ISSN: 1176-3485

ANNUAL SUMMARY OF OUTBREAKS IN NEW ZEALAND 2003

Science Program Manager

Project Leader

Peer Reviewer

Client Number
FW# 0419

ACKNOWLEDGMENTS

This report could not have been produced without the continued support of staff in the Public Health Services who provide us with data from their regions. The author wishes to thank the staff in the Population and Environmental Health group of the Institute of Environmental Science and Research Ltd.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

OUTBREAK DESCRIPTIONS

Incidence & Outcomes

- There were 369 outbreaks in 2003 (an increase from 337 in 2002).
- The average number of people involved per outbreak decreased from 8.8 to 8.2.
- The number of outbreak-associated cases decreased from 2890 in 2002 to 2789 in 2003.
- "Common Source Outbreaks" remain the most common outbreak type, predominantly common event exposure.
- Outbreaks resulted in 89 hospitalisations (compared with 77 in 2002) and four deaths (compared with two in 2002).
- One death was associated with a *Legionella* outbreak, another occurred in an outbreak of *Neisseria meningitidis*; the remaining two deaths were associated with a norovirus outbreak.
- Auckland had the highest percentage of outbreaks (58.3%).

Pathogens

- The causal agent(s) were identified in 223 outbreaks (65.6%), comprising 1994 cases (71.5%).
- Causative agents were not laboratory confirmed in 117 outbreaks (34.4%), consisting of 795 cases (28.5%).
- Norovirus and *Campylobacter* spp. were most often isolated from 'common event' outbreaks.
- *Giardia* spp. dominated community outbreaks (4 outbreaks, 19 cases), spread by person-to-person transmission. Transmission from the environment caused 28.3% of the household outbreaks and associated cases (19 outbreaks, 53 cases).
- Norovirus caused 70% of all institutional outbreaks (40) and almost three quarters of the cases associated with institutional outbreaks (1118).

Settings

- The percentage of cases associated with outbreaks occurring in restaurants/cafés has increased since 2002 (11.7% compared with 7.7%).
- There has been an increase in the number of cases associated with outbreaks occurring in rest/retirement homes from 19.8% in 2002 to 27.7% in 2003.

Transmission Routes

- The predominant method of transmission involved in most outbreaks was foodborne, although the majority of cases were associated with person-to-person outbreaks.
- Multiple modes of transmission were implicated in 9.7% of outbreaks.
- The proportions of outbreaks caused by each mode of transmission are similar to the proportions seen in 2002, however the proportion of cases attributable to outbreaks affected by person-to-person, environmental and unknown methods of transmission have all increased since 2002.

Sources

- Of the 144 outbreaks associated with the foodborne mode of transmission, 114 had source vehicles identified (79.2%).
- The proportion of foodborne outbreaks with no source identified has decreased significantly since 2002.
- Chicken was implicated in a similar proportion of foodborne outbreaks as in 2002, but caused 1.6 times fewer cases.
- Meat (includes: beef, pork and lamb) was implicated in a similar proportion of foodborne outbreaks as in 2002, but the proportion of cases associated with these outbreaks has increased since 2002.

Recognition, Reporting and Control of Outbreaks

- The date of onset of illness was recorded for 298 outbreaks (87.6%), a decrease since 2002 (95.8%).
- 94.6% of outbreaks (282) were reported within one calendar month (30 days), an increase since 2002 (85.4%).
- There was an increase in reporting delay since 2002 only in community wide person-to-person transmission outbreaks (12.5 days in 2002, and 25.5 days in 2003).
- The proportion of outbreaks controlled at the source increased from 2002 (60.7%) to 96.6% (228).
- Control via health education and advice increased (73.2% in 2003 compared with 60.7% in 2002 but control via the modifications of procedures decreased (41.2% compared with 54.2%).

DATA AND SURVEILLANCE SYSTEMS

POPULATION DEMOGRAPHICS

It is estimated that in December 2003, there were 4 038 900 people in New Zealand *(1)*. This is an estimate based on the census usually resident population adjusted for residents missed and for those overseas on census night. Due to the changeable nature of this estimate, the population figure used throughout this publication was 3 737 253, which was the total number of people in New Zealand on census night in 2001. 76% of the population reside in the North Island, and the remaining 24% in the South Island. 1 822 920 (48.7%) are male, while 1 914 333 (51.2%) are female. 69.8% of people are of European nationality, 14.1% Maori, 6.1% Asian, 5.4% Pacific Islanders and 4.0% did not specify their ethnicity and 0.6% were of other ethnicity.

