease have been divided into three bands and shaded to indicate DHBs with the highest, middle and lowest rates of disease. Shadings used are:

- Fewer than 5 cases in a cell or less than a national total of 50 cases for the year
- First (lowest) band
- Second (middle) band
- Third (highest) band

Table 87. Number of cases of selected notifiable diseases by year, 1987–1999

Disease	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Campylobacteriosis	2 921	2 796	4 187	3 850	4 148	5 144	8 101	7 714	7 442	7 635	8 924	11 572	8 161
Cryptosporidiosis[a]										119	357	866	977
Gastroenteritis[a b]										555	310	492	601
Giardiasis[a]										1 235	2 127	2 183	1 793
Hepatitis A	158	176	134	150	224	288	257	179	338	311	347	145	119
Listeriosis	12	7	10	16	26	16	11	8	13	10	35	17	19
Salmonellosis	1 140	1 128	1 860	1 619	1 244	1 239	1 340	1 522	1 334	1 141	1 177	2 069	2 077
Shigellosis	143	145	137	197	152	124	128	185	191	167	117	122	147
VTEC/STEC infection[c]							3	3	6	7	13	48	64
Yersiniosis[a]										330	488	546	503

[a] Acute gastroenteritis, cryptosporidiosis, giardiasis, VTEC/STEC infection and yersiniosis were added to the Health Act 1956 notification schedule in June 1996

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

[c] The first case of VTEC/STEC infection confirmed in New Zealand was reported in October 1993 [40] .

Table 88. Number of cases of selected notifiable diseases by year, 2000–2011

Disease	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Campylobacteriosis	8 418	10 146	12 494	14 788	12 215	13 836	15 873	12 778	6 694	7 177	7 346	6 692
Cryptosporidiosis	775	1 208	975	817	611	889	737	924	764	854	954	610
Gastroenteritis[a]	727	940	1 087	1 026	1 363	557	937	622	687	712	492	630
Giardiasis	1 688	1 604	1 547	1 570	1 514	1 231	1 214	1 402	1 660	1 639	1 985	1 935
Hepatitis A	107	61	106	70	49	51	123	42	89	44	46	26
Listeriosis	22	18	19	24	26	20	19	26	27	28	23	26
Salmonellosis	1 795	2 417	1 880	1 401	1 081	1 382	1 335	1 275	1 339	1 128	1 146	1 056
Shigellosis	115	157	112	87	140	183	102	129	113	119	105	101
VTEC/STEC infection	67	76	73	104	89	92	87	100	124	143	138	154
Yersiniosis	396	429	472	436	407	383	453	502	508	430	406	514

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

Note: cell is blank where data are unavailable

Table 89. Rate per 100 000 population of selected notifiable diseases in New Zealand and other selected countries

Disease	Country/Region (publication year of report)						
	New Zealand (2011)	Australia[a] (2011)	USA[b] (2010)	Canada[d] (2009)	UK[e] (2010)	EU Total[e] (2010)	Other high
Campylobacteriosis	151.9	79.3	13.6	5.2	113.4	48.6	201 (Czech Republic)[e] 120 (Luxembourg)[e]
Cryptosporidiosis	13.8	8.0	2.8	NN	9.1[f]	2.7[f]	10.0 (Ireland)[f]
Giardiasis	43.9	NN	7.4[c]	NN	6.1[f]	5.6[f]	27.6 (Bulgaria)[f] 112 (Kyrgystan)[g]
Hepatitis A	0.6	0.6	0.7[c]	NN	0.7[f]	3.5[f]	194 (Kyrgyzstan)[g] 101 (Latvia)[f]
Listeriosis	0.6	0.3	0.3	NN	0.3	0.4	1.3 (Finland)[e]
Salmonellosis	24.0	55.0	17.6	18.0	15.6	21.5	91 (Slovakia)[e] 78 (Czech Republic)[e]
Shigellosis	2.3	2.2	3.8	1.9	2.6[f]	1.6[f]	84 (Israel)[g] 40 (Armenia)[g] 9.9 (Bulgaria)[f]
VTEC/STEC infection	3.5	0.4	1.9[h]	1.8	1.8	0.8	12 (Azerbaijan)[g] 4.4 (Ireland)[e]
Yersiniosis	11.7	NN	0.3	1.1	0.1	1.6	12.9 (Lithuania)[e] 9.8 (Finland)[e]

NN: Not notifiable

[a] National Notifiable Diseases Surveillance System (NNDSS) http://www9.health.gov.au/cda/source/CDA-index.cfm

[b] FoodNet – Foodborne Diseases Active Surveillance Network http://www.cdc.gov/foodnet/

[c] Centers for Disease Control and Prevention. Summary of notifiable disease http://www.cdc.gov/mmwr/mmwr_nd/index.html (CDC data presented here relate to the 2009 year)

