Ministry for Primary Industries
Manatū Ahu Matua

Annual Report Concerning Foodborne Disease in New Zealand

2012

MPI Technical Paper No: 2013/17

Prepared for the Ministry for Primary Industries
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ISBN No: 978-0-478-41488-2 (online)
ISSN No: 2253-3923 (online)

June 2013

New Zealand Government

Growing and Protecting New Zealand

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ANNUAL REPORT CONCERNING FOODBORNE DISEASE IN NEW ZEALAND 2012

Prepared for Ministry for Primary Industries under
project MRP/12/02 – Systematic reporting of epidemiology of potentially
foodborne disease in New Zealand for year 2012,
as part of overall contract for scientific services

by

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June 2013

This report is available at www.foodsafety.govt.nz

First published: 28 June 2013

Suggested citation:
Lopez, L., Carey-Smith, G., Lim, E., Cressey, P., and Pirie, R.,
Annual Report Concerning Foodborne Disease in New Zealand 2012,
2013: Christchurch, New Zealand

Client Report FW13020

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Acknowledgements

Particular thanks are due to the staff in the public health services in New Zealand who provide data from their regions.

The authors also wish to acknowledge the New Zealand Ministry of Health as funders of the EpiSurv database.

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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 2012 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
Sapovirus	<1	NE	0	NE

[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 2012 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
Sapovirus infection	Virus	N,L	No specific ICD-10 code
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: Ministry of Health 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 2012, 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 is 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 2012 [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, which included 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 2012 [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.

Level of evidence for outbreaks

Foodborne outbreaks with a suspected vehicle identified have been classified as having weak or strong evidence. Outbreaks with strong evidence included those with a statistically significant elevated risk ratio or odds ratio (95% confidence) and/or laboratory evidence with the same organism and sub type detected in both disease cases and vehicle (to the highest available level of identification). Outbreaks were classified as having weak evidence when they met one or more of the following criteria

- Compelling evidence with symptoms attributable to specific organism e.g. scrombrotoxin, ciguatoxin etc.
- Other association but no evidence for causal link i.e. organism detected at source but not linked directly to the vehicle or indistinguishable DNA or PFGE profiles
- Raised but not statistically significant relative risk or odds ratio
- No evidence found but logical deduction given circumstances

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 7 February 2013 and 22 February 2013, 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 2012 mid-year population estimates and are crude rates unless otherwise stated. At 30 June 2012, the New Zealand population was estimated to be 4 433 120. 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 speckled 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 (2009−2011).

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.

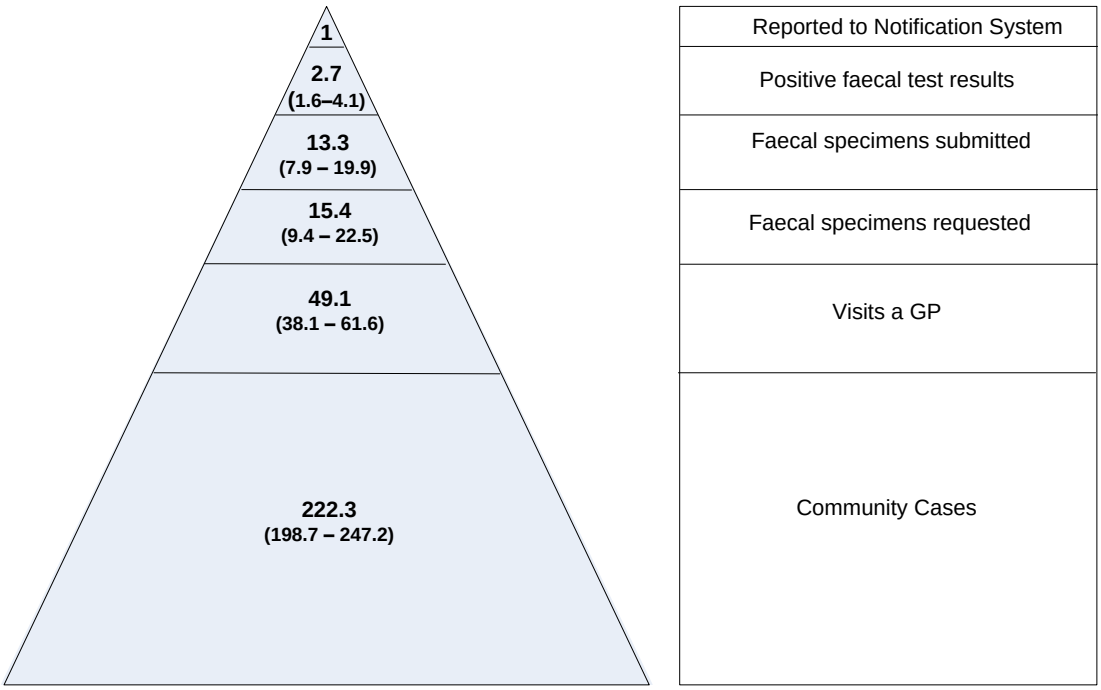
The three study elements were completed during 2005−2007 and each has been reported separately:

- 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 (NZFSA; 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, 1150 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 [8]. 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 2012

	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	7031		158.6
Estimated not travelled overseas	6573	93.5	148.3
Estimated foodborne transmission proportion	3780	57.5 (37.1-69.6)[a]	85.3 (55.0-103.2)[b]

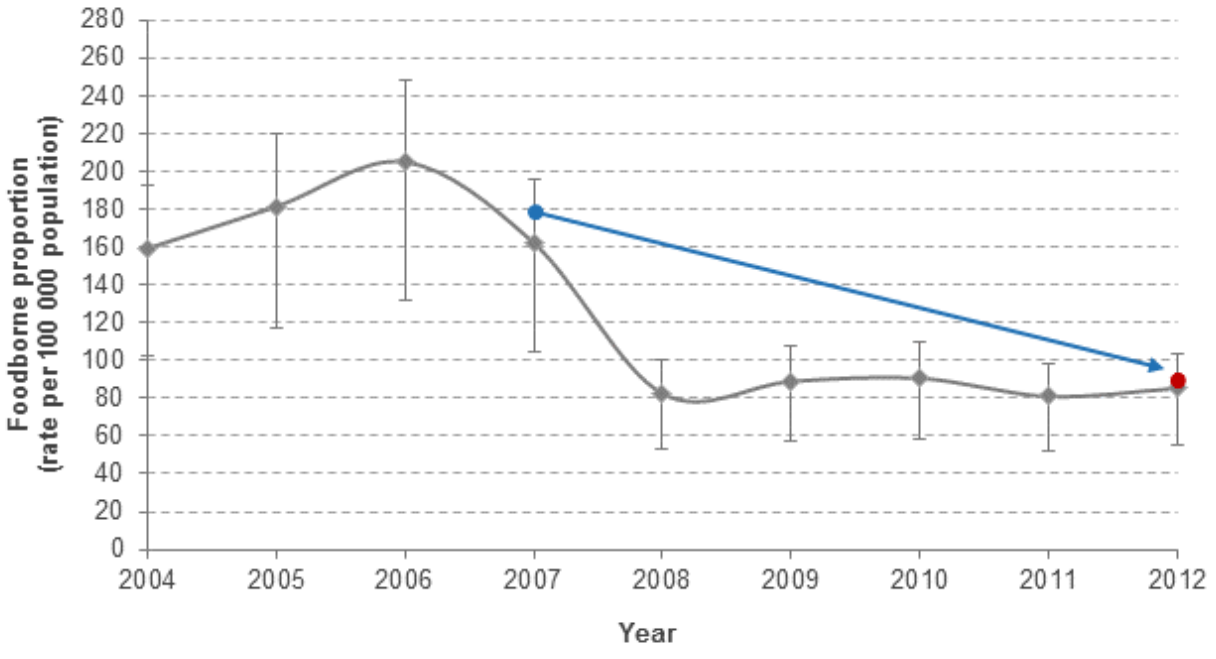
[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation

[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 2012

	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	1085		24.5
Estimated not travelled overseas	781	72.0	17.6
Estimated foodborne transmission proportion	474	60.7 (45.4-68.9)[a]	10.7 (8.0-12.1)[b]

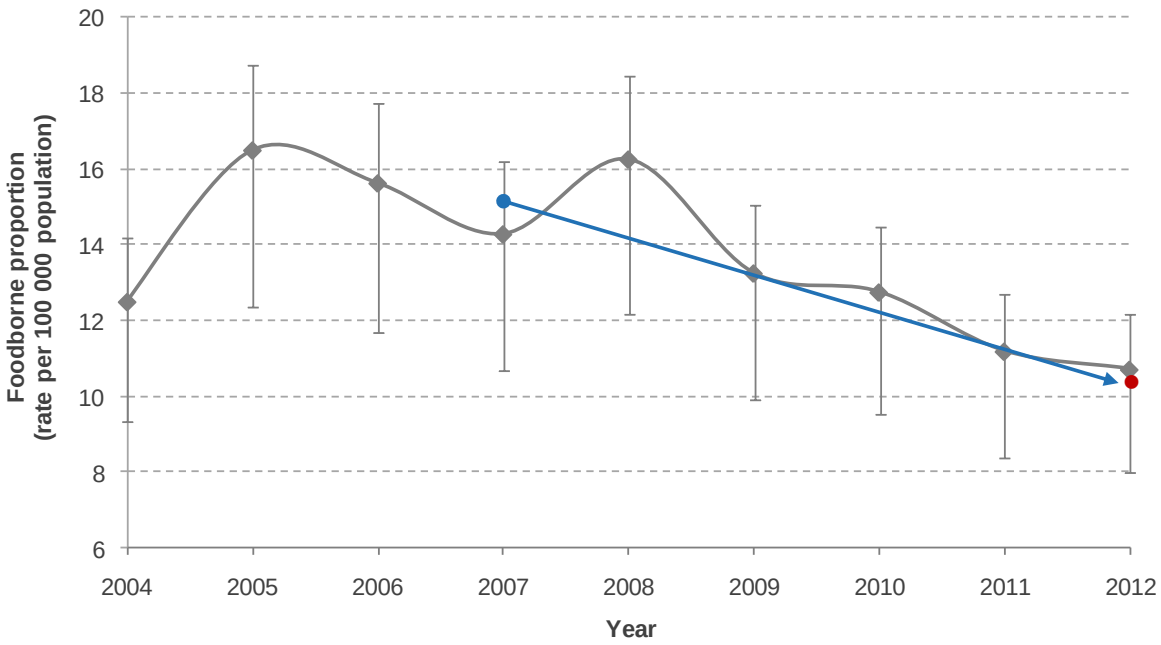
[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation

[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 2012

	Cases	Proportion (%)	Rate (per 100 000, mid year estimated population)
Total notified	25		0.56
Estimated not travelled overseas	24	95.7	0.54
Estimated foodborne transmission proportion	20	84.9 (78.4-92.1)[a]	0.46 (0.42-0.50)[b]

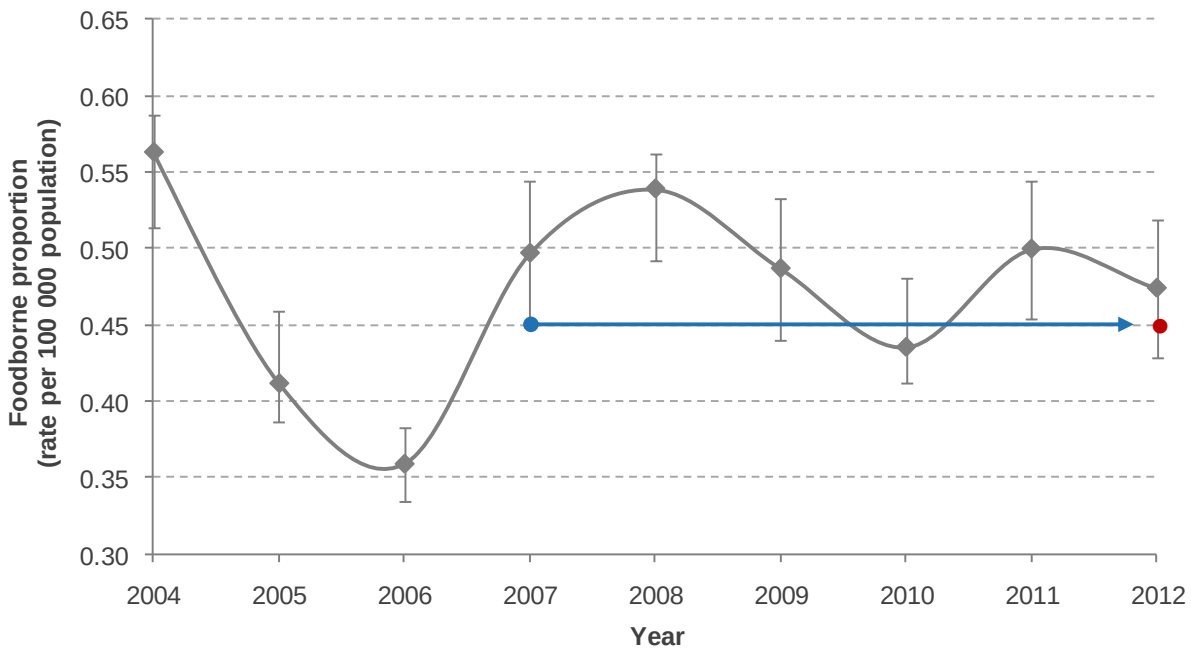
[a] Most likely (minimum – maximum) estimates of proportion foodborne, from expert consultation

[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.
Confirmed	A clinically compatible illness that is laboratory confirmed, OR a clinically compatible illness and a common exposure associated with a laboratory confirmed case.

Bacillus cereus intoxication cases reported in 2012 by data source

During 2012, two notifications of *B. cereus* intoxication were reported in EpiSurv. Note that not all cases of *B. cereus* intoxication are necessarily notifiable only those where there is a suspected common source.

The ICD-10 code A05.4 was used to extract *B. cereus* intoxication hospitalisation data from the MoH NMDS database. There were no hospital admissions recorded in 2012 with *B. cereus* intoxication as the primary or other relevant diagnosis.

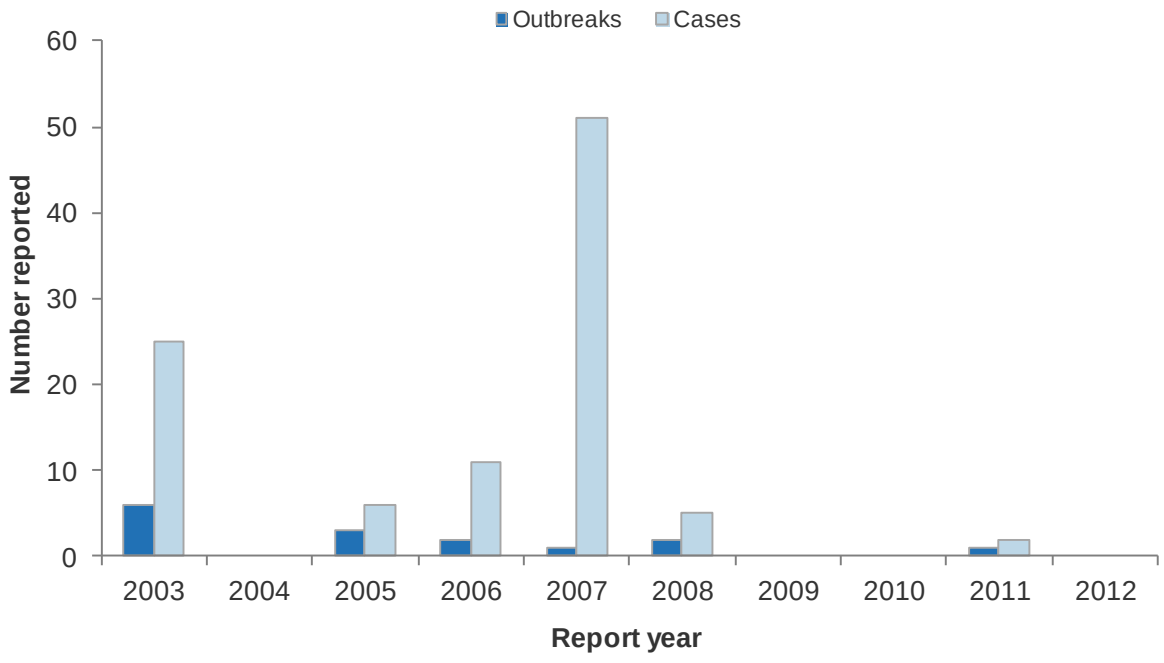
Expert consultation estimated that 97% (minimum = 90%, maximum = 99%) of *B. cereus* intoxication will be due to foodborne transmission. The expert consultation also estimated that approximately 60% of the foodborne transmission would be due to consumption of rice.

Outbreaks reported as caused by *Bacillus cereus*

During 2012, no outbreaks of *B. cereus* were reported in EpiSurv.

From 2004 to 2012, fewer outbreaks were reported each year in EpiSurv than the six outbreaks reported in 2003 (Figure 5).

Figure 5. Foodborne *B. cereus* outbreaks and associated cases reported by year, 2003−2012



In 2012, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *B. cereus* outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil

Relevant regulatory developments

Nil.

Campylobacteriosis

Summary data for campylobacteriosis in 2012 are given in Table 7.

Table 7. Summary of surveillance data for campylobacteriosis, 2012

Parameter	Value in 2012	Source
Number of cases	7 031	EpiSurv
Rate (per 100 000)	158.6	EpiSurv
Hospitalisations (%)	660 (9.4%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	458 (6.5%)	EpiSurv
Estimated food-related cases (%)*	3780 (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 - that is, is part of a common-source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Campylobacteriosis cases reported in 2012 by data source

During 2012, 7031 notifications (158.6 cases per 100 000 population) of campylobacteriosis and no resulting deaths were reported in EpiSurv.

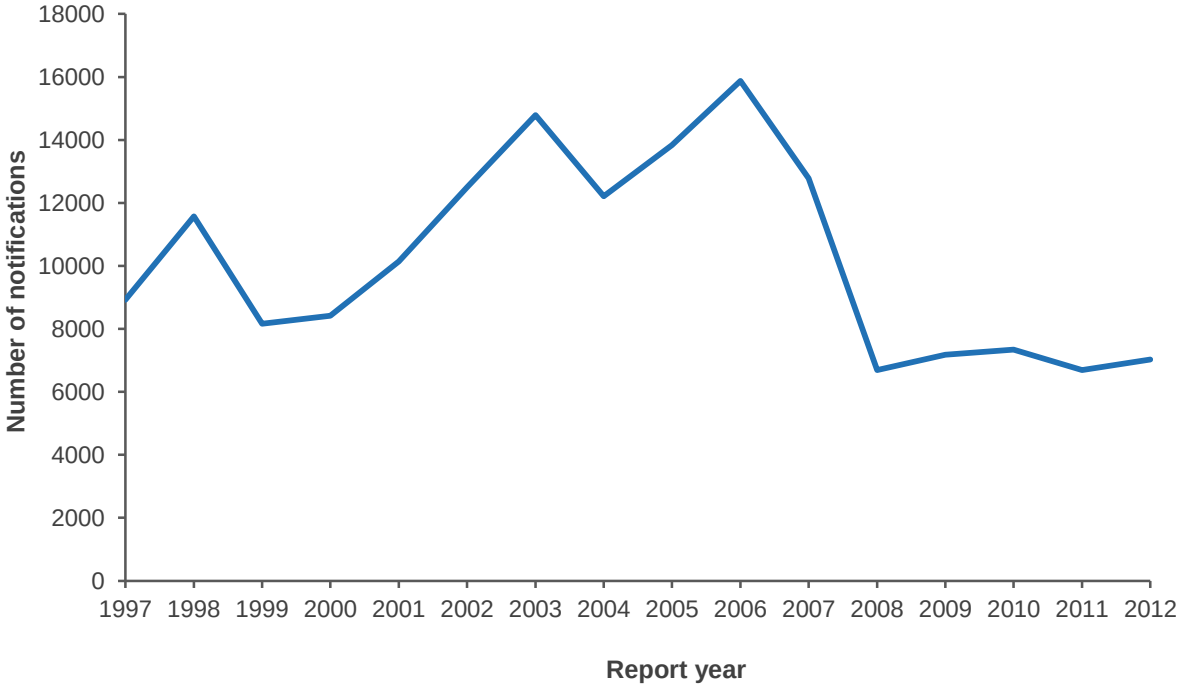
The ICD-10 code A04.5 was used to extract campylobacteriosis hospitalisation data from the MoH NMDS database. Of the 660 hospital admissions (14.9 admissions per 100 000 population) recorded in 2012, 544 were reported with campylobacteriosis as the primary diagnosis and 116 with campylobacteriosis as 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

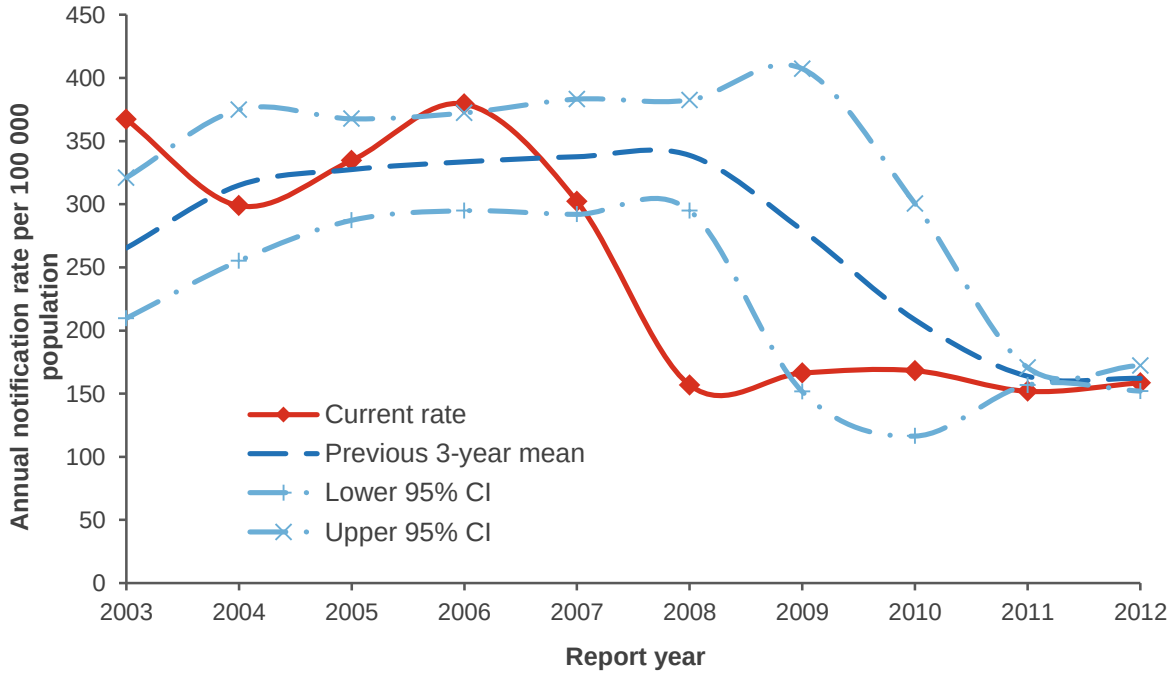
The number of campylobacteriosis notifications reported each year generally increased from 1997, with the highest number recorded in 2006 (15 873 cases). Since 2006, there has been a significant decrease in the number of cases reported (Figure 6). The number of notifications has remained fairly stable each year since 2008.

Figure 6. Campylobacteriosis notifications by year, 1997–2012



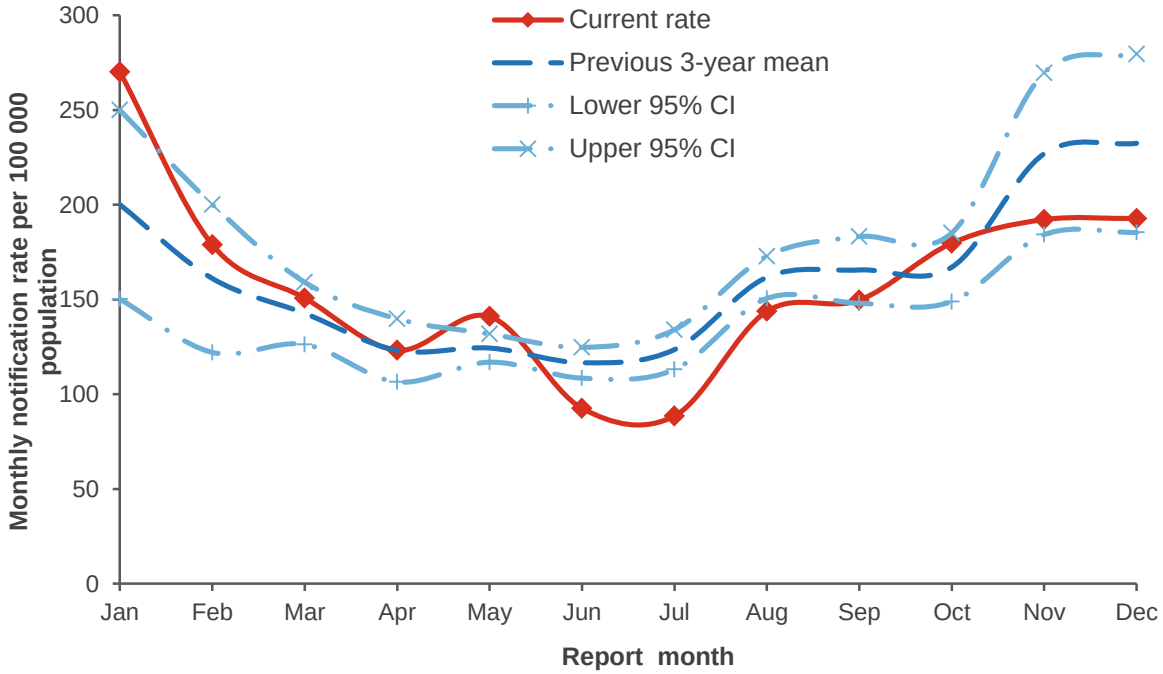
The campylobacteriosis annual rate trend (Figure 7) was very similar to the corresponding annual notification trend; with high notification rates observed over the period 2003−2006, followed by a sudden decrease in 2008. The notification rate has been fairly stable since 2008.

Figure 7. Campylobacteriosis notification rate by year, 2003–2012



The number of notified cases of campylobacteriosis per 100 000 population by month for 2012 is shown in Figure 8. The monthly number of notifications in 2012 ranged from 327 notifications (July) to 998 notifications (January).

Figure 8. Campylobacteriosis monthly rate (annualised), 2012



Campylobacteriosis rates varied throughout the country as shown in Figure 9. The highest DHB rates were in the South Island, in particular South Canterbury (314.8 per 100 000 population, 178 cases), Canterbury (225.2 per 100 000, 1127 cases) and Southern (220.2 per 100 000, 678 cases) DHBs. Taranaki DHB (199.4 per 100 000 population, 220 cases) had the highest rate for the North Island. The lowest rates were for Counties Manukau (94.5 per 100 000, 480 cases), Auckland (113.4 per 100 000, 524 cases), and Tairawhiti (115.4 per 100 000, 54 cases) DHBs. South Canterbury and Hawke's Bay DHBs have frequently featured in the highest quantile of campylobacteriosis notification rates between 2009 and 2012.

In 2012, the rate of notifications and hospitalisations for campylobacteriosis was approximately 20% higher for males (180.6 cases per 100 000 population, 16.4 admissions per 100 000) compared with females (137.3 per 100 000, 13.4 admissions per 100 000) (Table 8).

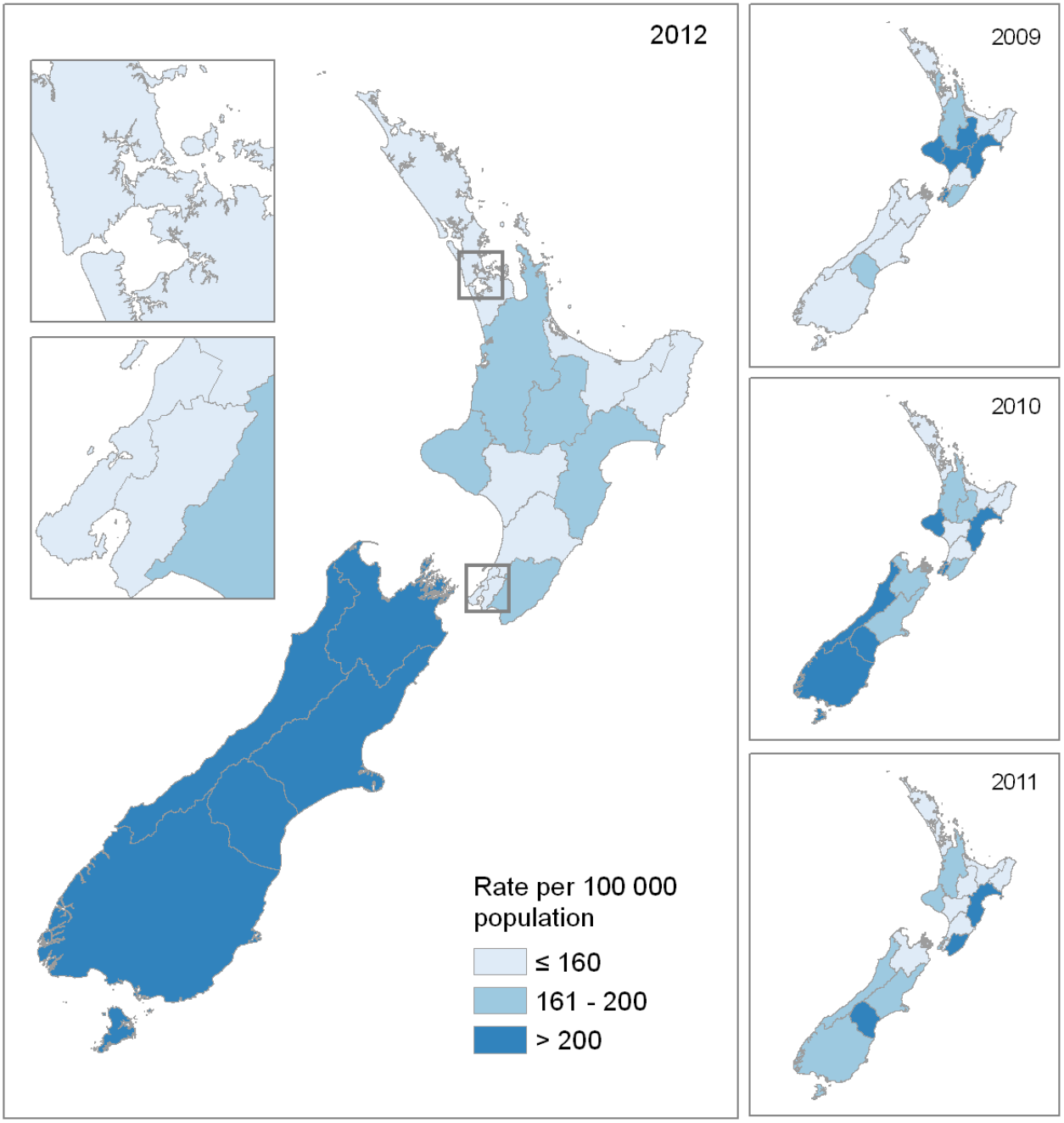
Table 8. Campylobacteriosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	3 938	180.6	357	16.4
Female	3 093	137.3	303	13.4
Total	**7 031**	**158.6**	**660**	**14.9**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 population

Figure 9. Geographic distribution of campylobacteriosis notifications, 2009–2012



The highest age-specific notification rates for campylobacteriosis in 2012 were for the 1 to 4 years (300.1 per 100 000 population, 754 cases) and the less than 1 year (269.0 per 100 000, 163 cases) age groups. The highest hospitalisation rate was for the 70 years and over age group, which was almost double the rate for the less than 1 year age group and approximately 2.5 to 6.5 times the rate for any other age group (Table 9).

Table 9. Campylobacteriosis cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	163	269.0	16	26.4
1 to 4	754	300.1	37	14.7
5 to 9	347	119.0	20	6.9
10 to 14	274	94.8	20	6.9
15 to 19	440	141.3	28	9.0
20 to 29	1 124	179.0	116	18.5
30 to 39	714	128.0	45	8.1
40 to 49	855	136.6	57	9.1
50 to 59	842	147.9	54	9.5
60 to 69	769	179.5	77	18.0
70+	742	176.5	190	45.2
Unknown	7	-	0	-
Total	**7 031**	**158.6**	**660**	**14.9**

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

The risk factors recorded for campylobacteriosis notifications in 2012 are shown in Table 10. The most common risk factors reported were consumption of food from retail premises (46.6%) and contact with farm animals (42.5%).

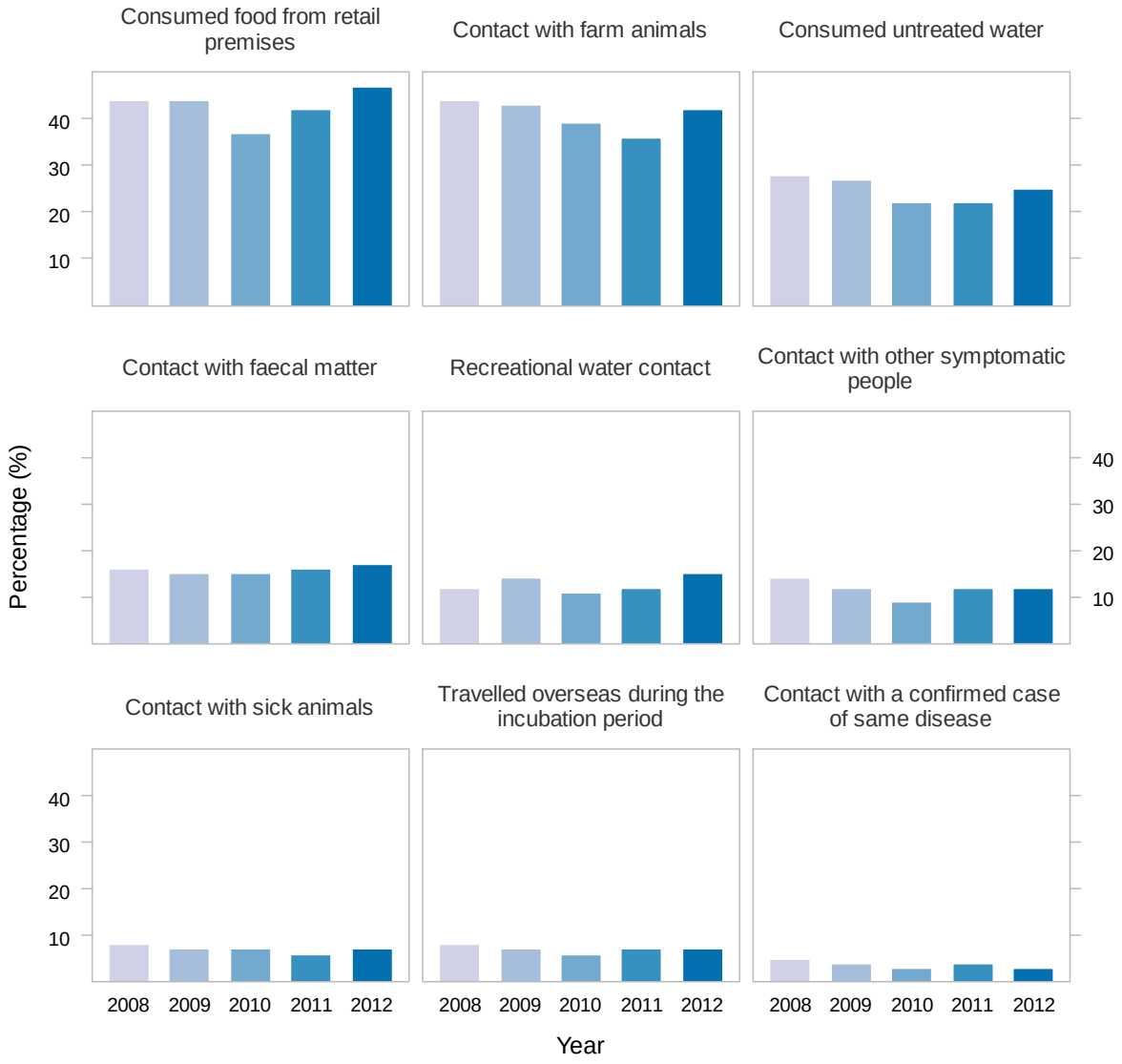
Table 10. Exposure to risk factors associated with campylobacteriosis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	1 175	1 346	4 510	46.6
Contact with farm animals	1 216	1 647	4 168	42.5
Consumed untreated water	574	1 759	4 698	24.6
Contact with faecal matter	441	2 113	4 477	17.3
Recreational water contact	405	2 237	4 389	15.3
Contact with other symptomatic people	306	2 297	4 428	11.8
Contact with sick animals	166	2 279	4 586	6.8
Travelled overseas during the incubation period	213	3 056	3 762	6.5

[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 2008 and 2012, consumption of food from retail premises, contact with farm animals, and consumption of untreated water were consistently the most commonly reported risk factors for campylobacteriosis. There was a decreasing trend in percentage of reported contact with farm animals and consumption of untreated water for four years. The percentages of cases for all of the most commonly reported risk factors show an increase in 2012 compared to 2011 (Figure 10).

