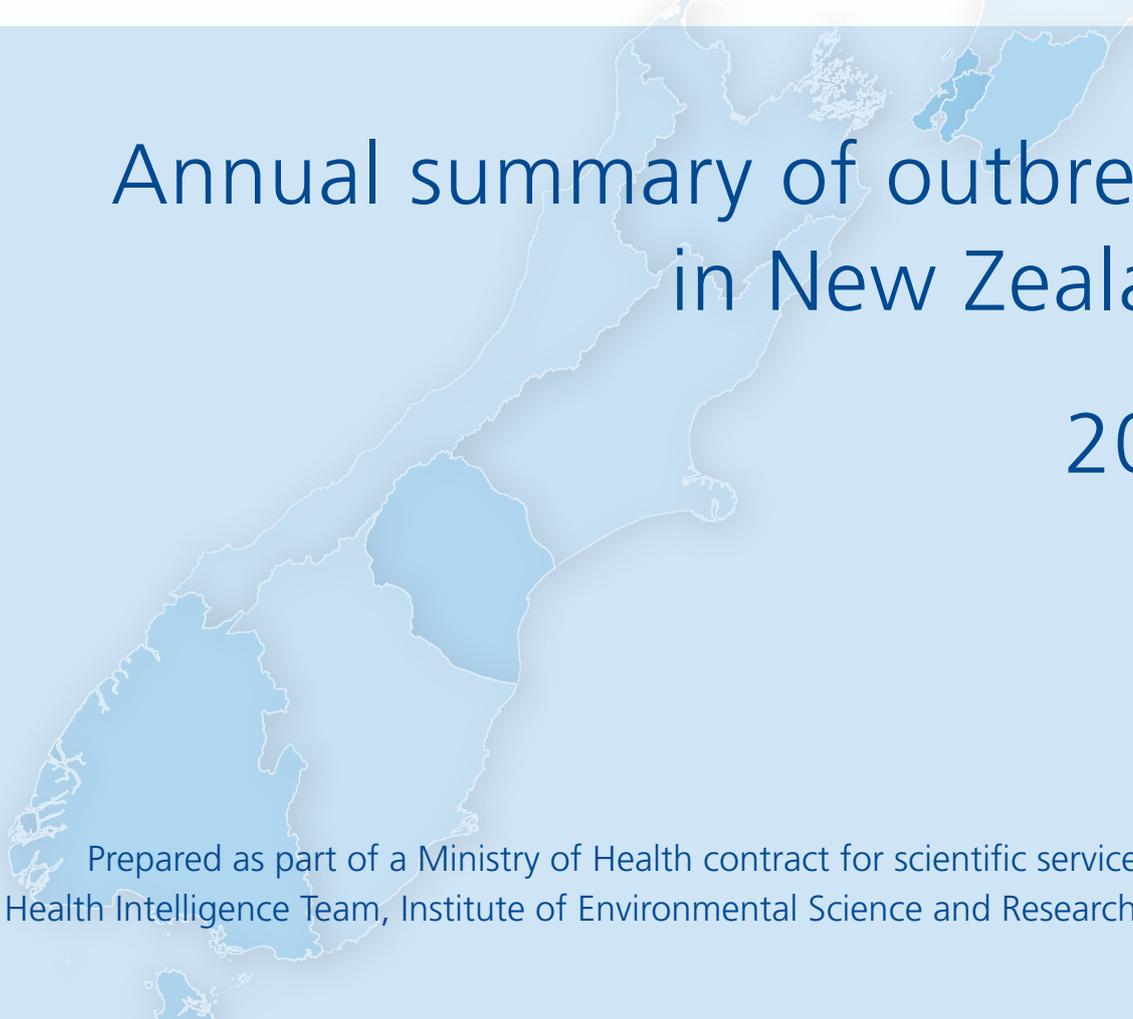


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SURVEILLANCE REPORT

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Annual summary of outbreaks
in New Zealand
2010

Prepared as part of a Ministry of Health contract for scientific services by the Health Intelligence Team, Institute of Environmental Science and Research Limited

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SUMMARY

SUMMARY

The following is a summary of the main findings in this report:

Incidence and outcomes

There were 606 outbreaks reported during 2010 involving 6321 cases (1837 confirmed and 4484 probable cases). A total of 94 cases required hospitalisation and one case died.

The highest number of outbreaks was reported by Auckland Public Health Unit, which represented 47.5% (288/606) of all outbreaks in 2010.

Public health units with outbreak rates exceeding the national rate of 13.9 per 100 000 population were Waikato (22.0 per 100 000 population, 80 outbreaks), Auckland (19.5 per 100 000, 288 outbreaks) and Manawatu (16.1 per 100 000, 27 outbreaks).

Causal agents

The causal agent (pathogen, toxin or chemical) was identified in 71.6% (434/606) of outbreaks involving 75.6% (4905/6321) of outbreak-associated cases.

Enteric agents were implicated in 94.2% (571/606) of outbreaks. The most commonly identified pathogen was norovirus in 25.1% (152/606) of outbreaks, followed by *Giardia* spp. in 16.0% (97/606) and *Cryptosporidium* spp. in 7.1% (43/606) of outbreaks. The most commonly implicated non-enteric agent was *Bordetella pertussis*, which was identified in 2.8% (17/606) of outbreaks.

Outbreak settings

The most common settings where exposure to or transmission of causal agents occurred were the home environment (37.8%, 229/606) and at a restaurant/cafe (13.4%, 81/606).

The highest percentage of outbreak-related cases occurred in rest/retirement homes (23.4%, 1482/6321), followed by continuing care hospitals (18.4%, 1165/6321) and the home (16.4%, 1034/6321).

Modes of transmission

Person-to-person transmission was reported for 73.6% (446/606) of outbreaks in 2010. Foodborne and environmental transmission was reported for 23.3% (141/606) and 20.3% (123/606) of outbreaks, respectively. Multiple modes of transmission were implicated in 31.8% (193/606) of outbreaks.

Sources

Of the 141 foodborne outbreaks in 2010, 75.9% (107/141) had a source or vehicle listed. The most commonly implicated food types in outbreaks were poultry (15.9%, 17 outbreaks) followed by shellfish (15.0%, 16 outbreaks), and dairy (12.1%, 13 outbreaks). The highest percentage of cases was associated with outbreaks linked to grains/beans (16.9%, 135/801 cases), followed by meat (beef) (13.5%, 108/801), shellfish (12.0%, 96/801), and dairy (10.5%, 84/801).

Recognition, reporting, investigation and control

Most outbreaks were recognised by increases in disease incidence (55.9%, 339/606), person-to-person contact with other cases (52.8%, 320/606) and when cases attended a common event (27.7%, 168/606).

Time/temperature abuse was the most common factor contributing to foodborne outbreaks (48.9%, 69/141), followed by contamination of food (35.5%, 50/141).

Almost half of all outbreaks (47.3%, 270/571 where information was available) were reported within one week of the onset of illness in the first case. The overall median reporting delay for outbreaks was 7.5 days.

Control measures were reported for 95.7% (580/606) of the 2010 outbreaks. The most common measures undertaken were health education and advice regarding the source (80.9%, 469/606), followed by cleaning and disinfection (56.4%, 327/606).

1. INTRODUCTION

1. INTRODUCTION

Outbreak surveillance in New Zealand has been conducted by the Institute of Environmental Science and Research Ltd (ESR) on behalf of the Ministry of Health since 1996. The outbreak surveillance system collects data on disease outbreaks reported by public health units (PHUs). Since 1997, the outbreak surveillance system has been incorporated as a module within EpiSurv, the national notifiable disease surveillance system.

Outbreak surveillance is undertaken to [1]:

- identify and control widely dispersed outbreaks
- improve outbreak prevention
- assess the impacts of outbreaks and set priorities
- evaluate prevention strategies
- improve investigation methods
- improve public health training
- improve understanding of emerging diseases
- meet international reporting requirements.

2. METHODS

2. METHODS

2.1 Outbreak definition

The Manual for Public Health Surveillance in New Zealand[2] states that the following types of outbreaks should be reported:

- two or more cases linked to a common source, in particular where the common source is exposure at a common event, food or water dispersed in the community, an environmental source, or a source in an institutional setting
- a community-wide or person-to-person outbreak (except when the source has become well established as a national epidemic and reporting it as a discrete event no longer serves a useful purpose)
- any other situation where outbreak investigation or control measures are being used or considered.

Outbreak reporting is encouraged for:

- a secondary case in an institution
- household outbreaks – if there is a reasonable possibility that the outbreak resulted from a common source exposure for that household group.

Outbreak reporting is not usually required for:

- most secondary cases
- single cases where a specific contaminated source is identified.

2.2 Data sources

Outbreaks are reported to, or identified by, local PHUs. Data on each outbreak are recorded by the PHU on a standardised Outbreak Report Form within EpiSurv. PHUs are encouraged to enter data early as an interim report that can be finalised when further data become available. These data are entered at each PHU via a secure web-based portal, onto the EpiSurv database. The real-time data are collated and analysed by ESR on behalf of the Ministry of Health. The national database is supplemented by data from ESR's Enteric Reference Laboratory, and virology and public health laboratories. If an outbreak is first identified by these laboratory sources, the appropriate PHU is asked to complete an Outbreak Report Form.

The Outbreak Report Form and manual can be found in <http://www.surv.esr.cri.nz/episurv/index.php>

The Outbreak Report Form consists of the following sections:

- reporting authority (outbreak report date and interim/final report)
- condition and implicated pathogen, toxin or chemical (name of implicated agent and case definitions)
- outbreak demographics (number of cases, outbreak dates, age/sex of cases, incubation period and duration of illness)
- circumstances of exposure/transmission (means of outbreak recognition, setting, geographic location, mode of transmission and vehicle/source evidence)
- factors contributing to the outbreak (specific factors relating to foodborne, waterborne, person-to-person and environmental outbreaks)
- management of the outbreak (control measures undertaken)

The terms used in the Outbreak Report Form that relate to this report are defined in the glossary at the end of this report.

A separate data set obtained from the Norovirus Reference Laboratory at ESR was used for the analysis in the norovirus outbreak section. The number of norovirus and sapovirus associated outbreaks reported in this section differ to that reported elsewhere in the report.

2.3 Data analysis

This report contains an analysis of data on outbreaks reported between 1 January 2010 and 31 December 2010, and recorded on EpiSurv as at 17 February 2011. Amendments made to outbreak data on EpiSurv after 17 February 2011 will not be reflected in this report.

The numbers and percentages of outbreaks and/or associated cases were ascertained. Rates were calculated using national and PHU population figures based on Statistics New Zealand mid-year population estimates for 2010.

The categories and subcategories analysed in this report were directly based on fields in the Outbreak Report Form with two exceptions: implicated food sources were grouped into one or more food categories and reporting delay was calculated as the difference between the outbreak report date and the date of onset of illness for the first case.

2.4 Data limitations

The available outbreak data are restricted to the outbreaks recorded in EpiSurv by PHUs. Outbreaks are more likely to be reported if they involve unusual pathogens, notifiable diseases, a large number of cases or a well-defined setting. The differing availability of resources among PHUs may also impact on outbreak reporting at a regional level. For these reasons caution is advised when interpreting the data contained in this report.

Measurement bias occurs when fields in an Outbreak Report Form are incomplete or incorrectly entered. For example, the date of onset of illness for the first case was not reported for 35 outbreaks in 2010.

A new Outbreak Report Form was introduced in October 2010 following consultation with PHU staff (see Appendix for current and old Outbreak Report Forms). As a result of removal or modification of some fields in the new form, some fields reported in previous annual outbreak summaries were no longer available for reporting. New fields added to the Outbreak Report Form will be reported in the *Annual Summary of Outbreaks* in 2011 and onwards.

Different methods of data analysis were used for the *Annual Summary of Outbreaks in New Zealand* before 2005. In 2003 and 2004, interim outbreak reports were excluded from analysis. In 2002, causal agents were categorised as laboratory confirmed versus suspected. As a result of these different analytical methods, comparisons of outbreak trends in past reports should be restricted to the period since 2005.