DATA QUALITY WITHIN THE SURVEILLANCE SYSTEM

Outbreak surveillance provides a method for systematically recording outbreak characteristics and investigation. Outbreak summaries are recorded on EpiSurv, and can be linked to individual cases via an outbreak reference number.

The outbreak surveillance system in EpiSurv has been operational since 1997, though outbreak surveillance began in July 1996. It should however be noted that outbreaks involving unusual pathogens or large numbers of cases are more likely to be reported, which will bias the information towards large outbreaks of unusual diseases. Notifiable diseases are more easily recognised by Public Health Services, and will be reported more readily than outbreaks caused by non-notifiable diseases.

Data recording differences between outbreaks are difficult to resolve, as some fields of the outbreak report form are never filled in. The utility of the current systems for national surveillance purposes will be progressively re-examined in 2004 and 2005. A result of the worldwide pandemic of SARS in early 2003 is that additional functionality of the surveillance system is desirable for such situations.

METHODS

OUTBREAK DEFINITION

For the purposes of this report, an outbreak is defined as: two or more linked cases thought to be linked by a common exposure except when this common source is well established as a national epidemic and reporting it as a discrete event is no longer appropriate.

However, if cases are more likely to have resulted from secondary transmission within a household, this is not an outbreak. Nor is it an outbreak wherein a single secondary case, or a small number of cases, has resulted from person-to-person transmission from a primary case.

DATA USED FOR THIS REPORT

Outbreaks identified in the community, by 12 district public health services (PHSs) are assessed at the PHS level. Once confirmed as an outbreak, the PHSs record data about the outbreak on a standardised Outbreak Report Form within their district electronic surveillance databases (EpiSurv). PHSs are encouraged to enter preliminary data as an interim report as soon as the outbreak is confirmed, then complete the remainder of the Outbreak Report Form when final data is available. On a weekly basis, this is downloaded from the district database and sent to ESR. It is collected within the national database on behalf of the Ministry of Health. The national database is supplemented by data on outbreaks recorded in the foodborne disease database, and by the ESR enteric reference and virology laboratories. PHS staff are asked to complete an Outbreak Report Form on outbreaks reported from these laboratory sources if appropriate.

The data in this report contains all outbreaks that were reported on by the 17th of February 2004. Toward the end of the calendar year, some outbreaks have a report date that falls in the 2004 calendar year. If this is the case, then the PHS's were advised to ensure that the first onset date (or date of onset of symptoms for the index case of the outbreak) was within the 2003 calendar year, and thus the outbreak would be included for analysis.

There were a total of 369 outbreaks that occurred or began between 1st January 2003 and 31st December 2003, but only 340 of those were finalized. Due to the changeable and incomplete nature of the data contained in interim reports, the 29 outbreaks for which final reports were not available were excluded from the analysis.

RESULTS

CHARACTERISTICS OF OUTBREAKS

Incidence of outbreaks in New Zealand

Three hundred and sixty nine outbreaks were reported to ESR in 2003, a crude national rate of 9.9 outbreaks per 100 000 population (Table 1). Of the 369 outbreaks reported in 2002, 340 (92.1%) were recorded as 'final reports'. This proportion is less than in 2002 (94.6%). Due to the changeable and incomplete nature of the data contained in interim reports, the 29 outbreaks for which final reports were not available were excluded from the analysis.

Outbreaks reported during 2003 involved 2789 confirmed and probable cases, a rate of 74.6 cases per 100 000 population at an average of 8.2 cases per outbreak.

The number of outbreaks in 2003 was more than the number of outbreaks in 2002 (337 in 2002), as was the number of outbreak-associated cases (2890 in 2002).

Table 1. Characteristics of Outbreaks in New Zealand in 2003

Characteristics	Total
Number of Outbreaks	340
Number of Cases	
Confirmed	756
Probable	2033
Total	2789[a]
Number of Exposed Persons[b]	9199
Number of Hospitalized Persons[c]	89
Number of Deaths[d]	4

a There is a disparity of 17 cases between the total number of cases recorded versus calculated. This is due to errors in data entry for five final reports. The reported total is 2806.