Figure 10. Percentage of cases by exposure to risk factors associated with campylobacteriosis and year, 2008−2012



For cases where information on travel was provided in 2012, 6.5% (95% CI 5.7-7.4%) 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 2012. The resultant distribution has a mean of 458 cases (95% CI 386-535).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 6.8% (95% CI 6.4-7.2%).

Outbreaks reported as caused by *Campylobacter* spp.

In 2012, 11 (34.4%) of the *Campylobacter* outbreaks and 51 (18.1%) of the associated cases were reported as foodborne (Table 11). *Campylobacter* outbreaks accounted for 4.5% (32/716) of all outbreaks and 2.7% (282/10 491) of all associated cases reported in 2012.

Table 11. *Campylobacter* spp. outbreaks reported, 2012

Measure	Foodborne *Campylobacter* spp. outbreaks	All *Campylobacter* spp. outbreaks
Outbreaks	11	32
Cases	51	282
Hospitalised cases	0	3

From 2003 to 2006 the annual number of foodborne *Campylobacter* spp. outbreaks reported ranged from 17 to 32 with the number of annual outbreak associated cases ranging from 81 to 135. Since 2007 the 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 2012, 11 outbreaks (51 cases) were reported which was similar to 2011 (11 outbreaks, 53 cases).

Figure 11. Foodborne *Campylobacter* spp. outbreaks and associated cases reported by year, 2003–2012

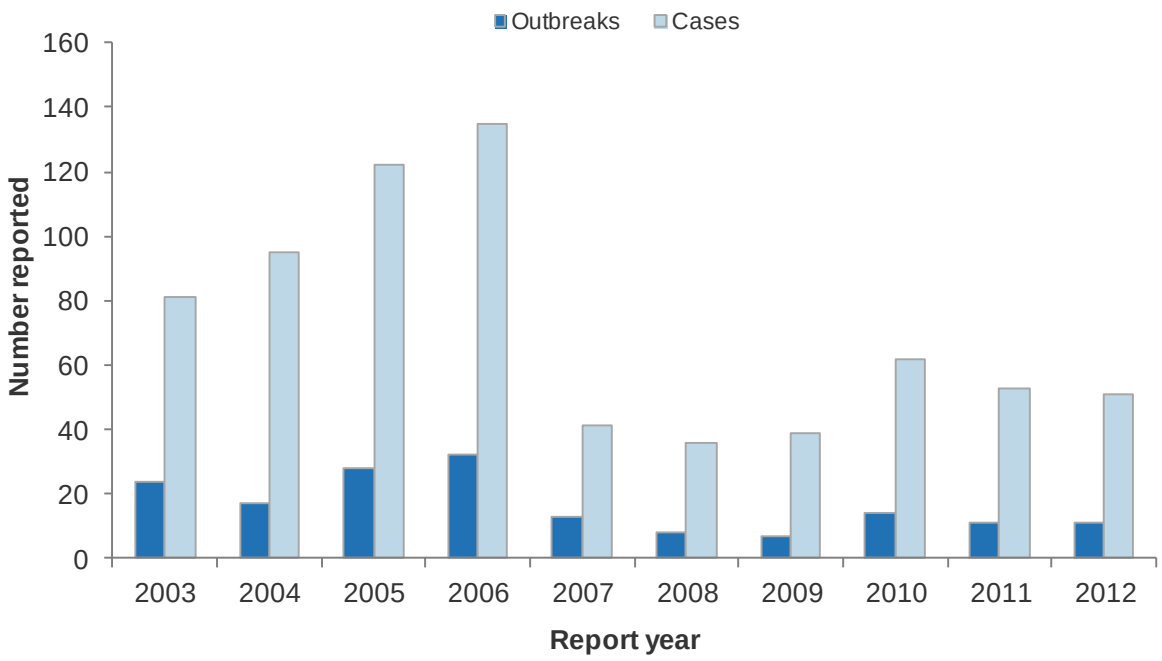


Table 12 contains details of the 11 foodborne *Campylobacter* spp. outbreaks reported in 2012.

Table 12. Details of foodborne *Campylobacter* spp. outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	Jan	Unknown	Private home	Private home	2C
Waikato	Jan	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	1C, 2P
Manawatu	Feb	Unknown	Long-term care facility	Long-term care facility	3C, 8P
Wellington	Apr	Chicken liver pâté	Restaurant/cafe/bakery	Restaurant/cafe/bakery	4C, 5P
Waikato	May	Unknown	Private home, childcare centre	Private home	1C, 2P
Manawatu	Jul	Raw milk	Private home	Commercial food manufacturer	3C, 1P
Waikato	Aug	Raw milk	Private home		2C
Tauranga	Sep	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	4C, 2P
Manawatu	Oct	Undercooked chicken	Hostel/boarding house	Community gathering	1C, 2P
Waikato	Oct	Raw milk, insufficiently treated drinking water	Private home	Private home	3C, 2P
Waikato	Nov	Unknown	Farm		1C, 2P

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

For all five *Campylobacter* spp. outbreaks with a suspected food vehicle (Table 12), the evidence for the implicated food was weak.

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2012, samples were received from three of the foodborne outbreaks listed in Table 12. *Campylobacter* was isolated from clinical specimens submitted from two outbreaks, but was not isolated from chicken liver associated with the April outbreak in Wellington (Table 12).

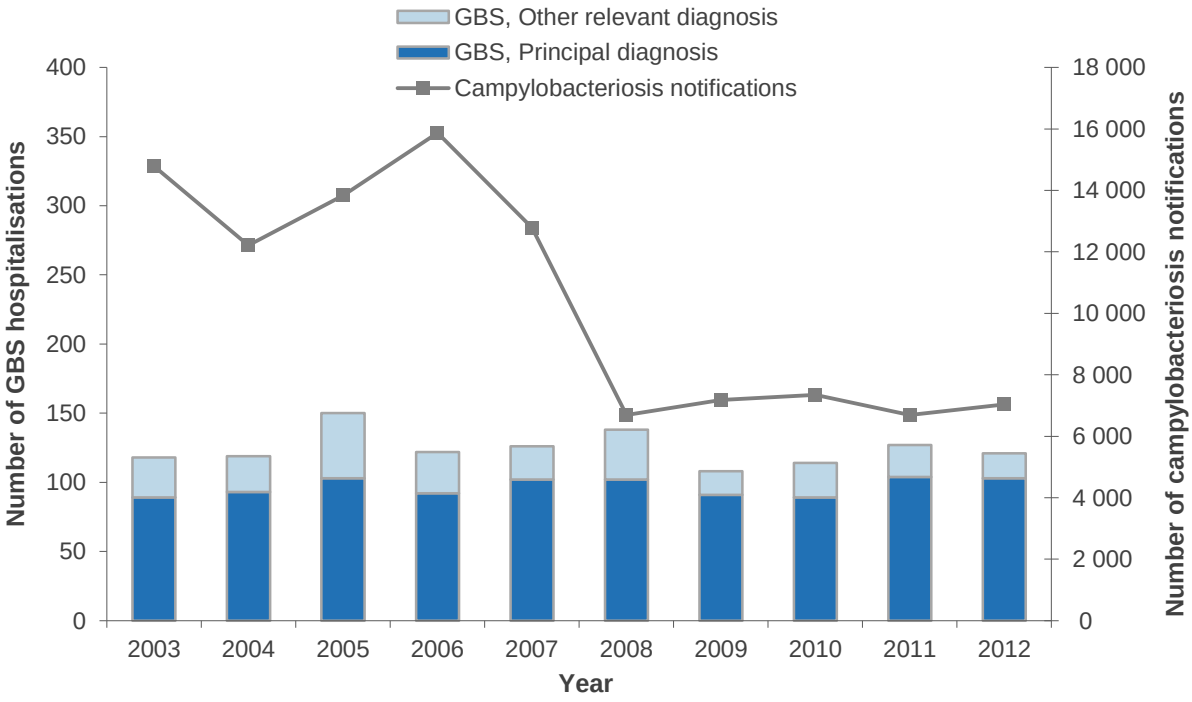
Disease sequelae - Guillain-Barré syndrome

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 121 hospitalised cases recorded in 2012 (2.7 admissions per 100 000 population), 103 were reported with GBS as the primary diagnosis and 18 with this condition as another relevant diagnosis.

Between 2003 and 2012, 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 hospitalised cases, 2003–2012



In 2012, the number of hospitalised cases due to GBS was higher for males than for females (Table 13).

Table 13. Guillain-Barré syndrome hospitalised cases by sex, 2012

Sex	Hospitalised cases[a]	
	No.	Rate[b]
Male	68	3.1
Female	53	2.4
Total	**121**	**2.7**

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

In 2012, 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 14).

Table 14. Guillain-Barré syndrome hospitalised cases by age group, 2012

Age group (years)	Hospitalised cases	
	No.	Rate[b]
<5	8	2.6
5 to 9	2	-
10 to 14	1	-
15 to 19	1	-
20 to 29	9	1.4
30 to 39	10	1.8
40 to 49	18	2.9
50 to 59	26	4.6
60 to 69	17	4.0
70+	29	6.9
Total	**121**	**2.7**

[a] MoH NMDS 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

Nil.

Relevant New Zealand studies and publications

1. Reports

Campylobacter exposure models for the consumption of different meat types were generated during a Cross Departmental Research Project (CDRP). These CDRP models indicated that the estimated number of campylobacteriosis notifications in New Zealand due to poultry was markedly higher than for all other meat types. A project was conducted to review the inputs to the CDRP beef exposure model (excluding offal), and conduct sensitivity analysis of the model [15].

Between 2007 and 2009, the New Zealand Food Safety Authority (NZFSA, now incorporated into MPI) funded Massey University to develop a statistical model to detect spatio-temporal clusters in campylobacteriosis notification data. This model (epiclustR) was applied to retrospective New Zealand campylobacteriosis notification data from 2001 to 2007. The model was trialled to assess whether it could be used by public health agencies to aid disease outbreak investigation [16].

2. Journal papers

A study was carried out to determine the prevalence and genetic diversity of *Campylobacter* spp. in domestic backyard chicken flocks in the Canterbury region of New Zealand [17]. *Campylobacter* spp. were detected in 86% of flocks examined. Genetic analysis revealed that 28 of 50 different genotypes had previously been isolated from human cases of campylobacteriosis. Many of the genotypes were indistinguishable from types previously isolated from retail chicken.

Campylobacter was detected in one of 296 (0.34%) samples of raw milk taken from farm vats in five of the main milk collection regions of New Zealand [18].

A retrospective analysis of 36,000 notified human cases of human campylobacteriosis during 2001−2007 explored spatial and temporal determinants of *Campylobacter* notification [19]. High dairy cattle density was associated with an increased risk of notification in two of three regions studied. Rural residence was a risk factor for young children, while generally urban residence was a risk factor.

A literature review concluded that poor home hygiene practices during food preparation was a contributing factor to New Zealand's comparatively high rate of campylobacteriosis [20]. However, the study noted that there was little information available from which to draw this conclusion.

Occurrence of *Campylobacter* spp. was investigated on five occasions over six months in a housed dairy goat herd in New Zealand [21]. Overall, 74 of 249 fresh faecal samples were found to contain *Campylobacter* spp., with the predominant species being *C. jejuni*.

In an analysis of hospitalisation records for 1988-2010, annual rates of hospitalisation for Guillain-Barré syndrome (GBS) were found to be significantly correlated with notification rates of campylobacteriosis. Three years after successful interventions to lower *Campylobacter* spp. contamination of fresh poultry meat, hospitalisations for GBS had declined by 13% [22].

Relevant regulatory developments

During 2012, a notice was issued including changes to the *Campylobacter* Performance Targets for poultry, included in the National Microbiological Database (NMD) requirements [23]. 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 2012 by data source

During 2012, one notification of ciguatera fish poisoning was reported in EpiSurv. Note that not all cases of ciguatera fish poisoning are necessarily notifiable, only those where there is a suspected common source.

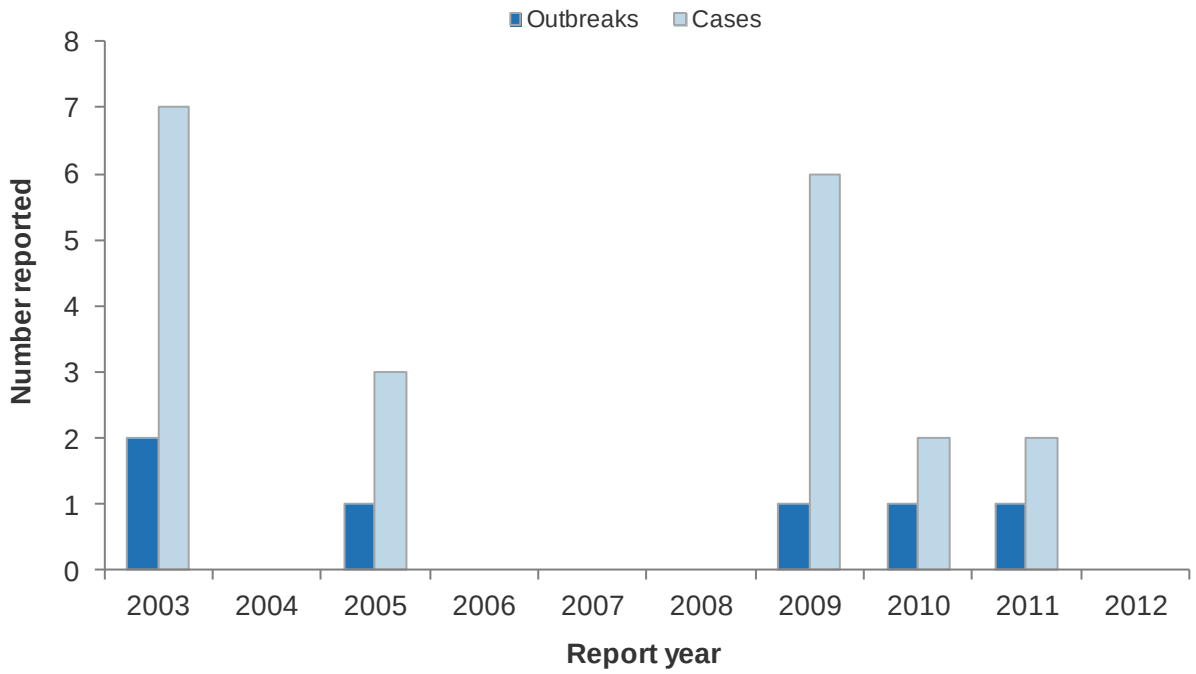
The ICD-10 code T61.0 was used to extract ciguatera fish poisoning hospitalisation data from the MoH NMDS database. Of the 15 hospital admissions (0.3 admissions per 100 000 population) recorded in 2012, 13 were reported with ciguatera fish poisoning as the primary diagnosis and two with ciguatera fish 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

No foodborne outbreaks of ciguatera fish poisoning were reported in 2012.

Over the 10-year period from 2003 to 2012, very few outbreaks of ciguatera fish poisoning were reported, with no more than two outbreaks of ciguatera fish poisoning reported in any year (Figure 13).

Figure 13. Foodborne ciguatera fish poisoning outbreaks and associated cases reported by year, 2003–2012



In 2012, 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.

Confirmed: A clinically compatible illness that is laboratory confirmed, OR a clinically compatible illness and a common exposure associated with a laboratory confirmed case

Clostridium perfringens intoxication cases reported in 2012 by data source

During 2012, two 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 2012 with *C. perfringens* intoxication as a primary or other relevant diagnosis.

Outbreaks reported as caused by *Clostridium perfringens*

There were four *C. perfringens* outbreaks with 18 associated cases reported in 2012, all were associated with a suspected or known foodborne source (Table 15).

Table 15. *C. perfringens* outbreaks reported, 2012

Measure	Foodborne *C. perfringens* outbreaks	All *C. perfringens* outbreaks
Outbreaks	4	4
Cases	18	18
Hospitalised cases	0	0

Between 2003 and 2012, 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.

Figure 14. Foodborne *C. perfringens* outbreaks and associated cases reported by year, 2003–2012

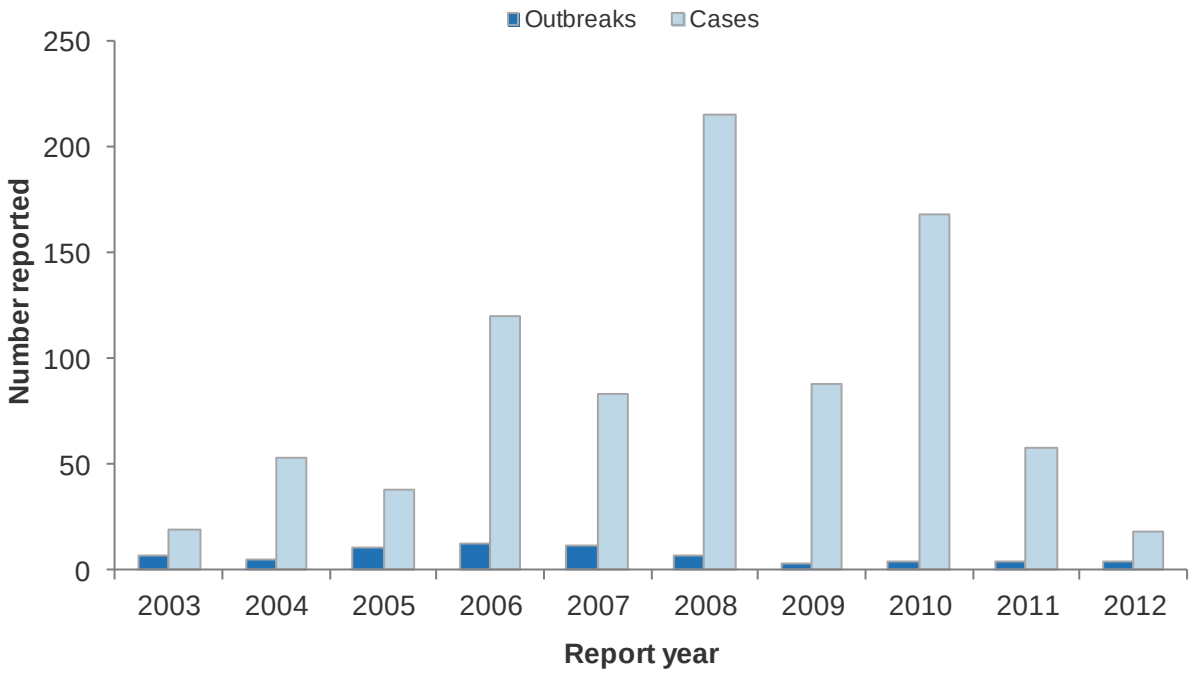


Table 16 contains details of the four foodborne *C. perfringens* outbreaks reported in 2012.

Of the two *C. perfringens* outbreaks with a suspected food vehicle (Table 16), the evidence for the implicated food was strong for the rice salad (*C. perfringens* isolated from both the food and faecal samples) and weak for the fermented rice.

Table 16. Details of foodborne *C. perfringens* outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Canterbury	Sep	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	1C, 6P
Auckland	Oct	Rice salad	Temporary or mobile food premise	Temporary or mobile food premise	1C, 2P
Auckland	Nov	Fermented rice	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2P
Auckland	Nov	Unknown	Camp, takeaway	Camp, takeaway	2C, 4P

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

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2012, samples were received from three of the four outbreaks listed in Table 16. *C. perfringens* was detected in clinical samples from two of the four outbreaks identified in Table 16. *C. perfringens* was also isolated from a rice salad sample submitted in relation to the October outbreak in Auckland.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

Nil.

Cryptosporidiosis

Summary data for cryptosporidiosis in 2012 are given in Table 17.

Table 17. Summary of surveillance data for cryptosporidiosis, 2012

Parameter	Value in 2012	Source
Number of cases	877	EpiSurv
Rate (per 100 000)	19.8	EpiSurv
Hospitalisations (%)	54 (6.2%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	83 (9.4%)	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 acute illness that includes symptoms of diarrhoea (may be profuse and watery) 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 2012 by data source

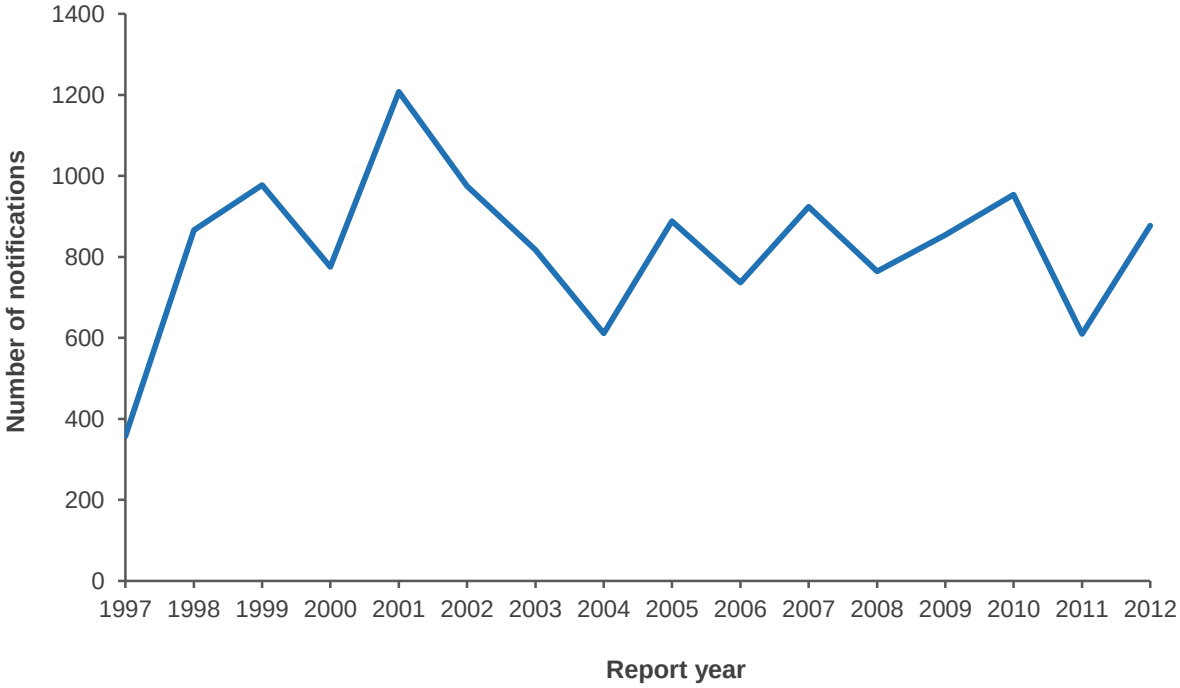
During 2012, 877 notifications (19.8 cases per 100 000 population) of cryptosporidiosis and no resulting deaths were reported in EpiSurv.

The ICD-10 code A07.2 was used to extract cryptosporidiosis hospitalisation data from the MoH NMDS database. Of the 54 hospital admissions (1.2 admissions per 100 000 population) recorded in 2012, 42 were reported with cryptosporidiosis as the primary diagnosis and 12 with cryptosporidiosis as another relevant diagnosis.

Notifiable disease data

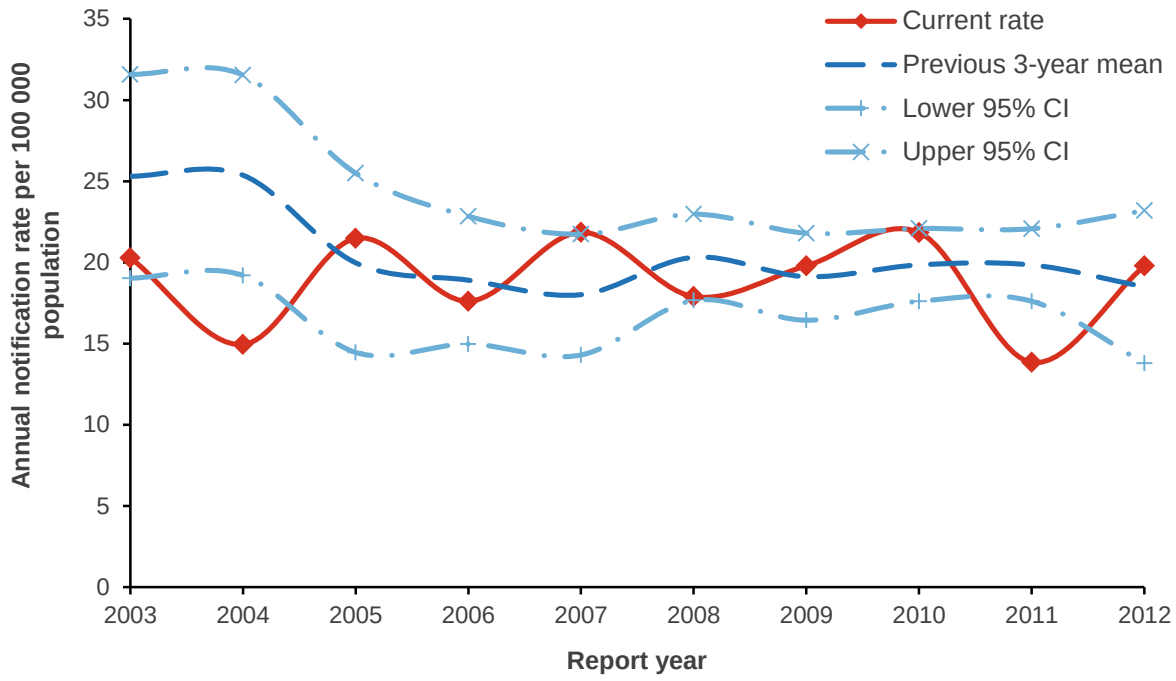
Cryptosporidiosis became a notifiable disease in 1996. The annual number of notifications peaked at 1208 cases in 2001 and then decreased to 611 in 2004. Since 2004, the number of notifications has ranged between 610 and 954 notifications each year (Figure 15).

Figure 15. Cryptosporidiosis notifications by year, 1997–2012



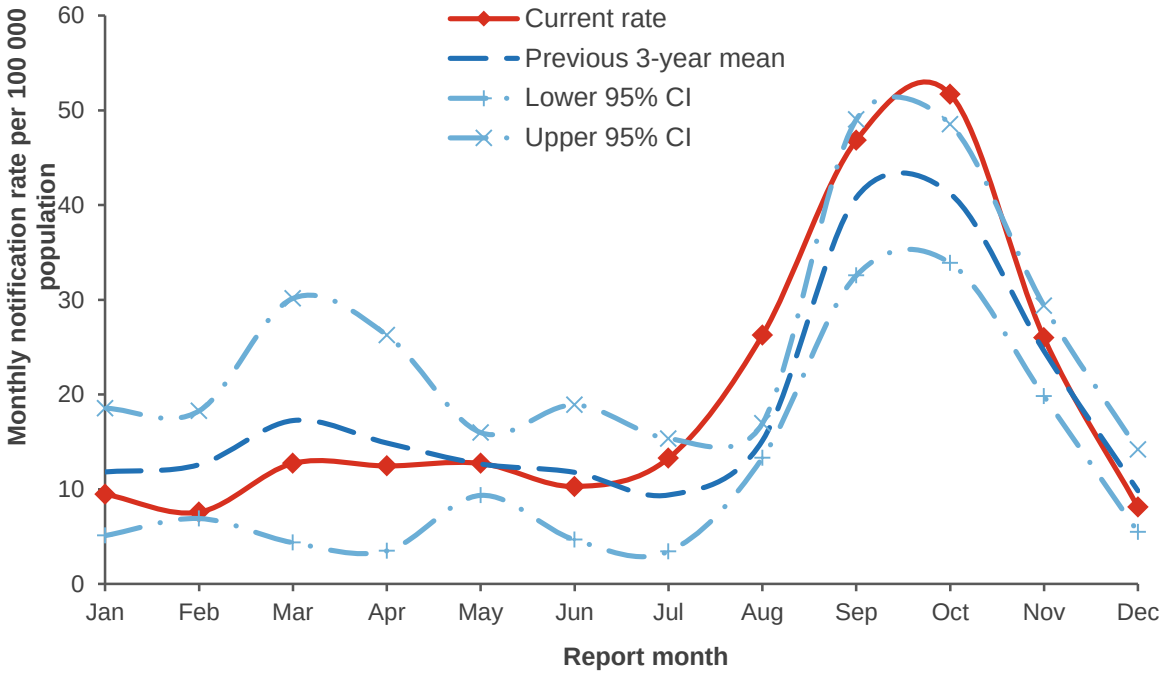
The cryptosporidiosis annual population rate trend is very similar to the corresponding annual notification trend. In 2012, notification rates were slightly higher than the mean of the previous 3 years with, the rates being similar each year (Figure 16).

Figure 16. Cryptosporidiosis notification rate by year, 2003–2012



The number of notified cases of cryptosporidiosis reported per 100 000 population by month for 2012 was mostly consistent with previous years. The spring peak in September/October began approximately one month earlier than usual in 2012 (Figure 17).

Figure 17. Cryptosporidiosis monthly rate (annualised), 2012



There have been consistently higher population rates of cryptosporidiosis notifications in the predominantly rural DHBs compared to the more urban DHBs (Figure 18). In 2012, the highest rates were for South Canterbury (81.3 per 100 000 population, 46 cases) and Waikato (48.3 per 100 000, 179 cases) DHBs.

In 2012, the number of notifications and rates for cryptosporidiosis were slightly higher for males (20.7 per 100 000 population, 452 cases) compared to females (18.9 per 100 000, 425 cases). This was also the case for the number and rate of hospitalisations (Table 18).

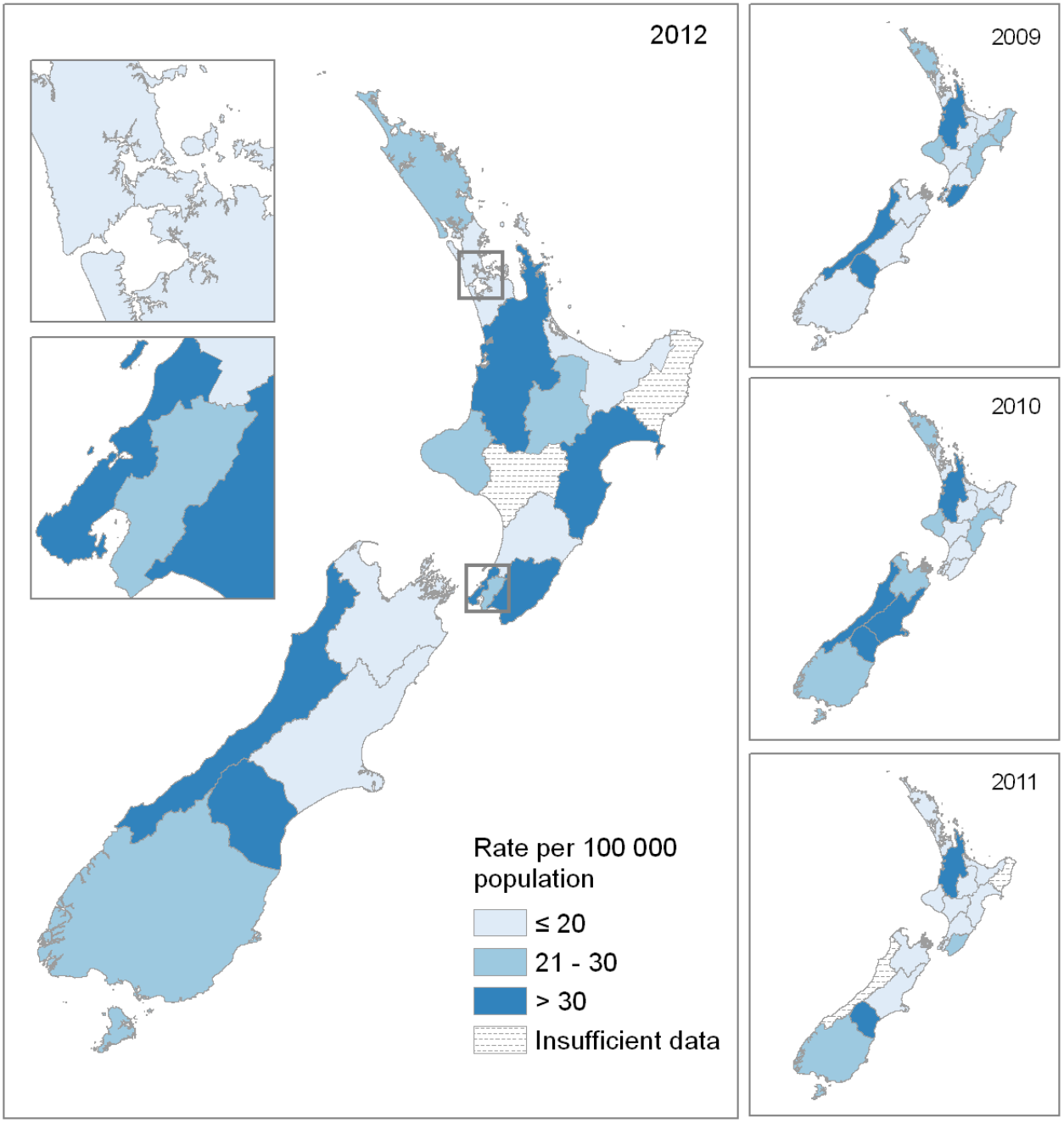
Table 18. Cryptosporidiosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	452	20.7	33	1.5
Female	425	18.9	21	0.9
Total	**877**	**19.8**	**54**	**1.2**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 of population

Figure 18. Geographic distribution of cryptosporidiosis notifications, 2009-2012



During 2012, the highest cryptosporidiosis age specific notification rates were for the 1 to 4 years age group (120.6 per 100 000 population, 303 cases), followed by the 5 to 9 years (38.8 per 100 000, 113 cases) and the less than 1 year (31.4 per 100 000, 19 cases) age groups (Table 19). The hospitalisation rates were also highest in the 1 to 4 years and the 5 to 9 years age groups.

Table 19. Cryptosporidiosis cases by age group, 2012

Age group	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	19	31.4	3	-
1 to 4	303	120.6	15	6.0
5 to 9	113	38.8	7	2.4
10 to 14	61	21.1	5	1.7
15 to 19	61	19.6	2	-
20 to 29	93	14.8	8	1.3
30 to 39	108	19.4	5	0.9
40 to 49	51	8.1	1	-
50 to 59	33	5.8	4	-
60 to 69	21	4.9	4	-
70+	14	3.3	0	-
Total	**877**	**19.8**	**54**	**1.2**

[a] MoH NMDS 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 2012, the most commonly reported risk factors for cryptosporidiosis were contact with farm animals (62.8%), consumption of untreated water (44.8%), and contact with faecal matter (35.0%) (Table 20).