3. RESULTS

3. RESULTS

3.1 Characteristics of outbreaks

There were 606 outbreaks reported in 2010 compared with 640 outbreaks reported in 2009. The national rate of 13.9 outbreaks per 100 000 population in 2010 was lower than 2009 when there were 14.8 outbreaks per 100 000 population. Of the outbreak reports in 2010, 99.7% (604/606) were classified as final, while the remaining two outbreaks were classified as interim. A total of 6321 cases were associated with outbreaks, giving a national rate of 144.7 outbreak cases per 100 000 population. In comparison in 2009, there were 640 outbreaks with a national rate of 249.7 outbreak cases per 100 000 population. Of the 6321 cases in 2010, 1837 (29.1%) cases were confirmed and 4484 (70.9%) cases were probable.

3.2 Distribution of outbreaks by PHU

The highest number of outbreaks (288) and associated cases (2140) was reported by Auckland PHU, which represented 47.5% (288/606) of all outbreaks in 2010 (Table 1). Waikato PHU reported the second highest number of outbreaks (13.2%, 80 outbreaks), followed by Wellington (9.9%, 60 outbreaks) and Canterbury (9.2%, 56 outbreaks) PHUs. The highest outbreak rate (22.0 per 100 000 population) was reported by Waikato PHU (Figure 1) while the lowest outbreak rate was reported by Marlborough PHU (2.2 per 100 000 population). Other PHUs with an outbreak rate higher than the national rate (13.9 outbreaks per 100 000 population) were Auckland (19.5 outbreaks per 100 000 population) and Manawatu (16.1 outbreaks per 100 000 population).

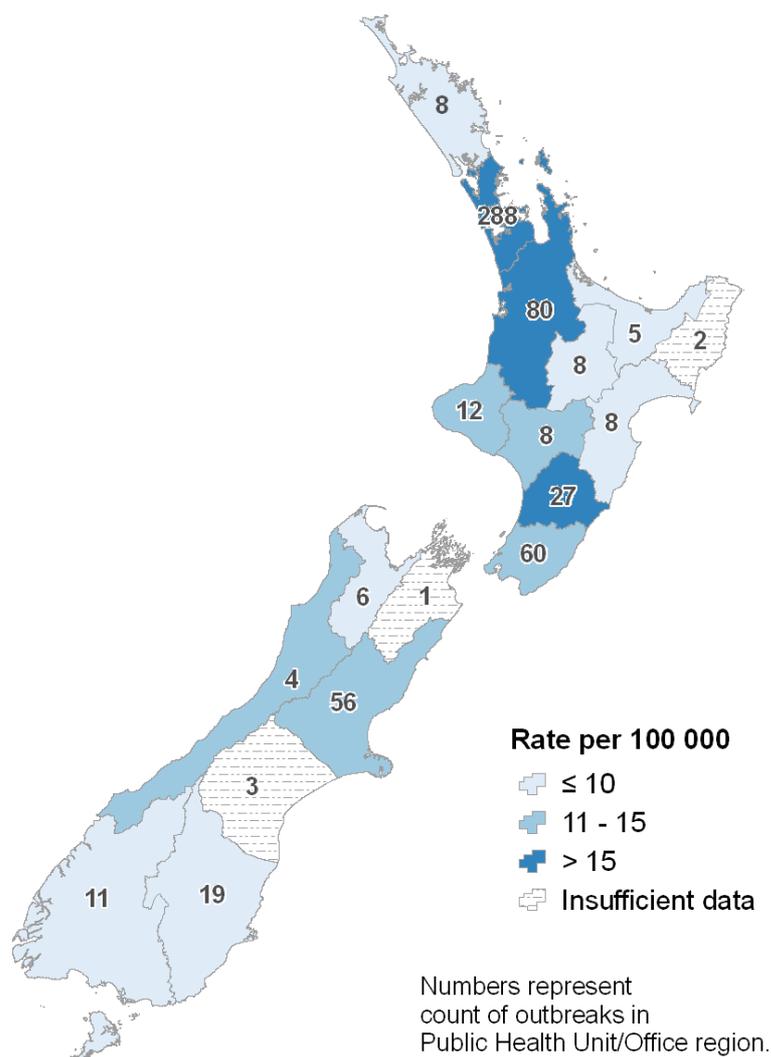
Table 1. Outbreaks and associated cases by PHU, 2010

PHU	No. of outbreaks	% of outbreaks (N = 606)	No. of cases	% of cases (N = 6321)	Outbreak rate ¹
Northland	8	1.3	96	1.5	5.1
Auckland ²	288	47.5	2 140	33.9	19.5
Waikato	80	13.2	617	9.8	22.0
Bay of Plenty	5	0.8	54	0.9	9.9
Rotorua	8	1.3	75	1.2	7.8
Taranaki	12	2.0	75	1.2	11.0
Hawke's Bay	8	1.3	143	2.3	5.2
Gisborne	2	0.3	43	0.7	4.3
Wanganui	8	1.3	142	2.2	12.7
Manawatu	27	4.5	425	6.7	16.1
Wellington ³	60	9.9	701	11.1	12.6
Marlborough	1	0.2	35	0.6	2.2
Nelson	6	1.0	308	4.9	6.5
West Coast	4	0.7	17	0.3	12.2
Canterbury	56	9.2	1048	16.6	11.7
South Canterbury	3	0.5	41	0.6	3.5
Otago	19	3.1	192	3.0	10.0
Southland	11	1.8	169	2.7	9.7
Total	606	100.0	6321	100.0	13.9

¹ Crude rate of outbreaks per 100 000 population calculated using Statistics New Zealand population estimates for 2010

² Includes Northwest Auckland, Central Auckland and South Auckland health districts

³ Includes Wellington, Hutt and Wairarapa health districts

Figure 1. Number of outbreaks per 100 000 population by PHU, 2010

Note: 'Insufficient data' denotes where there were fewer than five outbreaks reported in the public health unit/office region.

3.3 Causal agents

The causal agent was identified in 71.6% (434/606) of outbreaks involving 77.6% (4905/6321) of the associated cases. Of these, six outbreaks with two causal agents were recorded. No specific pathogen was identified in the remaining 28.4% (172/606) of outbreaks and 22.4% (1416/6321) of the associated cases, all of which were recorded as gastroenteritis outbreaks.

Enteric agents were implicated in the vast majority of outbreaks (94.2%, 571/606) and associated cases (96.9%, 6122/6321) (Table 2). The most common single causal agent implicated in outbreaks in 2010 was norovirus, which resulted in 25.1% (152/606) of outbreaks and 51.0% (3223/6321) of the associated cases. The next most common enteric causal agents associated with outbreaks were *Giardia* spp. (16.0%, 97/606), *Cryptosporidium* spp. (7.1%, 43/606) and *Campylobacter* spp. (4.8%, 29/606). Outbreaks due to *Giardia* spp. had the second highest number of associated cases (6.0%, 378/6321). The median number of cases associated with each *Clostridium perfringens* outbreak (39.5 cases) was the highest of any enteric agent, followed by *Plesiomonas shigelloides*, which was only implicated in one outbreak involving 23 cases.

Non-enteric agents accounted for 5.8% (35/606) of outbreaks associated with 3.1% (199/6321) of the cases in 2010 (Table 2). The five agents involved in more than one outbreak were: *Bordetella pertussis*

(2.8%, 17/606), influenza A(H1N1) 09 (1.2%, 7/606), *Mycobacterium tuberculosis* (0.5%, 3/606), dengue fever (0.3%, 2/606) and *Leptospira* (0.3%, 2/606). The median number of cases associated with acute respiratory infection (6.0) was the highest of any non-enteric agent in 2010. Outbreaks due to *B. pertussis* had the highest number of associated cases (1.8%, 111/6321).

Table 2. Outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 606)	No. of cases	% of cases (N = 6321)	Median cases per outbreak
Enteric¹	571	94.2	6 122	96.9	4.0
Norovirus	152	25.1	3 223	51.0	17.0
<i>Giardia</i> spp.	97	16.0	378	6.0	3.0
<i>Cryptosporidium</i> spp.	43	7.1	294	4.7	3.0
<i>Campylobacter</i> spp.	29	4.8	113	1.8	3.0
<i>Salmonella</i> spp.	23	3.8	100	1.6	3.0
Rotavirus	21	3.5	291	4.6	12.0
Sapovirus	8	1.3	127	2.0	17.0
<i>Escherichia coli</i> O157:H7	5	0.8	12	0.2	2.0
<i>Shigella</i> spp.	5	0.8	16	0.3	2.0
<i>Clostridium perfringens</i>	4	0.7	168	2.7	39.5
Histamine (scombroid) fish poisoning	4	0.7	13	0.2	2.5
<i>Salmonella</i> Typhi	2	0.3	5	0.1	2.5
<i>Staphylococcus aureus</i>	2	0.3	6	0.1	3.0
<i>Yersinia</i> spp.	2	0.3	13	0.2	6.5
<i>Aeromonas hydrophila</i>	1	0.2	2	0.0	2.0
Ciguatera fish poisoning	1	0.2	2	0.0	2.0
<i>Clostridium difficile</i>	1	0.2	2	0.0	2.0
Hepatitis A virus	1	0.2	3	0.0	3.0
Probable MSG poisoning	1	0.2	2	0.0	2.0
<i>Salmonella</i> Paratyphi	1	0.2	2	0.0	2.0
Toxic shellfish poisoning	1	0.2	8	0.1	8.0
<i>Plesiomonas shigelloides</i>	1	0.2	23	0.4	23.0
Unidentified pathogen ¹	172	28.4	1 416	22.4	4.0
Non-enteric	35	5.8	199	3.1	4.0
<i>Bordetella pertussis</i>	17	2.8	111	1.8	4.0
Influenza A(H1N1) 09	7	1.2	59	0.9	5.0
<i>Mycobacterium tuberculosis</i>	3	0.5	8	0.1	3.0
Dengue fever	2	0.3	4	0.1	2.0
<i>Leptospira</i>	2	0.3	5	0.1	2.5
Acute respiratory infection	1	0.2	6	0.1	6.0
Chemical poisoning from the environment	1	0.2	2	0.0	2.0
Group A streptococcus	1	0.2	2	0.0	2.0
<i>Rickettsia typhi</i>	1	0.2	2	0.0	2.0

¹ More than one enteric agent was reported in six outbreaks with 97 cases

² All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

3.4 Norovirus outbreaks – strains and setting

The most common causal agent implicated in outbreaks in 2010 was norovirus, which resulted in 25.1% (152/606) of the outbreaks and 51.0% (3223/6321) of the associated cases. The remainder of this section is based on data from the Norovirus Reference Laboratory. The number of norovirus- and sapovirus-associated outbreaks reported in this section differ to that reported elsewhere in the report.

Norovirus was confirmed by laboratory testing for 80.9% (123/152) of the outbreaks. This is a large decrease in laboratory-confirmed outbreaks from 2009 when 199 outbreaks were laboratory confirmed, but an increase in terms of the percentage of norovirus confirmed compared with 2009 when 73.7% of the outbreaks were laboratory confirmed.

No seasonal winter peak was observed. The highest number of laboratory-confirmed outbreaks was reported in January and the lowest number was reported in May and June (Figure 2). This is quite distinct from data collected over previous years where the number of reported outbreaks has peaked in October each year.

Healthcare institutions (rest/retirement homes and acute or continuing care hospitals) were the most common setting for norovirus outbreaks (39%, 48/123) (Figure 3). Outbreaks were also commonly associated with food-related settings (17.9%, 22/123), home settings (14.6%, 18/123) and hospitals (healthcare/medical settings: 13.0%, 16/123).

Most norovirus strains identified belonged to genogroup II (GII) (106). Only 17 strains belonged to genogroup I (GI). The norovirus genotype was identified by DNA sequencing in 92.7% (114/123) of the outbreaks. One GI strain was not typable. Eight strains from two-person home outbreaks were not genotyped (Figure 3). GII.4 has been the predominant genotype responsible for outbreaks both in New Zealand and overseas over the last 10 years, especially in healthcare and institutional settings[3]. In 2010, GII.4 norovirus strains were identified in 67.2% (43/64) of healthcare-related outbreaks and in 50.0% (57/114) of all outbreaks. A range of both GI and GII genotypes were associated with home, food-related and child-related outbreaks.

Gastroenteritis outbreaks caused by other enteric viruses

Specimens from outbreaks found to be negative for norovirus were tested for the presence of sapovirus and astrovirus. These viruses are frequently associated with overseas outbreaks of gastroenteritis.

During 2010, specimens from 90 norovirus-negative outbreaks were analysed for the presence of astrovirus and sapovirus. Sapoviruses were identified in 14 outbreaks. Of these, seven outbreaks occurred in rest-home settings, three in catered settings, two in child-related settings and two in home settings. No astroviruses were detected.