[d] National Enteric Surveillance Program (NESP) http://www.nml-lnm.gc.ca/NESP-PNSME/index-eng.htm

[e] European Food Safety Authority and European Centre for Disease Prevention and Control (ECDC). The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2010 http://www.efsa.europa.eu/en/efsajournal/doc/2597.pdf

[f] European Centre for Disease Prevention and Control (ECDC). Annual epidemiological report on communicable diseases in Europe http://ecdc.europa.eu/en/Pages/home.aspx (ECDC data presented here relate to the 2009 year)

[g] World Health Organization Regional Office for Europe Centralized Information System for Infectious Diseases (CISID) http://data.euro.who.int/cisid/?TabID=67 (CISID data presented here relates to the 2010 year)

[h] Includes both *Escherichia coli* O157 and non-O157

Table 90. Foodborne outbreaks and associated cases by pathogen/condition, 2011

Pathogen/Condition	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Norovirus	20	16.4	206	31.4
Campylobacter	11	9.0	53	8.1
Salmonella	8	6.6	42	6.4
Giardia	6	4.9	24	3.7
Clostridium perfringens	4	3.3	56	8.5
Shigella	4	3.3	27	4.1
Cryptosporidium	3	2.5	9	1.4
Salmonella Typhi	2	1.6	5	0.8
Bacillus cereus	1	0.8	2	0.3
Ciguatera fish poisoning	1	0.8	2	0.3
Histamine (scombroid) fish poisoning	1	0.8	9	1.4
Sapovirus	1	0.8	14	2.1
Yersinia	1	0.8	2	0.3
Unidentified pathogen[c]	60	49.2	207	31.6
Total[d]	**122**		**656**	

[a] Percentage of outbreaks for each pathogen/condition, calculated using the total number of foodborne outbreaks (122).

[b] Percentage of cases for each pathogen/condition, calculated using the total number of associated cases (656).

[c] All outbreaks with no pathogen identified in 2011 were classified as gastroenteritis.

[d] One outbreak had two pathogens identified therefore sum of individual pathogen/condition numbers exceed total number of outbreaks/cases reported.

Table 91. Foodborne outbreaks and associated cases by exposure setting, 2011

Exposure setting	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Commercial food operator	**73**	**59.8**	**409**	**62.3**
Restaurant/cafe/bakery	43	35.2	226	34.5
Takeaways	16	13.1	46	7.0
Caterers	6	4.9	72	11.0
Fast food restaurant	4	3.3	44	6.7
Supermarket/delicatessen	3	2.5	13	2.0
Other food outlet	2	1.6	10	1.5
Institution	**9**	**7.4**	**106**	**16.2**
Long term care facility	3	2.5	47	7.2
Hospital (acute care)	2	1.6	14	2.1
Camp site	1	0.8	10	1.5
Childcare centre	1	0.8	3	0.5
Marae	1	0.8	2	0.3
Other institution	1	0.8	30	4.6
Other	**44**	**36.1**	**221**	**33.7**
Private home	31	25.4	106	16.2
Other setting[c]	13	10.7	117	17.8
Unknown setting[d]	**6**	**4.9**	**22**	**3.4**
Total[e]	**122**		**656**	

[a] Percentage of outbreaks for each exposure setting, calculated using the total number of foodborne outbreaks (122).

[b] Percentage of cases for each exposure setting, calculated using the total number of associated cases (656).

[c] Includes outbreaks where exposure setting was recorded as community gathering (2) and travel (1).

[d] Includes five outbreaks where transmission occurred overseas.

[e] More than one exposure setting was implicated in some outbreaks therefore sum of individual exposure setting numbers exceed total number of outbreaks/cases reported.

Table 92. Foodborne outbreaks and associated cases by preparation setting, 2011

Preparation setting	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Commercial food operators	**73**	**59.8**	**394**	**59.2**
Restaurant/cafe/bakery	41	33.6	196	49.7
Takeaways	17	13.9	52	13.2
Caterers	7	5.7	76	19.3
Fast food restaurant	2	1.6	38	9.6
Supermarket/delicatessen	2	1.6	11	2.8
Temporary or mobile service	1	0.8	5	1.3
Other food outlet	5	3.3	26	4.6
Non-commercial food operators	**32**	**26.2**	**143**	**36.3**
Unknown setting	**17**	**13.9**	**119**	**30.2**
Total[c]	**122**		**656**	

[a] Percentage of outbreaks for each preparation setting, calculated using the total number of foodborne outbreaks (122).

[b] Percentage of cases for each implicated vehicle/source, calculated using the total number of associated cases (656)

[c] More than one preparation setting was implicated in some outbreaks therefore sum of individual preparation setting numbers exceed total number of outbreaks/cases reported.

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