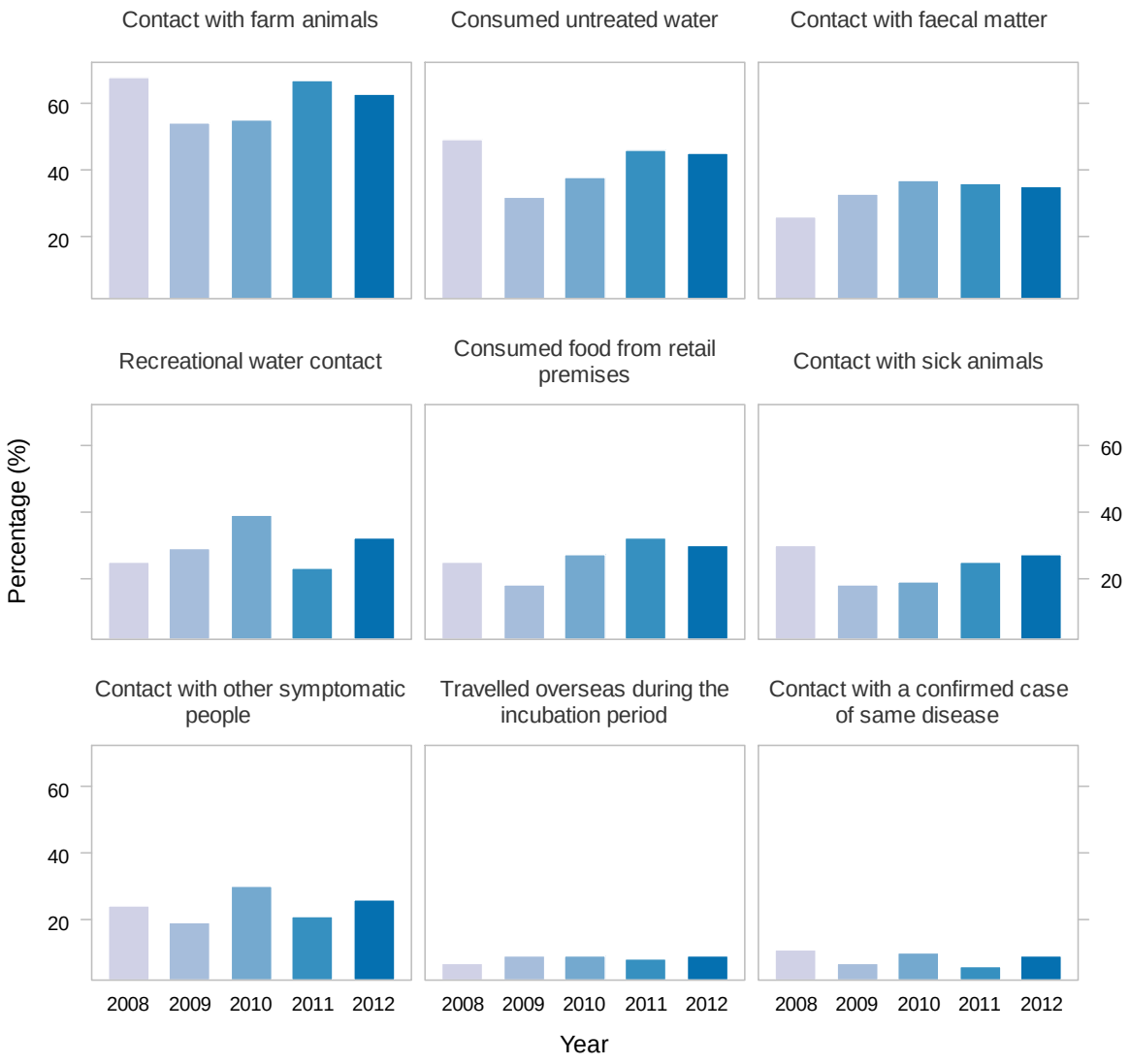
Table 20. Exposure to risk factors associated with cryptosporidiosis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Contact with farm animals	393	233	251	62.8
Consumed untreated water	231	285	361	44.8
Contact with faecal matter	187	348	342	35.0
Recreational water contact	190	405	282	31.9
Consumed food from retail premises	156	366	355	29.9
Contact with sick animals	128	350	399	26.8
Contact with other symptomatic people	142	409	326	25.8
Travelled overseas during the incubation period	60	577	240	9.4

[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 2008 and 2012, the most commonly 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 with an increase seen in 2012. There was also an increasing trend in the percentage of reported contact with sick animals and consumption of untreated water between 2009 and 2012.

Figure 19. Percentage of cases by exposure to risk factors associated with cryptosporidiosis and year, 2008–2012



For cases where information on travel was provided, 9.4% (95% CI 7.3-12.0%) 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 2012. The resultant distribution has a mean of 83 cases (95% CI 61-107).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 8.7% (95% CI 7.7-9.8%).

Outbreaks reported as caused by *Cryptosporidium* spp.

In 2012, one (2.1%) of the *Cryptosporidium* spp. outbreaks and two (1.2%) of the associated cases were reported as foodborne (Table 21). *Cryptosporidium* spp. outbreaks accounted for 6.6% (47/716) of all outbreaks and 1.6% (164/10491) of all associated cases.

Table 21. *Cryptosporidium* spp. outbreaks reported, 2012

Measure	Foodborne *Cryptosporidium* spp. outbreaks	All *Cryptosporidium* spp. outbreaks
Outbreaks	1	47
Cases	2	164
Hospitalised cases	0	0

Foodborne *Cryptosporidium* spp. outbreaks are rare, with not more than one outbreak reported each year in the nine year period, (2003−2009), two outbreaks reported in 2010 and four in 2011 (Figure 20). The largest outbreak, with 11 associated cases, was reported in 2011.

Figure 20. Foodborne *Cryptosporidium* spp. outbreaks and associated cases reported by year, 2003–2012

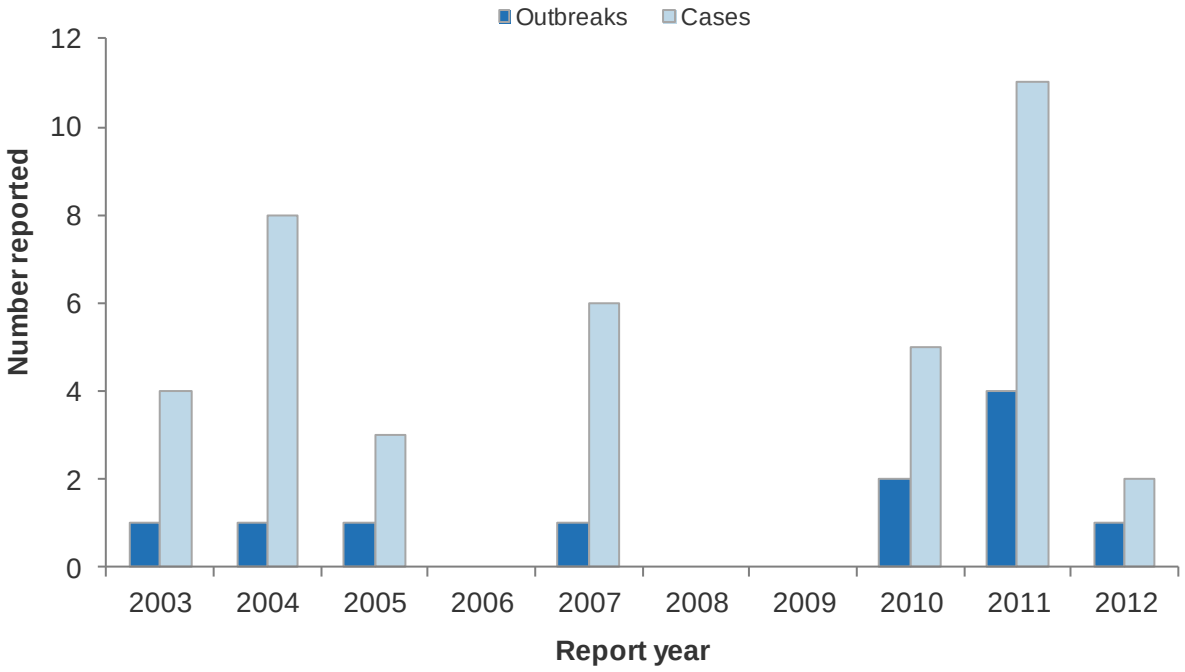


Table 22 contains details of the foodborne *Cryptosporidium* spp. outbreak reported in 2012.

Raw milk was the suspected food vehicle in the single *Cryptosporidium* spp. outbreak (Table 22). The evidence was weak for the implicated food.

Table 22. Details of foodborne *Cryptosporidium* spp. outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	Sep	Raw milk	Farm		2C

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

In 2012, 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

Molecular subtyping was used to characterise strains of *Cryptosporidium* and *Giardia* isolated from pre- and post-weaned calves from eight locations in Canterbury [24]. The study indicated that dairy calves in the South Island of New Zealand harbour zoonotic genotypes of these parasites, which are likely to have significant public health implications.

Relevant regulatory developments

Nil.

Giardiasis

Summary data for giardiasis in 2012 are given in Table 23.

Table 23. Summary of surveillance data for giardiasis, 2012

Parameter	Value in 2012	Source
Number of cases	1719	EpiSurv
Rate (per 100 000)	38.8	EpiSurv
Hospitalisations (%)	50 (2.9%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	342 (19.9%)	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, flatulence, nausea, 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 – that is, is part of a common-source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Giardiasis cases reported in 2012 by data source

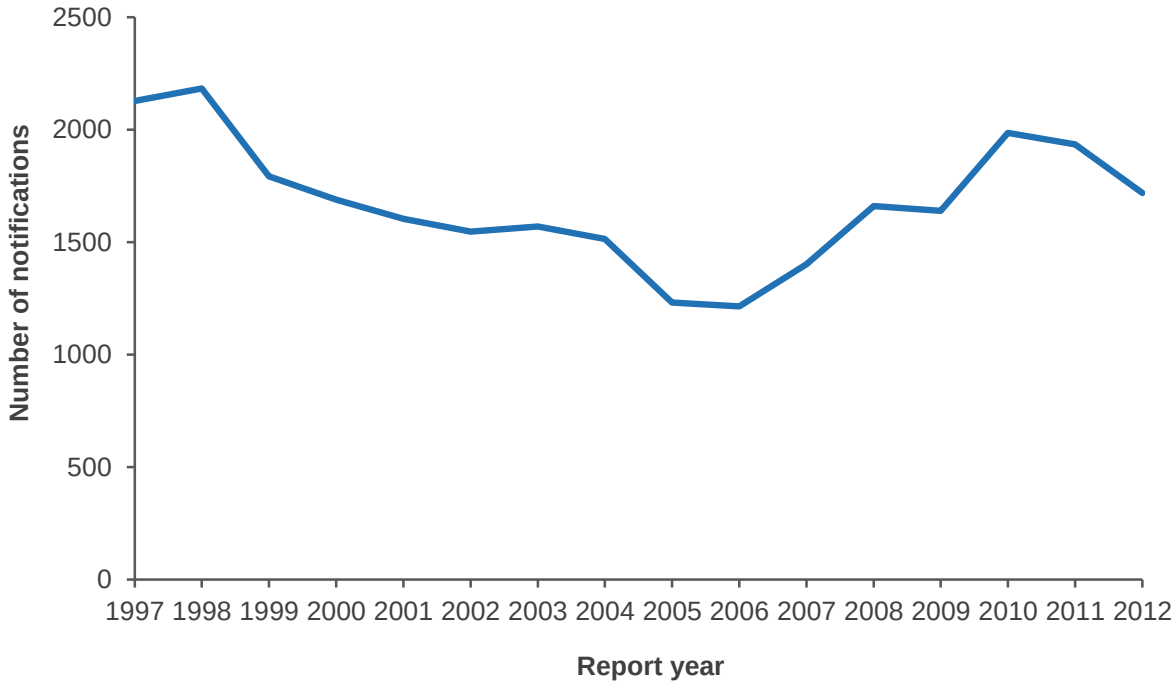
During 2012, 1719 notifications (38.8 cases per 100 000 population) of giardiasis and no resulting deaths were reported in EpiSurv.

The ICD-10 code A07.1 was used to extract giardiasis hospitalisation data from the MoH NMDS database. Of the 50 hospital admissions (1.1 admissions per 100 000 population) recorded in 2012, 27 were reported with giardiasis as the primary diagnosis and 23 with giardiasis as another relevant diagnosis.

Notifiable disease data

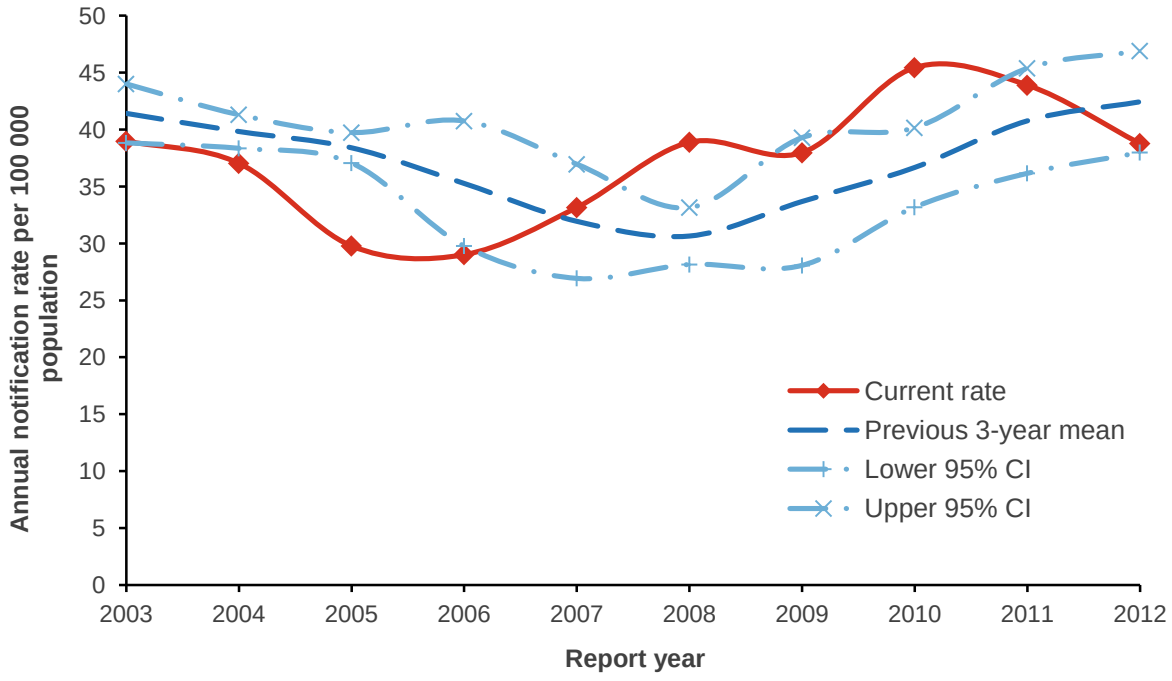
There was a steady decrease in the number of giardiasis cases reported each year from 1998 to 2006. Since 2006, an increasing trend in the number of notifications was observed although there has been a decrease in the number of notifications since 2010. The highest number of notifications since 1999 was reported in 2010 (1985 cases), followed by 2011 (1934 cases) (Figure 21).

Figure 21. Giardiasis notifications by year, 1997–2012



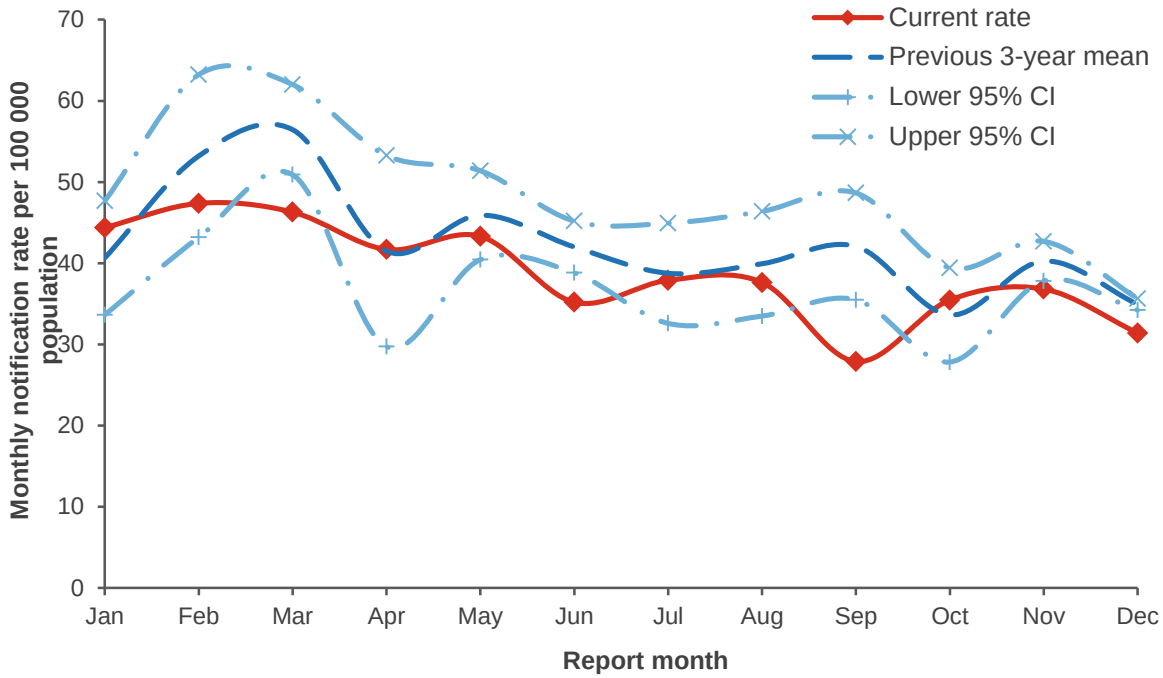
The giardiasis annual population rate trend is very similar to the corresponding annual notification trend. The giardiasis notification rate was decreasing steadily from 2003 to 2006 and then showed an increasing trend from 2006 to 2010 (Figure 22). The 2012 notification rate has shown a decrease to similar rates in 2003 and 2008. The 2010 rate was the highest rate reported between 2003 and 2012.

Figure 22. Giardiasis notification rate by year, 2003–2012



There was no strong seasonal pattern in the population rate of giardiasis notifications reported by month either historically or in 2012. Overall, there were similar or fewer notifications reported each month 2012 compared to previous years (Figure 23).

Figure 23. Giardiasis monthly rate (annualised), 2012



Giardiasis rates varied throughout the country during 2012 (Figure 24). The highest rate was for Lakes DHB (57.2 per 100 000 population, 59 cases), followed by Auckland (55.6 per 100 000, 257 cases) DHB. The lowest rates were for Whanganui (11.2 per 100 000 population, 7 cases) and MidCentral (11.8 per 100 000, 20 cases) DHBs. Auckland and Capital and Coast DHBs have consistently been in the highest quantile in the last four years.

The 2012 number and rate for both notifications and hospitalisations were slightly higher for females compared to males (Table 24).

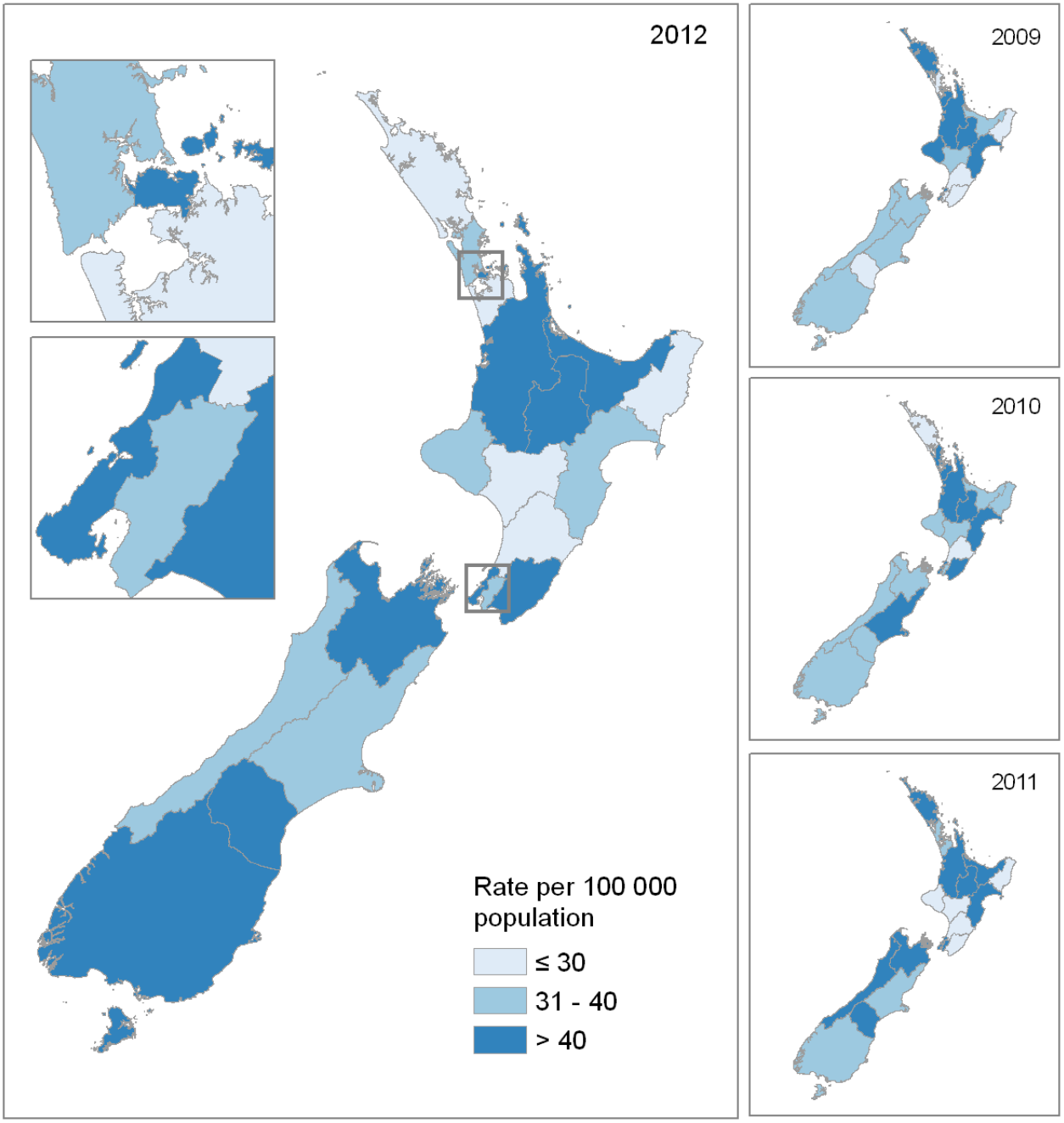
Table 24. Giardiasis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	811	37.2	21	1.0
Female	907	40.3	29	1.3
Unknown	1	-	0	-
Total	**1 719**	**38.8**	**50**	**1.1**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 of population

Figure 24. Geographic distribution of giardiasis notifications, 2009–2012



In 2012, the highest notification rate was for the 1 to 4 years age group (136.5 per 100 000 population, 343 cases), followed by the 30 to 39 years (72.1 per 100 000, 402 cases) and the less than 1 year (62.7 per 100 000, 38 cases) age groups (Table 25). The number of hospitalisations was highest for the 20 to 29 years age group.

Table 25. Giardiasis cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	38	62.7	1	-
1 to 4	343	136.5	6	2.4
5 to 9	102	35.0	2	-
10 to 14	36	12.5	1	-
15 to 19	39	12.5	1	-
20 to 29	177	28.2	11	1.8
30 to 39	402	72.1	3	-
40 to 49	236	37.7	5	0.8
50 to 59	156	27.4	7	1.2
60 to 69	146	34.1	9	2.1
70+	41	9.8	4	-
Unknown	3	-	0	-
Total	**1 719**	**38.8**	**50**	**1.1**

[a] MoH NMDS 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 2012, the most commonly reported risk factors for notified giardiasis cases were contact with faecal matter (45.5%), contact with recreational water (36.5%), and contact with other symptomatic people (34.8%) (Table 26).

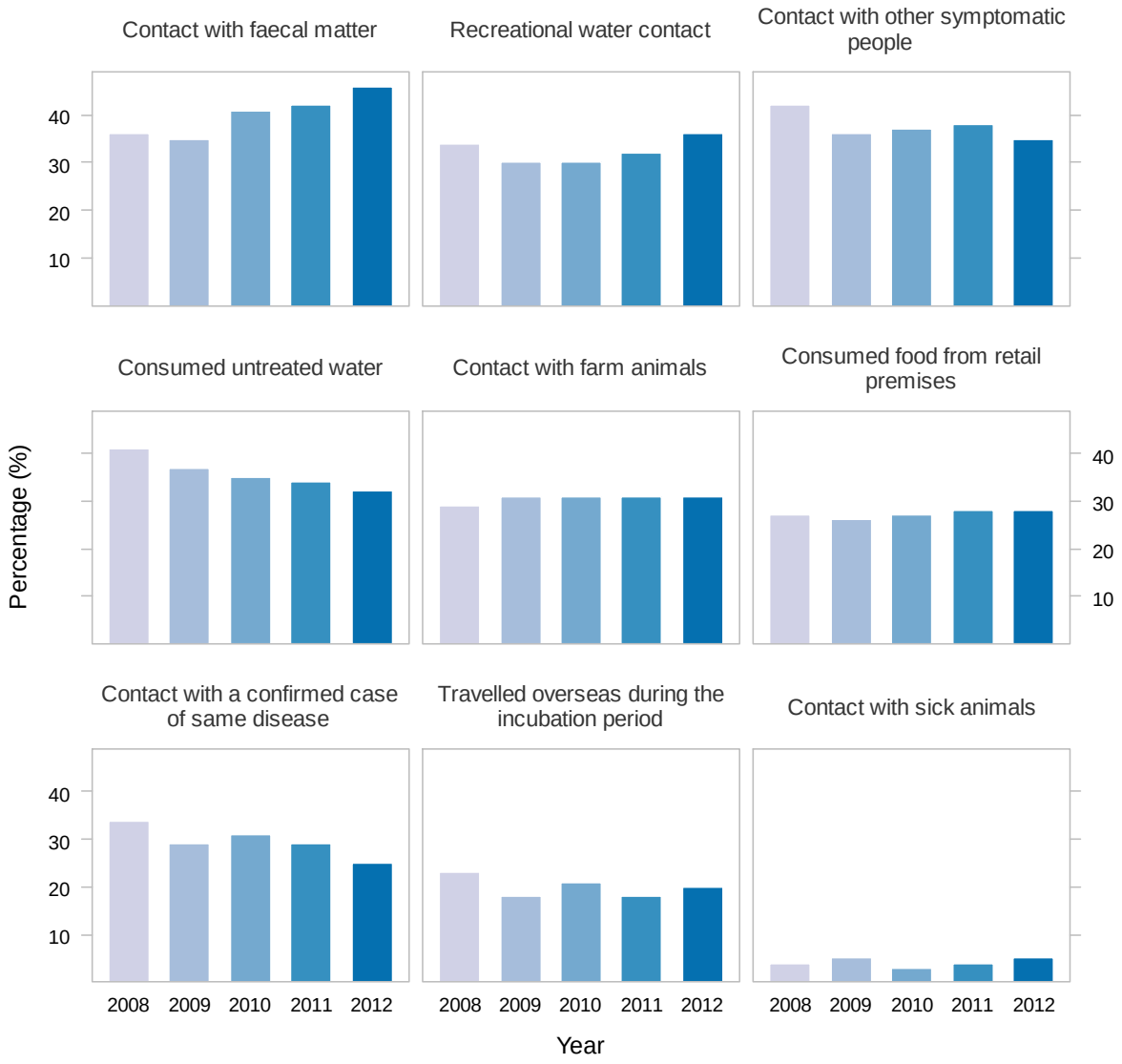
Table 26. Exposure to risk factors associated with giardiasis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Contact with faecal matter	326	390	1 003	45.5
Recreational water contact	269	468	982	36.5
Contact with other symptomatic people	254	475	990	34.8
Consumed untreated water	214	446	1 059	32.4
Contact with farm animals	236	532	951	30.7
Consumed food from retail premises	173	440	1 106	28.2
Travelled overseas during the incubation period	170	686	863	19.9
Contact with sick animals	31	645	1 043	4.6

[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 2008 and 2012, the most commonly reported risk factors for giardiasis were contact with faecal matter, recreational water contact, and contact with other symptomatic people (Figure 25). There was a decreasing trend in the percentage of reported contact with other symptomatic people, consumption of untreated water and contact with a confirmed case of same disease. Conversely, there was an increasing trend in reported contact with faecal matter.

Figure 25. Percentage of cases by exposure to risk factors associated with giardiasis and year, 2008−2012



For cases where information on travel was provided, 19.9% (95% CI 17.2-22.7%) 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 2012. The resultant distribution has a mean of 341 cases (95% CI 290-396).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 19.2% (95% CI 18.0-20.5%).

Outbreaks reported as caused by *Giardia* spp.

In 2012, there were 69 *Giardia* spp. outbreaks reported. Six of these were associated with a suspected or known foodborne source (Table 27).

Table 27. Giardia spp. outbreaks reported, 2012

Measure	Foodborne *Giardia* spp. outbreaks	All *Giardia* spp. outbreaks
Outbreaks	6	69
Cases	17	284
Hospitalised cases	0	3

Between 2003 and 2010, one to four foodborne *Giardia* spp. outbreaks were reported each year, with the exception of 2009 when no outbreaks were reported (Figure 26). Each of these outbreaks involved two to six cases. In 2011 and 2012, six outbreaks each were reported involving 24 cases and 17 cases respectively. This represented the greatest number of foodborne *Giardia* spp. outbreaks and associated cases reported in the period 2003−2012.

Figure 26. Foodborne *Giardia* spp. outbreaks and associated cases of reported by year, 2003–2012

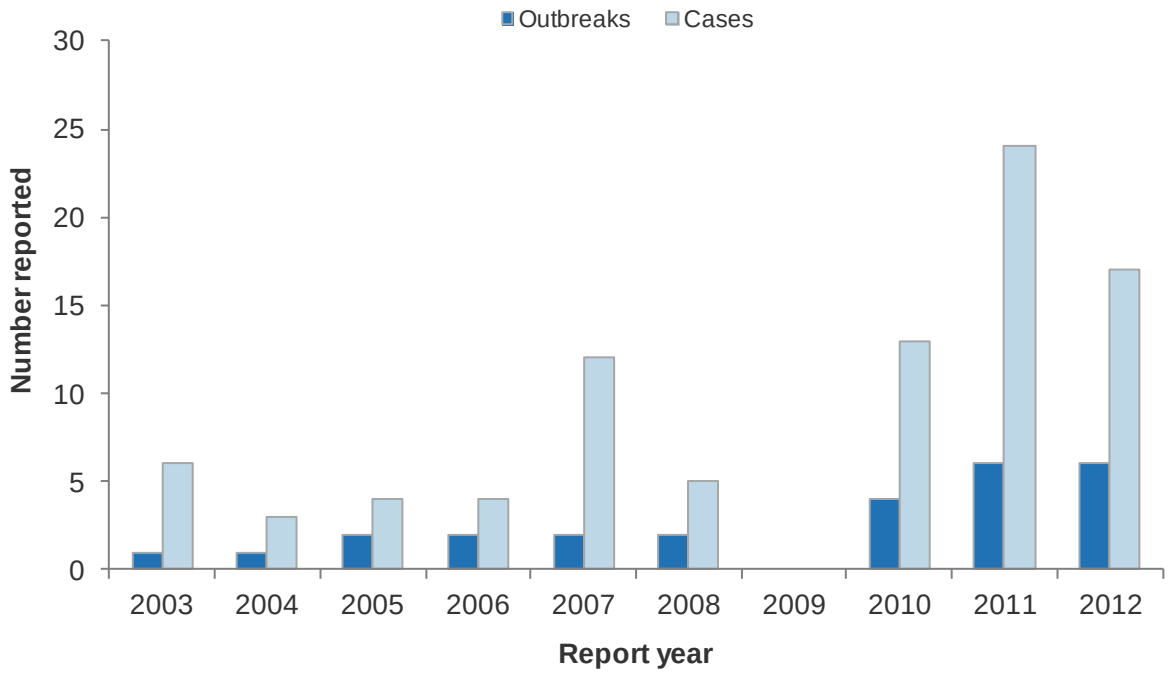


Table 28 contains details of the six foodborne *Giardia* spp. outbreaks reported in 2012.

Table 28. Details of foodborne *Giardia* spp. outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Waikato	Jan	Unknown	Private home	Private home	2C
Waikato	Mar	Unknown	Private home	Private home	4C
Waikato	Jun	Unknown	Private home	Farm, private home	1C, 1P
Auckland	Jul	Unknown	Private home		3C
Auckland	Oct	Unknown	Private home	Private home	4C
Waikato	Oct	Unknown	Private home		1C, 1P

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

In 2012, 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

Molecular subtyping was used to characterise strains of *Cryptosporidium* and *Giardia* isolated from pre- and post-weaned calves from eight locations in Canterbury [24]. The study indicated that dairy calves in the South Island of New Zealand harbour zoonotic genotypes of these parasites, which are likely to have significant public health implications.

Relevant regulatory developments

Nil.

Hepatitis A

Summary data for hepatitis A in 2012 are given in Table 29.

Table 29. Summary of surveillance data for hepatitis A, 2012

Parameter	Value in 2012	Source
Number of cases	82	EpiSurv
Rate (per 100 000)	1.8	EpiSurv
Hospitalisations (%)	39 (47.6%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	41 (50.0%)	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: Following a prodrome of fever, malaise, anorexia, nausea or abdominal discomfort, there is jaundice, elevated serum aminotransferase levels and sometimes an enlarged tender liver. Children are often asymptomatic and occasionally present with atypical symptoms, including diarrhoea, cough, coryza or arthralgia. Jaundice is very unusual in children younger than 4 years, and 90% of cases in the 4–6 years age group are anicteric.

Laboratory test for diagnosis: Positive hepatitis A-specific IgM in serum (in the absence of recent vaccination).

Case classification:

Probable: A clinically compatible illness that is epidemiologically linked to a confirmed case.

Confirmed: A clinically compatible illness that is laboratory confirmed

Hepatitis A cases reported in 2012 by data source

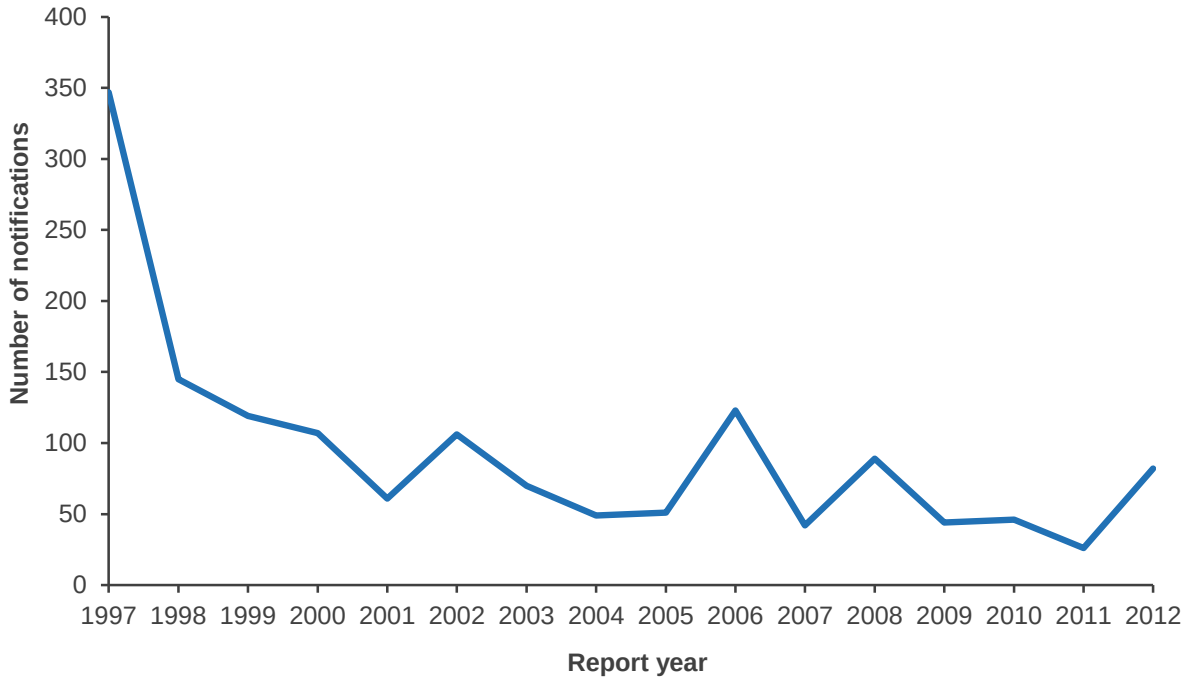
During 2012, 82 notifications (1.8 cases per 100 000 population) of hepatitis A and no resulting deaths were reported in EpiSurv.