Figure 2. Laboratory-confirmed norovirus outbreak typing by month, 2010

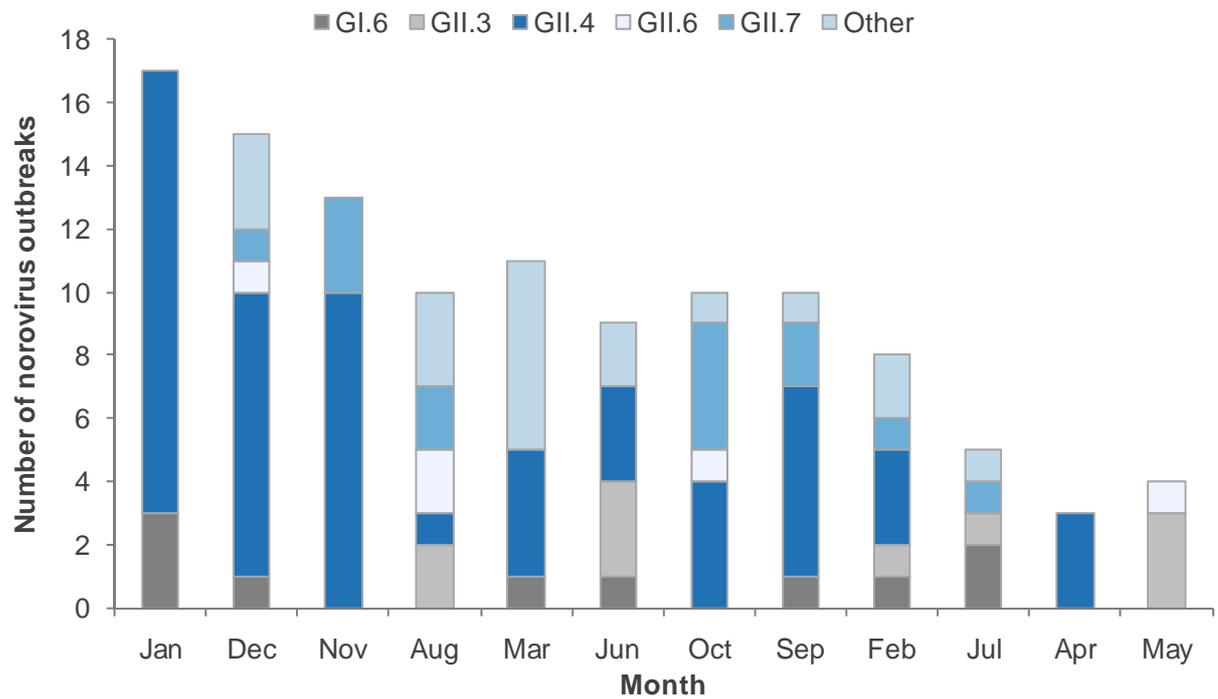
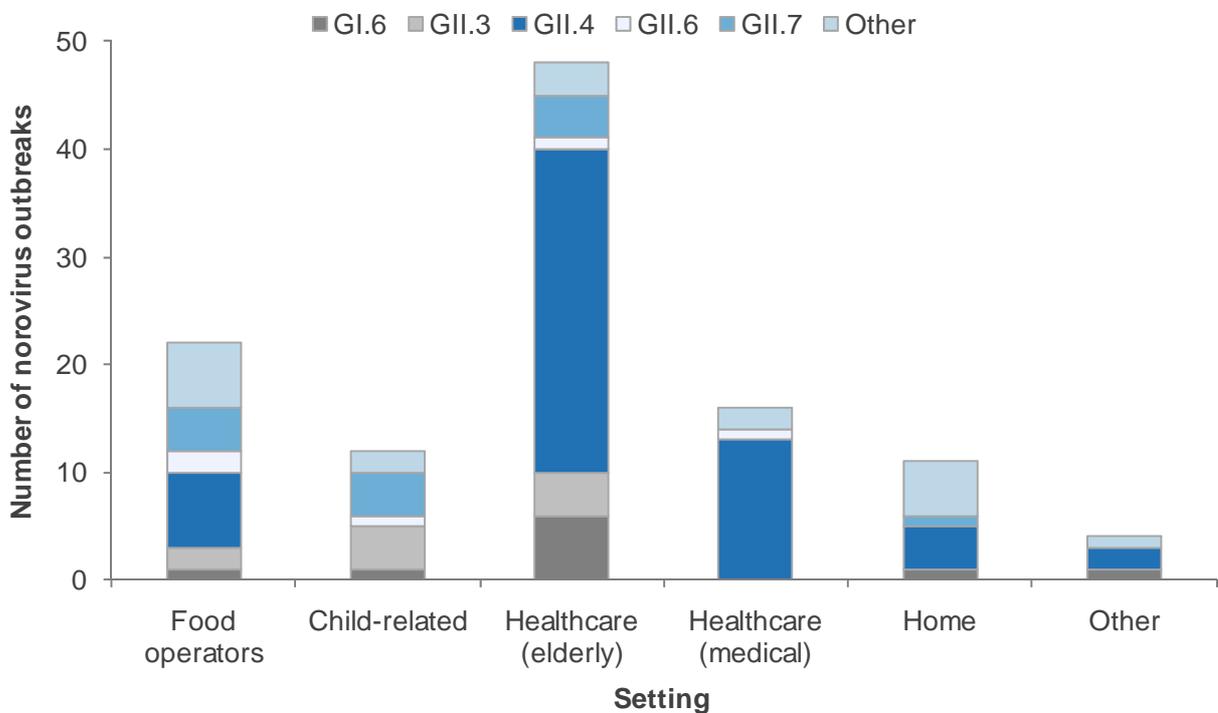


Figure 3. Laboratory-confirmed norovirus outbreak strains by setting, 2010



3.5 Morbidity and mortality

Hospitalisation information was recorded for 67.0% (406/606) of outbreaks. A total of 94 outbreak-associated cases (1.5%) were hospitalised. There were over six-times more cases hospitalised for outbreaks due to enteric agents (81 cases) compared with non-enteric agents (13 cases) (Table 3). However, a higher percentage of cases associated with non-enteric outbreaks was hospitalised compared with enteric outbreaks (9.4% versus 2.0%). The non-enteric agent with the highest proportion of hospitalised cases was group A streptococcus (100.0%, 2/2 cases), followed by *Leptospira* (66.7%, 2/3) and *M. tuberculosis* (62.5%, 5/8). The enteric agents with the highest proportion of hospitalised cases were *Shigella* spp. (33.3%, 4/12) and hepatitis A virus (33.3%, 1/3), followed by *Escherichia coli* O157:H7 (20.0%, 1/5).

There was one death associated with a norovirus outbreak in 2010 at a long-term care facility in Auckland.

Table 3. Hospitalised outbreak cases and total outbreak cases by agent type, 2010

Agent type	No. of outbreaks ¹	No. of associated cases ¹	No. of hospitalised cases	% of hospitalised cases
Enteric²	385	4 026	81	2.0
Norovirus	109	2 285	30	1.3
<i>Salmonella</i> spp.	20	90	9	10.0
<i>Campylobacter</i> spp.	25	103	6	5.8
Sapovirus	6	102	6	5.9
Rotavirus	16	250	5	2.0
<i>Shigella</i> spp.	3	12	4	33.3
<i>Giardia</i> spp.	63	234	3	1.3
<i>Cryptosporidium</i> spp.	29	135	1	0.7
<i>Escherichia coli</i> O157:H7	2	5	1	20.0
Hepatitis A virus	1	3	1	33.3
<i>Staphylococcus aureus</i>	2	6	1	16.7
<i>Aeromonas hydrophila</i>	1	2	0	0.0
Ciguatera fish poisoning	1	2	0	0.0
<i>Clostridium perfringens</i>	2	15	0	0.0
Histamine (scombroid) fish poisoning	3	11	0	0.0
Probable MSG poisoning	1	2	0	0.0
<i>Salmonella</i> Typhi	1	2	0	0.0
Unidentified pathogen ³	104	851	19	2.2
Non-enteric	21	138	13	9.4
<i>Mycobacterium tuberculosis</i>	3	8	5	62.5
<i>Bordetella pertussis</i>	10	76	3	3.9
<i>Leptospira</i>	1	3	2	66.7
Group A streptococcus	1	2	2	100.0
Influenza A(H1N1) 09	5	47	1	2.1
Chemical poisoning from the environment	1	2	0	0.0
Total hospitalisations	406	4164	94	2.3

¹ Hospitalisation information was recorded for 67.0% (406/606) of outbreaks, relating to 65.9% (4164/6321) of cases

² More than one enteric agent was reported in six outbreaks with 97 cases

³ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

3.6 Outbreak settings

The most common outbreak setting was the home, which was recorded in 37.8% (229/606) of all outbreaks and 16.4% (1034/6321) of cases (Table 4). Commercial food operators were a common outbreak setting, which included restaurants/cafes (13.4%, 81/606), takeaway outlets (6.6%, 40/606), caterers (1.3%, 8/606), supermarkets/delicatessens (0.7%, 4/606) and other food outlets (0.8%, 5/606). Other common institutional settings for outbreaks were rest/retirement homes (11.4%, 69/606), hospitals (continuing care) (10.6%, 64/606), childcare centres (9.9%, 60/606) and hospitals (acute care) (6.4%, 39/606). The outbreak setting was unknown in 2.1% (13/606) of the outbreaks.

Table 4. Outbreaks and associated cases by setting of exposure/transmission, 2010

Outbreak setting	No. of outbreaks ¹	% of total outbreaks (N = 606)	No. of cases ¹	% of total cases (N = 6321)
Commercial food operators	138	22.8	678	10.7
Restaurant/cafe	81	13.4	414	6.5
Takeaway	40	6.6	120	1.9
Caterers	8	1.3	105	1.7
Supermarket/deli	4	0.7	11	0.2
Other food outlet	5	0.8	28	0.4
Institutions	277	45.7	4 871	77.1
Rest/retirement home	69	11.4	1 482	23.4
Hospital (continuing care)	64	10.6	1 165	18.4
Childcare centre	60	9.9	821	13.0
Hospital (acute care)	39	6.4	569	9.0
School	19	3.1	295	4.7
Hotel/motel	10	1.7	71	1.1
Camp	7	1.2	276	4.4
Hostel/boarding house	5	0.8	111	1.8
Marae	4	0.7	81	1.3
Community	35	5.8	380	6.0
Swimming/spa pool	27	4.5	251	4.0
Community/church gathering	7	1.2	101	1.6
Tangi	1	0.2	28	0.4
Workplace	36	5.9	201	3.2
Farm	24	4.0	78	1.2
Workplace	12	2.0	123	1.9
Home	229	37.8	1 034	16.4
Other setting	39	6.4	525	8.3
Unknown setting	13	2.1	36	0.6

¹ More than one setting was recorded for 140 outbreaks with 1280 associated cases

3.7 Modes of transmission

In 2010, the most common reported mode of transmission was person-to-person (73.6%, 446/606 outbreaks), followed by foodborne (23.3%, 141/606) and environmental (20.3% 123/606) modes of transmission (Table 5). Person-to-person transmission also accounted for the highest percentage of cases (84.9%, 5368/6321), followed by the environmental mode of transmission (29.7%, 1876/6321). The mode of transmission was unknown in 4.3% (26/606) of outbreaks.