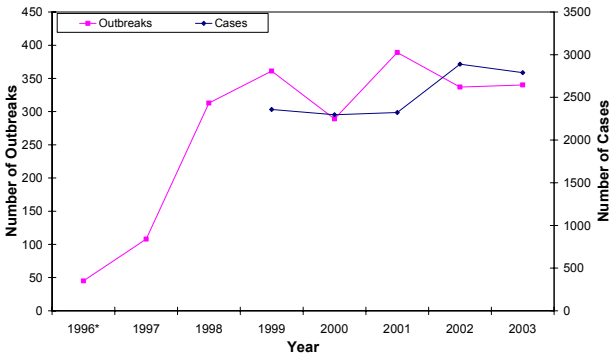
b This was recorded for 248 outbreaks (73%)

c This was recorded for 312 outbreaks (92%)

d This was recorded for 311 outbreaks (91%)

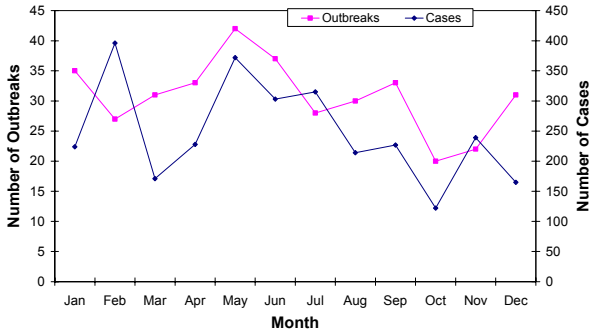
Since 1997, the number of outbreaks and the number of cases involved in outbreaks has risen (Figure 1). The number of outbreaks has increased, while the number of cases has decreased since 2002.

Figure 1. Number of Outbreaks and Cases by year, 1996 - 2003



Reporting of outbreaks was distributed normally throughout the year, with a high in May (42 outbreaks, 372 cases), and low in October (20 outbreaks, 122 cases). The most cases (396) were reported during February when the average number of cases per outbreak was 15.

Figure 2. Number of Outbreaks and Cases by month, 2003



TYPES OF OUTBREAKS

Table 2. Outbreak Types seen in 2003

Type of Outbreak	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Common Source	172	50.6	877	31.4
Attended Common Event	144	42.4	595	21.3
Common Source dispersed in community	11	3.2	130	4.7
Common Source in specific place	17	5.0	152	5.4
Community-wide person to person transmission	10	2.9	106	3.8
Transmission within defined setting	125	36.7	1721	61.3
Institutional	58	17.0	1516	54.0
Household	67	19.7	205	7.3
Other	7	2.1	21	0.7
Unknown	26	7.6	64	2.3
TOTAL	**340**		**2789**	

Common Source Outbreaks

One hundred and 72 outbreaks (50.6%) were reported as from a common source. Of these, 144 (83.7%) were identified with a common event (e.g. conference etc.), 11 (6.3%) a common source in the community (e.g. dissemination of a contaminated food product during manufacturing) and 17 (9.8%) with transmission over a protracted period, but from a specific place (e.g. contamination of recreational water). Combined, these outbreaks comprised 877 cases (31.4% of total).

Community Wide Outbreaks

Community wide outbreaks, where transmission occurred through person-to-person contact accounted for ten outbreaks (2.9%). There were 106 cases involved with community-wide outbreaks, an average of 10.6 cases per outbreak. This is a considerable increase since 2002 wherein there were three outbreaks involving 28 cases,

however the average number of cases per outbreak is similar (9.8 in 2002).

Outbreaks in Defined Settings

One hundred and twenty five outbreaks (36.7%) were reported as being due to transmission within a defined setting. Of these, 58 (46.4%) were institutional outbreaks (e.g. rest homes) involving 1516 cases (54.0% of all outbreak cases in 2003) at an average of 12.1 cases per outbreak.