The ICD-10 code B15 was used to extract hepatitis A hospitalisation data from the MoH NMDS database. Of the 39 hospital admissions (0.9 admissions per 100 000 population) recorded in 2012, 35 were reported with hepatitis A as the primary diagnosis and 4 with hepatitis A as another relevant diagnosis.

Notifiable disease data

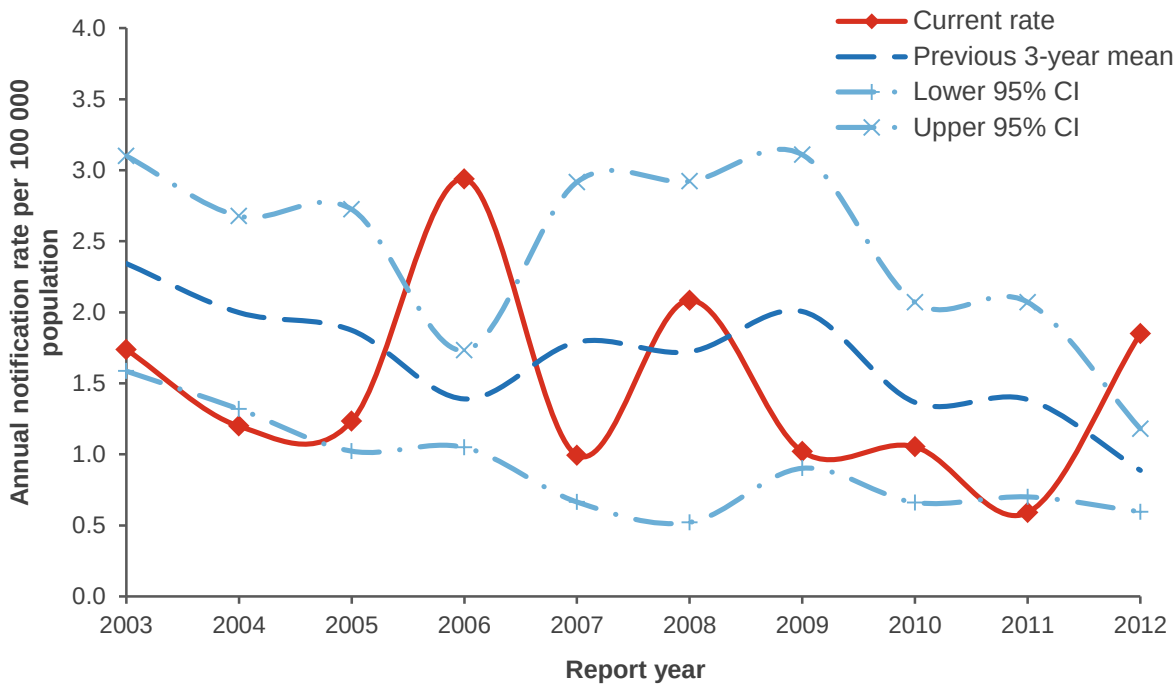
Between 1997 and 2012, there has been an overall downward trend in the number of notifications of hepatitis A, although an increase in notifications was observed in 2002, 2006, 2008, and 2012 corresponding to large numbers of hepatitis A cases associated with an outbreak in each of those years (Figure 27).

Figure 27. Hepatitis A notifications by year, 1997–2012



Hepatitis A notification rates varied throughout the 10-year period, 2003–2012 (Figure 28). The notification rate trend is very similar to the corresponding annual notification trend, showing peaks in 2006 and 2008 and an increase in 2012. The highest hepatitis A notification rate was in 2006 (2.9 per 100 000 population).

Figure 28. Hepatitis A notification rate by year, 2003–2012



In 2012, the number and rate of hepatitis A notifications and hospitalisations were higher for males compared to females (Table 30).

Table 30. Hepatitis A cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	45	2.1	23	1.1
Female	37	1.6	16	0.7
Total	**82**	**1.8**	**39**	**0.9**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 of population

In 2012, the highest notification rate was for the less than 20 years age group (4.1 per 100 000 population, 49 cases), followed by the 20 to 39 years age group (1.6 per 100 000, 19 cases). The hospitalisation rate was also highest for the less than 20 years age group (18 cases) (Table 31).

Table 31. Hepatitis A cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<20	49	4.1	18	1.5
20 to 39	19	1.6	13	1.1
40 to 59	10	0.8	5	0.4
60+	4	-	3	-
Total	**82**	**1.8**	**39**	**0.9**

[a] MoH NMDS 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 2012 was contact with a household confirmed case (61.1%) (Table 32).

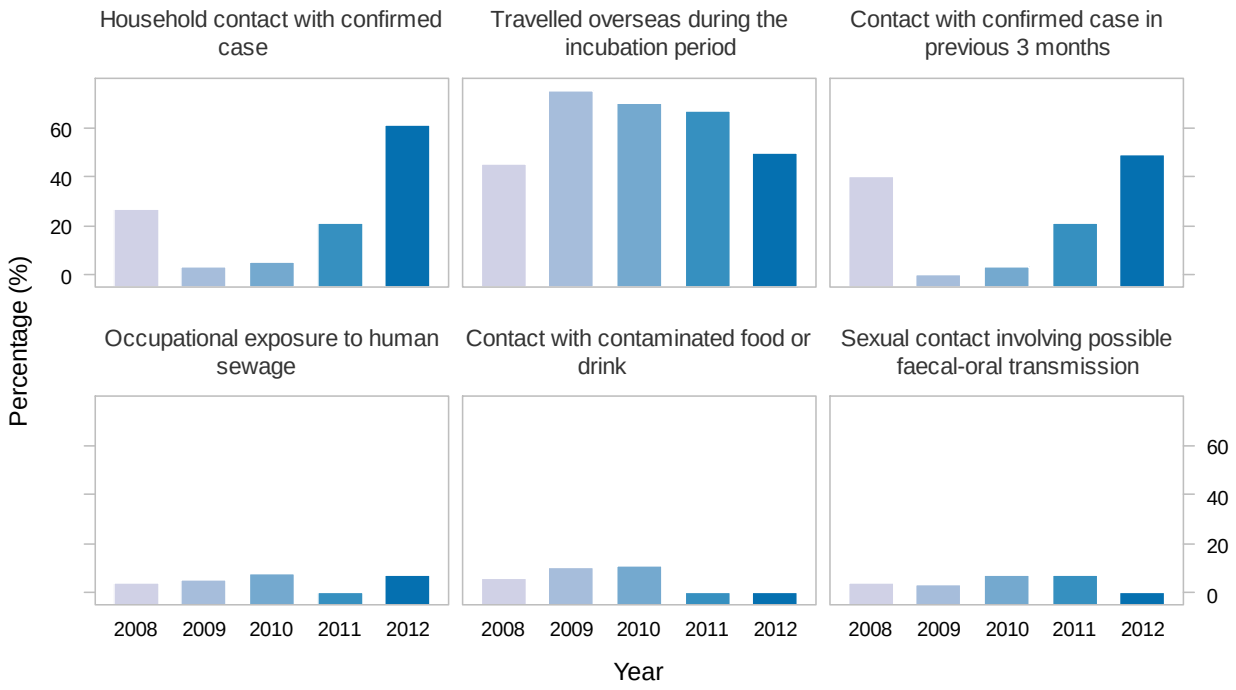
Table 32. Exposure to risk factors associated with hepatitis A, 2012

Risk Factor	Notifications			
	Yes	No	Unknown	%[a]
Household contact with confirmed case	33	21	28	61.1
Travelled overseas during the incubation period	38	38	6	50.0
Contact with confirmed case in previous 3 months	22	23	37	48.9
Occupational exposure to human sewage	3	43	36	6.5
Contact with contaminated food or drink	0	25	57	0.0
Sexual contact involving possible faecal-oral transmission	0	48	34	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.

A decrease in reported cases from overseas travel during the incubation period was seen in 2012, a change from previous years as since 2008 to 2011 it was the most frequently reported risk factor (Figure 29). In 2012, an increase in the percentage of reported household contact with a confirmed case made it the most common risk factor. Contact with a confirmed case in the previous three months also showed an increase. Contact with contaminated food or drink has been reported by only a small proportion of cases each year.

Figure 29. Hepatitis A risk factors by percentage of cases and year, 2008−2012



For cases where information on travel was provided, 50.0% (95% CI 38.3-61.7%) 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 2012. The resultant distribution has a mean of 41 cases (95% CI 27-57).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 62.9% (95% CI 53.7-72.8%).

Outbreaks reported as caused by hepatitis A virus

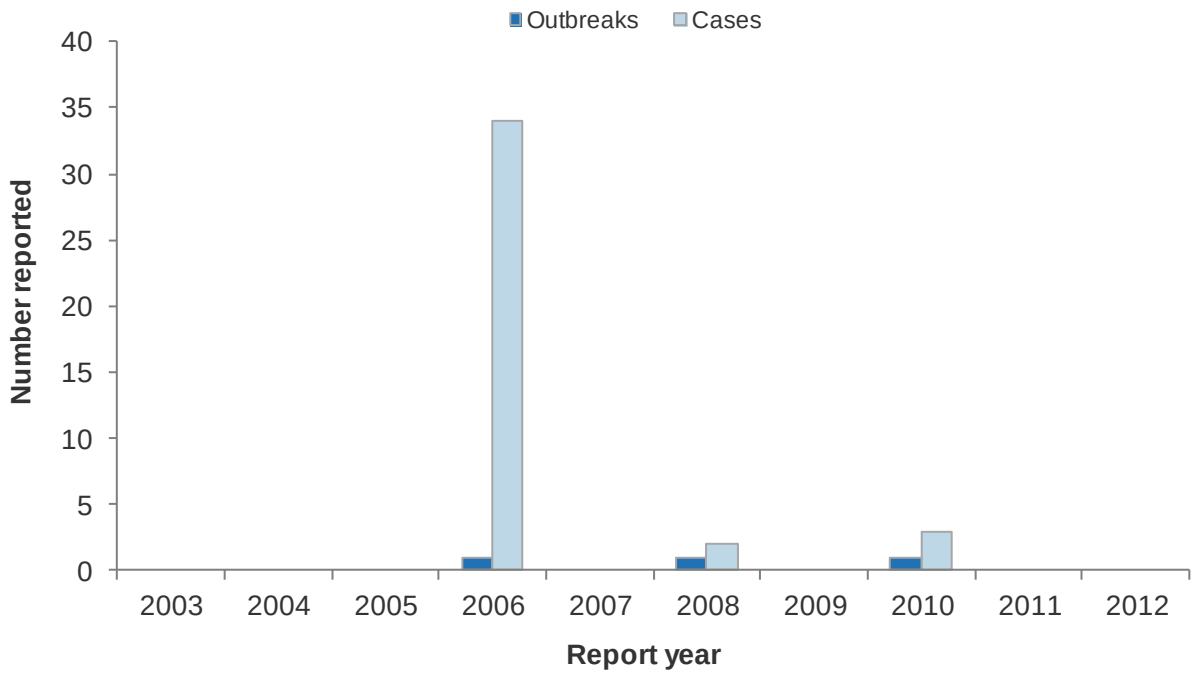
One outbreak of hepatitis A virus with 30 cases was reported in 2012. The outbreak was not associated with a suspected or known foodborne source (Table 33).

Table 33. Hepatitis A outbreaks reported, 2012

Measure	Foodborne Hepatitis A outbreaks	All Hepatitis A outbreaks
Outbreaks	0	1
Cases	0	30
Hospitalised cases	0	0

Foodborne hepatitis A virus outbreaks are rare with only three outbreaks reported in the period 2003 to 2012 (2006, 2008 and 2010) (Figure 30). Although occurring infrequently, foodborne outbreaks of hepatitis A virus can be associated with many cases (34 cases for the outbreak reported in 2006), although this was not so for the food-associated outbreaks in 2008 and 2010 (2 cases and 3 cases respectively).

Figure 30. Foodborne hepatitis A virus outbreaks and associated cases reported by year, 2003–2012



In 2012, 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 2012 by data source

Four cases of histamine (scombroid) fish poisoning and no resulting deaths were reported in EpiSurv during 2012. Note that not every case of histamine (scombroid) fish poisoning is necessarily notifiable, only those where there is a suspected common source.

The ICD-10 code T61.1 was used to extract scombroid fish poisoning hospitalisation data from the MoH NMDS database. Of the 11 hospital admissions (0.3) were recorded in 2012, 10 were reported with scombroid fish poisoning as the primary diagnosis and one with scombroid fish poisoning as another relevant diagnosis.

Outbreaks reported as caused by histamine (scombroid) fish poisoning

One histamine (scombroid) fish poisoning outbreak was reported in 2012 involving two associated cases, neither case were hospitalised (Table 34).

Table 34. Histamine (scombroid) fish poisoning outbreaks reported, 2012

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

Between 2003 and 2012 the number of foodborne histamine (scombroid) fish poisoning outbreaks reported each year ranged from one to six (Figure 31). The highest number of outbreaks was reported in 2004 (6 outbreaks, 21 cases) and the highest total number of associated cases was reported in 2003 (5 outbreaks, 26 cases).

Figure 31. Foodborne histamine (scombroid) fish poisoning outbreaks and associated cases reported by year, 2003–2012

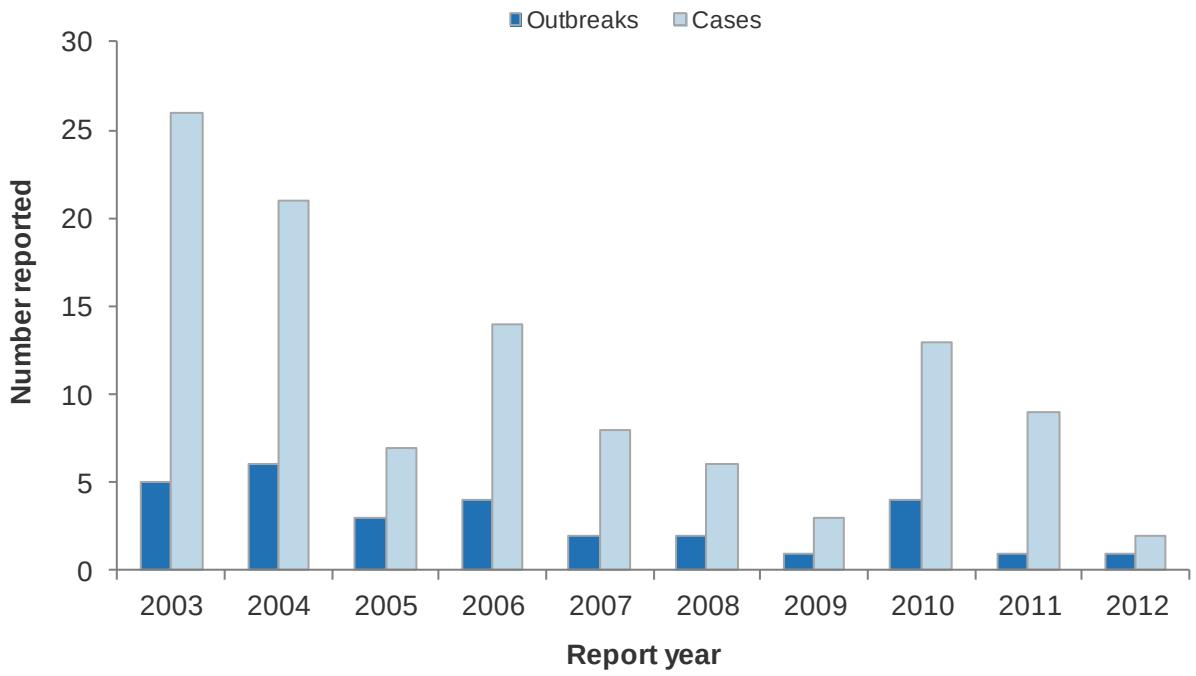


Table 35 contains details of the one histamine fish poisoning outbreak reported in 2012.

Table 35. Details of foodborne histamine (scombroid) fish poisoning outbreak, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Jan	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2P

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

In 2012, 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 2012 are given in Table 36.

Table 36. Summary of surveillance data for listeriosis, 2012

Parameter	Value in 2012	Source
Number of cases	25	EpiSurv
Rate (per 100 000)	0.6	EpiSurv
Hospitalisations (%)	27 (108%)	MoH NMDS
Deaths (%)	6 (24%)	EpiSurv
Estimated travel-related cases (%)	1 (4.3%)	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: Listeriosis most commonly presents with diarrhoea, often associated with fever, myalgia and vomiting. Bacteraemia most often occurs in pregnant women (usually in the third trimester), the elderly and immunosuppressed. In pregnant women, the foetus may become infected, sometimes leading to miscarriage, stillbirth, premature delivery, newborn septicaemia or meningitis. The elderly and immunosuppressed may present with septicaemia, meningitis or pyogenic foci of infection.

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

Case classification:

Probable Not applicable

Confirmed A clinically compatible illness that is laboratory confirmed

Cases can be further classified, if appropriate, as follows:

Perinatal A case occurring in an infant from 7 days before birth until 7 days after birth.

Listeriosis cases reported in 2012 by data source

During 2012, 25 notifications (0.6 cases per 100 000 population) of listeriosis were reported in EpiSurv, of which two were perinatal. Twenty-five 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 27 hospital admissions (0.6 admissions per 100 000 population) recorded in 2012, 14 were reported with listeriosis as the primary diagnosis and 13 with listeriosis as another relevant diagnosis.

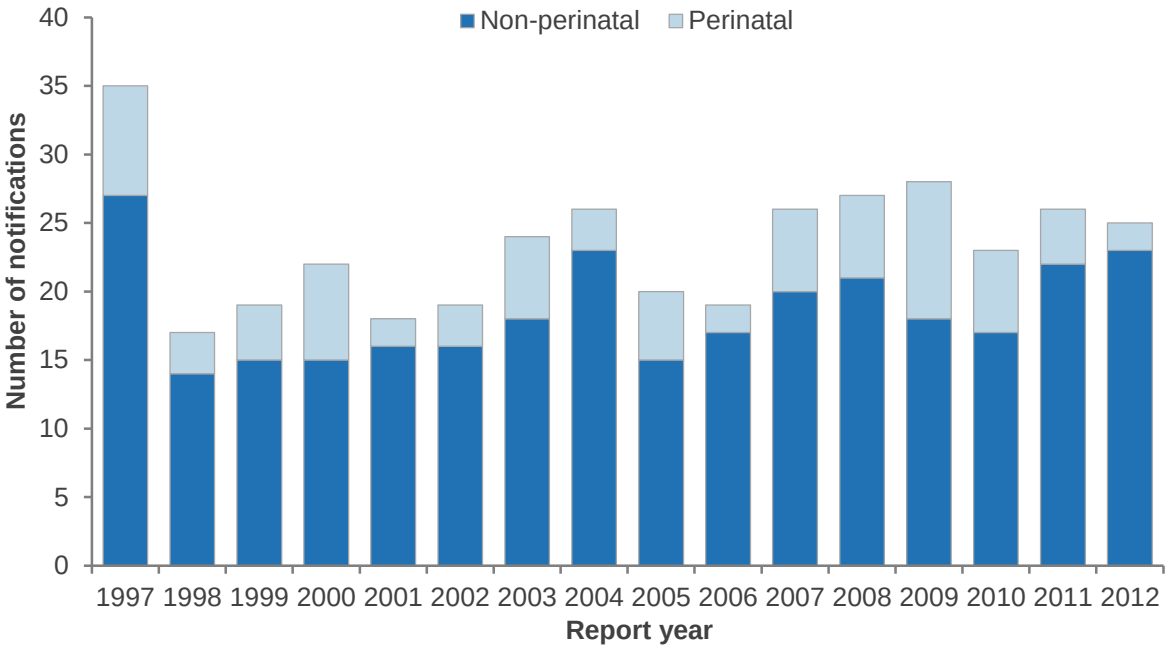
Four deaths resulting from non-perinatal listeriosis were recorded in EpiSurv in 2012.

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 2012, 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 2012, two of the notifications were reported as perinatal, a decrease compared to an annual average of 6.4 perinatal cases for the previous five years.

Figure 32. Listeriosis non-perinatal and perinatal notifications by year, 1997–2012



In 2012, the rate of notifications for listeriosis was similar for males (0.5 per 100 000 population, 11 cases) and females (0.6 per 100 000, 14 cases). The number and rate of hospitalisations were higher for females than males (Table 37). The four non-perinatal deaths reported in 2012 were female.

Table 37. Listeriosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	11	0.5	11	0.5
Female	14	0.6	16	0.7
Total	**25**	**0.6**	**27**	**0.6**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 of population

In 2012, notification rates for listeriosis were highest in the 60 years and over age group for both the notifications (2.2 per 100 000 population, 19 cases) and hospitalisations (2.0 per 100 000, 17 admissions) (Table 38). The non-perinatal deaths reported in 2012 were in the 60 years and over age group.

Table 38. Listeriosis cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<20	1	-	1	-
20 to 39	2	-	4	-
40 to 59	3	-	5	0.4
60+	19	2.2	17	2.0
Total	**25**	**0.6**	**27**	**0.6**

[a] MoH NMDS 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 2012, the most common risk factors reported for non-perinatal listeriosis cases were having an underlying illness (69.6%) and being admitted to hospital for treatment of another illness (54.5%) (Table 39).

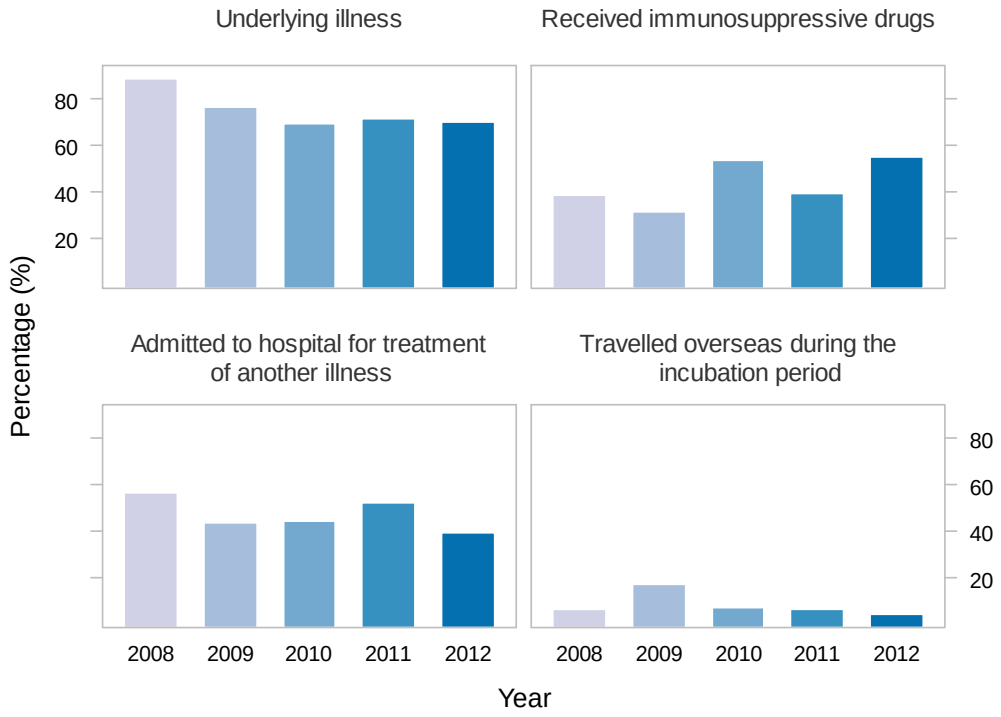
Table 39. Exposure to risk factors associated with listeriosis (non-perinatal), 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Underlying illness	16	7	0	69.6
Received immunosuppressive drugs	12	10	1	54.5
Admitted to hospital for treatment of another illness	9	14	0	39.1
Travelled overseas during the incubation period	1	22	0	4.3

[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 2008 and 2012 the risk factor most commonly associated with listeriosis each year was having an underlying illness. Receiving immunosuppressive drugs and admission to hospital for treatment of another illness were also commonly reported risk factors (Figure 33).

Figure 33. Percentage of cases by exposure to risk factors associated with listeriosis (non-perinatal) and year, 2008−2012



For cases where information on travel was provided, 4.3% (95% CI 0.1-22.0%) 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 0-4).

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

Outbreaks reported as caused by *Listeria* spp.

In 2012, there was one *Listeria* spp. outbreak reported with six associated cases. The outbreak source was reported to be foodborne (Table 40).

Table 40. *Listeria* spp. outbreaks reported, 2012

Measure	Foodborne *Listeria* spp. outbreaks	All *Listeria* spp. outbreaks
Outbreaks	1	1
Cases	6	6
Hospitalised cases	5	5

This outbreak is the subject of a current investigation and further details are not yet available for publication.

Listeria monocytogenes types commonly reported

ESR's Special Bacteriology Laboratory reported a total of 25 cases infected with *L. monocytogenes* during 2012.

Table 41 shows the number of cases and percentage of *L. monocytogenes* serotypes reported by the Special Bacteriology Laboratory at ESR between 2009 and 2012.

Table 41. *L.* monocytogenes serotypes identified by the Special Bacteriology Laboratory, 2009–2012

Serotype	2009		2010		2011		2012	
	No.	%	No.	%	No.	%	No.	%
O4	25	86.2	16	72.7	15	57.7	12	48.0
O1/2	4	13.8	6	27.3	11	42.3	13	52.0
Total	**29**		**22**		**26**		**25**	

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Listeria was detected in 16 of 295 samples of raw milk taken from farm vats in five of the main milk collection regions of New Zealand [18]. Two samples (0.68%) were found to contain *Listeria monocytogenes*, while a further 4% contained *L. innocua.*

Relevant regulatory developments

During 2011, MPI published a series of guidance documents for the control of *Listeria monocytogenes* in ready-to-eat foods [25, 26].

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.
Confirmed	A clinically compatible illness that is laboratory confirmed, OR a clinically compatible illness and a common exposure associated with a laboratory confirmed case

Norovirus infection cases reported in 2012 by data source

During 2012, 213 notifications (4.8 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 363 hospital admissions (8.2 admissions per 100 000 population) recorded in 2012, 90 were reported with norovirus infection as the primary diagnosis and 273 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

In 2012, 26 (10.4%) of the norovirus outbreaks and 549 (9.0%) of the associated cases were reported as foodborne (Table 42Table 42). Norovirus outbreaks accounted for 34.8% (249/716) of all outbreaks and 58.1% (6097/10 491) of all associated cases reported in 2012.

Table 42. Norovirus outbreaks reported, 2012

Measure	Foodborne norovirus infection outbreaks	All norovirus infection outbreaks
Outbreaks	26	249
Cases	549	6 097
Hospitalised cases	1	99

Between 2003 and 2012 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 (2005) to 618 cases (2008). The number of cases in 2012 (549 cases) was higher than in recent years and was the second highest reported in the 10-year period.

Figure 34. Foodborne norovirus outbreaks and associated cases reported by year, 2003–2012

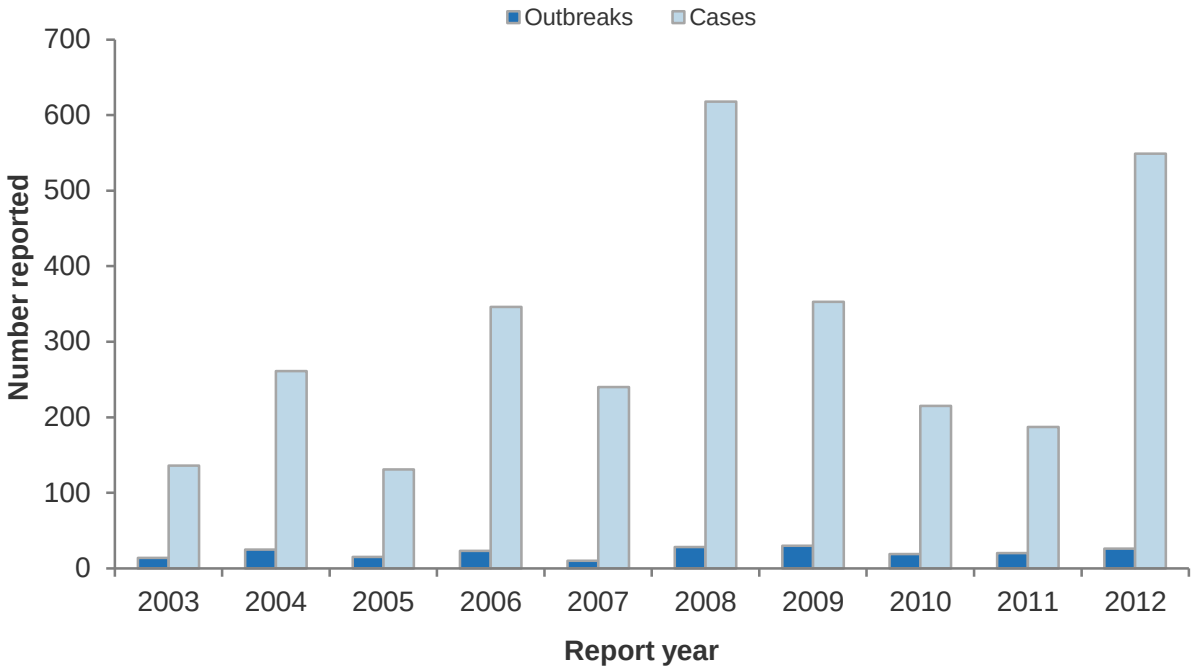


Table 43 contains details of the 26 foodborne norovirus outbreaks reported in 2012.

There were eight norovirus outbreaks with a suspected food vehicle during 2012 (Table 43). There was strong evidence for three of these vehicles; namely, pasta salad (elevated risk ratio and positive faecal specimens from three cases and two food handlers) and imported oysters (2 outbreaks with an elevated risk ratio for one outbreak and norovirus isolated from both food and faecal samples from cases). The evidence was weak for the implicated foods of the other five outbreaks.

Table 43. Details of foodborne norovirus outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Otago	Jan	Unknown	Private home	Private home	1C, 12P
Otago	Feb	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 37P
Nelson	Mar	Butter chicken, rice and naan bread	Takeaway	Takeaway	4C
Auckland	Mar	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C
Auckland	Mar	Unknown	Camp	Caterers	10C
Auckland	Mar	Pasta salad	School	Caterers, school	3C, 43P
Auckland	Mar	Unknown	Community gathering	Caterers	4C, 16P
Manawatu	Apr	Unknown	Other institution, other food outlet	Other food outlet	1C, 51P
Tauranga	Apr	Frozen imported oysters	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 9P
Auckland	May	Frozen imported oysters	Private home	Private home, overseas manufacturer	1C, 1P
Auckland	Jun	Unknown	Long-term care facility	Long-term care facility	1C, 16P
Tauranga	Jun	Frozen imported oysters	Marae	Marae	5C, 23P
Auckland	Jul	Unknown	Hospital (acute care), other institution	Hospital (acute care)	13C, 138P
Manawatu	Jul	Raw milk	Private home	Commercial food manufacturer	3C, 1P
Wellington	Aug	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	3C, 2P
Canterbury	Sep	Unknown	Long-term care facility	Long-term care facility	54C
Auckland	Sep	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 2P
Auckland	Oct	Unknown	School	Caterers	3C, 16P
Auckland	Oct	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	3C, 5P
Waikato	Oct	Unknown	Long-term care facility		2C, 16P
Manawatu	Nov	Unknown	Private home, takeaway	Private home	3C, 4P
Auckland	Nov	Chicken sandwiches	Restaurant/cafe/bakery	Restaurant/cafe/bakery	2C, 1P
Auckland	Nov	Hawaiian pizza	Restaurant/cafe/bakery	Restaurant/cafe/bakery	3C, 2P
Auckland	Nov	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	1C, 2P
Nelson	Dec	Unknown	Workplace	Restaurant/cafe/bakery	14C
Nelson	Dec	Unknown	Other setting, workplace	Commercial food manufacturer, workplace	10C

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

Table 44 shows the number of hospitalised cases and total cases by genotypes for the 26 foodborne norovirus outbreaks reported during 2012. The majority of the outbreaks were due to GII.4 Sydney 2012 variant (10 outbreaks, 91 cases) and GII.4 New Orleans 2009 variant (7 outbreaks, 288 cases). Only one case was hospitalised from an outbreak due to mixed GI and GII genotype.

Table 44. Norovirus genotypes reported in foodborne outbreaks, 2012

Norovirus	Outbreaks	Hospitalised cases	Total cases
GII.4 Sydney 2012 variant	10	0	91
GII.4 New Orleans 2009 variant	7	0	288
GI.2	1	0	4
GII.12/GII.3	1	0	13
GII.16/GII.2	1	0	52
GII.7	1	0	2
Mixed GI and GII	2	1	30
Untypable GII or GII	1	0	11
Genotype unknown	2	0	58

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2012, samples were received relating to 18 of the 26 food-associated norovirus outbreaks identified in Table 43. Norovirus was detected in faecal samples from cases associated with 18 foodborne outbreaks. Additionally, norovirus was detected in faecal specimens from food handlers associated with four outbreaks. Food samples were submitted for six of these outbreaks, with norovirus detected in oysters associated with two outbreaks.

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 2012, GII was the predominant norovirus genotype identified in outbreaks (208/221 outbreaks, 94.1%), followed by genotype GI (9/221 outbreaks, 4.1%).

Over the period 2008 to 2012, 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 17 outbreaks in 2008 to three outbreaks in 2011. However, this increased to 30 outbreaks in 2012. Other genotypes were identified in between 0 and 16 outbreaks each year and showed no consistent pattern across the five-year period.

Table 45. Norovirus genotypes identified in outbreaks by the Norovirus Reference Laboratory, 2008–2012

Genotype	2008	2009	2010	2011	2012
Genogroup I	**21**	**25**	**17**	**10**	**9**
GI untyped	3	2	1	0	1
GI.2	0	0	0	1	5
GI.3	15	0	2	3	0
GI.4	1	19	3	1	1
GI.5	0	0	0	1	0
GI.6	0	4	10	4	2
GI.8	2	0	1	0	0
Genogroup II	**147**	**244**	**106**	**149**	**208**
GII untyped	8	3	7	2	2
GII.1	0	0	1	1	1
GII.2	0	11	3	3	1
GII.3	3	1	11	2	0
GII.4	84	214	58	111	160
GII.5	0	0	1	0	0
GII.6	17	10	5	3	30
GII.7	8	1	14	5	1
GII.13	0	2	2	2	0
GII.17	1	0	0	0	0
GII.20	0	0	4	0	0
GII.b/GII.3	9	1	0	3	2
GII.c/GII.12	15	1	0	2	0
GII.12/GII.3	0	0	0	14	3
GII.16/GII.2	0	0	0	0	5
Other recombinants	2	0	0	1	3
Mixed GI and GII	**3**	**2**	**0**	**2**	**4**
Total	**171**	**271**	**123**	**161**	**221**

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

A review was conducted of laboratory-confirmed norovirus outbreaks in New Zealand between 2002 and 2009. Of the 1206 recorded outbreaks, 8.7% were caused by norovirus genogroup I strains, 89.9% were caused by genogroup II strains, and both strains were detected in 0.8%. The predominant genotype was GII.4, which was identified in 68.4% outbreaks. Norovirus GII.4 variant strains implicated in overseas outbreaks also occurred in New Zealand, indicating global spread. The predominant outbreak settings were healthcare institutions for the elderly and acute care patients; other settings included catering establishments, cruise ships, homes, community events, school camps, child-related settings and consumption of contaminated shellfish [27].

Relevant regulatory developments

Nil.

Salmonellosis

Summary data for salmonellosis in 2012 are given in Table 46.

Table 46. Summary of surveillance data for salmonellosis, 2012

Parameter	Value in 2012	Source
Number of cases	1085	EpiSurv
Rate (per 100 000)	24.5	EpiSurv
Hospitalisations (%)	174 (16.0%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	304 (28.0%)	EpiSurv
Estimated food-related cases (%)*	474 (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, with abdominal pains, diarrhoea (occasionally bloody), fever, nausea and vomiting. Asymptomatic infections may occur.