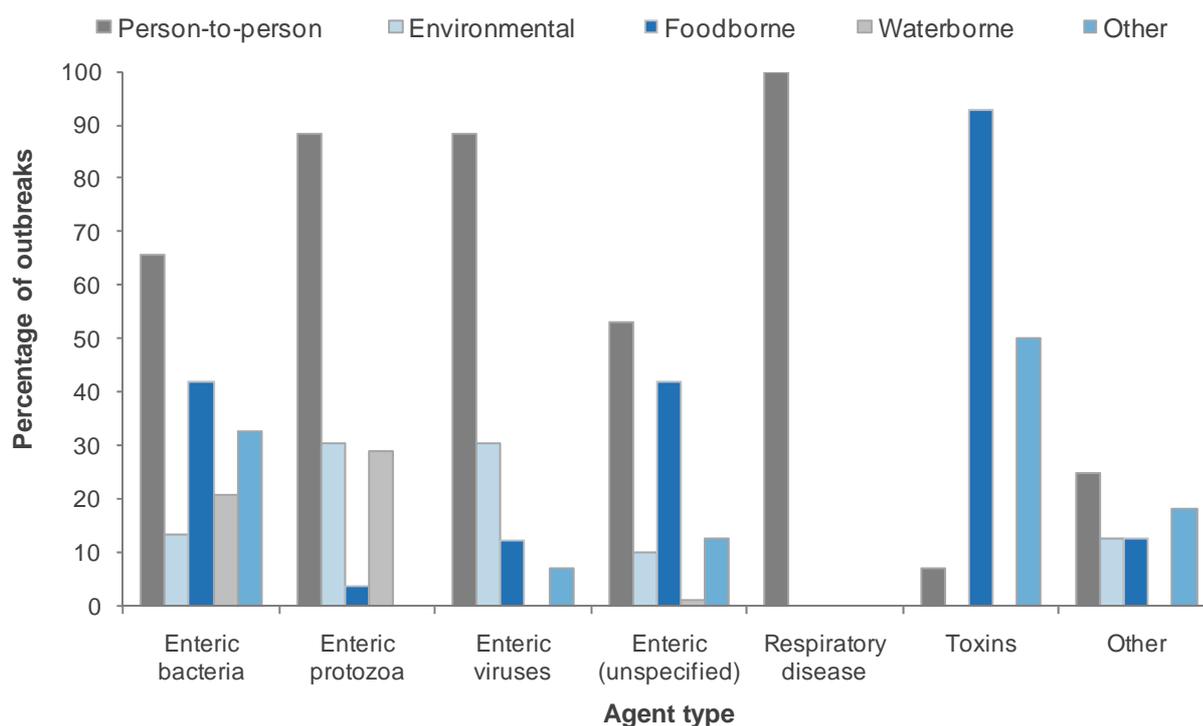
Table 5. Outbreaks and associated cases by mode of transmission, 2010

Mode of transmission	No. of outbreaks ¹	% of total outbreaks (N = 606)	No. of cases ¹	% of total cases (N = 6321)
Person-to-person	446	73.6	5 368	84.9
Foodborne	141	23.3	936	14.8
Environmental	123	20.3	1 876	29.7
Waterborne	56	9.2	235	3.7
Zoonotic	36	5.9	109	1.7
Vectorborne	3	0.5	6	0.1
Other	13	2.1	90	1.4
Unknown	26	4.3	82	1.3

¹ More than one mode of transmission was recorded for 193 outbreaks with 2235 associated cases

Person-to-person was the most common mode of transmission for enteric bacteria (65.7%, 44/67), enteric protozoa (88.4%, 122/138), enteric viruses (88.2%, 157/178), unspecified enteric pathogens (52.9%, 91/172) and respiratory disease (100%, 29/29) (Figure 4). Foodborne transmission was the principal mode of transmission for toxins (92.9%, 13/14), and it also contributed substantially to outbreaks due to unspecified enteric pathogens (41.9%, 72/172) and enteric bacteria (41.8%, 28/67) (Figure 4). Waterborne transmission was an important mode of transmission for enteric protozoa (29.0%, 40/138) and enteric bacteria (20.9%, 14/67). Environmental transmission contributed substantially to outbreaks of enteric protozoa (30.4%, 42/138) and enteric viruses (30.3%, 54/178).

Figure 4. Percentage of outbreaks by agent type and mode of transmission, 2010



Note: more than one mode of transmission was recorded for some outbreaks therefore totals may add to greater than 100%

3.8 Foodborne outbreaks

Causal agent

There were 141 foodborne outbreaks with 936 associated cases reported in 2010, 48.9% (69/141) of which were linked to a causal agent or agents (Table 6). Causal agents most commonly associated with foodborne outbreaks included norovirus (13.5%, 19/141), *Campylobacter* spp. (9.9%, 14/141) and *Salmonella* spp. (7.1%, 10/141). Enteric bacteria (*Campylobacter* spp., *Salmonella* spp., *Yersinia* spp., *E. coli* O157:H7, *S. Typhi* and *Shigella* spp.) were implicated in 20.6% (29/141) of foodborne outbreaks, and enteric viruses (norovirus, sapovirus and hepatitis A virus) in 15.6% (22/141) of foodborne outbreaks.

Table 6. Foodborne outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 141)	No. of cases	% of cases (N = 936)
Norovirus	19	13.5	215	23.0
<i>Campylobacter</i> spp.	14	9.9	62	6.6
<i>Salmonella</i> spp.	10	7.1	56	6.0
<i>Clostridium perfringens</i>	4	2.8	168	17.9
<i>Giardia</i> spp.	4	2.8	13	1.4
Histamine (scombroid) fish poisoning	4	2.8	13	1.4
<i>Cryptosporidium</i> spp.	2	1.4	5	0.5
Sapovirus	2	1.4	24	2.6
<i>Staphylococcus aureus</i>	2	1.4	6	0.6
<i>Yersinia</i> spp.	2	1.4	13	1.4
Ciguatera fish poisoning	1	0.7	2	0.2
<i>Escherichia coli</i> O157:H7	1	0.7	3	0.3
Hepatitis A virus	1	0.7	3	0.3
Probable MSG poisoning	1	0.7	2	0.2
<i>Salmonella</i> Typhi	1	0.7	3	0.3
<i>Shigella</i> spp.	1	0.7	2	0.2
Toxic shellfish poisoning	1	0.7	8	0.9
Unidentified pathogen ¹	72	51.1	340	36.3
Total²	141	100.0	936	100.0

¹ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

² Two agents were reported in one foodborne outbreak with two cases, therefore totals add to more than 100%

Vehicle/source implicated

Of the 141 foodborne outbreaks in 2010, 75.9% (107/141) had a source or vehicle listed. The main foods implicated in these 107 outbreaks were poultry (15.9%, 17 outbreaks) followed by shellfish (15.0%, 16 outbreaks), dairy (12.1%, 13 outbreaks), fish (7.5%, 8 outbreaks) and rice (7.5%, 8 outbreaks) (Table 7). The highest numbers of cases were associated with outbreaks linked to grains/beans (16.9%, 135 cases), meat (beef) (13.5%, 108 cases), shellfish (12.0%, 96 cases) and dairy (10.5%, 84 cases). No source was identified for 24.1% (34/141 outbreaks).

The largest foodborne outbreaks involved 87 and 66 cases, both were from Auckland and both involved *Clostridium perfringens*. While the first outbreak involving 87 cases was attributed to mince with Mexican bean sauce, the source was not identified in the other outbreak involving 66 cases.

Table 7: Foodborne outbreaks and associated cases by implicated vehicle/source, 2010

Implicated vehicle/source	No. of outbreaks ¹	% of outbreaks (N = 107)	No. of cases	% of cases (N = 801)
Poultry	17	15.9	73	9.1
Shellfish	16	15.0	96	12.0
Dairy	13	12.1	84	10.5
Fish	8	7.5	24	3.0
Rice	8	7.5	23	2.9
Grains/beans	6	5.6	135	16.9
Oils/sugars	6	5.6	33	4.1
Meat (pork)	5	4.7	57	7.1
Meat (beef)	5	4.7	108	13.5
Meat (lamb)	4	3.7	34	4.2
Vegetables (root)	3	2.8	8	1.0
Vegetables (leafy)	3	2.8	7	0.9
Eggs	3	2.8	59	7.4
Water	3	2.8	20	2.5
Fruit/nut	2	1.9	36	4.5
Vegetables (vine/stalk)	2	1.9	6	0.7
Unspecified food source ²	46	43.0	377	47.1
Total	17	100	801	100

¹ More than one vehicle / source was implicated in some outbreaks

² A common meal, premises or setting may have been implicated but no specific food items were recorded

Note: Mixed foods were assigned to multiple categories based on the groupings published by Painter et al 2009 [4]. Only explicit ingredients were assigned into a category. All foods within a mixed item were given equal priority.

Foodborne outbreaks with poultry as a possible vehicle or source (15.9%, 17 outbreaks) were most frequently linked to *Campylobacter* spp. (54.5%, 6/11 outbreaks) (Table 8). Foodborne outbreaks with shellfish as a possible vehicle or source (15.0%, 16 outbreaks) were most commonly associated with norovirus (23.1%, 3/13 outbreaks).

Table 8. Foodborne outbreaks by causal agent and implicated vehicle/source, 2010

Implicated vehicle/source ¹	Norovirus	<i>Campylobacter</i> spp.	<i>Salmonella</i> spp.	<i>Clostridium</i> spp.	<i>Staphylococcus aureus</i>	Histamine (scombroid) fish poisoning	<i>Giardia</i> spp.	Other ²	Unidentified pathogen ³	Total number of outbreaks
Poultry	0	6	1	1	0	0	1	1	7	17
Shellfish	3	1	0	0	1	0	0	3	8	16
Dairy	0	3	3	0	1	0	1	2	3	13
Fish	0	0	0	0	0	4	0	1	3	8
Rice	0	1	0	0	1	0	0	0	6	8
Grains/beans	1	1	0	1	0	0	0	0	3	6
Oils/sugars	0	1	2	0	0	0	0	0	3	6
Meat (pork)	1	0	0	1	1	0	0	1	1	5
Meat (beef)	0	0	0	3	0	0	0	0	2	5
Meat (lamb)	0	1	0	1	0	0	0	1	1	4
Vegetables (root)	0	0	0	0	0	0	0	0	3	3
Vegetables (leafy)	0	0	0	0	1	0	0	0	2	3
Eggs	0	0	2	0	0	0	0	0	1	3
Water	0	1	1	0	0	0	0	1	0	3
Fruit/nut	0	0	0	0	0	0	0	0	2	2
Vegetables (vine/stalk)	0	0	0	0	0	0	0	0	2	2
Unspecified food source ²	9	1	3	1	0	0	0	2	30	46
Total	13	11	8	4	2	4	2	12	51	107

¹ More than one vehicle / source was implicated in some outbreaks

² Includes all causal agents listed in Table 7 that were implicated in fewer than three foodborne outbreaks

³ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

⁴ A common meal, premises or setting may have been implicated but no specific food items were recorded

Contributing factors

The factors contributing to foodborne outbreaks most commonly involved either time and temperature abuses (48.9%, 69/141) or contamination of food (35.5%, 50/141). The time and temperature abuses contributing to more than 10 outbreaks were undercooking (12.1%, 17/141), improper storage prior to preparation (10.6%, 15/141) and inadequate cooling or refrigeration of food (9.9%, 14/141) (Table 9). Contamination of food predominantly occurred via cross-contamination with other food (19.1%, 27/141) or via an infected food handler (14.9%, 21/141). Unsafe sources accounted for 9.2% (13/141) of the outbreaks, including 5.7% (8/141) associated with unpasteurised milk. Factors contributing to foodborne outbreaks were unknown in 24.8% (35/141) of the outbreaks.

Table 9. Foodborne outbreaks by contributing factor, 2010

Contributing factor	No. of outbreaks ¹	% of foodborne outbreaks (N = 141)
Time/temperature abuse	69	48.9
Undercooking	17	12.1
Improper storage prior to preparation	15	10.6
Inadequate cooling or refrigeration	14	9.9
Improper hot holding	10	7.1
Inadequate reheating of previously cooked food	7	5.0
Preparation too far in advance	4	2.8
Inadequate thawing	2	1.4
Contamination of food	50	35.5
Cross contamination	27	19.1
Contamination from an infected food handler	21	14.9
Chemical contamination	2	1.4
Unsafe sources	13	9.2
Use of unpasteurised milk in food preparation	8	5.7
Consumption of raw food	7	5.0
Use of ingredients from unsafe sources	4	2.8
Use of untreated water in food preparation	2	1.4
Other factors	27	19.1
Unknown factors	35	24.8

¹ More than one contributing factor was recorded for some outbreaks

3.9 Person-to-person outbreaks

Causal agents

There were 446 person-to-person outbreaks with 5368 associated cases in 2010, 79.6% (355/446) of which were linked to a causal agent type (Table 10). The most common causal agent was norovirus, which was recorded in 29.6% (132/446) of person-to-person outbreaks involving 56.6% (3036/5368) of cases. Other common pathogens included *Giardia* spp. (20.2%, 90/446) and *Cryptosporidium* spp. (7.6%, 34/446). Of the person-to-person outbreaks, enteric viruses (norovirus, rotavirus, sapovirus and hepatitis A virus) were implicated in 36.1% (161/446) of the outbreaks, and enteric protozoa (*Giardia* spp. and *Cryptosporidium* spp.) in 27.8% (124/446), enteric bacteria (*Campylobacter* spp., *Salmonella* spp., *E. coli* O157, *Shigella* spp., *S. Typhi*, *A. hydrophila*, *P. shigelloides*, *S. Paratyphi* and *Yersinia* spp.) in 10.3% (46/446), respiratory bacteria (*B. pertussis*, *M. tuberculosis* and group A streptococcus) in 4.7% (21/446),

respiratory viruses (influenza A(H1N1) 09 and acute respiratory infection) in 1.8% (8/446), and toxins (*C. perfringens*) in 0.7% (1/146) of the outbreaks.