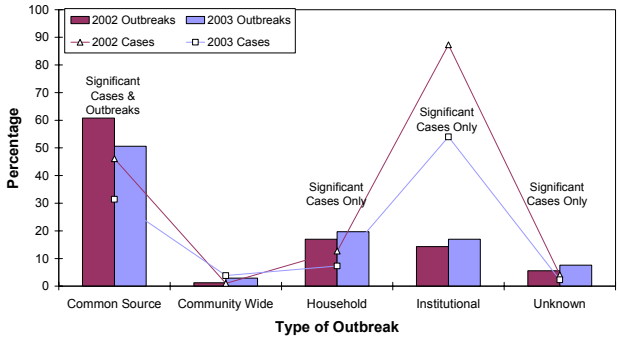
Sixty-seven defined setting outbreaks (53.6%) occurred in households. There were 205 associated cases, an average of 1.6 cases per outbreak.

2002 and 2001 Comparisons

The proportion of common source outbreaks has decreased by 10% since 2002, but the proportions of all other types of outbreaks remains unchanged.

The proportion of cases involved in common source, household, institutional and unknown types of outbreaks have decreased since 2002. There was no significant increase in proportion of outbreaks nor in the proportion of cases in 2003 when compared to 2002. These results are summarised in Figure 3.

Figure 3. Comparison of outbreaks and cases by outbreak type, 2003 v 2002



Outbreaks and Cases by Health District

During 2003, outbreaks were reported from all health districts except Ruapehu (Table 3).

The Auckland region (incorporating North West, Central and South Auckland districts) had 198 outbreaks (58.2 %) and 1020 cases (33.5%). Canterbury had the second highest number of outbreaks (34 outbreaks, 10%) involving 719 cases (25.8%) followed by Wellington and Otago (13 outbreaks, 3.8%) involving 190 and 102 cases, respectively (6.8% and 3.7%).

In 2003, the proportion of cases in Tauranga, Taranaki, Hawke's Bay, Wellington and Nelson-Marlborough Health Districts were significantly reduced from those seen in 2002. There were no significant increases in proportion of cases, and no differences seen when comparing proportions of outbreaks occurring in each health district between 2003 and 2002. This can be seen visually in Figure 4.

In 2003, Tauranga and Rotorua have significantly lower numbers of cases per outbreak than the national average, and Waikato, Gisborne, Hutt, Nelson-Marlborough and Canterbury have significantly higher numbers of cases per outbreak than the national average. This pattern has changed since 2002, where the Eastern Bay of Plenty, Rotorua, Taupo and the West Coast all had significantly lower numbers of cases per outbreak than the national average. Hawke's Bay, Wellington, Nelson-Marlborough and Canterbury had significantly higher numbers of cases per outbreak than the national average.

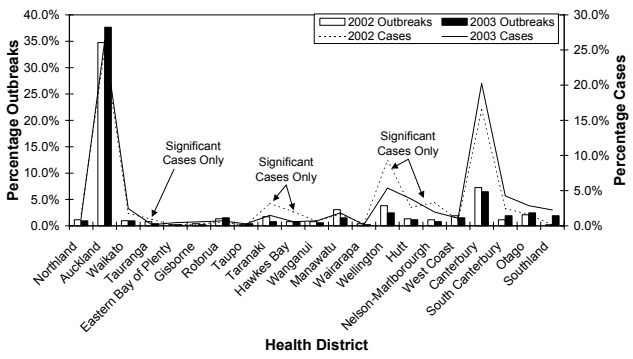
Table 3. Outbreaks and Associated Cases by Health District

Health District[a]	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Auckland[b]	198	58.3	935	33.6
Canterbury	34	10.0	719	25.8
Eastern Bay of Plenty	1	0.3	16	0.6
Gisborne	1	0.3	20	0.7
Hawke's Bay	4	1.2	21	0.8
Hutt	6	1.8	136	4.9
Manawatu	8	2.4	65	2.3
Nelson-Marlborough	4	1.2	69	2.4
Northland	5	1.5	37	1.3
Otago	13	3.8	102	3.7
Rotorua	8	2.4	25	0.9
South Canterbury	10	2.9	151	5.4
Southland	10	2.9	80	2.9
Taranaki	4	1.2	53	1.9
Taupo	2	0.6	9	0.3
Tauranga	2	0.6	5	0.2
Waikato	5	1.5	87	3.1
Wairarapa	1	0.3	5	0.2
Wanganui	3	0.9	25	0.9
Wellington	13	3.8	190	6.8
West Coast	8	2.4	39	1.4
NEW ZEALAND	**340**		**2789**	

[a] Where no health district was indicated on the reporting form, health district was assigned according to the PHU where the outbreak was entered into the surveillance system (20 outbreaks, 303 cases)

[b] Includes North West Auckland, Central Auckland and South Auckland Health Districts

Figure 4. Comparison of outbreaks and cases by health district, 2003 v 2002



CAUSAL PATHOGENS AND TOXINS

The causal agent(s) of outbreaks were identified in 223 outbreaks (65.6%) comprising 1994 cases (71.5%), Table 4 shows outbreaks and cases by causal organism. The proportion of cases involved in outbreaks caused by unidentified pathogens has increased since 2002 (from 13.3% to 28.5%).