Laboratory test for diagnosis: Isolation of *Salmonella* species 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 – that is, is part of a common-source outbreak

Confirmed: A clinically compatible illness that is laboratory confirmed

Salmonellosis cases reported in 2012 by data source

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

During 2012, 1085 notifications (24.5 cases per 100 000 population) of salmonellosis and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 1044 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 174 hospital admissions (3.9 admissions per 100 000 population) recorded in 2012, 128 were reported with salmonellosis as the primary diagnosis and 46 with salmonellosis as another relevant diagnosis.

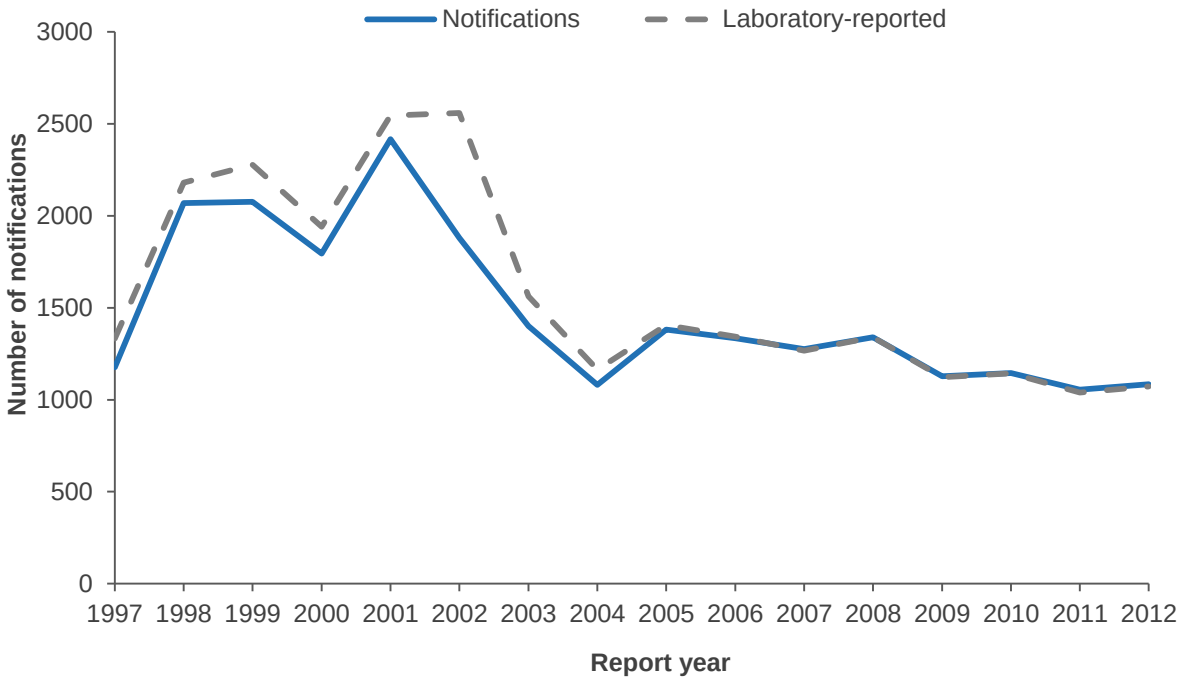
It has been estimated by expert consultation that 60.7% (minimum = 45.4%, maximum = 68.9%) of salmonellosis incidence is due to foodborne transmission. It was further estimated that 36% of foodborne transmission was due to transmission via poultry.

Notifiable disease data

From 1997 to 2001 there was a general trend of increasing salmonellosis notifications with the highest number reported in 2001 (2417 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 was reported in 2011 (1056 cases). Notifications for 2012 were slightly elevated from 2011 (1085 cases).

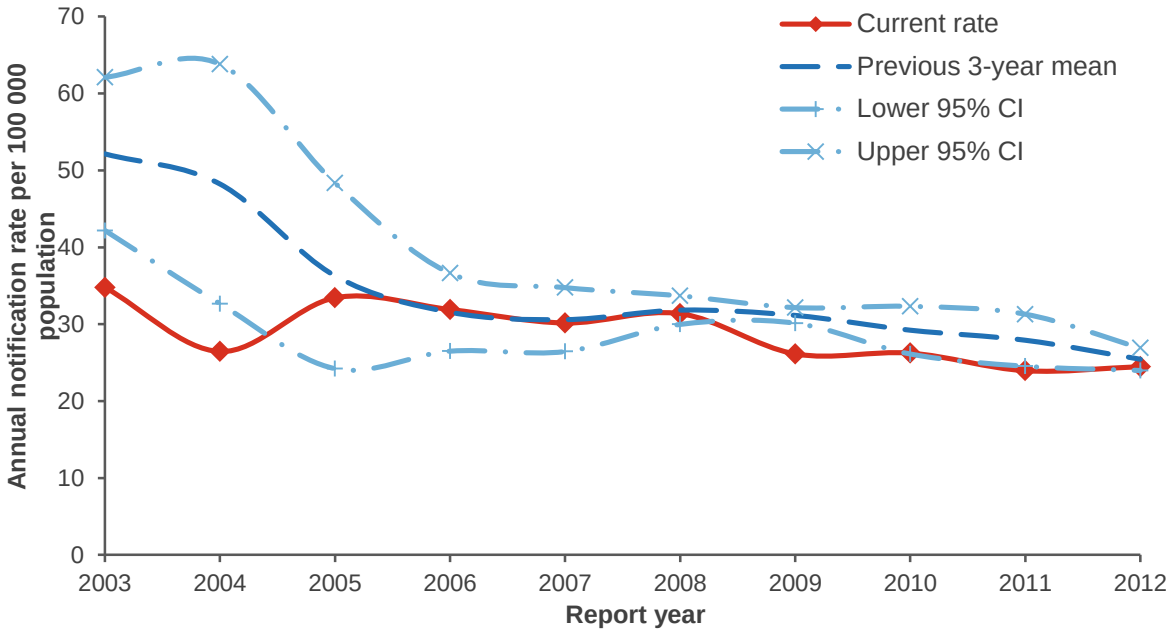
Integration of notification and laboratory data at ESR and the introduction of electronic laboratory reporting of notifiable diseases has reduced the differences between the number of notifications and laboratory reported cases seen prior to 2005.

Figure 35. Salmonellosis notifications and laboratory-reported cases by year, 1997–2012



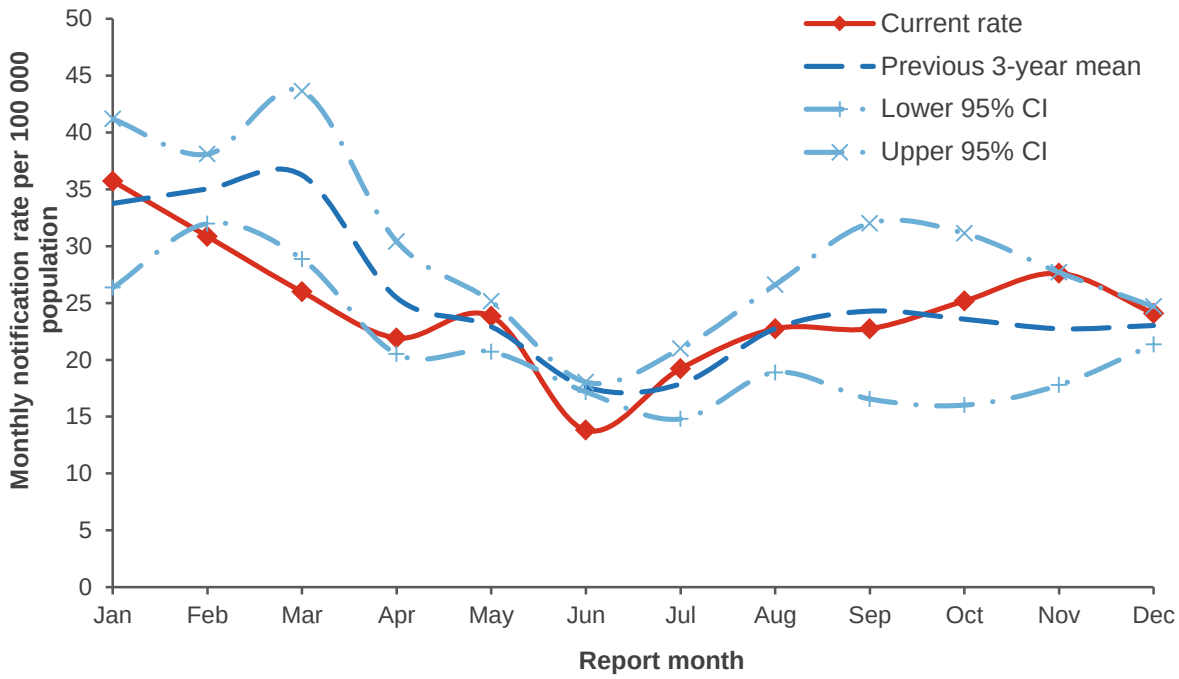
Between 2003 and 2012, the salmonellosis annual notification rate followed a generally decreasing trend with the lowest notification rate in 2011 (23.9 per 100 000 population) (Figure 36).

Figure 36. Salmonellosis notification rate by year, 2003–2012



The number of notified cases of salmonellosis per 100 000 population by month for 2012 is shown in Figure 37. The overall pattern differed from the historical mean with a lower rate seen in late summer and early winter and a higher rate seen in spring.

Figure 37. Salmonellosis monthly rate (annualised), 2012



Rates of salmonellosis varied throughout the country as illustrated in Figure 38. The highest salmonellosis notification rate in 2012 was for Southern DHB (54.9 per 100 000 population, 169 cases), followed by South Canterbury DHB (51.3 per 100 000, 29 cases). South Canterbury and Southern DHBs consistently featured in the highest quantile of salmonellosis notification rates between 2009 and 2012.

In 2012, the numbers and rates of notifications were higher for males compared to females. Hospitalisation numbers and rates for salmonellosis were similar for males and females (Table 47).

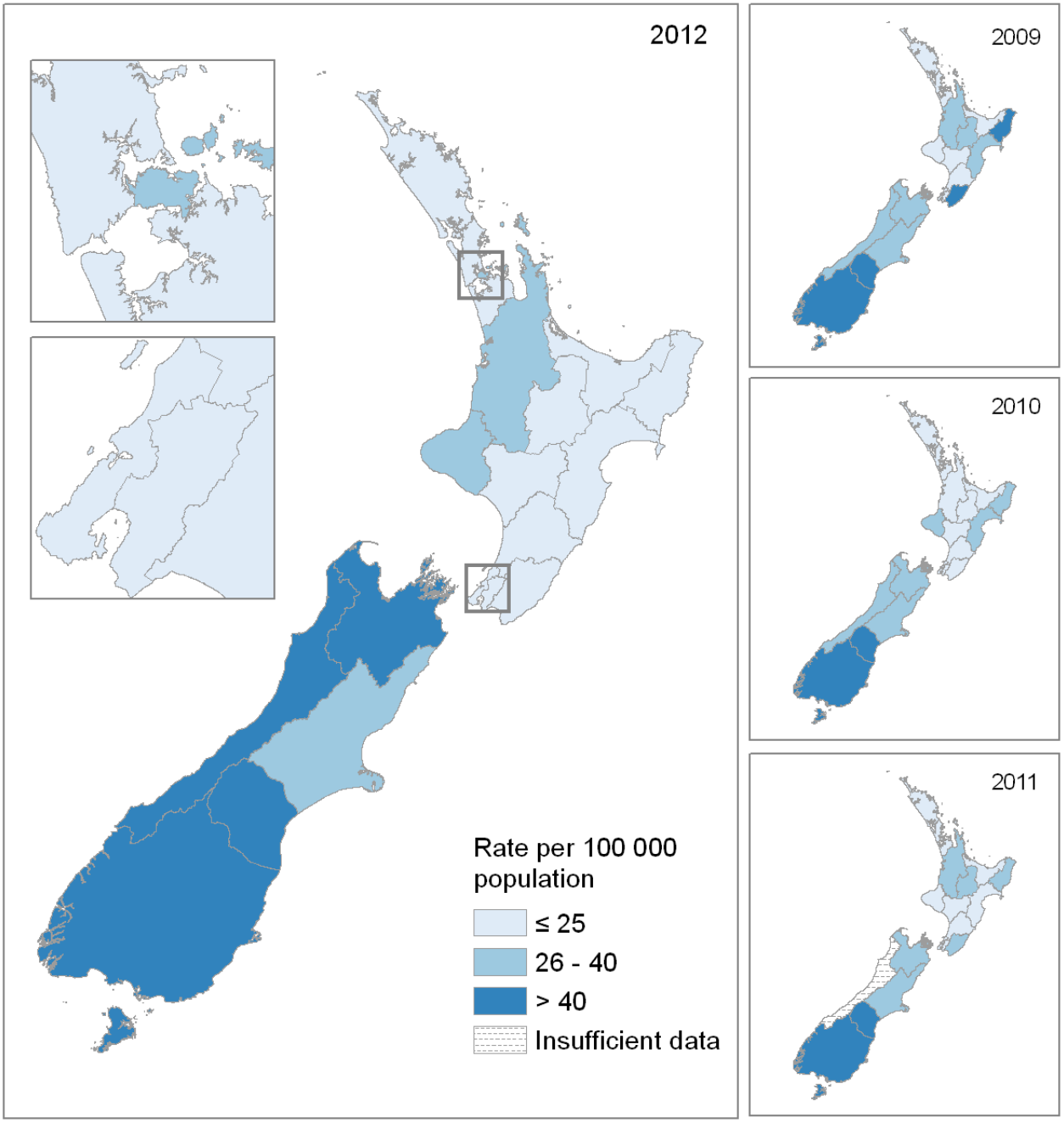
Table 47. Salmonellosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	561	25.7	87	4.0
Female	524	23.3	87	3.9
Unknown	0			
Total	**1 085**	**24.5**	**174**	**3.9**

[a] MoH NMDS data for hospital admissions

[b] per 100 000 of population

Figure 38. Geographic distribution of salmonellosis notifications, 2009–2012



In 2012, both notification and hospitalisation rates of salmonellosis were highest for the less than 1 year age group (107.3 cases per 100 000 population, 19.8 admissions per 100 000) (Table 48). The 1 to 4 years age group also had high salmonellosis notification rates compared to other age groups.

Table 48. Salmonellosis cases by age group, 2012

Age group	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	65	107.3	12	19.8
1 to 4	185	73.6	17	6.8
5 to 9	59	20.2	10	3.4
10 to 14	34	11.8	5	1.7
15 to 19	49	15.7	6	1.9
20 to 29	172	27.4	22	3.5
30 to 39	106	19.0	8	1.4
40 to 49	117	18.7	13	2.1
50 to 59	119	20.9	30	5.3
60 to 69	93	21.7	22	5.1
70+	85	20.2	29	6.9
Unknown	1	-	0	-
Total	**1085**	**24.5**	**174**	**3.9**

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

The most commonly reported risk factors for salmonellosis cases notified during 2012 were consumption of food from retail premises (44.5%), contact with farm animals (33.5%), and consumption of untreated water (24.9%) (Table 49).

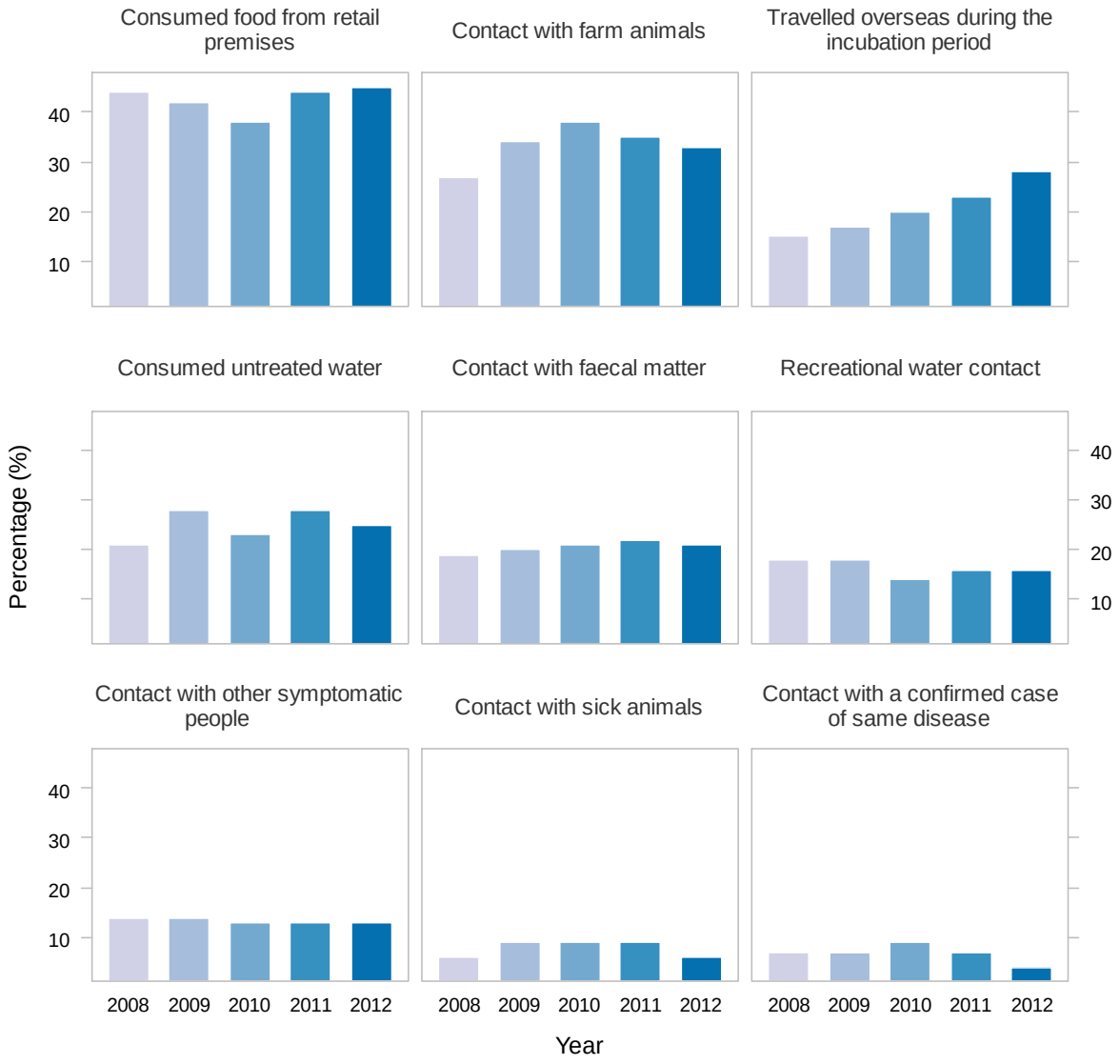
Table 49. Exposure to risk factors associated with salmonellosis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	236	294	555	44.5
Contact with farm animals	187	372	526	33.5
Travelled overseas during the incubation period	182	467	436	28.0
Consumed untreated water	120	361	604	24.9
Contact with faecal matter	111	412	562	21.2
Recreational water contact	87	454	544	16.1
Contact with other symptomatic people	71	460	554	13.4
Contact with sick animals	30	474	581	6.0

[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 2008 and 2012 the risk factors associated with salmonellosis have generally occurred in the same order of importance and to a similar magnitude each year (Figure 39). Contact with farm animals has shown a decrease in magnitude over the last three years. In the past five years there was an increasing trend in the percentage of cases reporting overseas travel during the incubation period and in 2012, this risk factor was reported more than consumption of untreated water unlike previous years. The most commonly reported risk factors for salmonellosis cases each year were consumption of food from retail premises, and contact with farm animals.

Figure 39. Percentage of cases by exposure to risk factors associated with salmonellosis and year, 2008−2012



For cases where information on travel was provided, 28.0% (95% CI 24.6-31.7%) 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 2012. The resultant distribution has a mean of 304 cases (95% CI 259-352).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 22.0% (95% CI 20.5-23.5%).

Outbreaks reported as caused by *Salmonella* spp.

In 2012, there were 27 *Salmonella* spp. outbreaks reported, and 11 of these were reported to be foodborne (Table 50). Seven of the nine hospitalisations due to *Salmonella* spp. were associated with foodborne outbreaks.

Table 50. *Salmonella* spp. outbreaks reported, 2012

Measure	Foodborne *Salmonella* spp. outbreaks	All *Salmonella* spp. outbreaks
Outbreaks	11	27
Cases	100	149
Hospitalised cases	7	9

The number of foodborne outbreaks associated with *Salmonella* spp. reported between 2003 and 2012 ranged from zero (2004) to 18 (2005) and have been lower than the peak in 2005 (Figure 40). The total numbers of cases associated with the outbreaks has generally decreased over the same period with the exception of 2008 and 2012. In 2008 the second highest number of annual outbreak-associated cases was reported in the period. In 2012 the third highest number of outbreaks associated with *Salmonella* spp. was reported.

Figure 40. Foodborne *Salmonella* spp. outbreaks and associated cases reported by year, 2003–2012

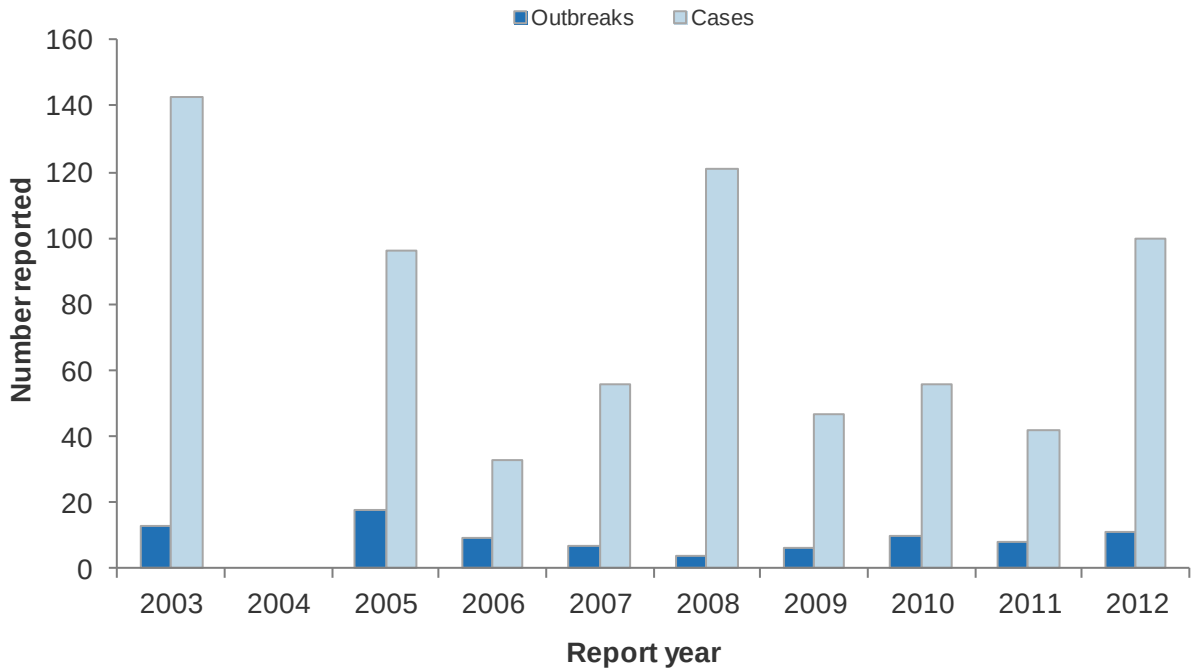


Table 51 contains details of the 11 foodborne *Salmonella* spp. outbreaks reported in 2012.

Of the six *Salmonella* spp. outbreaks with a suspected food vehicle in 2012 (Table 51), there was strong evidence for two of these vehicles. *Salmonella* Derby was isolated from a faecal specimen from a case who had consumed tabouli and from a food sample for one outbreak. In the other outbreak, *Salmonella* Montevideo (13 cases), *S.* Mbandaka (3 cases) and *S.* Maastricht (1 case) were isolated from cases who had consumed tahini (sesame seed paste). All three organisms were also isolated from unopened tubs of tahini sourced from the warehouse of the Auckland distributor. The remaining four outbreaks had weak evidence for the implicated foods.

Table 51. Details of foodborne *Salmonella* spp. outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Wellington	Feb	Undercooked pork	Private home, community gathering	Private home, community gathering	8C
Otago	Mar	Ham on the bone	Caterers, sports gathering	Caterers, commercial food manufacturer	1C, 3P
Auckland	Apr	Unknown	Takeaway, private home	Takeaway	1C, 4P
Auckland	Sep	Unknown	Overseas (Indonesia)		1C, 1C
Manawatu	Sep	Minced meat	Private home	Private home	2C, 3P
Nelson	Oct	Chicken	Takeaway	Takeaway	23C
Tauranga	Nov	Tahini	Restaurant/cafe/bakery	Overseas manufacturer	13C, 3P
Whanganui	Nov	Unknown	Private home	Private home	2C
Taranaki	Dec	Unknown	Private home	Private home	2C, 1P
Otago	Dec	Unknown	Private home, restaurant/café/bakery	Private home, restaurant/café/bakery	4C
Nelson	Dec	Tabouli	Takeaway	Takeaway	28C

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

During investigations of suspected foodborne illness outbreaks by ESR's Public Health Laboratory in 2012, samples were submitted relating to four of the foodborne *Salmonella* spp. outbreaks identified. *Salmonella* spp. were detected in a sample of tahini (sesame seed paste) associated with the November Tauranga outbreak (Table 51).

Salmonella types commonly reported

1. Human isolates

A total of 1044 cases infected with non-typhoidal *Salmonella* were reported by the ESR Enteric Reference Laboratory during 2012. Of these cases, 459 (44.0%) were *Salmonella* Typhimurium.

Table 52 shows the number of cases by *Salmonella* types reported by the Enteric Reference Laboratory at ESR. The most common serotypes identified in 2012 were *S.* Typhimurium phage type RDNC-May 06 (73 cases), *S.* Enteritidis phage type 11 and *S.* Infantis (52 cases each).

Figure 41 shows the annual trend for selected *Salmonella* serotypes in recent years. Between 2009 and 2012, there was a noticeable increase in the number of cases infected with *S. enterica* subsp. *enterica* (I) ser. 4,[5],12 : i : -. Serotypes with a decreasing trend in the last five years were *S.* Typhimurium phage type 160, *S.* Infantis, *S.* Typhimurium phage type 1 and *S.* Typhimurium phage type 101.

Table 52. *Salmonella* serotypes and subtypes identified by the Enteric Reference Laboratory, 2008–2012

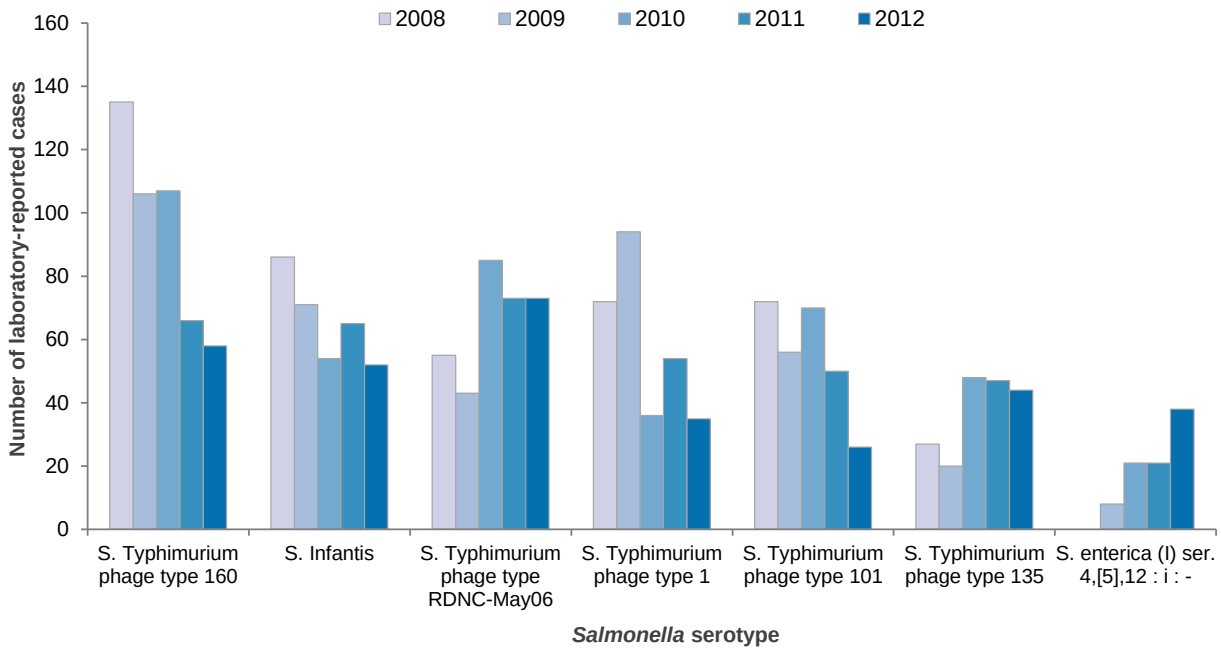
Serotype[a]	2008	2009	2010	2011	2012
S. Typhimurium	**729**	**661**	**594**	**495**	**459**
160	135	106	107	66	58
101	72	56	70	50	26
1	72	94	36	54	35
135	27	20	48	47	44
156	67	54	35	29	21
12a	28	28	35	28	26
RDNC[b]-May 06	55	43	85	73	73
Other or unknown	273	288	213	176	176
S. Enteritidis	**124**	**95**	**113**	**134**	**125**
11[c]	45	39	49	56	52
1b	19	4	5	8	9
Other or unknown	60	52	59	70	64
Other serotypes	**486**	**366**	**437**	**410**	**460**
S. Infantis	86	71	54	65	52
S. Brandenburg	33	36	47	34	34
S. Saintpaul	35	26	34	31	27
S. Stanley	10	9	28	28	22
S. Agona	10	10	12	20	11
S. Virchow	14	12	16	18	17
S. Montevideo	0	9	13	1	26
S. Weltevreden	8	10	23	16	24
S. Mississippi	10	14	9	13	12
S. enterica (I) ser. 4,[5],12 : i :	0	8	21	21	38
Other or unknown	280	188	224	201	197
Total	**1 339**	**1 122**	**1 144**	**1 039**	**1 044**

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

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

[c] Prior to 2012 *S.* Enteritidis phage type 11 was known as a 9a.

Figure 41. Percentage of laboratory-reported cases for selected Salmonella types by year, 2008–2012



2. Non-human isolates

A total of 1021 non-human *Salmonella* isolates were typed by the Enteric Reference Laboratory during 2012. *S.* Brandenburg was the most commonly isolated serotype in non-human samples during 2012, with a decrease in numbers compared to 2011. 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 (Table 53).

Table 53. *Salmonella* serotypes and subtypes from non-human sources identified by the Enteric Reference Laboratory, 2008−2012

Serotype	2008	2009	2010	2011	2012	Major sources, 2012
S. Typhimurium	**727**	**388**	**574**	**656**	**421**	
RDNC	104	67	80	80	66	Bovine (32)
1	63	42	57	39	57	Bovine (33)
101	146	48	88	91	53	Bovine (47)
12a	39	32	84	100	50	Bovine (44)
156	55	31	33	53	33	Bovine (29)
8	64	13	37	73	30	Bovine (24)
42	37	21	17	29	19	Bovine (12)
Unknown or other	219	134	177	168	113	
Other serotypes	**622**	**500**	**646**	**783**	**600**	
S. Brandenburg	92	137	238	203	113	Environmental (38), ovine (36), bovine (21),
S. Infantis	51	30	34	78	78	Meat/bone meal (42), bovine (10),
S. Hindmarsh	34	46	56	65	77	Ovine (65)
S. Mbandaka	51	9	16	25	35	Environmental (8)
S. Agona	26	36	25	77	26	Meat and bone meal (9)
Other or unknown serotypes	368	242	277	335	271	
Total	**1349**	**888**	**1220**	**1439**	**1021**	

3. Outbreak types

Table 54 shows the number of hospitalised cases and total cases by subtype for the 11 foodborne *Salmonella* outbreaks reported during 2012. Two outbreaks were due to *S.* Typhimurium phage type 160 and the remaining outbreaks were associated with unique subtypes. The largest outbreak was due to *S.* Derby (28 cases) followed by *S.* Typhimurium phage type 1 (23 cases) both from Nelson Marlborough.

Table 54. *Salmonella* subtypes reported in foodborne outbreaks, 2012

Pathogen and subtype	Outbreaks	Hospitalised cases	Total cases
S. Typhimurium phage type 160	2	2	8
S. Derby	1	0	28
S. Infantis	1	0	8
S. Montevideo	1	5	16
S. Typhimurium phage type 1	1	0	23
S. Typhimurium phage type 12a	1	0	5
S. Typhimurium phage type 135	1	0	5
S. Typhimurium phage type 185	1	0	3
S. Typhimurium phage type RDNC-May06	1	0	2
S. enterica subsp. enterica (I) ser. 9,12 : l complex : 1,5	1	0	2

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Salmonella was not detected in 294 samples of raw milk, taken from farm vats in five of the main milk collection regions of New Zealand [18].

Relevant regulatory developments

Nil.

Sapovirus

Case definition

Clinical description:	Gastroenteritis usually lasting 2-6 days
Laboratory test for diagnosis:	Detection of sapovirus in faecal or vomit specimen or leftover food
Case classification:	
Probable	A clinically compatible illness.
Confirmed	A clinically compatible illness that is laboratory confirmed, OR a clinically compatible illness and a common exposure associated with a laboratory confirmed case

Sapovirus infection cases reported in 2012 by data source

In 2012, two notifications of sapovirus and no resulting deaths were reported in EpiSurv. It should be noted that not every case of sapovirus infection is notifiable; only those that are part of a common source outbreak or from a person in a high risk category.

The number of notifications for sapovirus in 2012 was lower than 2011 (7 notifications) and 2010 (5 notifications).

Outbreaks reported as caused by sapovirus

In 2012, three sapovirus outbreaks were reported with 18 associated cases. None of the outbreaks was reported to be foodborne (Table 55).

Laboratory testing for sapovirus began in New Zealand in 2009. Since 2009 specimens from gastroenteritis outbreaks found to be negative for norovirus have been tested for the presence of sapovirus. In 2012, sapoviruses were identified in three (3.6%) of the 84 norovirus-negative gastroenteritis outbreaks. This was lower than the number of sapovirus outbreaks reported in 2011 (12 outbreaks from 98 norovirus-negative outbreaks) and 2010 (14 outbreaks from 90 norovirus-negative outbreaks)

Table 55. Sapovirus outbreaks reported, 2012

Measure	Foodborne sapovirus outbreaks	All sapovirus outbreaks
Outbreaks	0	3
Cases	0	18
Hospitalised cases	0	0

There were two foodborne sapovirus outbreaks reported in 2010 with 24 associated cases and one outbreak in 2011 with 14 cases.

Shigellosis

Summary data for shigellosis in 2012 are given in Table 56.

Table 56. Summary of surveillance data for shigellosis, 2012

Parameter	Value in 2012	Source
Number of cases	132	EpiSurv
Rate (per 100 000)	3.0	EpiSurv
Hospitalisations (%)	20 (15.2%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	73 (55.4%)	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: Acute diarrhoea with fever, abdominal cramps, blood or mucus in the stools and a high secondary attack rate among contacts.

Laboratory test for diagnosis: Isolation of any *Shigella* spp. from a stool sample or rectal swab and confirmation of genus.