The most frequent causal agent identified in outbreaks where there were 20 or more associated cases was norovirus, accounting for 77.5% (55/71) of the person-to-person outbreaks. The two largest person-to-person outbreaks were attributed to norovirus, one occurred on a cruise ship in Auckland with 247 cases, and the other occurred at a camping ground in the Nelson Marlborough region with 200 cases. The third largest person-to-person outbreak was attributed to *Cryptosporidium* spp. at a swimming pool in Canterbury with 121 cases.

Table 10. Person-to-person outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 446)	No. of cases	% of cases (N = 5368)
Norovirus	132	29.6	3 036	56.6
<i>Giardia</i> spp.	90	20.2	355	6.6
<i>Cryptosporidium</i> spp.	34	7.6	269	5.0
Rotavirus	21	4.0	291	5.4
<i>Bordetella pertussis</i>	17	3.8	111	2.1
<i>Campylobacter</i> spp.	17	3.8	50	0.9
<i>Salmonella</i> spp.	14	3.1	47	0.9
Influenza A(H1N1) 09	7	1.6	59	1.1
Sapovirus	7	1.6	124	2.3
<i>Escherichia coli</i> O157:H7	5	1.1	12	0.2
<i>Shigella</i> spp.	4	0.9	14	0.3
<i>Mycobacterium tuberculosis</i>	3	0.7	8	0.1
<i>Salmonella</i> Typhi	2	0.4	5	0.1
Acute respiratory infection	1	0.2	6	0.1
<i>Aeromonas hydrophila</i>	1	0.2	2	0.0
<i>Clostridium perfringens</i>	1	0.2	2	0.0
Hepatitis A virus	1	0.2	3	0.1
<i>Plesiomonas shigelloides</i>	1	0.2	23	0.4
Group A streptococcus	1	0.2	2	0.0
<i>Salmonella</i> Paratyphi	1	0.2	2	0.0
<i>Yersinia</i> spp.	1	0.2	5	0.1
Unidentified pathogen ¹	91	20.4	1039	19.4
Total²	446	100	5368	100

¹ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

² Two agents were reported in six person-to-person outbreaks with 97 cases, therefore totals add to more than 100%

Contributing factors

Exposure to infected people was the primary contributing factor reported for 97.1% (433/446) of person-to-person outbreaks reported. Other contributing factors reported included poor hygiene of cases (29.4%, 131/446), inadequate vaccination coverage (1.8%, 8/446), inadequate vaccination effectiveness (1.3%, 6/446), excessively crowded living conditions (0.7%, 3/446) and a compromised immune system (0.4%, 2/446).

3.10 Waterborne outbreaks

Causal agents

There were 56 waterborne outbreaks with 235 associated cases reported in 2010, 96.4% (54/56) of which were linked to a specific pathogen (Table 11). The most commonly reported waterborne pathogen was *Giardia* spp. (51.8%, 29/56), followed by *Cryptosporidium* spp. (19.6%, 11/56). Enteric protozoa (*Giardia* spp. and *Cryptosporidium* spp.) were implicated in 71.4% (40/56) of waterborne outbreaks and enteric bacteria (*Campylobacter* spp., *Salmonella* spp., and *Yersinia* spp.) in 25.0% (14/56) of waterborne outbreaks.

Table 11. Waterborne outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 56)	No. of cases	% of cases (N = 235)
<i>Giardia</i> spp.	29	51.8	113	48.1
<i>Cryptosporidium</i> spp.	11	19.6	29	12.3
<i>Campylobacter</i> spp.	9	16.1	52	22.1
<i>Salmonella</i> spp.	4	7.1	14	6.0
<i>Yersinia</i> spp.	1	1.8	8	3.4
Unidentified pathogen ¹	2	3.6	19	8.1
Total	56	100	235	100

¹ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

Contributing factors

The most common contributing factor linked to waterborne outbreaks was an untreated drinking-water supply (73.2%, 41/56), followed by an inadequately treated water supply (16.1%, 9/56), recent or ongoing treatment failure (1.8%, 1/56) and source water quality inferior to normal (1.8%, 1/56) (Table 12). No contributing factors were recorded for 14.3% (8/56) of the outbreaks.

Table 12. Waterborne outbreaks by contributing factor, 2010

Contributing factor	No. of outbreaks ¹	% of total outbreaks (N = 56)
Untreated drinking-water supply ¹	41	73.2
Inadequately treated water supply ²	9	16.1
Recent or ongoing treatment process failure	1	1.8
Source water quality inferior to normal ²	1	1.8

¹ Includes surface water with no treatment, roof collected rainwater with no treatment, groundwater not assessed as secure and no treatment.

² Option only available on new Outbreak Report Form

3.11 Environmental outbreaks

Causal agents

There were 123 environmental outbreaks with 1876 associated cases reported in 2010, 86.2% (106/123) of which were linked to a specific causal agent (Table 13). The most common causal agent identified in environmental outbreaks was norovirus, which was recorded in 36.6% (45/123) of environmental outbreaks and associated with 60.5% (1135/1876) of cases. Enteric viruses (norovirus, rotavirus, sapovirus, and hepatitis A virus) were implicated in 43.9% (54/123) of environmental outbreaks, and enteric protozoa (*Giardia* spp. and *Cryptosporidium* spp.) in 34.1% (42/123), enteric bacteria (*Campylobacter* spp., *Salmonella* spp., *P. shigelloides* and *Yersinia* spp.) in 7.3% (9/123) and other agent (chemical poisoning from the environment (cyanobacteria)) in 0.8% (1/123) of environmental outbreaks.

Table 13. Environmental outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 123)	No. of cases	% of cases (N = 1876)
Norovirus	45	36.6	1135	60.5
<i>Giardia</i> spp.	28	22.8	91	4.9
<i>Cryptosporidium</i> spp.	14	11.4	211	11.2
<i>Campylobacter</i> spp.	4	3.3	17	0.9
Rotavirus	4	3.3	63	3.4
<i>Salmonella</i> spp.	3	2.4	12	0.6
Norovirus/rotavirus	2	1.6	48	2.6
Sapovirus	2	1.6	43	2.3
Chemical poisoning from the environment	1	0.8	2	0.1
<i>Plesiomonas shigelloides</i>	1	0.8	23	1.2
Hepatitis A virus	1	0.8	3	0.2
<i>Yersinia</i> spp.	1	0.8	8	0.4
Unidentified pathogen ¹	17	13.8	220	11.7
Total	123	100	1876	100

¹ All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

Contributing factors

The major contributing factors to environmental outbreaks were exposure to contaminated swimming/spa pools (18.7%, 23/123) and exposure to contaminated environment(s) (16.3%, 20/123), this included exposure to contaminated land, air and built environments, and exposure to other recreational waters (5.7%, 7/123). No contributing factors were recorded for 60.2% (74/123) of the outbreaks.

3.12 Zoonotic outbreaks

Causal agents

There were 36 zoonotic outbreaks with 109 associated cases reported in 2010, 97.2% (35/36) of which were linked to a specific pathogen (Table 14). The most common causal agent identified in zoonotic outbreaks was *Cryptosporidium* spp. which was linked to 36.1% (13/36) of the zoonotic outbreaks and 32.1% (35/109) of the associated cases. Enteric protozoa (*Cryptosporidium* spp. and *Giardia* spp.) were implicated in 61.1% (22/36) of the zoonotic outbreaks, enteric bacteria (*Campylobacter* spp. and *Salmonella* spp.) in 30.6% (11/36) and other bacteria (*Leptospira*) in 5.6% (2/36) of the zoonotic outbreaks.

Table 14. Zoonotic outbreaks and associated cases by agent type, 2010

Agent type	No. of outbreaks	% of outbreaks (N = 36)	No. of cases	% of cases (N = 109)
<i>Cryptosporidium</i> spp.	13	36.1	35	32.1
<i>Giardia</i> spp.	9	25.0	32	29.4
<i>Campylobacter</i> spp.	7	19.4	23	21.1
<i>Salmonella</i> spp.	4	11.1	12	11.0
<i>Leptospira</i>	2	5.6	5	4.6
Unidentified pathogen ¹	1	2.8	2	1.8
Total	36	100.0	109	100.0

¹All outbreaks with no pathogen identified in 2010 were classified as gastroenteritis

Contributing factors

Thirty-five outbreaks had recorded exposure to infected animals (97.2%, 35/36). Multiple settings were identified in 11 outbreaks. The most common setting for zoonotic outbreaks was home (22 outbreaks), although 11 of these outbreaks identified another setting. The second most common setting for zoonotic outbreaks was farms (18 outbreaks) and eight of these identified another setting.

3.13 Outbreaks with overseas transmission

There were 15 outbreaks in 2010 with overseas transmission involving 289 cases. Australia and Samoa were associated with two outbreaks each, and all other overseas destinations were associated with a single outbreak (Table 15). The majority of cases associated with overseas transmission contracted norovirus (86.9%, 251/289 cases), followed by *Giardia* spp. (6.9%, 20/289 cases).

Table 15. Outbreaks with overseas transmission by destination, 2010

Destination	<i>Giardia</i> spp.	Dengue fever	Norovirus	<i>Salmonella</i> spp.	<i>Cryptosporidium</i> spp.	Hepatitis A virus	<i>Salmonella</i> Typhi	Total
Australia	1		1					2
Cook Islands	1							1
Fiji	1							1
India							1	1
Indonesia		1						1
Norfolk Island			1					1
Philippines					1			1
Samoa	2							2
South America	1							1
Tonga				1				1
Vanuatu						1		1
Vietnam		1						1
United Arab Emirates, Fiji and Thailand ¹				1				1
No. of outbreaks	6	2	2	2	1	1	1	15
No. of cases	20	4	251	6	3	3	2	289

¹ One outbreak recorded with multiple destinations

3.14 Outbreak recognition, investigation and control

Timeliness of reporting

For the 571 outbreaks where timeliness of reporting data were available, the majority were reported to the PHU within one week of the onset of illness in the first case (47.3%, 270/571), while 34.2% (195/571) of outbreaks were reported between 7 and 30 days (inclusive) after the onset of illness in the first case, and 11.4% (65/571) of outbreaks were reported between 31 and 60 days after the onset of illness in the first case. Forty-one (7.2%) of outbreaks were reported more than 60 days after the onset of illness in the first case.

Reporting delay (time between date of onset of illness in the first case and the report date) varied among the different modes of transmission (Table 16). The shortest median reporting delay (3.0 days) was associated with foodborne outbreaks, followed by other mode (9.0 days) and person-to-person (10.0 days) outbreaks. The longest median reporting delay (50.0 days) was observed in vectorborne outbreaks, with the overall median reporting delay for outbreaks being 7.5 days.

Table 16. Median reporting delay by outbreak type, 2010

Outbreak type	No. of outbreaks ¹	Median reporting delay (days)
Foodborne	135	3.0
Other mode	13	9.0
Person-to-person	418	10.0
Environmental	121	16.0
Waterborne	53	21.0
Zoonotic	35	21.5
Vectorborne	3	50.0
Total²	571	7.5

¹ Outbreaks were excluded if the date of onset of illness in the first case was missing

² More than one mode of transmission was recorded for some outbreaks

Recognition of outbreaks

Almost 56% (339/606) of outbreaks were identified through an increase in disease incidence and 52.8% (320/606) through cases having person-to-person contact with other cases (Table 17). Other frequent means of outbreak recognition included cases attending a common event 27.7% (168/606) and cases being linked to a common source 15.3% (93/606). There was more than one means of recognition for 42.6% (258/606) of outbreaks.