There was no change in the proportion of outbreaks or cases caused by enteric bacteria, enteric viruses, enteric protozoa, respiratory diseases, toxins, other viruses or other diseases. Pathogens within these groups are as follows:

- Enteric bacteria: *Campylobacter* spp., *Salmonella* spp., *Shigella* spp., *E. coli*, *Yersinia enterocolitica*
- Enteric viruses: Hepatitis A, norovirus, rotavirus
- Enteric protozoa: *Cryptosporidium* spp., *Giardia* spp.
- Respiratory diseases: *M. tuberculosis*, Influenza virus, *B. pertussis*
- Toxins: *B. cereus*, *S. aureus*, Histamine, Anti-cholinergic, *C. perfringens*
- Other viruses: Measles, Rubella, Morbillivirus
- Other diseases: Lead absorption, *Legionella* spp., *Leptospira* spp., *N. meningitides*

There were outbreaks of Lead absorption, Measles and Morbillivirus in 2003 that were not pathogens causing outbreaks in 2002. Additionally, in 2003, there were no outbreaks of solanine intoxification or Hepatitis C as there were in 2002.

Table 4. Outbreaks and Associated Cases by Agent of Disease

Pathogen	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases	Average Number of Cases per Outbreak
Unidentified	117	34.4	795	28.5	6.8
Anti-cholinergic poisoning	1	0.3	4	0.1	4.0
Bacillus cereus	6	1.8	25	0.9	4.2
Bordetella pertussis	6	1.8	16	0.5	2.6
Campylobacter spp.	42	12.4	140	5.1	3.3
Clostridium perfringens	7	2.1	19	0.7	2.7
Cryptosporidium parvum	7	2.1	102	3.7	14.6
Escherichia coli	2	0.6	5	0.2	2.5
Giardia spp.	27	7.9	89	3.2	3.3
Hepatitis A virus	4	1.2	14	0.5	3.5
Histamine	1	0.3	13	0.5	13.0
Influenza virus	1	0.3	35	1.3	35.0
Lead Absorption	3	0.9	10	0.4	3.3
Legionella spp.	1	0.3	3	0.1	3.0
Leptospira spp.	1	0.3	4	0.1	4.0
Measles	2	0.6	23	0.8	11.5
Morbillivirus	1	0.3	2	0.1	2.0
Mycobacterium tuberculosis	1	0.3	10	0.4	10.0
Neisseria meningitidis	2	0.6	4	0.1	2.0
Norovirus	73	21.5	1368	49.0	18.7
Rotavirus	2	0.6	13	0.5	6.5
Rubella	1	0.3	2	0.1	2.0
Salmonella spp.	19	5.6	49	1.8	2.6
Salmonella paratyphi	1	0.3	2	0.1	2.0
Salmonella typhimurium	4	1.2	10	0.4	2.5
Shigella spp.	3	0.9	15	0.5	5.0
Staphylococcus aureus	2	0.6	11	0.4	5.5
VTEC/STEC	2	0.6	4	0.1	2.0
Yersinia enterocolitica	1	0.3	2	0.1	2.0
TOTAL	**340**		**2789**		

Causative agents were not laboratory confirmed in 117 outbreaks (34.4%) consisting of 795 cases (28.5%).

Of the outbreaks caused by unknown organisms/toxins, 116 (comprising 779 cases) were outbreaks of gastroenteritis. Seven of these may have been caused by norovirus (25 cases), nine may have been caused by toxins (*B. cereus*, *C. perfringens*, *S. aureus*, Histamine) involving 56 cases, and the remaining 95 gastroenteritis outbreaks (698 cases) were caused by unidentified pathogens.