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 2012 by data source

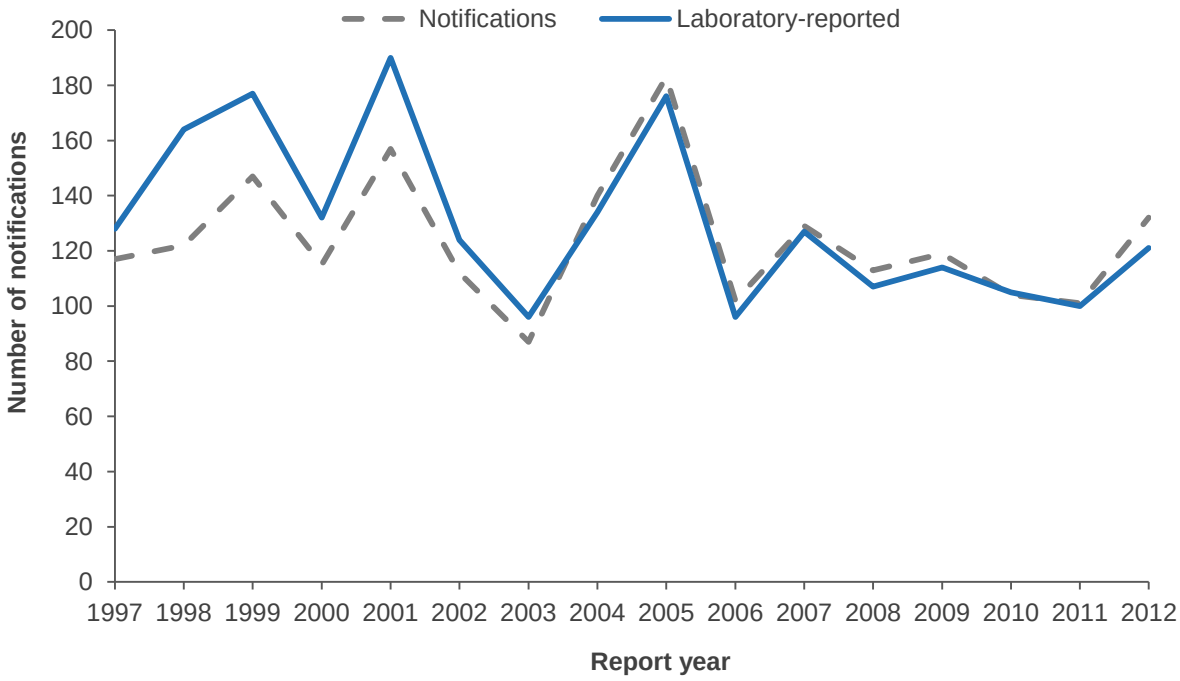
During 2012, 132 notifications (3.0 cases per 100 000 population) of shigellosis and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 121 cases (2.7 per 100 000 population) infected with *Shigella* in 2012.

The ICD-10 code A03 was used to extract shigellosis hospitalisation data from the MoH NMDS database. Of the 20 hospital admissions (0.5 admissions per 100 000 population) recorded in 2012, 12 were reported with shigellosis as the primary diagnosis and eight with shigellosis as another relevant diagnosis.

Notifiable disease data

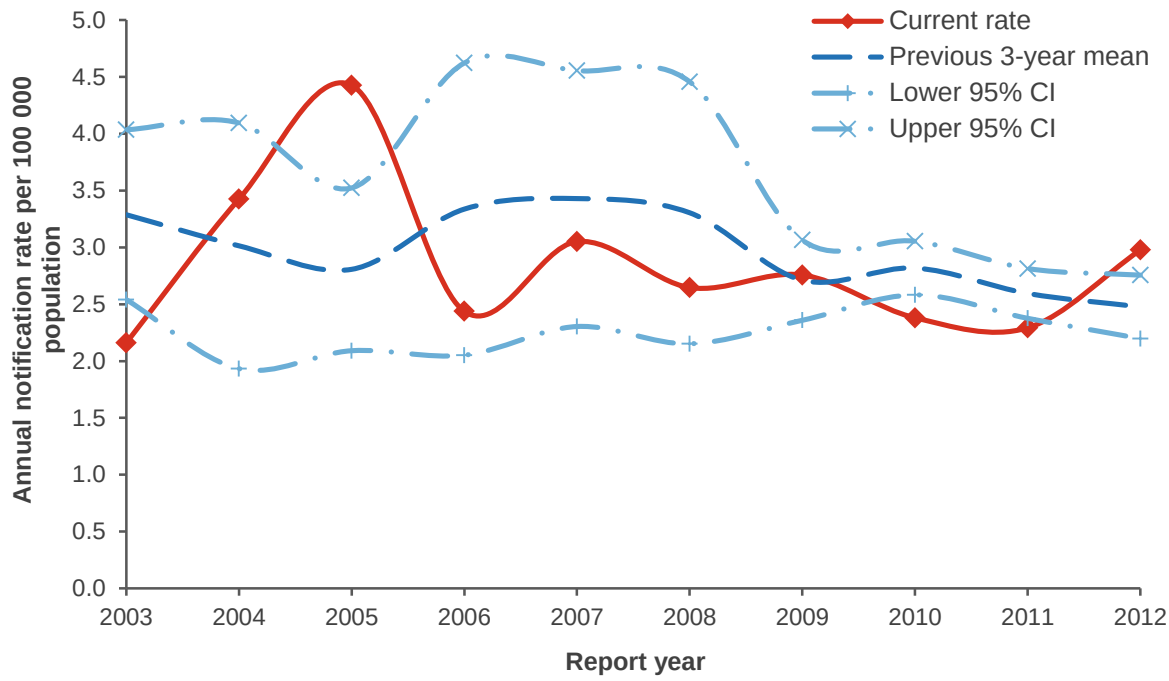
The number of notifications and laboratory reported cases of shigellosis fluctuates from year to year, but there has been a slight decreasing trend since the peak of 183 cases in 2005. Notifications for 2012 show an increase in case numbers compared to the previous three years (Figure 42).

Figure 42. Shigellosis notifications and laboratory-reported cases by year, 1997–2012



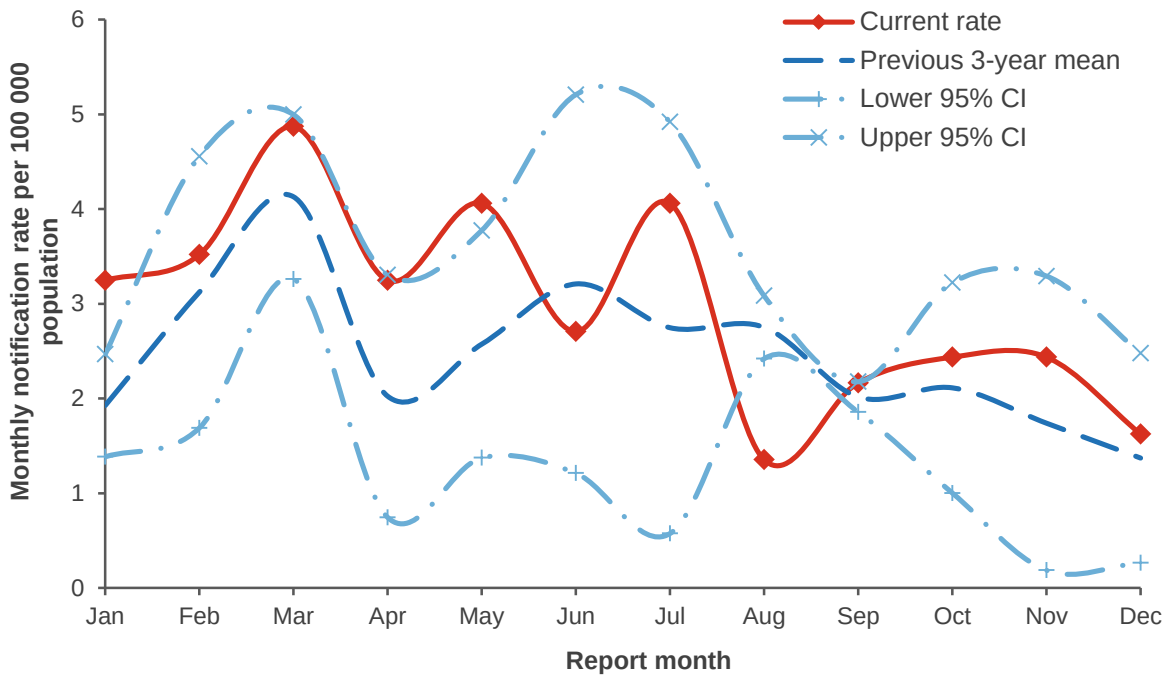
The shigellosis annual notification rate increased from 2.2 per 100 000 population in 2003 to a ten year period high of 4.4 per 100 000 in 2005. Since 2007 the annual notification rate has followed a generally decreasing pattern although an increase in the rate was seen in 2012 (Figure 43).

Figure 43. Shigellosis notification rate by year, 2003–2012



The number of notified cases of shigellosis per 100 000 population by month for 2012 is shown in Figure 44. In 2012, the shigellosis notification rate generally above the previous 3-year mean, except in June and August.

Figure 44. Shigellosis monthly rate (annualised), 2012



In 2012, the rates of notification and hospitalisation for shigellosis were higher for females compared to males (Table 57).

Table 57. Shigellosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	62	2.8	8	0.4
Female	70	3.1	12	0.5
Total	**132**	**3.0**	**20**	**0.5**

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

Shigellosis rates of notification and hospitalisation were highest for those in the 1 to 4 years and 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 58).

Table 58. Shigellosis cases by age group, 2012

Age group	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	0	-	0	-
1 to 4	16	6.4	1	-
5 to 9	10	3.4	3	-
10 to 14	1	-	0	-
15 to 19	5	1.6	1	-
20 to 29	26	4.1	4	-
30 to 39	17	3.0	1	-
40 to 49	15	2.4	2	-
50 to 59	17	3.0	2	-
60 to 69	19	4.4	2	-
70+	6	1.4	4	-
Total	**132**	**3.0**	**20**	**0.5**

[a] MoH NMDS 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 2012 was overseas travel during the incubation period (55.4%), followed by consumption of food from retail premises (44.7%) (Table 59).

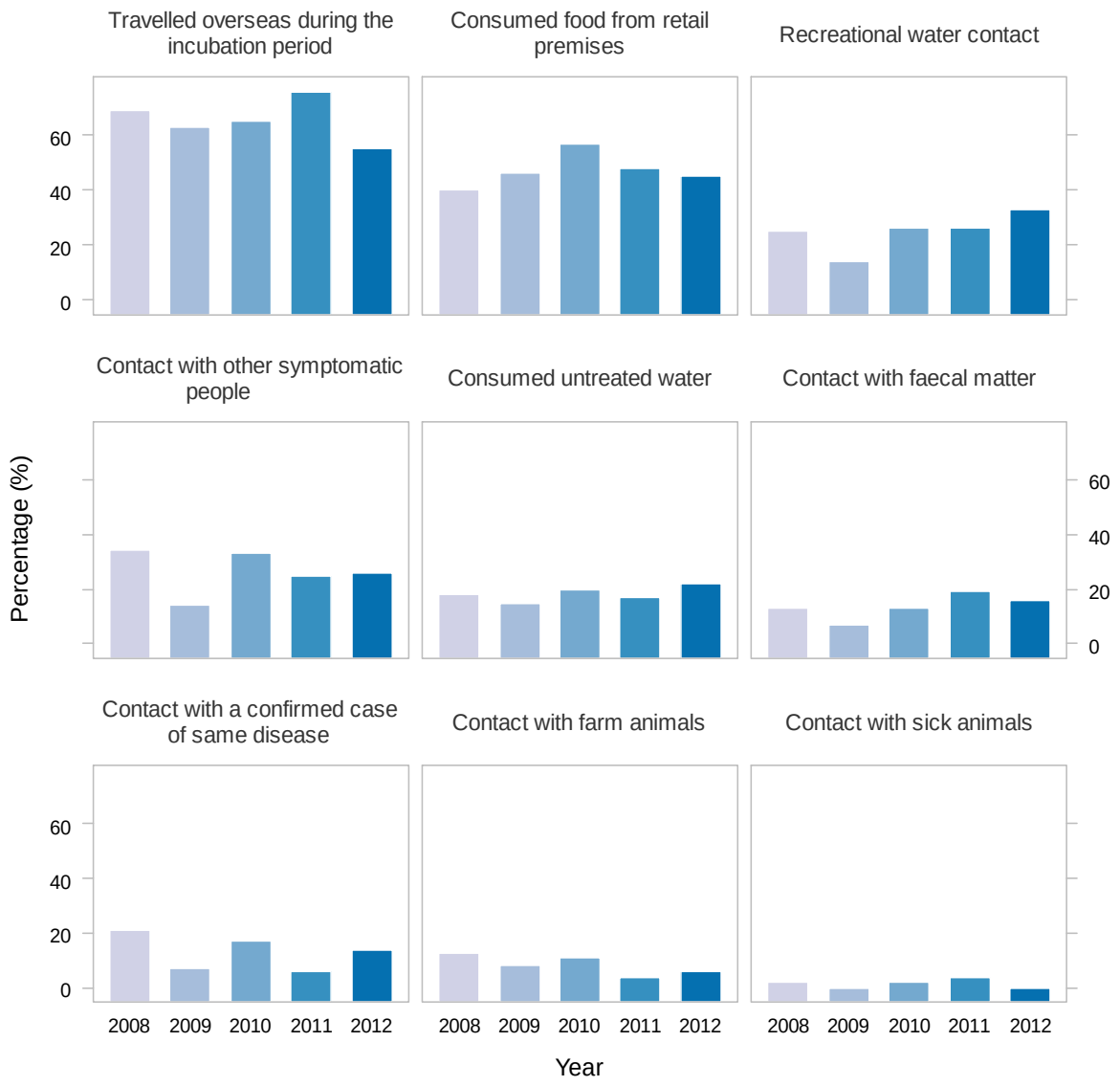
Table 59. Exposure to risk factors associated with shigellosis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Travelled overseas during the incubation period	72	58	2	55.4
Consumed food from retail premises	21	26	85	44.7
Recreational water contact	16	33	83	32.7
Contact with other symptomatic people	12	34	86	26.1
Consumed untreated water	8	28	96	22.2
Contact with faecal matter	8	41	83	16.3
Contact with farm animals	3	44	85	6.4
Contact with sick animals	0	47	85	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.

In 2012 both overseas travel during the incubation period and consumption of food from retail premises showed a decrease in reported cases compared to previous years where they were the two most commonly reported risk factors for shigellosis (Figure 45). From 2008 to 2011, both risk factors showed a general increasing trend. The percentage of cases with exposure to recreational water contact has increased in 2012 compared to the previous 4 years.

Figure 45. Percentage of cases by exposure to risk factors associated with shigellosis and year, 2008–2012



For cases where information on travel was provided, 55.4% (95% CI 46.4-64.1%) 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 2012. The resultant distribution has a mean of 73 cases (95% CI 54-94).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 62.6% (95% CI 55.4-70.2%).

Outbreaks reported as caused by *Shigella* spp.

In 2012, there were 12 *Shigella* spp. outbreaks reported and four of these were reported to be foodborne (Table 60). Neither of the two hospitalisations due to *Shigella* spp. were associated with foodborne outbreaks.

Table 60. *Shigella* spp. outbreaks reported, 2012

Measure	Foodborne *Shigella* spp. outbreaks	All *Shigella* spp. outbreaks
Outbreaks	4	12
Cases	10	43
Hospitalised cases	0	2

Foodborne shigellosis outbreaks are rare with not more than two outbreaks being reported each year from 2003 to 2010 (Figure 46). The highest number of outbreaks was reported in 2011 and 2012, both with four outbreaks (27 cases and 10 cases, respectively).

Figure 46. Foodborne *Shigella* spp. outbreaks and associated cases reported by year, 2003–2012

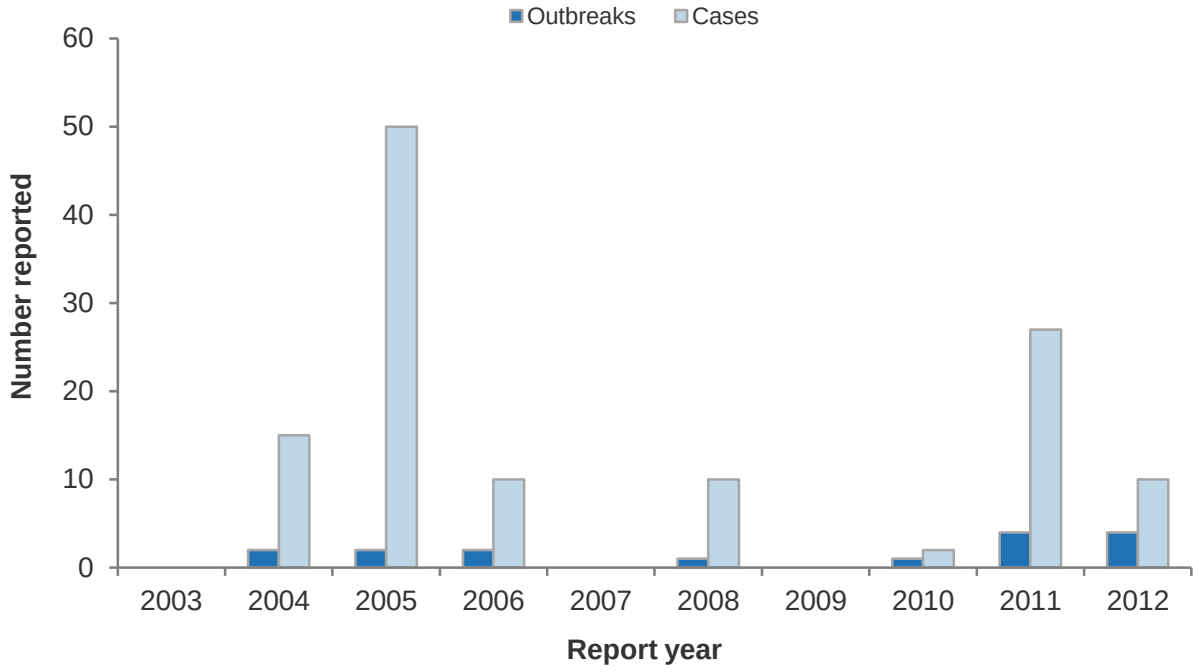


Table 61 contains details of the *Shigella* spp. outbreaks reported in 2012.

Table 61. Details of foodborne *Shigella* spp. outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Jan	Unknown	Overseas (Samoa)		2C
Waikato	Apr	Raw fish	Overseas (Samoa)		1C, 1P
Auckland	Oct	Unknown	Private home	Private home	4C
Waikato	Nov	Unknown	Other setting, private home		1C, 1P

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

In 2012, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated *Shigella* spp. outbreaks.

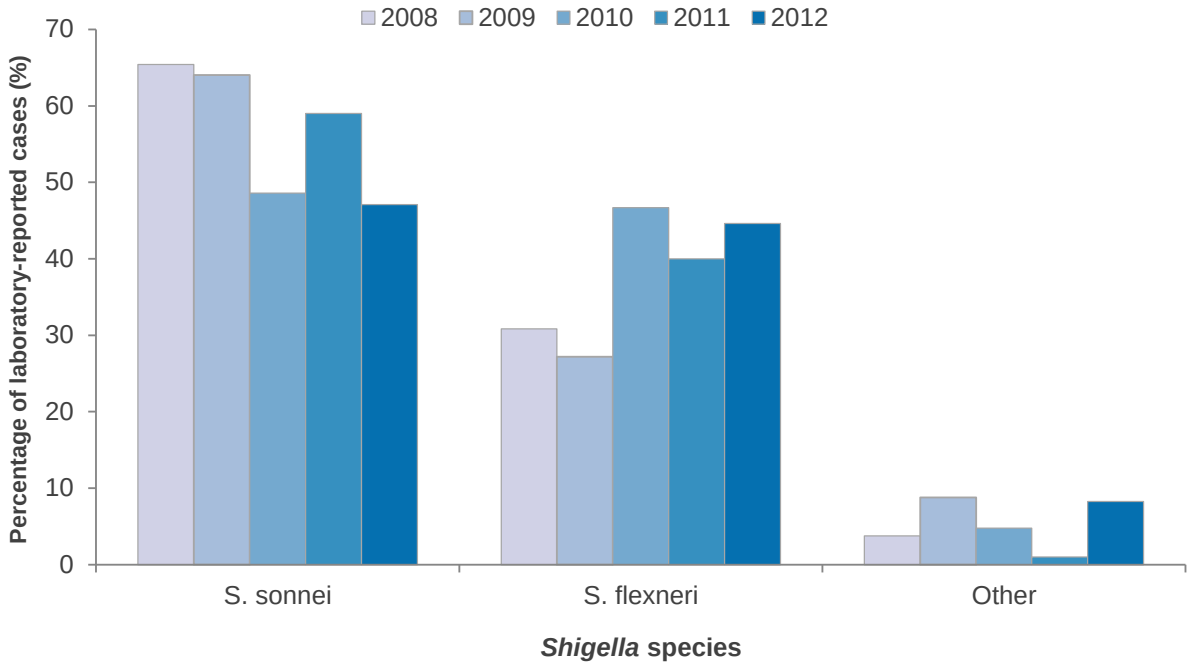
Shigella types commonly reported

In 2012, the Enteric Reference Laboratory at ESR reported 121 cases infected with *Shigella* spp. The species and major serogroups identified in 2012 were distributed as follows: *S. sonnei* biotypes (57 cases, including 27 of biotype a and 27 of biotype g) and *S. flexneri* (54 cases, including 10 of type 2a) (Table 62). A decreasing trend can be seen in the percentage of cases infected with *S. sonnei* between 2008 and 2012, and an increase in the percentage of *S. flexneri* cases (Figure 47).

Table 62. Shigella species and subtypes identified by the Enteric Reference Laboratory, 2008–2012

Species	2008	2009	2010	2011	2012
S. sonnei	**70**	**73**	**51**	**59**	**57**
biotype a	28	33	27	38	27
biotype f	1	4	1	1	3
biotype g	41	36	23	20	27
S. flexneri	**33**	**31**	**49**	**40**	**54**
2a	12	13	21	15	10
2b	0	2	10	1	3
3a	4	6	6	5	3
6	6	3	4	6	7
Other	11	7	8	13	31
Other	**4**	**10**	**5**	**1**	**10**
S. boydii	3	8	4	0	7
S. dysenteriae	0	0	1	1	3
Shigella species not identified	1	2	0	0	0
Total	**107**	**114**	**105**	**100**	**121**

Figure 47. Percentage of laboratory-reported cases by *Shigella* species and year, 2008–2012



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.
Confirmed	A clinically compatible illness that is laboratory confirmed, OR a clinically compatible illness and a common exposure associated with a laboratory confirmed case.

Staphylococcus aureus intoxication cases reported in 2012 by data source

During 2012, there was one notification of *S. aureus* intoxication and no resulting deaths reported in EpiSurv. Note that not every case of *S. aureus* intoxication is necessarily notifiable, only those where there is a suspected common source.

The ICD-10 code A05.0 was used to extract foodborne staphylococcal intoxication hospitalisation data from the MoH NMDS database. There were two hospitalisations recorded in 2012 and both were reported with foodborne staphylococcal intoxication as the primary diagnosis.

Outbreaks reported as caused by *Staphylococcus aureus*

In 2012, one foodborne *S. aureus* outbreak was reported with three cases (Table 63).

Table 63. *S. aureus* outbreaks reported, 2012

Measure	Foodborne *S. aureus* outbreaks	All *S. aureus* outbreaks
Outbreaks	1	1
Cases	3	3
Hospitalised cases	0	0

The number of foodborne outbreaks associated with *S. aureus* reported between 2003 and 2012 ranged from zero to five annually (Figure 48). No *S. aureus* outbreaks were reported in EpiSurv in four of the last seven years.

Figure 48. Foodborne *S. aureus* outbreaks and associated cases reported by year, 2003–2012

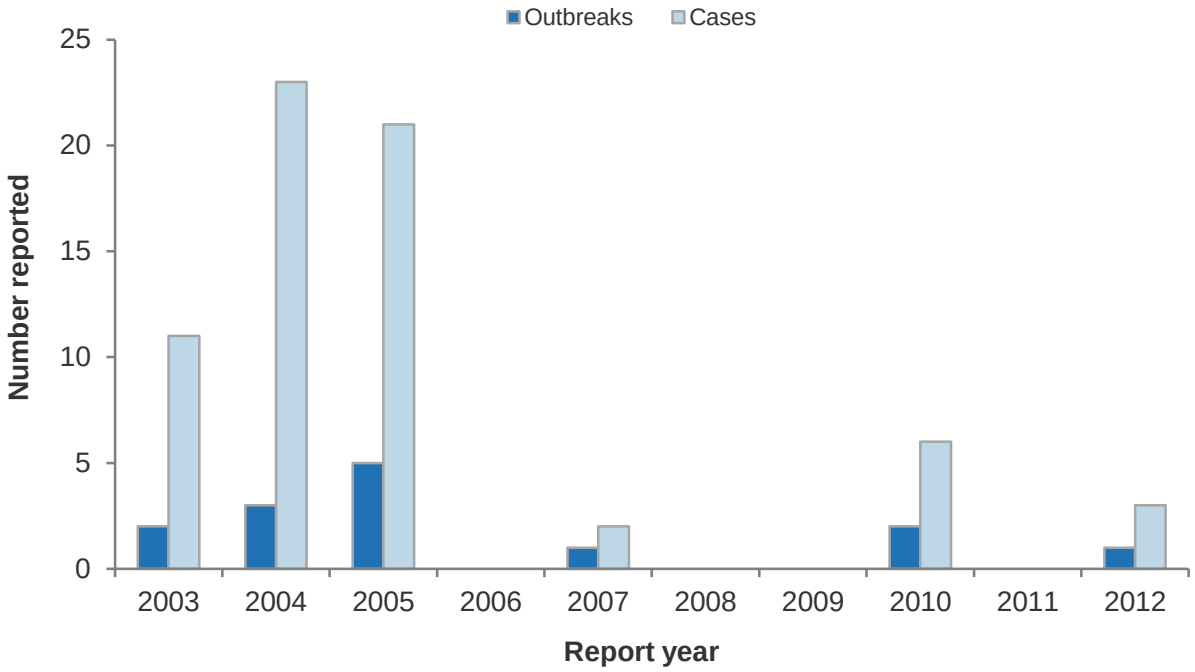


Table 64 contains details of the one foodborne *S. aureus* outbreak reported in 2012.

Table 64. Details of foodborne *S. aureus* outbreaks, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Auckland	Aug	Unknown	Restaurant/cafe/bakery	Restaurant/cafe/bakery	1C, 2P

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

In 2012, clinical samples were submitted to ESR's Public Health Laboratory relating to the food-associated *S. aureus* outbreak listed in Table 64. Coagulase positive staphylococci were detected in all faecal samples and staphylococcal enterotoxin was detected in one sample.

Recent surveys

Nil.

Relevant New Zealand studies and publications

1. Journal papers

Staphylococcus aureus was detected in 79% of 293 samples of raw milk taken from farm vats in five of the main milk collection regions of New Zealand [18]. However, none of the samples contained concentrations of *S. aureus* considered to be necessary for significant enterotoxin production (>10^5 CFU/ml).

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 2012

During 2012, 34 notifications (0.8 cases per 100 000 population) of toxic shellfish poisoning and no resulting deaths were reported in EpiSurv. Of the 34 cases notified, 29 cases were part of the toxic shellfish poisoning outbreak reported in the Bay of Plenty region (Table 65). These 29 cases had consumed tuatuas (29 cases), mussels (3 cases) and pipis (1 case) collected from the Bay of Plenty coastline. Only four cases had consumed the seafood raw. Of the five toxic shellfish poisoning cases not associated with the Bay of Plenty outbreak, four cases had eaten steamed mussels, purchased from a Wellington supermarket, together at a private function and one case had consumed raw scallops, collected from Kawhia Wharf.

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 20 hospital admissions (0.5 admissions per 100 000 population) reported in 2012, 19 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

In 2012, one foodborne toxic shellfish outbreak was reported with 29 cases (Table 65).

Table 65. Toxic shellfish poisoning outbreaks reported, 2012

Measure	Foodborne TSP outbreaks	All TSP outbreaks
Outbreaks	1	1
Cases	29	29
Hospitalised cases	0	0

Shellfish collected from the Bay of Plenty coastline was the suspected food vehicle in the single toxic shellfish poisoning outbreak (Table 66). The evidence was weak for the implicated food.

Table 66. Details of the foodborne toxic shellfish poisoning outbreak, 2012

PHU	Month	Suspected vehicle	Exposure setting	Preparation setting	No. ill
Tauranga	Dec	Shellfish	Other setting	Home and other setting	29C

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

In 2012, no food or clinical samples were submitted to ESR's Public Health Laboratory relating to food-associated toxic shellfish poisoning outbreaks.

Recent surveys

Nil.

Relevant New Zealand studies and publications

Nil.

Relevant regulatory developments

During 2012, MPI issued procedures to be followed before fish or fish product detained or recalled due to the presence of marine biotoxins could be released [28].

VTEC/STEC infection

Summary data for VTEC/STEC infection in 2012 are given in Table 67.

Table 67. Summary of surveillance data for VTEC/STEC infection, 2012

Parameter	Value in 2012	Source
Number of cases	147	EpiSurv
Rate (per 100 000)	3.3	EpiSurv
Hospitalisations (%)	13 (8.8%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	4 (2.5%)	EpiSurv
Estimated food-related cases (%)*	57 (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: Diarrhoea resulting from infection with VTEC/STEC may range from mild, watery and non-bloody to almost pure bloody diarrhoea with abdominal cramping. The disease is distinguishable from other causes of gastroenteritis by its high incidence of bloody diarrhoea (profuse rectal bleeding without fever sometimes clouds the diagnosis), severity (approximately 40 percent of cases are hospitalised) and frequency of complications. Haemolytic uraemic syndrome (HUS) complicates 8–10% of VTEC/STEC infections in children; this syndrome includes haemolytic anaemia, thrombocytopenia and acute renal failure. Of children with HUS, 12–30% will have severe sequelae, including renal and cerebral impairment. Elderly patients with VTEC infections may suffer thrombotic thrombocytopenic purpura (TTP), which is similar to HUS but with greater neurological involvement.

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 Not applicable

Confirmed A clinically compatible illness that is laboratory confirmed

VTEC/STEC infection cases reported in 2012 by data source

During 2012, 147 notifications (3.3 cases per 100 000 population) of VTEC/STEC infection and no resulting deaths were reported in EpiSurv. The Enteric Reference Laboratory at ESR reported 142 cases (3.2 per 100 000) infected with VTEC/STEC in 2012.

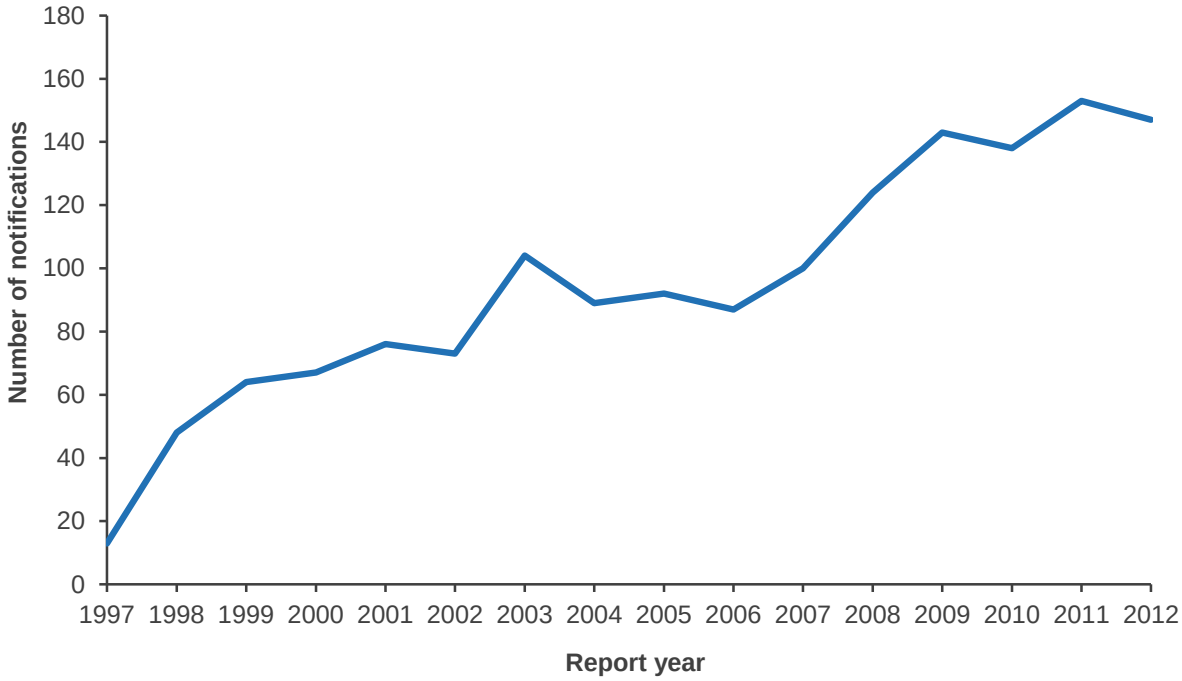
The ICD-10 code A04.3 was used to extract enterohaemorrhagic *E. coli* infection hospitalisation data from the MoH NMDS database. All 13 hospital admissions (0.3 admissions per 100 000 population) recorded in 2012 were reported with enterohaemorrhagic *E. coli* infection as the primary diagnosis.

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

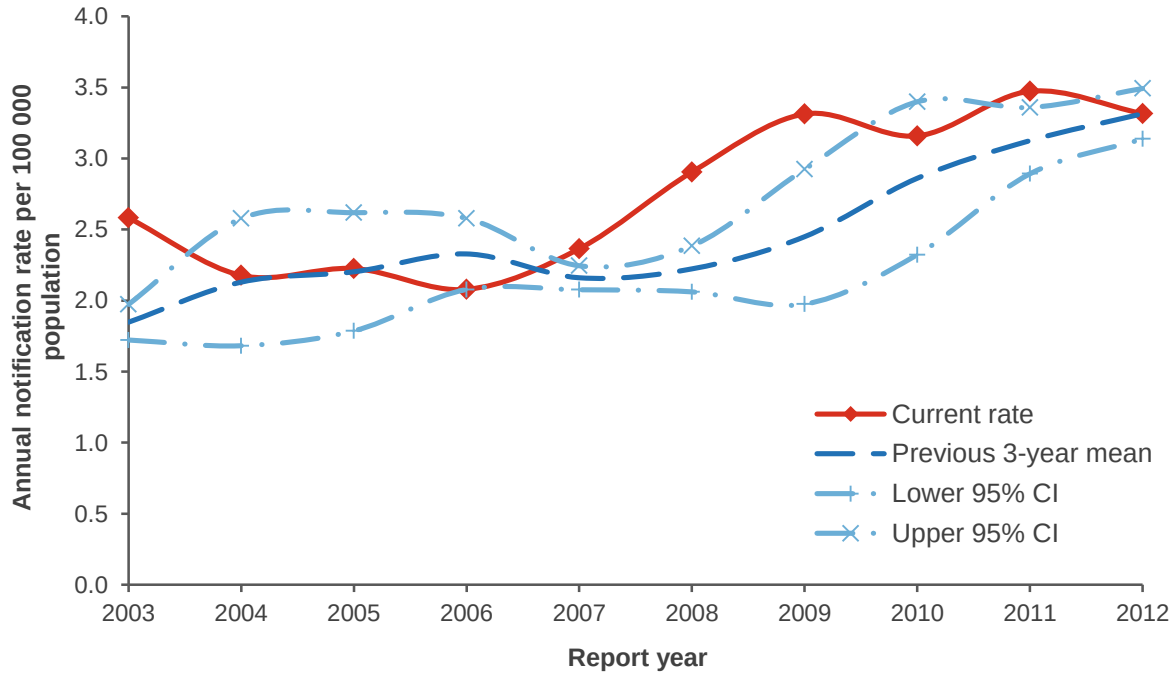
There has been a general increase in the notifications of VTEC/STEC infection since 1997, with the highest number of notifications in 2011 (154 cases). A slight decrease in notifications was seen in 2012 (147 cases) (Figure 49).