Table 17. Outbreaks by means of recognition, 2010

Means of recognition	No. of outbreaks ¹	% of total outbreaks (N = 606)
Increase in disease incidence	339	55.9
Cases had person to person contact with other case(s)	320	52.8
Cases attended common event	168	27.7
Cases linked to common source (eg food, water, environmental site)	93	15.3
Common organism type/strain characteristics between cases)	23	3.8
Other means	27	4.5

¹ More than one means of recognition was recorded for some outbreaks

Control measures

Outbreak control measures undertaken were reported in 95.7% (580/606) of outbreaks reported in 2010, of which 8.8% (51/580) reported taking no control measures. For the remaining 4.3% of outbreaks (26/606), it was unknown whether control measures were undertaken. The most common measures undertaken were health education and advice regarding the source (80.9%, 469/580), followed by cleaning and disinfection (56.4%, 327/580) (Table 18).

Table 18. Outbreaks by control measures undertaken, 2010

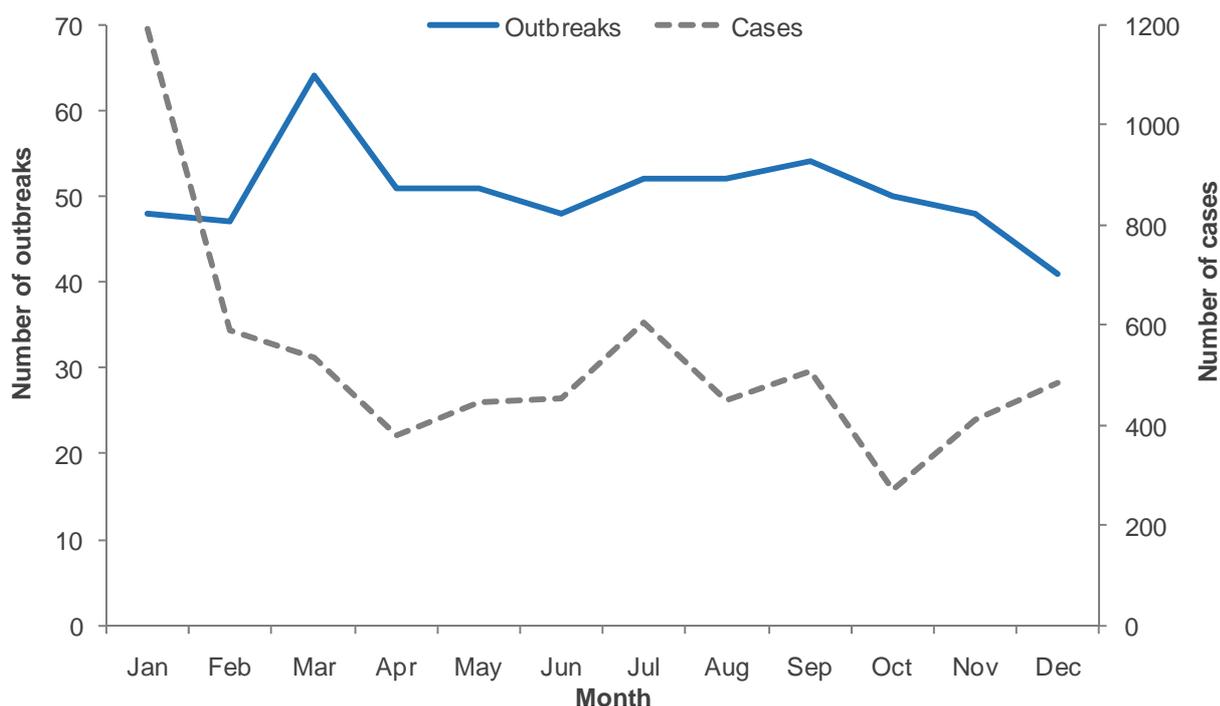
Outbreak control measure	No. of outbreaks ¹	% of total outbreaks (N = 580)
Source	517	89.1
Health education and advice	469	80.9
Cleaning, disinfection	327	56.4
Exclusion	296	51.0
Isolation	184	31.7
Modification of procedures	120	20.7
Closure	66	11.4
Health warning	84	14.5
Treatment	26	4.5
Removal	11	1.9
Vehicle and vector	12	2.1
Removal	5	0.9
Treatment	9	1.6
Contacts and potential contacts	98	16.9
Health education and advice	97	16.7
Chemoprophylaxis	17	2.9
Vaccination	6	1.0
Other control measures	10	1.7
No control measures	51	8.8

¹ More than one control measure was recorded for some outbreaks

3.15 Summary of trends

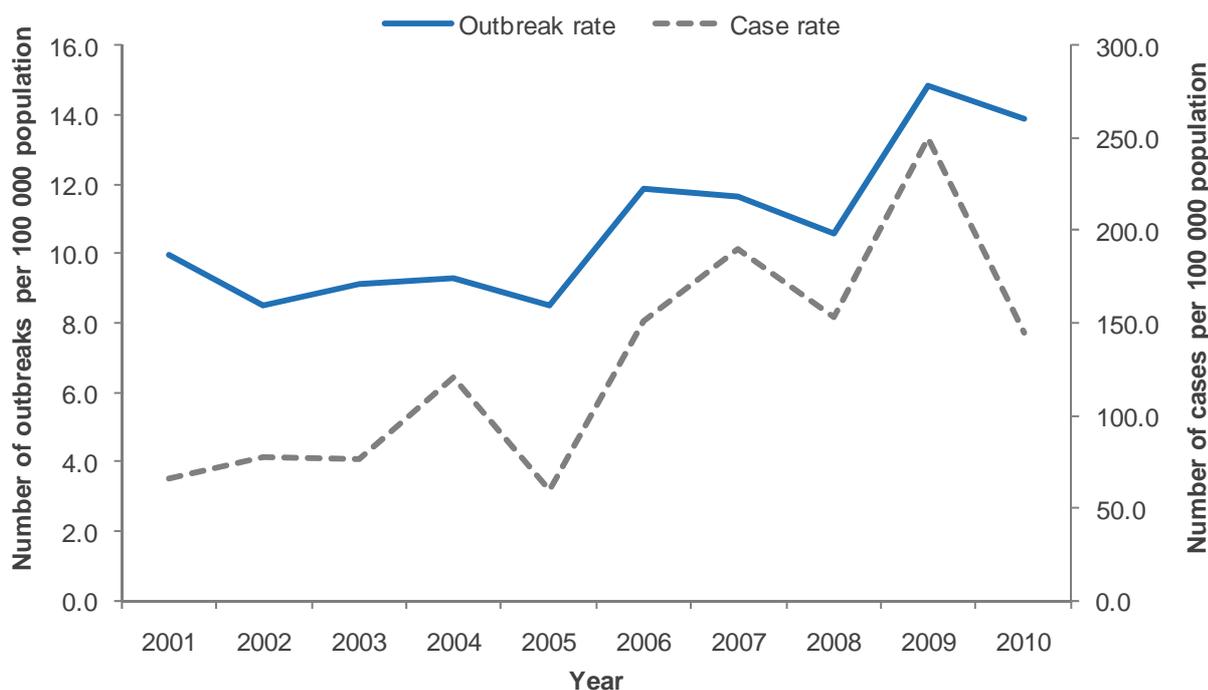
In 2010, the highest number of outbreaks was reported in March (64 outbreaks). The number of outbreaks was more or less stable (range 47 to 51) for the remaining months apart from a decrease in December (41 outbreaks). The highest number of outbreak-related cases occurred in January (1193 cases). This was almost double the number in July which was month in which the next highest number of outbreak-related cases occurred (606 cases) (Figure 5).

Figure 5. Number of outbreaks and associated cases by month, 2010



The national annual outbreak rate for 2010 (13.9 outbreaks per 100 000 population) was lower than the rate for 2009 (14.8), but greater than the rates from 2001 to 2008 (Figure 6). The national outbreak case rate of 144.7 cases per 100 000 population in 2010 was also lower than the 2009 case rate (248.7 cases per 100 000), but was similar to rates in 2006 and 2008.

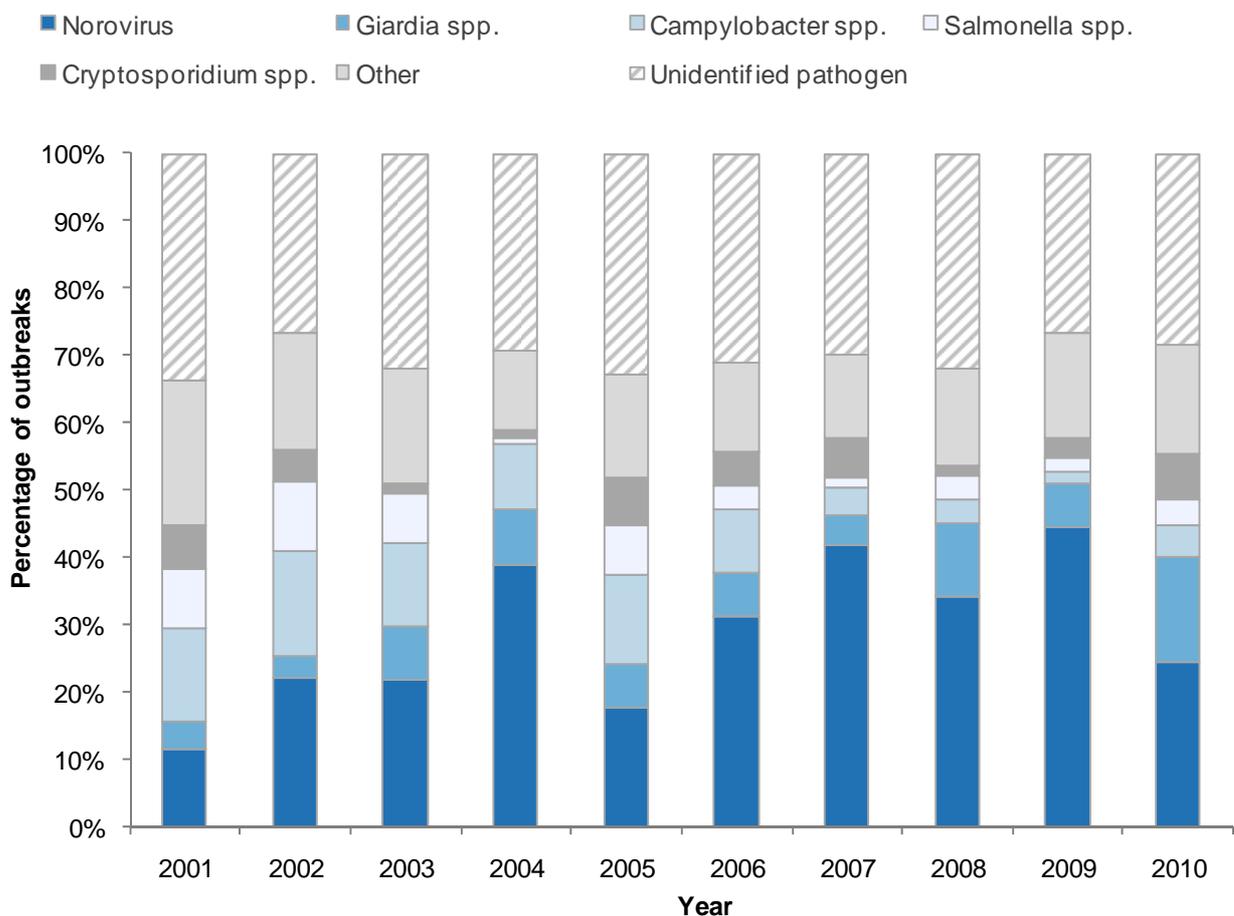
Figure 6. Outbreak rates and associated cases by year, 2001–2010



Since 2001, the number of outbreaks linked with an identified causal agent has remained close to 70% (range 66.3% to 73.4%). In 2010, 71.6% (434/606) of outbreaks were linked to an identified agent. Since 2004, the causal agent associated with the greatest number of outbreaks and greatest number of outbreak cases has been norovirus, although the number and percentage of norovirus outbreaks and cases has varied considerably from year to year (Figure 7). In 2009, there were 285 norovirus outbreaks with 7428 cases, the highest observed since reporting began in 2001. The number of norovirus outbreaks in 2010 was 152 outbreaks with 3223 cases. The number of *Giardia* spp. outbreaks increased more than four times between 2007 (21 outbreaks and 111 cases) and 2010 (97 outbreaks and 378 cases). Rotavirus has emerged in the last three years as a substantial contributor to outbreaks with 16 outbreaks in 2008, 32 in 2009 and 21 in 2010.

In contrast, the number of outbreaks and the number of cases linked to *Campylobacter* have both decreased since 2006. The number of *Campylobacter* spp.-associated outbreaks reduced by 42.6% between 2006 and 2010 (from 47 to 29 outbreaks), while the number of associated cases decreased by more than 50% (from 221 cases to 113). However, there was an increase in 2010 compared with 2009 (12 outbreaks and 65 cases). *Campylobacter* has consistently remained within the top five causal agents for outbreaks.

Figure 7. Percentage of outbreaks by agent type and year, 2001–2010



In 2010, the most common outbreak settings were the home and restaurant/cafes. This is in contrast to the period from 2006 to 2009 where rest or retirement homes and homes were the common settings.

Over the last 10 years substantial changes have occurred in the modes of outbreak transmission. Over this period, person-to-person transmission overtook foodborne transmission to become the most commonly reported mode of transmission. The number of outbreaks linked to person-to-person transmission rose by more than three times between 2001 and 2010 (from 132 to 446, respectively), and in 2010 person-to-person transmission outbreaks outnumbered all other modes of transmission by at least three times. The number of outbreaks linked to foodborne transmission has tended to vary each year with no clear trend. From 2007 to 2009 there were relatively fewer foodborne outbreaks (range 74 to 89), but in 2010 the number increased to 141, which is more in line with the number seen in the years prior to 2007 (range 116 to 192). Environmental transmission is increasingly being reported as a mode of outbreak transmission rising from 13 outbreaks in 2001 to 123 in 2010. When interpreting these trends it should be noted that the proportion of outbreaks with multiple modes of transmission reported increased from 19% in 2001 to 32% in 2010.

In 2010, 15 outbreaks involving 289 cases had overseas transmission. This is higher than in 2009 (5 outbreaks and 54 cases) and 2008 (7 outbreaks and 54 cases). No country was associated with more than two outbreaks per year between 2007 and 2010.

The median delay between date of onset of illness in the first case and the outbreak report date was calculated as 7.5 days for 2010, compared with 4.0 days in 2009 and 2008.

Health education and advice related to the outbreak source has been the most common control measure since 2001. Between 2001 and 2006, modification of procedures pertaining to the source had been the second most common control measure undertaken. In 2007 and 2008 cleaning and disinfection was more commonly reported than modification of procedures. The proportion of outbreaks where it was reported that no control measures were undertaken decreased from 27.8% of outbreaks in 2001 to 4.3% of outbreaks in 2010.

GLOSSARY

GLOSSARY

Common event outbreak

An outbreak due to exposure of a group of persons to a noxious influence that is common to the individuals in the group, where the exposure is brief and essentially simultaneous and all resultant cases develop within one incubation period of the disease. Cases therefore have exposures that are grouped in place and time (synonymous with point source outbreak).

Common site outbreak

An outbreak due to exposure of a group of persons to a noxious influence that is common to the individuals in the group, where exposures have occurred at the same place (or site) but over a longer time period than those of common event outbreaks (i.e. grouped in place but not in time). In the Outbreak Report Form, these outbreaks are called *common source in a specific place*.

Common source outbreak

An outbreak due to exposure of a group of persons in the community to a noxious influence that is common to the individuals in the group. These outbreaks are subcategorised into common event (where exposures are grouped in time and place), dispersed common source (grouped in time but not in place) and common site (grouped in place but not in time).

Community-wide outbreak

An outbreak that occurs among individuals in a community where transmission predominantly occurs by direct exposure of susceptible people to infectious people (synonymous with person-to-person outbreak).

Contamination

The presence of a disease-causing agent on a body surface, in clothes, bedding, toys or other inanimate articles or substances, including water and food.

Dispersed common source outbreak

Outbreak due to exposure of a group of persons in the community to a noxious influence that is common to the individuals in the group, where the exposures are not grouped in place (and may or may not be grouped in time). These outbreaks are often due to a distributed vehicle of infection transmission, such as a commercially prepared food item or a water supply.

EpiSurv

The national notifiable disease surveillance system managed by ESR to record data on notifiable diseases and outbreaks reported by public health units.

ESR

Institute of Environmental Science & Research Limited.

Environment

All factors which are external to the individual human host.

Exposure

Proximity and/or contact with a potential source of a disease agent in such a manner that effective transmission of the agent and harmful or protective effects of the agent may occur.

Household outbreak

An outbreak confined to members of a single household.

Institutional outbreak

An outbreak confined to the population of a specific residential or other institutional setting, such as a hospital, rest home, prison or boarding school.

Outbreak

Two or more cases of a specific disease or health related condition occurring in a location over a period of time in excess of the expected numbers for the place and time.

Source (of illness)

The person, animal, object or substance from which a disease agent passes to a host.

Transmission of illness

Any mechanism by which a disease agent is spread through the environment or to another person. Mechanisms are defined as either direct or indirect.

REFERENCES

REFERENCES

1. Lopez L, Baker M, and C. Kieft, *Annual Summary of Outbreaks in New Zealand 2000*. 2001, Institute of Environmental Science and Research Ltd: Wellington.
2. ESR, *Manual for Public Health Surveillance*. 2005, Institute of Environmental Science and Research Ltd: Wellington.
3. Siebenga, J., et. al., *Norovirus Illness is a Global Problem; Emergence and Spread of Norovirus GII.4 Variants, 2001-2007*. *J Infect Dis* 2009. **200(5)**: p. 802-12.
4. Painter, J., et al., *Recipes for Foodborne Outbreaks: A Scheme for Categorizing and Grouping Implicated Foods*. *Foodborne Pathogens and Disease*, 2009. **6(10)**: p. 1259-64.

APPENDIX

Outbreak Summary	Outbreak No.
Circumstances of Exposure/Transmission	
How was the outbreak first recognised?	
<input type="radio"/> Increase in disease incidence <input type="radio"/> Cases had person to person contact with other cases(s)	
<input type="radio"/> Cases attended common event <input type="radio"/> Common organism type/strain characteristics between cases	
<input type="radio"/> Cases linked to common source (eg food, water, environmental site)	
<input type="radio"/> Other means (specify) _____	
Were these cases part of a well-defined exposed group (eg Common event, institutional, environmental, household)	
<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown	
If yes, date of exposure _____ If exposure >1 day, date exposure ended _____	
Description of exposure event _____	
First setting where exposure occurred	
Setting unknown <input type="checkbox"/>	
<input type="radio"/> Food premises <input type="radio"/> Institution <input type="radio"/> Workplace/Community/Other	
<input type="radio"/> Restaurant/café/bakery <input type="radio"/> Hostel/boarding house <input type="radio"/> Workplace	
<input type="radio"/> Takeaway <input type="radio"/> Hotel/motel <input type="radio"/> Farm	
<input type="radio"/> Supermarket/delicatessen <input type="radio"/> Long term care facility <input type="radio"/> Petting zoo	
<input type="radio"/> Temporary or mobile service <input type="radio"/> Hospital (acute care) <input type="radio"/> Home	
<input type="radio"/> Fast food restaurant <input type="radio"/> Prison <input type="radio"/> Community, church, sports gathering	
<input type="radio"/> Caterers <input type="radio"/> Camp <input type="radio"/> Cruise ship, airline, tour bus, train	
<input type="radio"/> Other food outlet <input type="radio"/> School <input type="radio"/> Childcare centre <input type="radio"/> Other setting	
<input type="radio"/> Marae <input type="radio"/> Other institution	
Setting name _____	
Setting Address Number _____ Street _____ Suburb _____	
Town/City _____ Post Code _____ <input type="checkbox"/> GeoCode _____	
Second setting where exposure occurred	
Setting unknown <input type="checkbox"/>	
<input type="radio"/> Food premises <input type="radio"/> Institution <input type="radio"/> Workplace/Community/Other	
<input type="radio"/> Restaurant/café/bakery <input type="radio"/> Hostel/boarding house <input type="radio"/> Workplace	
<input type="radio"/> Takeaway <input type="radio"/> Hotel/motel <input type="radio"/> Farm	
<input type="radio"/> Supermarket/delicatessen <input type="radio"/> Long term care facility <input type="radio"/> Petting zoo	
<input type="radio"/> Temporary or Mobile Service <input type="radio"/> Hospital (acute care) <input type="radio"/> Home	
<input type="radio"/> Fast food restaurant <input type="radio"/> Prison <input type="radio"/> Community, church, sports gathering	
<input type="radio"/> Caterers <input type="radio"/> Camp <input type="radio"/> Cruise ship, airline, tour bus, train	
<input type="radio"/> Other food outlet <input type="radio"/> School <input type="radio"/> Childcare centre <input type="radio"/> Other setting	
<input type="radio"/> Marae <input type="radio"/> Other institution	
Setting name _____	
Setting Address Number _____ Street _____ Suburb _____	
Town/City _____ Post Code _____ <input type="checkbox"/> GeoCode _____	

Outbreak Summary	Outbreak No.	
Circumstances of Exposure/Transmission contd		
First setting where contaminated food/beverage was prepared Setting unknown <input type="checkbox"/>		
<input type="radio"/> Overseas manufacturer, specify _____		
<input type="radio"/> Food premises <input type="radio"/> Restaurant/café/bakery <input type="radio"/> Takeaway <input type="radio"/> Supermarket/delicatessen <input type="radio"/> Temporary or Mobile Service <input type="radio"/> Fast food restaurant <input type="radio"/> Caterers <input type="radio"/> Other food outlet	<input type="radio"/> Institution <input type="radio"/> Hostel/boarding house <input type="radio"/> Hotel/motel <input type="radio"/> Long term care facility <input type="radio"/> Hospital (acute care) <input type="radio"/> Prison <input type="radio"/> Camp <input type="radio"/> School <input type="radio"/> Childcare centre <input type="radio"/> Marae <input type="radio"/> Other institution	<input type="radio"/> Workplace/Community/Other <input type="radio"/> Workplace <input type="radio"/> Farm <input type="radio"/> Petting zoo <input type="radio"/> Home <input type="radio"/> Community, church, sports gathering <input type="radio"/> Cruise ship, airline, tour bus, train <input type="radio"/> Commercial food manufacturer <input type="radio"/> Other setting
Setting name _____		
Setting Address Number _____ Street _____ Suburb _____ Town/City _____ Post Code _____ <input type="checkbox"/> GeoCode _____		
Second setting where contaminated food/beverage was prepared Setting unknown <input type="checkbox"/>		
<input type="radio"/> Overseas manufacturer, specify _____		
<input type="radio"/> Food premises <input type="radio"/> Restaurant/café/bakery <input type="radio"/> Takeaway <input type="radio"/> Supermarket/delicatessen <input type="radio"/> Temporary or Mobile Service <input type="radio"/> Fast food restaurant <input type="radio"/> Caterers <input type="radio"/> Other food outlet	<input type="radio"/> Institution <input type="radio"/> Hostel/boarding house <input type="radio"/> Hotel/motel <input type="radio"/> Long term care facility <input type="radio"/> Hospital (acute care) <input type="radio"/> Prison <input type="radio"/> Camp <input type="radio"/> School <input type="radio"/> Childcare centre <input type="radio"/> Marae <input type="radio"/> Other institution	<input type="radio"/> Workplace/Community/Other <input type="radio"/> Workplace <input type="radio"/> Farm <input type="radio"/> Petting zoo <input type="radio"/> Home <input type="radio"/> Community, church, sports gathering <input type="radio"/> Cruise ship, airline, tour bus, train <input type="radio"/> Commercial food manufacturer <input type="radio"/> Other setting
Setting name _____		
Setting Address Number _____ Street _____ Suburb _____ Town/City _____ Post Code _____ <input type="checkbox"/> GeoCode _____		
Geographic location where exposure occurred (tick one)		
<input type="radio"/> New Zealand <input type="radio"/> Overseas, specify _____ <input type="radio"/> Unknown		
If exposure occurred in New Zealand, specify		
Primary TA	_____	
DHB(s)	_____	
Health District(s)	_____	