Figure 49. VTEC/STEC infection notifications by year, 1997–2012



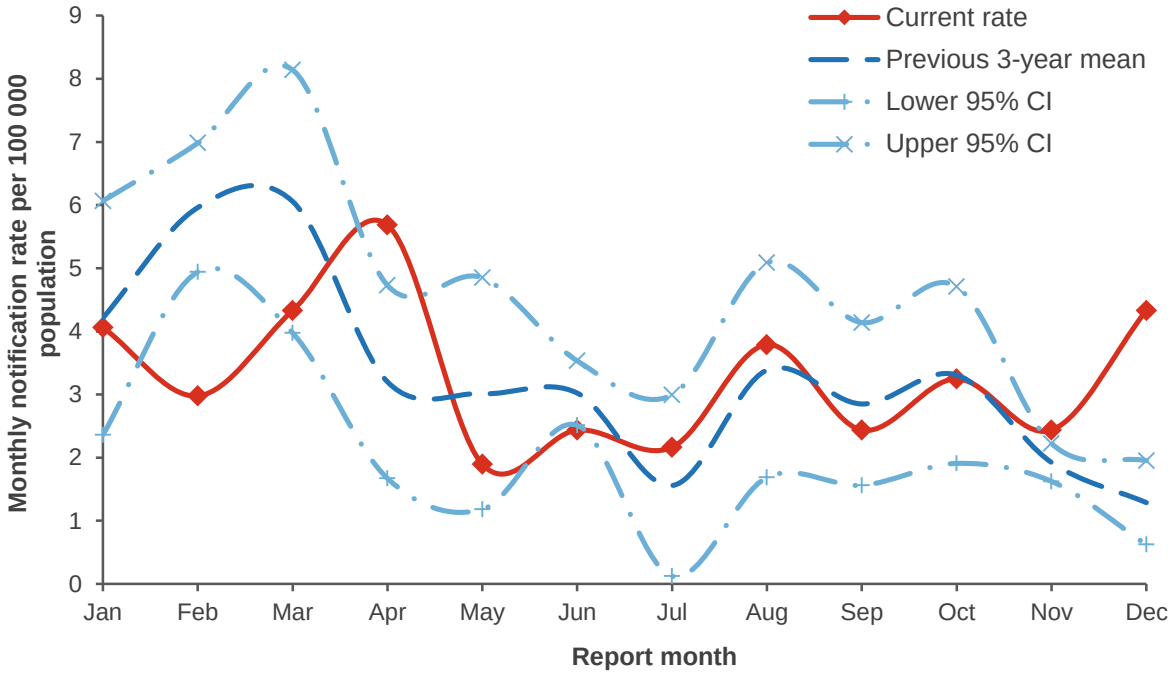
The VTEC/STEC infection annual rate (Figure 50) has shown a gradual increasing trend. Since 2007 the notifications rates have been higher than the mean. The trend in notification rate was very similar to the corresponding annual notification trend. The highest notification rate was in 2011 (3.5 per 100 000 population).

Figure 50. VTEC/STEC infection notification rate by year, 2003–2012



The number of notified cases of VTEC/STEC infection per 100 000 population by month for 2012 are shown in Figure 51. The 2012 monthly notification rate trend was higher compared to the trend in previous years showing a peak in autumn.

Figure 51. VTEC/STEC infection monthly rate (annualised), 2012



Rates of VTEC/STEC infection varied throughout the country as illustrated in Figure 52. In 2012, the highest rates of VTEC/STEC infection were for Bay of Plenty (8.5 per 100 000, 18 cases), Northland (7.6 per 100 000, 12 cases), and Taranaki (7.3 per 100 000, 8 cases) DHBs. These DHBs also had high notification rates between 2009 and 2011. Note that rates were not calculated for 11 DHBs where there were insufficient (less than 5) cases notified in 2012.

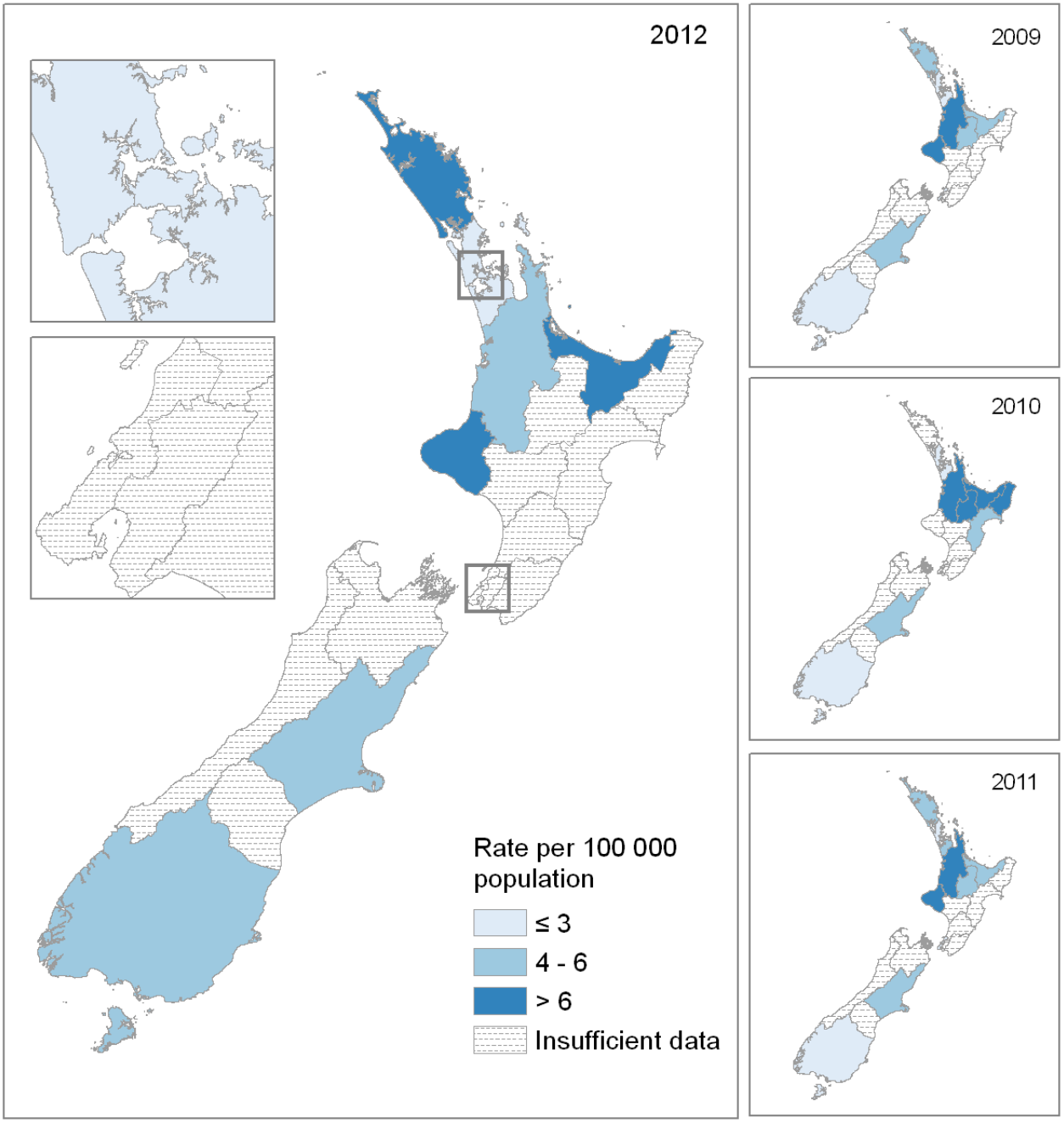
In 2012, notification rates were similar for males and females. Hospitalisation rates were higher for females than for males (Table 68).

Table 68. VTEC/STEC infection cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	74	3.4	5	0.2
Female	73	3.2	8	0.4
Total	**147**	**3.3**	**13**	**0.3**

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

Figure 52. Geographic distribution of VTEC/STEC infection notifications, 2009–2012



In 2012, VTEC/STEC infection notification rate was highest for the 1 to 4 years age group (22.7 per 100 000 population, 57 cases), followed by the less than 1 year age group (14.9 per 100 000, 9 cases). The number of hospitalisations ranged between zero and 3 for each of the age groups (Table 69).

Table 69. VTEC/STEC infection cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	9	14.9	0	-
1 to 4	57	22.7	3	-
5 to 9	15	5.1	2	-
10 to 14	6	2.1	1	-
15 to 19	8	2.6	1	-
20 to 29	11	1.8	0	-
30 to 39	9	1.6	0	-
40 to 49	7	1.1	1	-
50 to 59	9	1.6	2	-
60 to 69	7	1.6	2	-
70+	9	2.1	1	-
Total	**147**	**3.3**	**13**	**0.3**

[a] MoH NMDS 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 2012, the most commonly reported risk factors for VTEC/STEC infection were consumption of raw fruit/vegetables (87.5%), contact with household pets (86.8%), and consumption of dairy products (86.3%) (Table 70).

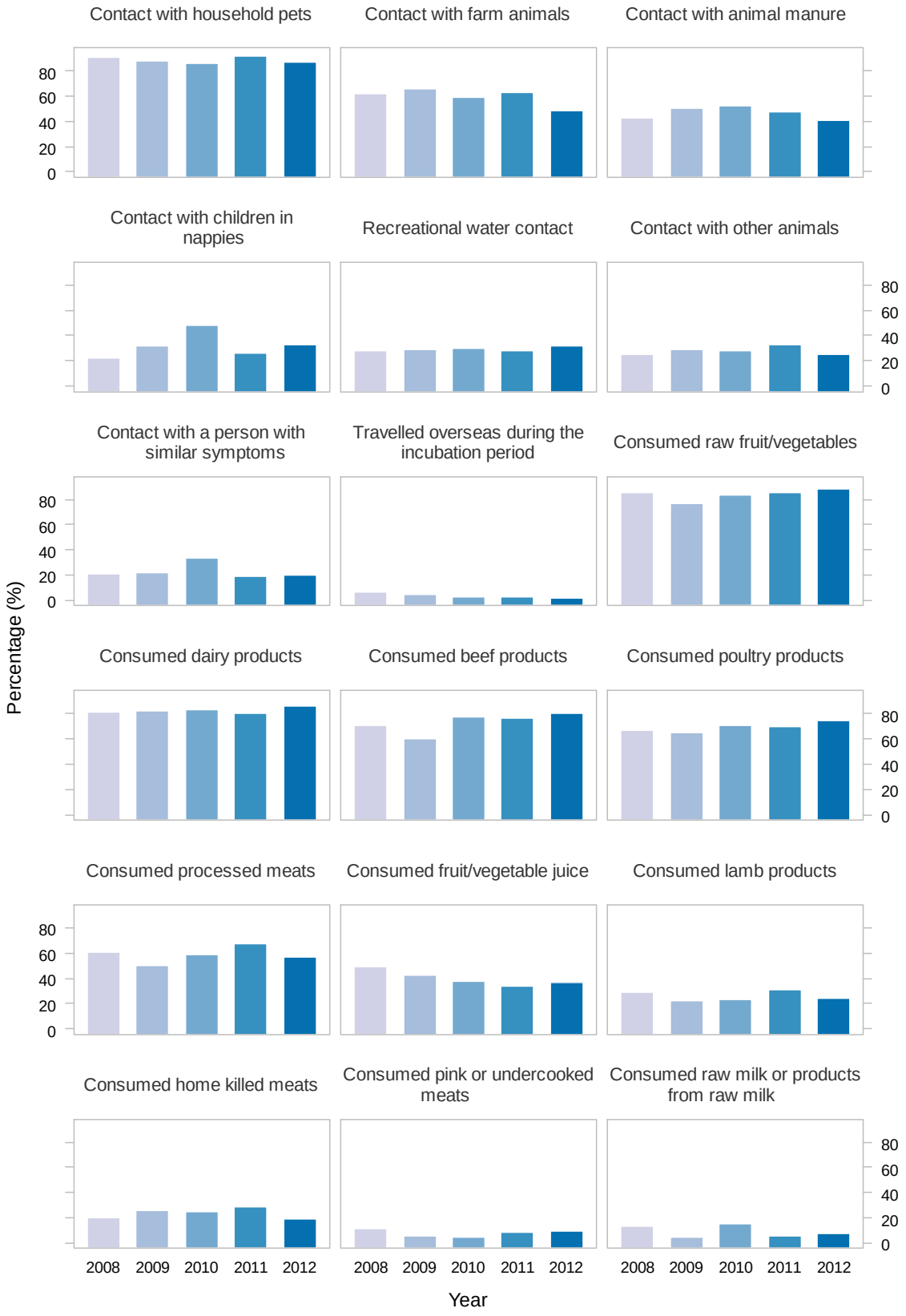
Table 70. Exposure to risk factors associated with VTEC/STEC infection, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed raw fruit/vegetables	105	15	27	87.5
Contact with household pets	79	12	56	86.8
Consumed dairy products	101	16	30	86.3
Consumed beef products	94	24	29	79.7
Consumed poultry products	86	30	31	74.1
Consumed processed meats	67	50	30	57.3
Contact with farm animals	39	43	65	47.6
Contact with animal manure	28	41	78	40.6
Consumed fruit/vegetables juice	38	66	43	36.5
Contact with children in nappies	34	70	43	32.7
Recreational water contact	37	80	30	31.6
Contact with other animals	19	57	71	25.0
Consumed lamb products	27	84	36	24.3
Contact with persons with similar symptoms	23	91	33	20.2
Consumed home killed meats	22	95	30	18.8
Consumed pink or undercooked meats	10	88	49	10.2
Consumed raw milk or products from raw milk	9	109	29	7.6
Travelled overseas during the incubation period	3	118	26	2.5

[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 2008 and 2012, 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 raw fruit and vegetables, and dairy products, followed closely by beef and poultry products, and processed meats.

Figure 53. Percentage of cases by exposure to risk factors associated with VTEC/STEC infection and year, 2008−2012



For cases where information on travel was provided, 2.5% (95% CI 0.5-7.1%) 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 2012. The resultant distribution has a mean of 4 cases (95% CI 0-9).

If data from the last four years are considered the estimated proportion of cases travelling overseas within the incubation period of the organism is 3.5% (95% CI 2.1-5.1%).

Outbreaks reported as caused by VTEC/STEC

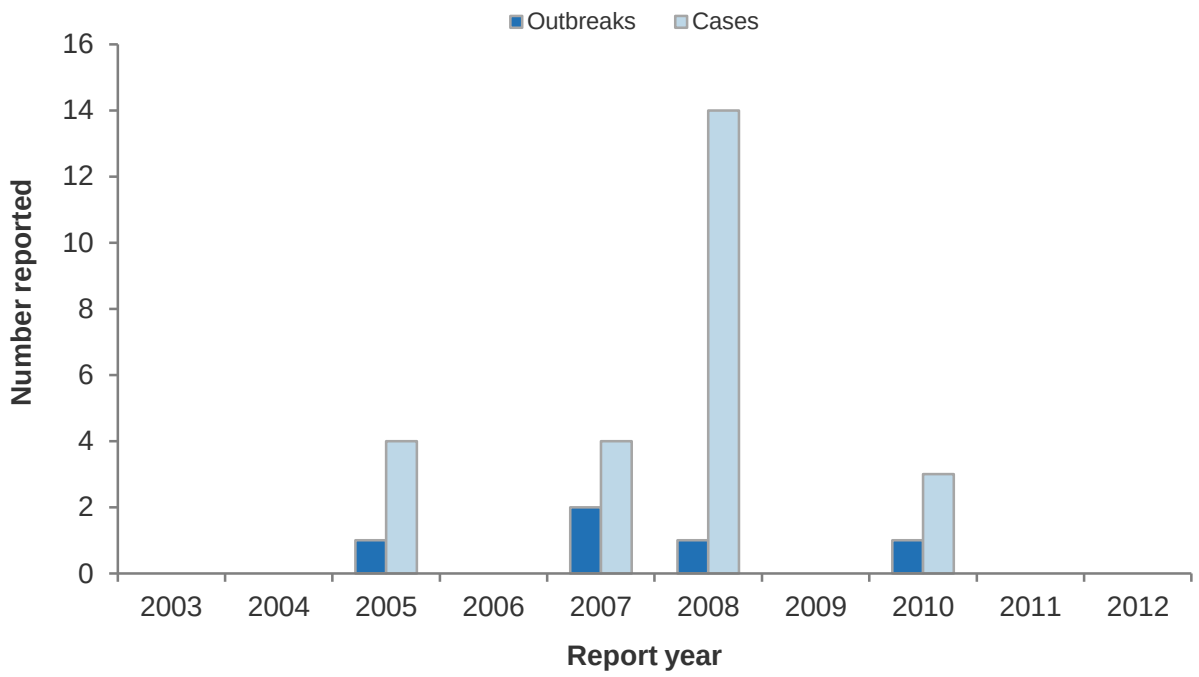
No foodborne outbreaks due to VTEC/STEC were reported in 2012 (Table 71).

Table 71. VTEC/STEC outbreaks reported, 2012

Measure	Foodborne VTEC/STEC outbreaks	All VTEC/STEC outbreaks
Outbreaks	0	1
Cases	0	3
Hospitalised cases	0	0

Over the 10-year period from 2003 to 2012 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, 2003–2012



In 2012, 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 142 cases infected with VTEC/STEC were reported by the ESR Enteric Reference Laboratory in 2012. Of these, 119 (83.8%) were identified as *E. coli* O157:H7, and 23 as non-O157:H7. Of the 23 non-O157:H7, one was typed as O176:HNM and a further four as ONT:HNM, while the remaining 18 serotypes were all unique (Table 72). Between 2008 and 2012, there has been an increasing percentage of cases infected with non-O157 VTEC/STEC (Figure 55).

Table 72. VTEC/STEC subtypes identified by the Enteric Reference Laboratory, 2008–2012

Serotype	2008	2009	2010	2011	2012
O157	**120**	**137**	**115**	**139**	**119**
O157:H7	120	137	115	139	119
Non-O157	**2**	**8**	**13**	**14**	**23**
O128:H2			1	2	
O84:H2			1	2	
O176:HNM	1		2	1	1
ONT:HNM		3			9
ONT:H11					2
Other types[a]	1	5	9	9	11
Total	**122**	**145**	**128**	**153**	**142**

[a] Single cases following types were identified

2008: O130:H11

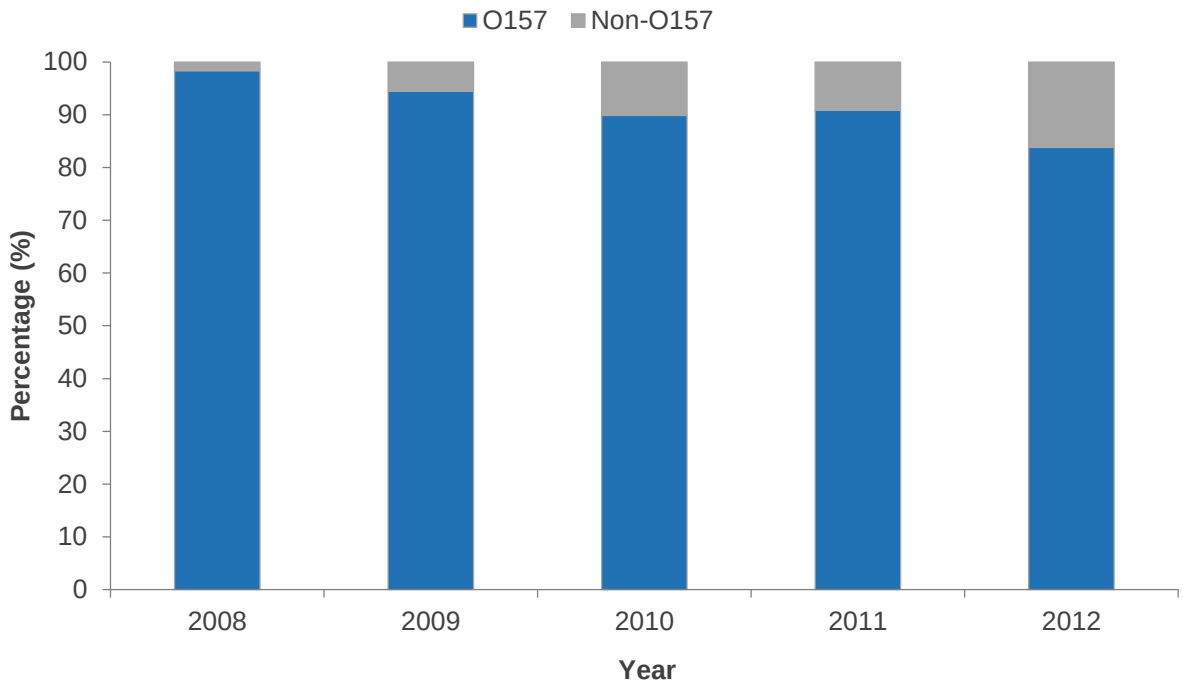
2009: O22:H16, O103:H25, O174:H21, O26:H11, O103:H2

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

2012: O26:H7, O26:H11, O38:H26, O68:HNM, O84:HNM, O128:HNM, O146:H21, O146:HRough, O176:HRough, O180:HNM, ONT:H7

Figure 55. Percentage of *E. coli* O157 and non-O157 laboratory-reported cases by year, 2008–2012



Most human isolates of O157:H7 are further genotyped by pulsed-field gel electrophoresis (PFGE). Table 73 summarises PFGE typing of human O157:H7 isolates for 2008-2012.

Table 73. PFGE genotypes of human E. coli O157:H7 isolates, 2008-2012

Genotype	Number of isolates				
	2008	2009	2010	2011	2012
Xb0040	9	32	30	26	19
Xb0040a	0	8	8	18	16
Xb0168	12	8	8	11	14
Xb0049	6	11	25	16	13
Xb0092	3	4	0	1	5
Xb0014	0	3	1	5	5
Xb0040g	1	2	3	6	4
Xb0296	1	0	2	1	3
Xb0070	0	0	0	0	2
Xb0200	0	2	2	2	2
Xb0202	0	0	1	3	2
Xb0191	0	0	0	0	2
Xb0386	0	0	0	0	2
Xb0382	0	0	0	0	2
Other types	44	70	35	49	32
Total	**76**	**140**	**115**	**138**	**123**

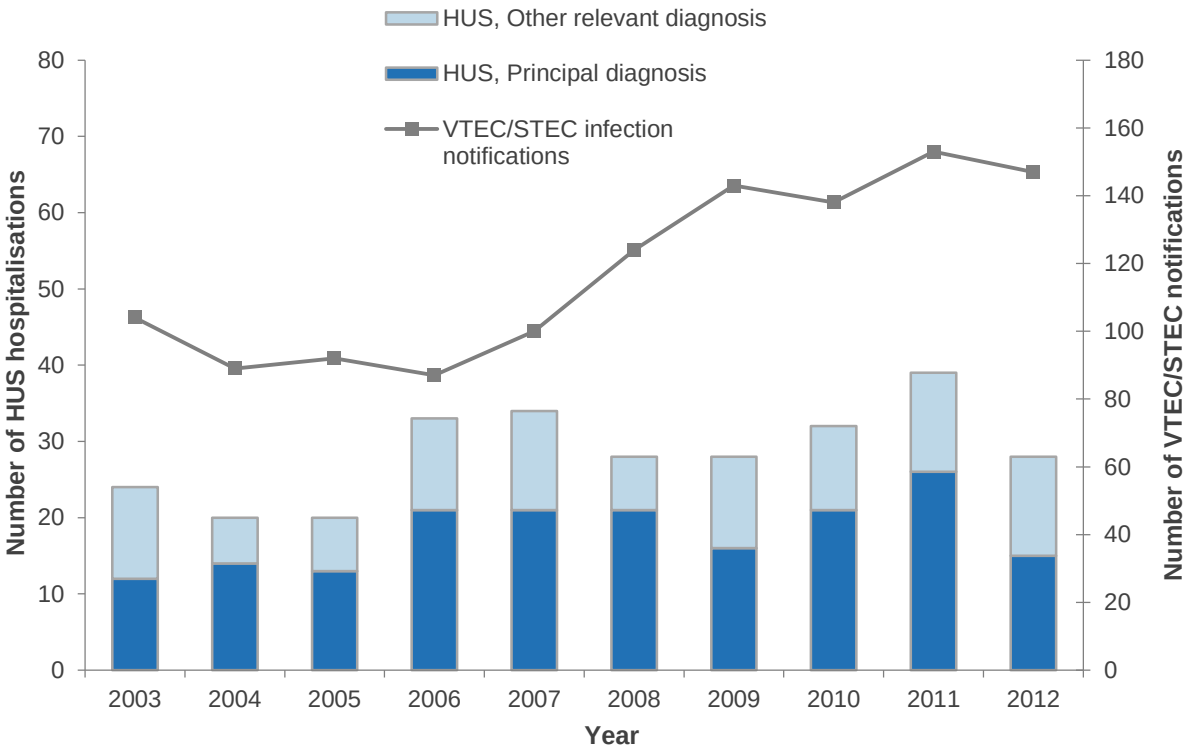
Disease sequelae - haemolytic-uraemic syndrome (HUS)

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. Of the 28 hospital admissions recorded in 2012 (0.6 per 100 000 population), 15 were reported with HUS as the primary diagnosis and 13 with HUS as another relevant diagnosis.

Between 2003 and 2012, the number of hospitalised cases (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 both have had a slight decrease in cases over the last year.

Figure 56. Haemolytic-uraemic syndrome (HUS) hospitalised cases, 2003–2012



In 2012, the number of hospitalised cases due to HUS was the same for females and males (Table 74).

Table 74. Haemolytic uraemic syndrome hospitalised cases by sex, 2012

Sex	Hospitalised cases[a]	
	No.	Rate[b]
Male	14	0.6
Female	14	0.6
Total	**28**	**0.6**

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

In 2012, the highest age-specific rate of hospitalised cases due to HUS was in the less than 5 years age group (Table 75).

Table 75. Haemolytic uraemic syndrome hospitalised cases by age group, 2012

Age group (years)	Hospitalised cases [a]	
	No.	Rate[b]
<5	7	2.2
5 to 9	2	-
10 to 14	1	-
15 to 19	1	-
20 to 29	5	0.8
30 to 39	2	-
40 to 49	7	1.1
50 to 59	2	-
60 to 69	1	-
70+	0	-
Total	**28**	**0.6**

[a] MoH NMDS 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 2012, five cases of HUS were reported to the NZPSU. The median age at presentation of cases was 3.5 years (range 1.2 to 4.3 years). Three cases had *E. coli* O157:H7 isolated from their stools and one had *Streptococcus pneumoniae*. Two of those positive for *E. coli* O157:H7 lived on a farm.

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

This study involved PFGE analysis of an additional 47 *E. coli* O157:H7 isolates from meat received by ESR during the period 1 January 2011 to 31 December 2011 [29]. All of the isolates have been analysed by PFGE using both *Xba*I and *Bln*I. When the two PFGE types were combined 30 *Xba*I:*Bln*I types were observed. Of the 30 *Xba*I:*Bln*I types 25 were new patterns not previously been seen in the New Zealand database. The remaining five patterns were indistinguishable using two enzymes from patterns previously analysed. All of the 47 New Zealand bovine isolates were distinguishable using two enzymes from the 2011 USA isolates reported by PulseNet USA as part of recognised outbreaks.

The genotyping performed was used to respond to two queries. The first a New Zealand based query as to whether isolates from the same premise were of the same genotype. They were all different genotypes which may indicate different contamination events. The second request from the USA was part of a supplier implication investigation. Comparison of the gel images, enabled us to conclude that we had NOT seen the implicated *Xba*I:*Bln*I pattern in New Zealand.

Relevant New Zealand studies and publications

1. Journal papers

Escherichia coli O157:H7 was not detected in 297 samples of raw milk taken from farm vats in five of the main milk collection regions of New Zealand [18]. Non-pathogenic *E. coli* O157 strains (lacking genes for *stx1, stx2, eae* and *Hly A*) were detected in 1% of samples.

A survey was conducted for *Escherichia coli* O157 in calves less than 1 week old (bobby calves) from dairy farms in the North Island of New Zealand [30]. A total of 309 recto-anal mucosal swabs and blood samples were collected from bobby calves at two slaughter plants. Of the samples, 17.7% were positive for *E. coli* O157 by real time PCR, and originated from 23.8% of farms. Serum IgG concentrations, carcass weight and calf gender were not associated with *E. coli* O157 test results.

Relevant regulatory developments

Nil.

Yersiniosis

Summary data for yersiniosis in 2012 are given in Table 76.

Table 76 Summary of surveillance data for yersiniosis, 2012

Parameter	Value in 2012	Source
Number of cases	517	EpiSurv
Rate (per 100 000)	11.7	EpiSurv
Hospitalisations (%)	41 (7.9%)	MoH NMDS
Deaths (%)	0 (0%)	EpiSurv
Estimated travel-related cases (%)	29 (5.6%)	EpiSurv
Estimated food-related cases (%)*	274 (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: In children under 5 years old, *Y. enterocolitica* infection typically causes diarrhoea, vomiting, fever and occasionally abdominal pain. In contrast, older children and adults are more likely to experience abdominal pain as the prominent symptom. Bacteraemia and sepsis may occur in immunocompromised individuals. *Y. pseudotuberculosis* is more likely to cause mesenteric adenitis and septicaemia than *Y. enterocolitica*.

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 epidemiologically linked to a confirmed case or has had contact with the same common source – that is, is part of a common-source outbreak.

Confirmed: A clinically compatible illness that is laboratory confirmed

Yersiniosis cases reported in 2012 by data source

During 2012, 517 notifications (11.7 cases per 100 000 population) of yersiniosis and no resulting deaths were reported in EpiSurv.

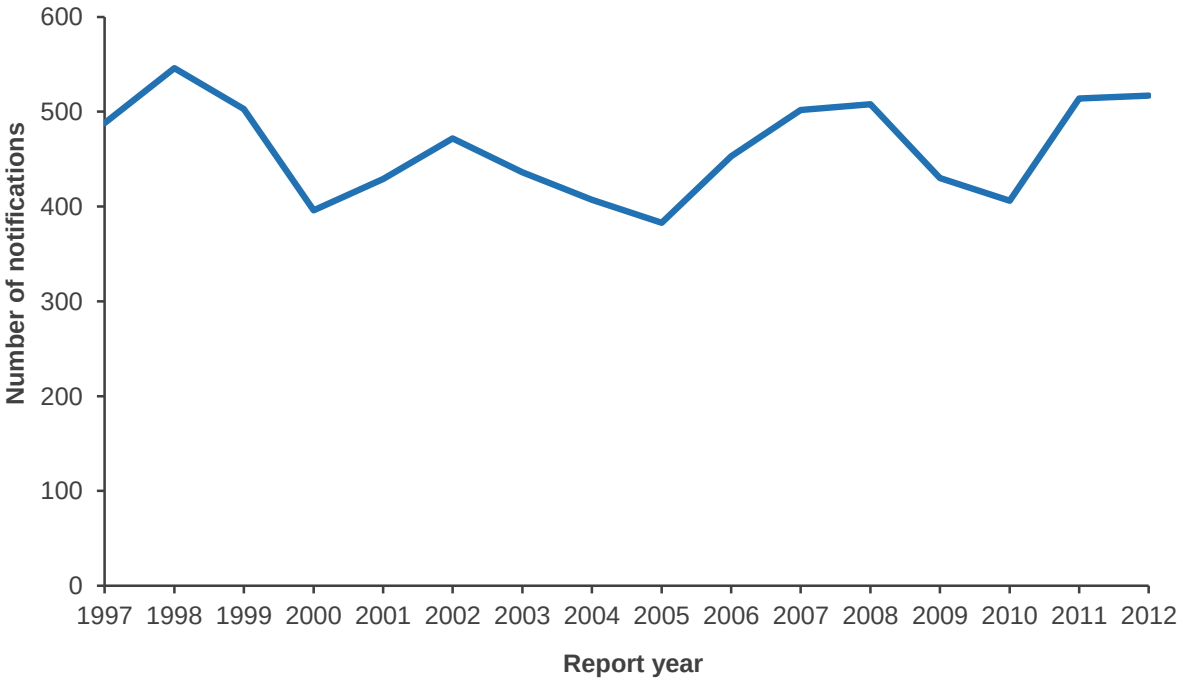
The ICD-10 code A04.6 was used to extract yersiniosis hospitalisation data from the MoH NMDS database. Of the 41 hospital admissions (0.9 admissions per 100 000 population) recorded in 2012, 18 were reported with yersiniosis as the primary diagnosis and 23 with yersiniosis as another relevant diagnosis.

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

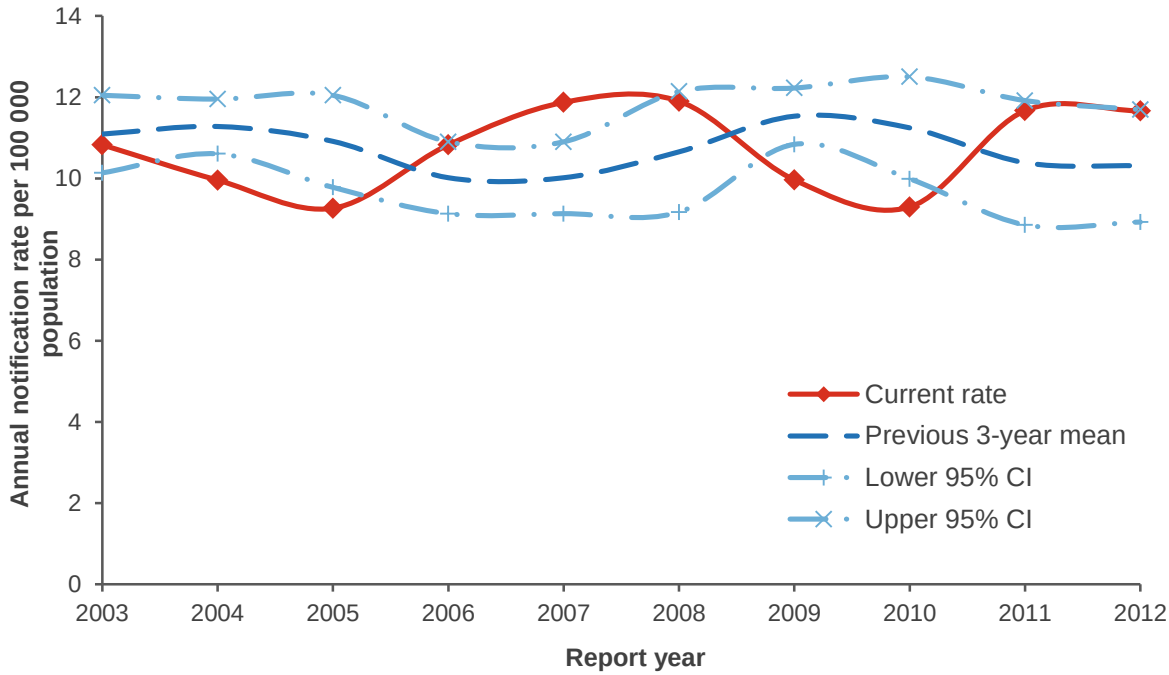
Yersiniosis became notifiable in 1996, with the highest number of notifications reported in 1998 (546 cases). Since 1998, the annual number of notifications has shown little variation with between 383 notifications (2005) and 517 notifications (2012) reported each year (Figure 57).

Figure 57. Yersiniosis notifications by year, 1997–2012



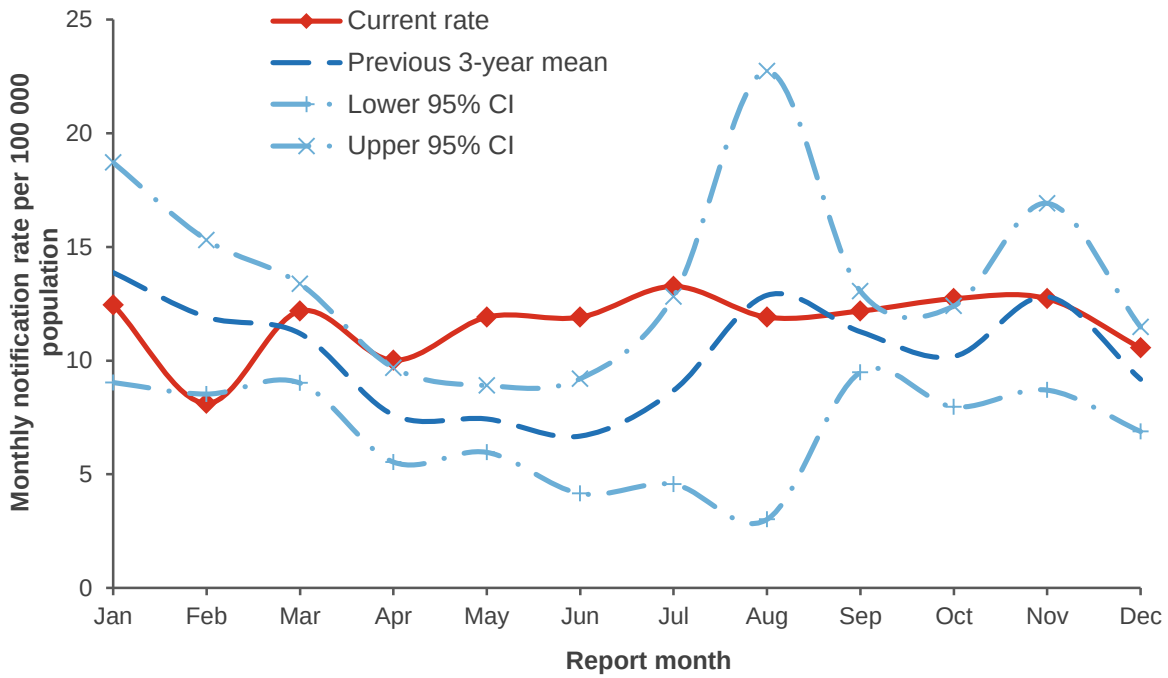
The yersiniosis annual notification rate has remained fairly stable between 2003 and 2012 (ranging from 9.3 to 11.9 per 100 000) (Figure 58).

Figure 58. Yersiniosis notification rate by year, 2003–2012



The number of notified cases of yersiniosis per 100 000 population by month for 2012 is shown in Figure 59. The 2012 notification rate trend was similar to the mean monthly rate in previous years, with a higher rate seen in May and June.

Figure 59. Yersiniosis monthly rate (annualised), 2012



Yersiniosis notification rates vary throughout New Zealand as illustrated in Figure 60. In 2012, the highest rates were for South Canterbury (23.0 per 100 000 population, 13 cases) and Capital and Coast (18.2 per 100 000, 54 cases) DHBs. Hutt Valley and Capital and Coast DHBs have been in the highest quantile of yersiniosis notification rates for each of the last four years.

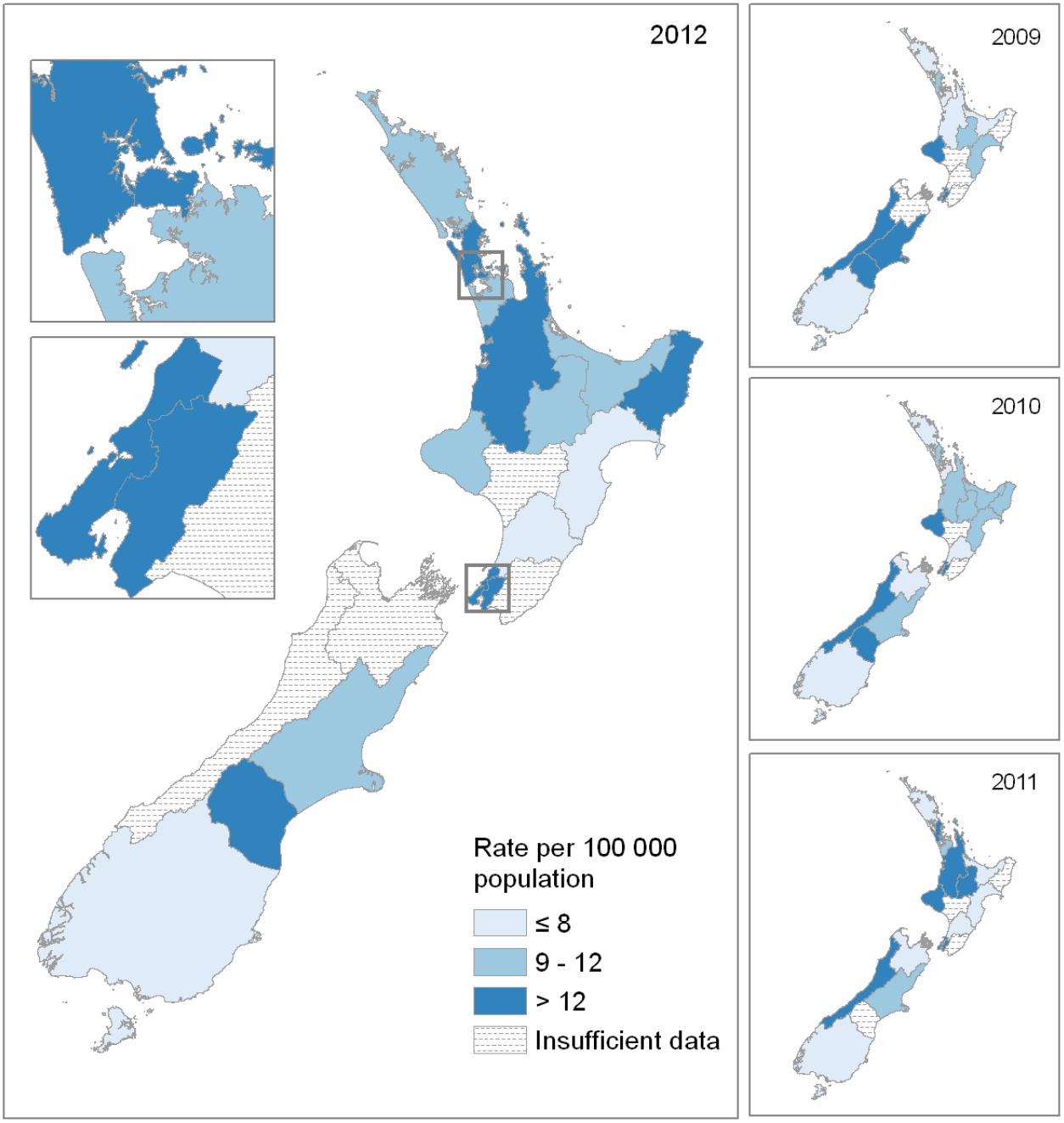
The yersiniosis notification rate was slightly higher for males (12.9 per 100 000 population, 282 cases) than for females (10.4 per 100 000, 234 cases) in 2012. The hospitalisation rate was slightly higher for females compared to males (Table 77).

Table 77. Yersiniosis cases by sex, 2012

Sex	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
Male	282	12.9	18	0.8
Female	234	10.4	23	1.0
Unknown	1	-	0	-
Total	**517**	**11.7**	**41**	**0.9**

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

Figure 60. Geographic distribution of yersiniosis notifications, 2009–2012



In 2012, the highest yersiniosis notification rates were for the less than 1 year (80.9 per 100 000 population, 49 cases) and 1 to 4 years (53.7 per 100 000, 135 cases) age groups. Notification rates were more than five times higher for those groups than for any other age group (Table 78). Just under half of the hospitalised cases were in the 70 years and over age group.

Table 78. Yersiniosis cases by age group, 2012

Age group (years)	EpiSurv notifications		Hospitalisations[a]	
	No.	Rate[b]	No.	Rate[b]
<1	49	80.9	1	-
1 to 4	135	53.7	3	-
5 to 9	20	6.9	1	-
10 to 14	23	8.0	0	-
15 to 19	24	7.7	4	-
20 to 29	57	9.1	3	-
30 to 39	45	8.1	1	-
40 to 49	45	7.2	4	-
50 to 59	51	9.0	2	-
60 to 69	28	6.5	3	-
70+	40	9.5	19	4.5
Total	**517**	**11.7**	**41**	**0.9**

[a] MoH NMDS 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 2012, the most commonly reported risk factors for yersiniosis notifications were consumption of food from retail premises (40.8%) and contact with farm animals (30.9%) (Table 79).

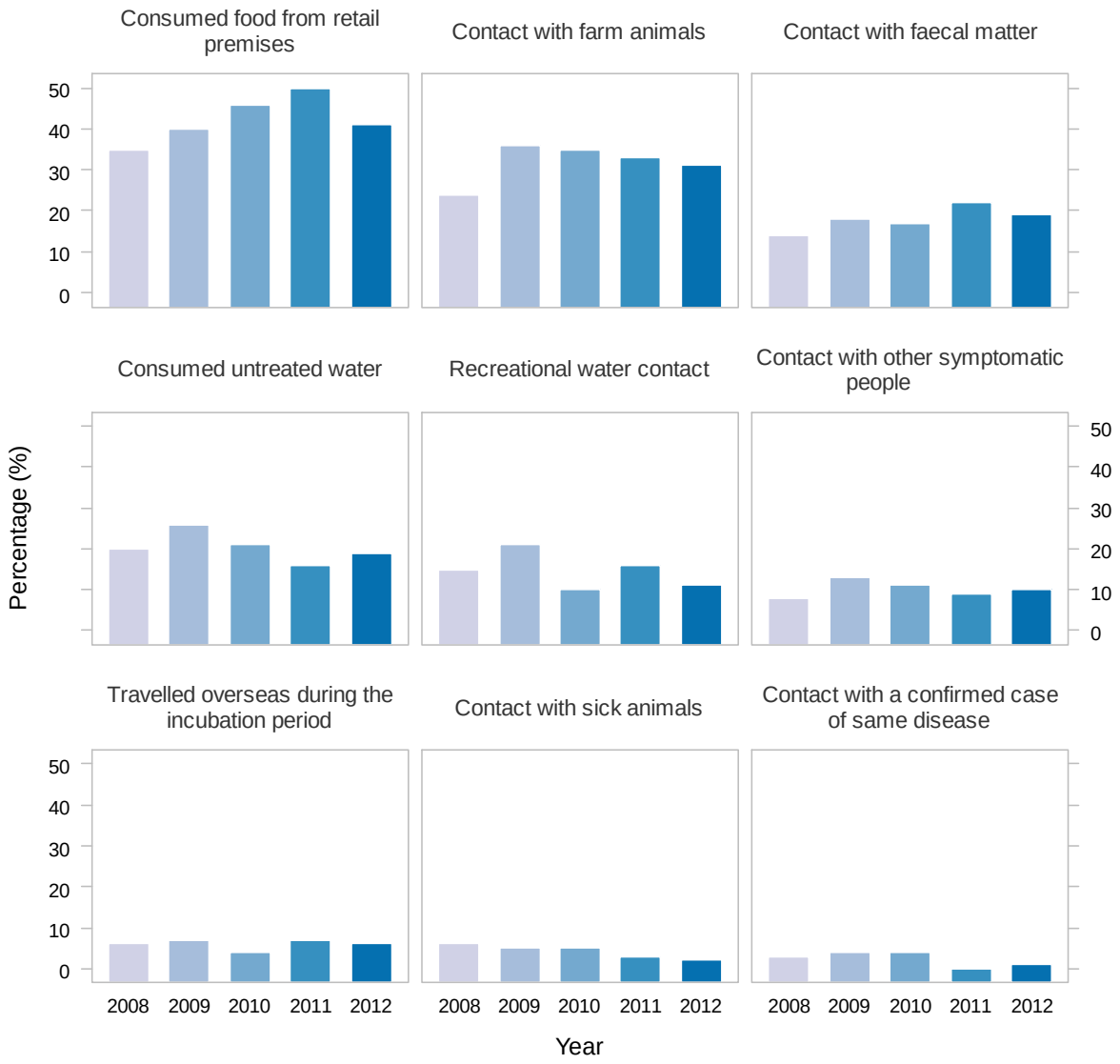
Table 79. Exposure to risk factors associated with yersiniosis, 2012

Risk factor	Notifications			
	Yes	No	Unknown	%[a]
Consumed food from retail premises	71	103	343	40.8
Contact with farm animals	64	143	310	30.9
Contact with faecal matter	35	145	337	19.4
Consumed untreated water	35	146	336	19.3
Recreational water contact	21	170	326	11.0
Contact with other symptomatic people	19	162	336	10.5
Travelled overseas during the incubation period	12	201	304	5.6
Contact with sick animals	3	185	329	1.6

[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 2008 and 2012, 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 but this was seen to decrease in 2012.

Figure 61. Percentage of cases by exposure to risk factors associated with yersiniosis and year, 2008−2012



For cases where information on travel was provided, 5.6% (95% CI 2.9-9.6%) 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 2012. The resultant distribution has a mean of 29 cases (95% CI 14-47).

If data from the last four years are considered, the estimated proportion of cases travelling overseas within the incubation period of the organism is 5.8% (95% CI 4.5-7.3%).

Outbreaks reported as caused by *Yersinia* spp.

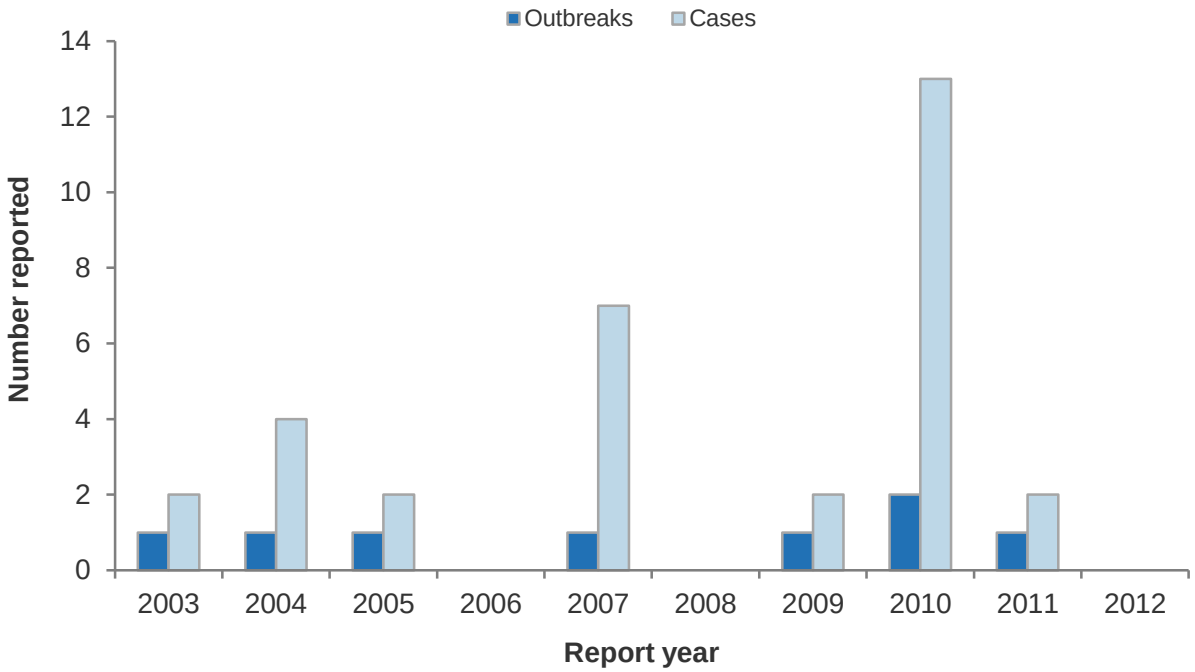
During 2012, there were five *Yersinia* spp. outbreaks, with a total of 14 cases, reported in EpiSurv. There were no *Yersinia* spp. outbreaks associated with a suspected foodborne source in 2012 (Table 80).

Table 80. *Yersinia* spp. outbreaks reported, 2012

Measure	Foodborne Yersinia spp. outbreaks	All *Yersinia* spp. outbreaks
Outbreaks	0	5
Cases	0	14
Hospitalised cases	0	0

Between 2003 and 2012 very few foodborne *Yersinia* spp. outbreaks were reported in EpiSurv (two or less each year), with a total number of associated cases (ranging from 2 to 13) (Figure 62).

Figure 62. Foodborne *Yersinia* spp. outbreaks and associated cases reported by year, 2003–2012



In 2012, 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 2012, clinical laboratories submitted 490 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 91% 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.

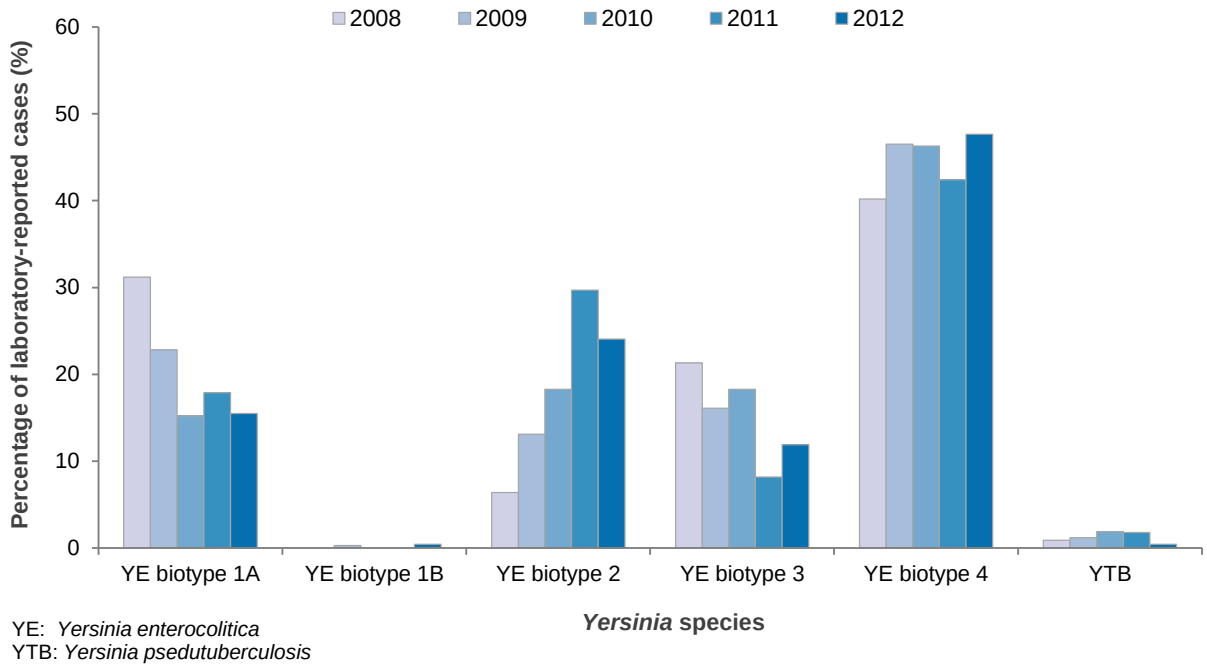
The number of notifiable *Yersinia* spp. cases identified by the Enteric Reference Laboratory at ESR each year is shown in Table 81. Between 2008 and 2012, the percentage of cases identified with YE biotype 2 increased from 6.3% (in 2008) to 29.7% (in 2011) then decreased (in 2012) to 24% of the notifiable *Yersinia* isolates. The percentage of YE biotype 4 cases have increased since 2008 (Figure 63). The number of YTB cases identified decreased in 2012 (from 8 in 2011 to 2 in 2012).

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 81. Notifiable *Yersinia* spp. identified by the Enteric Reference Laboratory, 2008–2012

Species	2008	2009	2010	2011	2012
Yersinia enterocolitica	**340**	**325**	**252**	**433**	**443**
biotype 1A	107	75	39	79	69
biotype 1B	0	1	0	0	2
biotype 2	22	43	47	131	107
biotype 3	73	53	47	36	53
biotype 4	138	153	119	187	212
Yersinia pseudotuberculosis	**3**	**4**	**5**	**8**	**2**
Total	**343**	**329**	**257**	**441**	**445**

Figure 63. Percentage of laboratory-reported cases of notifiable *Yersinia* spp. by species and year, 2008–2012



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 82. Number of cases and rate per 100 000 population of selected notifiable diseases in New Zealand, 2011–2012

Disease	2011		2012		Change [b,c]
	Cases	Rates	Cases	Rates	
Campylobacteriosis	6 689	151.8	7 031	158.6	➔
Cryptosporidiosis	610	13.8	877	19.8	➔
Gastroenteritis [a]	630	14.3	735	16.6	➔
Giardiasis	1 935	43.9	1 719	38.8	←
Hepatitis A	26	0.6	82	1.8	➔
Listeriosis	26	0.6	25	0.6	←
Salmonellosis	1 055	23.9	1 085	24.5	→
Shigellosis	101	2.3	132	3.0	➔
VTEC/STEC infection	153	3.5	147	3.3	←
Yersiniosis	514	11.7	517	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. Results are considered statistically significant when the *P* value is less than or equal to 0.05.

Table 83. Deaths due to selected notifiable diseases recorded in EpiSurv, 1997-2012

Disease	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Campylobacteriosis	2	2	1	3	1	1	0	0	1	1	1	0	0	0	0	0
Gastroenteritis	0	0	0	0	0	1	0	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	0
Listeriosis - non perinatal	2	0	1	2	1	0	2	3	1	0	2	3	2	3	1	4
Listeriosis - perinatal	6	0	2	4	1	3	2	2	0	1	2	2	2	4	0	2
Salmonellosis	2	2	1	7	2	1	0	0	1	1	1	1	1	0	0	0
Shigellosis	0	0	1	0	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	0
Yersiniosis	0	2	0	0	0	0	0	1	0	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 84. MoH mortality data for selected notifiable diseases, 2008-2010

Disease	ICD 10 Codes	2008		2009		2010 [a]	
		Und[b]	Cont[c]	Und[b]	Cont[c]	Und[b]	Cont[c]
Campylobacteriosis	A04.5	0	4	1	0	0	4
Hepatitis A	B15	0	1	0	0	0	2
Listeriosis	A32	1	1	3	3	3	0
Salmonellosis	A02	1	2	1	4	0	1
Shigellosis	A03	1	0	0	0	0	0
Yersiniosis	A04.6	1	1	1	0	0	0

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

Table 85. MoH Hospitalisations data for selected notifiable diseases, 2010-2012

Disease	ICD 10 Codes	2010		2011		2012	
		Principal diagnosis	Principal diagnosis	Principal diagnosis	Other relevant diagnosis	Principal diagnosis	Other relevant diagnosis
Campylobacteriosis	A04.5	526	107	445	132	544	116
Cryptosporidiosis	A07.2	16	14	16	2	42	12
Giardiasis	A07.1	18	15	35	25	27	23
Hepatitis A	B15	20	13	8	11	35	4
Listeriosis	A32	13	18	11	19	14	13
Salmonellosis	A02	121	49	107	29	128	46
Shigellosis	A03	21	4	22	6	12	8
Toxic shellfish poisoning	T61.2	22	4	14	1	19	1
VTEC/STEC infection	A04.3	10	3	12	6	13	0
Yersiniosis	A04.6	13	14	16	23	18	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 86. Number of cases and rate per 100 000 population of selected notifiable diseases by ethnic group, 2012

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	490	75.7	111	41.6	306	75.0	28	74.2	5 620	182.9	7 031	158.6
Cryptosporidiosis	69	10.7	15	5.6	18	4.4	5	13.2	746	24.3	877	19.8
Gastroenteritis[c]	57	8.8	16	6.0	32	7.8	2		549	17.9	735	16.6
Giardiasis	104	16.1	12	4.5	74	18.1	39	103.3	1 375	44.7	1 719	38.8
Hepatitis A	1		10	3.7	53	13.0	5	13.2	11	0.4	82	1.8
Listeriosis	1		4		1		1		18	0.6	25	0.6
Salmonellosis	94	14.5	38	14.2	101	24.8	8	21.2	781	25.4	1 085	24.5
Shigellosis	6	0.9	36	13.5	13	3.2	3		64	2.1	132	3.0
VTEC/STEC infection	15	2.3	0		5	1.2	1		125	4.1	147	3.3
Yersiniosis	42	6.5	29	10.9	128	31.4	4		280	9.1	517	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 2012 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 87. Number of cases and rates of selected notifiable diseases per 100 000 population by sex, 2012

Disease	Sex					
	Male		Female		Total[a]	
	Cases	Rate	Cases	Rate	Cases	Rate
Campylobacteriosis	3 938	180.6	3 093	137.3	7 031	158.6
Cryptosporidiosis	452	20.7	425	18.9	877	19.8
Gastroenteritis[b]	313	14.4	422	18.7	735	16.6
Giardiasis	811	37.2	907	40.3	1 719	38.8
Hepatitis A	45	2.1	37	1.6	82	1.8
Listeriosis – non perinatal	11	0.5	12	0.5	23	0.5
Salmonellosis	561	25.7	524	23.3	1 085	24.5
Shigellosis	62	2.8	70	3.1	132	3.0
VTEC/STEC infection	74	3.4	73	3.2	147	3.3
Yersiniosis	282	12.9	234	10.4	517	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 88. Number of cases and rates of selected notifiable diseases per 100 000 population by age group, 2012

	<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	163	269.0	754	300.1	347	119.0	274	94.8	440	141.3	1,124	179.0	714	128.0	855	136.6	842	147.9	769	179.5	742	176.5	7,031	158.6
Cryptosporidiosis	19	31.4	303	120.6	113	38.8	61	21.1	61	19.6	93	14.8	108	19.4	51	8.1	33	5.8	21	4.9	14	3.3	877	19.8
Gastroenteritis	27	44.6	83	33.0	18	6.2	15	5.2	27	8.7	83	13.2	104	18.6	85	13.6	82	14.4	46	10.7	141	33.5	735	16.6
Giardiasis	38	62.7	343	136.5	102	35.0	36	12.5	39	12.5	177	28.2	402	72.1	236	37.7	156	27.4	146	34.1	41	9.8	1719	38.8
Hepatitis A			13	5.2	21	7.2	10	3.5	5	1.6	12	1.9	7	1.3	7	1.1	3		3		1		82	1.8
Listeriosis							1				1		1		1		2		6	1.4	13	3.1	25	0.6
Salmonellosis	65	107.3	185	73.6	59	20.2	34	11.8	49	15.7	172	27.4	106	19.0	117	18.7	119	20.9	93	21.7	85	20.2	1085	24.5
Shigellosis			16	6.4	10	3.4	1		5	1.6	26	4.1	17	3.0	15	2.4	17	3.0	19	4.4	6	1.4	132	3
VTEC/STEC infection	9	14.9	57	22.7	15	5.1	6	2.1	8	2.6	11	1.8	9	1.6	7	1.1	9	1.6	7	1.6	9	2.1	147	3.3
Yersiniosis	49	80.9	135	53.7	20	6.9	23	8.0	24	7.7	57	9.1	45	8.1	45	7.2	51	9.0	28	6.5	40	9.5	517	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 89. Number of cases of selected notifiable diseases by District Health Board, 2012

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	230	776	524	480	695	166	267	54	220	297	91	199	171	430	73	303	72	1127	178	678	7031
Cryptosporidiosis	37	43	29	38	179	22	21	1	28	48	3	25	34	111	16	17	10	88	46	81	877
Gastroenteritis[a]	1	88	123	42	46	24	45	3	13	2	11	127	43	79	3	17	7	47	2	12	735
Giardiasis	43	214	257	131	156	59	95	8	38	60	7	20	51	128	20	67	11	195	24	135	1719
Hepatitis A	1	36	15	15	3		1		1	2			1	6				1			82
Listeriosis		3	2	5	3		5		1	4				1					1		25
Salmonellosis	29	120	121	71	94	23	36	9	29	29	9	31	32	44	5	58	14	133	29	169	1085
Shigellosis	2	31	24	25	6		7		4	1		2	1	11		1		9		8	132
VTEC/STEC infection	12	14	6	10	22	3	18	1	8	4		1	1			4	2	23	4	14	147
Yersiniosis	16	91	60	56	48	9	22	6	11	12	3	7	22	54	4	4	2	59	13	18	517

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

Table 90. Rate per 100 000 population of selected notifiable diseases by District Health Board, 2012

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	145.3	140.2	113.4	94.5	187.7	161.0	125.9	115.4	199.4	191.1	145.6	117.6	118.5	144.7	179.7	215.4	218.8	225.2	314.8	220.2	158.6
Cryptosporidiosis	23.4	7.8	6.3	7.5	48.3	21.3	9.9		25.4	30.9		14.8	23.6	37.3	39.4	12.1	30.4	17.6	81.3	26.3	19.8
Gastroenteritis		15.9	26.6	8.3	12.4	23.3	21.2		11.8		17.6	75.1	29.8	26.6		12.1	21.3	9.4		3.9	16.6
Giardiasis	27.2	38.7	55.6	25.8	42.1	57.2	44.8	17.1	34.4	38.6	11.2	11.8	35.3	43.1	49.2	47.6	33.4	39.0	42.4	43.9	38.8
Hepatitis A		6.5	3.2	3										2.0							1.8
Listeriosis				1			2.4														0.6
Salmonellosis	18.3	21.7	26.2	14.0	25.4	22.3	17.0	19.2	26.3	18.7	14.4	18.3	22.2	14.8	12.3	41.2	42.6	26.6	51.3	54.9	24.5
Shigellosis		5.6	5.2	4.9	1.6		3.3							3.7				1.8		2.6	3.0
VTEC/STEC infection	7.6	2.5	1.3	2.0	5.9		8.5		7.3									4.6		4.5	3.3
Yersiniosis	10.1	16.4	13.0	11.0	13.0	8.7	10.4	12.8	10.0	7.7		4.1	15.2	18.2				11.8	23.0	5.8	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 91. 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 [31] .

Table 92. Number of cases of selected notifiable diseases by year, 2000–2012

Disease	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Campylobacteriosis	8 418	10 146	12 494	14 788	12 215	13 836	15 873	12 778	6 694	7 177	7 346	6 689	7 031
Cryptosporidiosis	775	1 208	975	817	611	888	737	924	764	854	954	610	877
Gastroenteritis[a]	727	940	1 087	1 026	1 363	557	937	622	686	712	493	630	735
Giardiasis	1 688	1 604	1 547	1 570	1 514	1 231	1 214	1 402	1 660	1 639	1 985	1 934	1 719
Hepatitis A	107	61	106	70	49	51	123	42	89	44	46	26	82
Listeriosis	22	18	19	24	26	20	19	26	27	28	23	26	25
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	1085
Shigellosis	115	157	112	87	140	183	102	129	113	119	104	101	132
VTEC/STEC infection	67	76	73	104	89	92	87	100	124	143	138	153	147
Yersiniosis	396	429	472	436	407	383	453	502	508	430	406	514	517

[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 93. 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 (2012)	Australia[a] (2012)	USA[b] (2011)	Canada[d] (2011)	UK[e] (2010)	EU Total[e] (2012)	Other high
Campylobacteriosis	158.6	102.3	14.3	5.6	115.4	50.3	178 (Czech Republic)[e] 138 (Luxembourg)[e]
Cryptosporidiosis	19.8	13.9	2.6	NN	7.4[f]	2.3[f]	6.6 (Ireland)[f] 4.2 (Sweden)[f]
Giardiasis	38.8	NN	6.5[c]	NN	6.5[f]	5.7[f]	29.5 (Bulgaria)[f] 19.2 (Estonia)[f]
Hepatitis A	1.8	0.7	0.5[c]	NN	0.7[f]	2.7[f]	31.1 (Bulgaria)[f] 26.7 (Slovakia)[f]
Listeriosis	0.6	0.4	0.3	NN	0.3	0.3	0.9 (Denmark)[e]
Salmonellosis	24.5	49.9	16.4	19.7	15.1	20.7	81 (Czech Republic)[e] 72 (Slovakia)[e]
Shigellosis	3.0	2.4	4.5	2.5	3.0[f]	1.6[f]	7.9 (Bulgaria)[f] 6.8 (Slovakia)[f]
VTEC/STEC infection	3.3	0.5	2.3[g]	1.4[h]	2.4	1.9	6.8 (Germany)[e] 6.1 (Ireland)[e]
Yersiniosis	11.7	NN	0.3	1.1	0.1	1.6	11.4 (Lithuania)[e] 10.3 (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 2010 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 2011 http://www.efsa.europa.eu/en/efsajournal/doc/3129.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 2010 year)

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

[h] *Escherichia coli* O157 only

Table 94. Foodborne outbreaks and associated cases by pathogen/condition, 2012

Pathogen/Condition	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Norovirus	26	23.6	549	56.8
Salmonella spp.	11	10.0	100	10.3
Campylobacter spp.	11	10.0	51	5.3
Giardia spp.	6	5.5	17	1.8
Clostridium perfringens	4	3.6	18	1.9
Shigella spp.	4	3.6	10	1.0
Escherichia coli (EPEC)	3	2.7	63	6.5
Toxic shellfish poisoning	1	0.9	29	2.9
Aeromonas spp.	1	0.9	8	0.8
Listeria monocytogenes	1	0.9	6	0.6
Plesiomonas shigelloides	1	0.9	3	0.3
Staphylococcus aureus	1	0.9	3	0.3
Cryptosporidium spp.	1	0.9	2	0.2
Histamine (scombroid) fish poisoning	1	0.9	2	0.2
Salmonella Paratyphi	1	0.9	2	0.2
Pathogen not identified[c]	41	37.3	163	16.9
Total[d]	**110**		**967**	

[a] Percentage of outbreaks for each pathogen/condition, calculated using the total number of foodborne outbreaks (110).

[b] Percentage of cases for each pathogen/condition, calculated using the total number of associated cases (967).

[c] All outbreaks with no pathogen identified in 2012 were classified as gastroenteritis.

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

Table 95. Foodborne outbreaks and associated cases by exposure setting, 2012

Exposure setting	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Commercial food operators	**67**	**60.9**	**408**	**42.2**
Restaurant/café/bakery	42	38.2	221	22.9
Takeaway	16	14.5	107	11.1
Fast food restaurant	3	2.7	11	1.1
Supermarket/delicatessen	2	1.8	4	0.4
Caterers	1	0.9	4	0.4
Temporary or mobile food premise	1	0.9	3	0.3
Other food outlet	2	1.8	58	6.0
Institutions	**17**	**15.5**	**465**	**48.1**
Long-term care facility	5	4.5	108	11.2
Hospital (acute care)	2	1.8	157	16.2
School	2	1.8	65	6.7
Childcare centre	2	1.8	27	2.8
Camp site	2	1.8	16	1.7
Marae	1	0.9	28	2.9
Hostel/boarding house	1	0.9	3	0.3
Other institution	3	2.7	212	21.9
Other	**31**	**28.2**	**174**	**18.0**
Private home	23	20.9	90	9.3
Community/sports gathering	3	2.7	32	3.3
Workplace	2	1.8	24	2.5
Farm	2	1.8	5	0.5
Other setting[c]	4	3.6	43	4.4
Unknown exposure setting [c]	4	3.6	9	0.9
Total	**110**		**967**	

[a] Percentage of outbreaks for each exposure setting, calculated using the total number of foodborne outbreaks (110).

[b] Percentage of cases for each exposure setting, calculated using the total number of associated cases (967).

[c] Includes four outbreaks where transmission occurred overseas.

[d] 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 96. Foodborne outbreaks and associated cases by preparation setting, 2012

Preparation setting	Outbreaks		Cases	
	No.	%[a]	No.	%[b]
Commercial food operators	**68**	**61.8**	**490**	**50.7**
Restaurant/café/bakery	45	40.9	228	23.6
Takeaway	12	10.9	93	9.6
Caterers	5	4.5	99	10.2
Fast food restaurant	2	1.8	7	0.7
Temporary or mobile food premise	1	0.9	3	0.3
Supermarket/delicatessen	1	0.9	2	0.2
Other food outlet	2	1.8	58	6
Institutions	**10**	**9.1**	**354**	**36.6**
Long-term care facility	4	3.6	90	9.3
Hospital (acute care)	1	0.9	151	15.6
School	1	0.9	46	4.8
Marae	1	0.9	28	2.9
Childcare centre	1	0.9	24	2.5
Camp site	1	0.9	6	0.6
Other institution	1	0.9	9	0.9
Other	**25**	**22.7**	**142**	**14.7**
Private home	17	15.5	99	10.2
Overseas manufacturer	5	4.5	24	2.5
Commercial food manufacturer	4	3.6	47	4.9
Community gathering	2	1.8	11	1.1
Workplace	1	0.9	10	1
Farm	1	0.9	2	0.2
Unknown preparation setting	**11**	**10**	**41**	**4.2**
Total[c]	**110**		**967**	

[a] Percentage of outbreaks for each preparation setting, calculated using the total number of foodborne outbreaks (110).

[b] Percentage of cases for each implicated vehicle/source, calculated using the total number of associated cases (967)

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

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