Outbreak Summary	Outbreak No.
Circumstances of Exposure/Transmission contd	
Mode of transmission (indicate the primary mode and all secondary modes)	
<input type="checkbox"/> Foodborne, from consumption of contaminated food or drink (excluding water)	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Waterborne, from consumption of contaminated drinking water	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Person to person spread, from (non-sexual) contact with an infected person (including droplets)	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Sexual, from sexual contact with an infected person	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Parenteral, from needle stick injury or reuse of contaminated injection equipment	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Environmental, from contact with an environmental source (eg swimming)	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Zoonotic, from contact with an infected animal	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Vectorborne, from contact with an insect vector	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
<input type="checkbox"/> Other mode of transmission (specify) _____	
Mode <input type="radio"/> primary <input type="radio"/> secondary	Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4
Mode of transmission unknown <input type="checkbox"/>	
Vehicle/source of common source outbreak	
Was a specific contaminated food, water or environmental vehicle/source identified?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
If yes,	
Source 1 _____	
Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4	
Food category _____	ESR Updated <input type="checkbox"/> Date _____
Source 2 _____	
Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4	
Food category _____	ESR Updated <input type="checkbox"/> Date _____
Source 3 _____	
Level of evidence <input type="radio"/> 1 <input type="radio"/> 2a <input type="radio"/> 2b <input type="radio"/> 3a <input type="radio"/> 3b <input type="radio"/> 3c <input type="radio"/> 4	
Food category _____	ESR Updated <input type="checkbox"/> Date _____

Outbreak Summary	Outbreak No.	
Factors Contributing to Outbreak		
Foodborne outbreak (tick all that apply)		
<input type="checkbox"/> Inadequate reheating of previously cooked food	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Improper storage prior to presentation	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Inadequate thawing	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Preparation too far in advance	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Undercooking	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Improper hot holding	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Inadequate or slow cooling or refrigeration	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Cross contamination due to improper handling or storage	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Cross contamination from an infected food handler	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Chemical contamination	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Use of ingredient from an unsafe source	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Use of untreated water in food preparation	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Consumption of unpasteurised milk	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Consumption of raw food	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Other factors, specify _____	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
Waterborne outbreak (tick all that apply)		
(Pre latest form revision: <input type="checkbox"/> Untreated water supply)		
<input type="checkbox"/> Surface water with no treatment	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Roof collected rainwater with no treatment	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Groundwater not assessed as secure and with no treatment	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Source water quality inferior to normal, If source water quality inferior to normal, specify _____	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Inadequately treated water supply	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Recent or ongoing treatment process failure	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Contamination of post treatment water storage	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Post treatment contamination (other) If post treatment contamination (other), specify _____	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
Specify the WINZ supply code of the implicated water supply _____		
Person to person outbreak (tick all that apply)		
<input type="checkbox"/> Inadequate vaccination cover	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Inadequate vaccination effectiveness	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Exposure to infected person	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Poor hygiene of cases	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Excessively crowded living conditions	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Unprotected sexual activity	<input type="radio"/> Confirmed	<input type="radio"/> Suspected
<input type="checkbox"/> Compromised immune system	<input type="radio"/> Confirmed	<input type="radio"/> Suspected

Outbreak Summary	Outbreak No.
Factors Contributing to Outbreak	
Environmental outbreak (tick all that apply)	
<input type="checkbox"/> Exposure to contaminated land	<input type="radio"/> Confirmed <input type="radio"/> Suspected
<input type="checkbox"/> Exposure to contaminated air (including ventilation)	<input type="radio"/> Confirmed <input type="radio"/> Suspected
<input type="checkbox"/> Exposure to contaminated built environments (inc dwellings)	<input type="radio"/> Confirmed <input type="radio"/> Suspected
<input type="checkbox"/> Exposure to infected animals or animal products	<input type="radio"/> Confirmed <input type="radio"/> Suspected
<input type="checkbox"/> Exposure to contaminated swimming/spa pools	<input type="radio"/> Confirmed <input type="radio"/> Suspected
<input type="checkbox"/> Exposure to contaminated other recreational water	<input type="radio"/> Confirmed <input type="radio"/> Suspected
Other outbreaks	
<input type="checkbox"/> Other risk factor, specify _____	<input type="radio"/> Confirmed <input type="radio"/> Suspected
Management of the Outbreak	
Was there any specific action taken to control the outbreak?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
If yes, list the control measures undertaken (tick all that apply)	
Source	Specify
<input type="checkbox"/> Closure	_____
<input type="checkbox"/> Modification of procedures	_____
<input type="checkbox"/> Cleaning, disinfection	_____
<input type="checkbox"/> Removal	_____
<input type="checkbox"/> Treatment	_____
<input type="checkbox"/> Exclusion	_____
<input type="checkbox"/> Isolation	_____
<input type="checkbox"/> Health education and advice	_____
<input type="checkbox"/> Health warning	_____
Vehicles and vectors	
<input type="checkbox"/> Removal	_____
<input type="checkbox"/> Treatment	_____
Contacts and potential contacts	
<input type="checkbox"/> Chemoprophylaxis	_____
<input type="checkbox"/> Vaccination	_____
<input type="checkbox"/> Health education and advice	_____
Other control measures (specify)	

Outbreak Summary	Outbreak No.
Management of the Outbreak	
Was insufficient information supplied to complete the form? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown	
Other comments on outbreak	
Please attach a copy of written report if prepared.	
<p>Level of Evidence Codes</p> <ul style="list-style-type: none"> 1 Elevated risk ratio or odds ratio with 95% confidence intervals not including 1 AND laboratory evidence 2a Elevated relative risk or odds ratio with 95% confidence intervals not including 1 2b Laboratory evidence, same organism and sub type detected in both cases and vehicle (to the highest level of identification) 3a Compelling evidence, symptomatology attributable to specific organism e.g. scrombrotoxin, ciguatoxin etc 3b Other association i.e. organism detected at source but not linked directly to the vehicle or indistinguishable DNA or PFGE profiles 3c Raised but not statistically significant relative risk or odds ratio 4 No evidence found but logical deduction given circumstances 	

Version: 2 October 2010

Old Outbreak Report Form (version: 3 August 2007)

OUTBREAK REPORT FORM

Outbreak Summary		Outbreak No. _____	
Reporting Authority			
Name of public health officer responsible for case _____			
Date outbreak reported _____		<input type="radio"/> Interim report <input type="radio"/> Final report - date finalised _____	
Disease and Implicated Pathogen, Toxin or Chemical			
Name of implicated pathogen, toxin or chemical (if known) _____			
Subtype _____			
Other known pathogen _____			
Unknown pathogen <input type="checkbox"/> Gastroenteritis <input type="checkbox"/> Other illness (specify) _____			
CASE DEFINITION(S)			
Laboratory-confirmed case			

Other confirmed case			

Probable case			

Outbreak Demographics			
Number of cases	Lab confirmed (as per case defn above)	_____	Number Hospitalised _____
	Other confirmed (as per case defn above)	_____	Number Died _____
	Probable (as per case defn above)	_____	
	Total	_____	
Outbreak dates	Onset of illness in first case	_____	
	Onset of illness in last case	_____	or <input type="checkbox"/> Outbreak ongoing
Age of cases	Median age (years)	_____	Range (years) _____
Sex of cases	Number of males	_____	Number of females _____
Incubation period	Median	_____	<input type="radio"/> days <input type="radio"/> hrs Range _____ <input type="radio"/> days <input type="radio"/> hrs
	Duration of illness	Median	<input type="radio"/> days <input type="radio"/> hrs Range _____ <input type="radio"/> days <input type="radio"/> hrs
Circumstances of Exposure/Transmission			
How was the outbreak recognised and links among cases established? (tick all that apply)			
<input type="checkbox"/> Increase in disease incidence			
<input type="checkbox"/> Cases attended common event			
<input type="checkbox"/> Cases linked to common source (eg food, water, environmental site)			
<input type="checkbox"/> Cases had person to person contact with other cases(s)			
<input type="checkbox"/> Common organism type/strain characteristics between cases			
<input type="checkbox"/> Other means (specify) _____			

Outbreak Summary	Outbreak No. _____
Circumstances of Exposure/Transmission contd	
Mode of transmission (tick all that apply)	
<input type="checkbox"/> Foodborne, from consumption of contaminated food or drink (excluding water)	
<input type="checkbox"/> Waterborne, from consumption of contaminated drinking water	
<input type="checkbox"/> Person to person spread, from (non-sexual) contact with an infected person (including droplets)	
<input type="checkbox"/> Sexual, from sexual contact with an infected person	
<input type="checkbox"/> Parenteral, from needle stick injury or reuse of contaminated injection equipment	
<input type="checkbox"/> Environmental, from contact with an environmental source (eg swimming)	
<input type="checkbox"/> Zoonotic, from contact with an infected animal	
<input type="checkbox"/> Vectorborne, from contact with an insect vector	
<input type="checkbox"/> Other mode of transmission (specify) _____	
<input type="checkbox"/> Unknown mode of transmission	
Vehicle/source of common source outbreak	
Was a specific contaminated food, water or environmental vehicle/source identified? <input type="radio"/> Definite <input type="radio"/> Suspect <input type="radio"/> No <input type="radio"/> Unknown	
If suspected or definite, list all vehicles/sources in detail _____ _____	
Was the vehicle/source linked to a commercial operator?	
<input type="radio"/> Yes <input type="radio"/> No	
If yes, list all the operators and record whether each had a Ministry of Health approved food safety plan (FSP) in place.	
Name of food operators	MoH approved FSP in place?
_____	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
_____	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
_____	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
Evidence for mode of transmission (tick all that apply)	
<input type="checkbox"/> Epidemiological - case had history of exposure to implicated source	
<input type="checkbox"/> Epidemiological - case control or cohort study showed elevated risk for cases exposed to implicated source	
<input type="checkbox"/> Laboratory - pathogen/toxin/chemical suspected to have caused illness identified in implicated source eg leftover food, water, animal or environmental source	
<input type="checkbox"/> Laboratory - pathogen suspected to have caused illness identified in food handler	
<input type="checkbox"/> Environmental investigation - identified critical control point failures linked to implicated source	
<input type="checkbox"/> Other evidence (specify) _____	
<input type="checkbox"/> No evidence obtained	

Outbreak Summary	Outbreak No. _____	
Factors Contributing to Outbreak		
Foodborne outbreak (tick all that apply)		
<i>Time/temperature abuse</i>	<i>Contamination of food</i>	<i>Unsafe sources</i>
<input type="checkbox"/> Inadequate reheating of previously cooked food	<input type="checkbox"/> Cross contamination	<input type="checkbox"/> Use of ingredients from unsafe sources
<input type="checkbox"/> Improper storage prior to preparation	<input type="checkbox"/> Contamination from an infected food handler	<input type="checkbox"/> Use of untreated water in food preparation
<input type="checkbox"/> Inadequate thawing	<input type="checkbox"/> Chemical contamination	<input type="checkbox"/> Consumption of unpasteurised milk
<input type="checkbox"/> Preparation too far in advance		<input type="checkbox"/> Consumption of raw food
<input type="checkbox"/> Undercooking		
<input type="checkbox"/> Improper hot holding		
<input type="checkbox"/> Inadequate cooling or refrigeration		
<input type="checkbox"/> Other factor (specify) _____		
<input type="checkbox"/> Unknown factors		
Waterborne outbreak (tick all that apply)		
<input type="checkbox"/> Contamination of source water	<input type="checkbox"/> Untreated water supply	
<input type="checkbox"/> Treatment process failure	<input type="checkbox"/> Contamination of reservoir(s)/holding tank(s)	
<input type="checkbox"/> Post treatment contamination		
<input type="checkbox"/> Other factor (specify) _____		
<input type="checkbox"/> Unknown factors		
Specify the implicated supply distribution zone	Zone code _____	<input type="checkbox"/> Unknown
Other outbreak (tick all that apply)		
<i>Person to person</i>	<i>Environmental</i>	
<input type="checkbox"/> Inadequate vaccination coverage	<input type="checkbox"/> Exposure to contaminated environment(s)	
<input type="checkbox"/> Inadequate vaccination effectiveness	<input type="checkbox"/> Exposure to infected animals or animal products	
<input type="checkbox"/> Exposure to infected people	<input type="checkbox"/> Exposure to untreated recreational water	
<input type="checkbox"/> Poor hygiene of cases	<input type="checkbox"/> Exposure to contaminated swimming pool	
<input type="checkbox"/> Excessively crowded living conditions	<input type="checkbox"/> Exposure to inadequately maintained swimming pool	
<input type="checkbox"/> Unprotected sexual activity		
<input type="checkbox"/> Needle/syringe reuse by injecting drug users		
<input type="checkbox"/> Other factor (specify) _____		
<input type="checkbox"/> Unknown factors		
Evidence for implicating a contributing factor		
<input type="checkbox"/> Environmental investigation - identified critical point failure(s)		
<input type="checkbox"/> Other evidence for factor contributing to outbreak (specify) _____		