The five non-gastroenteritis outbreaks involved between two and five people each. One outbreak was laboratory-confirmed to have been caused by *Legionella longbeachae* (two cases) and therefore was misclassified as having been caused by an unidentified pathogen. Two outbreaks involved fish, and were possibly histamine poisoning (7 cases). One of the outbreaks was from consumption of tank water that did not comply with NZ drinking water standards (four cases), and there is no information on the last outbreak (three cases).

Pathogens Causing Types of Outbreaks

The frequency of toxins or pathogenic agents implicated in specific outbreak types is shown in Table 5.

Of the outbreaks where pathogenic agents were identified, norovirus and *Campylobacter* spp. were most often isolated from 'common event' outbreaks, though more than twice as many cases were involved in the norovirus outbreaks.

Campylobacter spp., *Salmonella* spp. and *B. cereus* caused the same number (two) of outbreaks that were caused by a common source dispersed in the community. The single outbreak of *Cryptosporidium parvum* involved half of the cases that were associated with this type of outbreak.

Campylobacter spp., *C. parvum* and norovirus caused an equal number of outbreaks of a common source from a specific place (three). With the norovirus outbreaks involving under a third of all outbreaks of this type.

Giardia spp. dominated community outbreaks (4 outbreaks, 19 cases), seemingly spread by person-to-person transmission and transmission from the environment.

Giardia spp. was also the cause of a quarter of the household outbreaks and associated cases (19 outbreaks, 53 cases).

Norovirus caused two thirds of all institutional outbreaks (40) and almost three quarters of the cases associated with institutional outbreaks (1118). One large outbreak in a

Canterbury rest home during winter involved 100 cases, transmitted by person-to-person contact.

There were seven outbreaks of 'other' type, attributed to a variety of pathogens: *Bordetella pertussis*, *Campylobacter* spp., *Giardia* spp., Hepatitis A, Measles, norovirus and Rubella. These caused between 2 and five cases each.

A third of the outbreaks of 'unknown' type were caused by norovirus (7 outbreaks, 20 cases), and this is the type of outbreak with the most data quality issues.

Table 5. Number of outbreaks and cases by outbreak type

	Common Event		Common Source Dispersed in Community		Common Source in Specific Place		Community Wide – person to person		Household		Institutional		Other Outbreak Type		Unknown		Total Outbreaks	Total Cases
Anti-cholinergic poisoning	1	4															1	4
Bacillus cereus	4	12	2	13													6	25
Bordetella pertussis									3	4	1	3	1	5			5	12
Campylobacter spp.	18	66	2	5	3	10	1	6	9	24	2	14	1	2	1	2	37	129
Campylobacter jejuni	3	6							2	5							5	11
Clostridium perfringens	7	19															7	19
Cryptosporidium parvum			1	67	3	26			3	9							7	102
Escherichia coli									1	3					1	2	2	5
Giardia	1	3					4	19	19	53	2	12	1	2			27	89
Hepatitis A virus					1	5			2	5			1	4			4	14
Histamine			1	13													1	13
Influenza virus											1	35					1	35
Lead Absorption					2	6			1	4							3	10
Legionella	1	3															1	3
Leptospira											1	4					1	4
Measles											1	20	1	3			2	23
Morbillivirus							1	2									1	2
Mycobacterium tuberculosis									1	10							1	10
Neisseria meningitidis											2	4					2	4
Norovirus	16	149			3	47	1	10	5	21	40	1118	1	3	7	20	73	1368
Pertussis							1	4									1	4
Rotavirus											2	13					2	13
Rubella													1	2			1	2
Salmonella spp.	5	14	2	6	1	2			9	23					2	4	17	43
Salmonella paratyphi									1	2							1	2
Salmonella typhimurium	1	2			1	3			1	3	2					1	5	9
Shigella	1	3							2	12							3	15
Staphylococcus aureus	2	11															2	11
Unidentified	83	301	3	26	3	53	2	65	6	23	6	293			14	34	117	795
VTEC/STEC									2	4							2	4
Yersinia enterocolitica	1	2															1	2
Total Outbreaks	**144**		**11**		**17**		**10**		**67**		**58**		**7**		**26**		**340**	
Total Cases		**595**		**130**		**152**		**106**		**205**		**1516**		**21**		**64**		**2789**

OUTCOME OF OUTBREAKS

Thirty-three outbreaks in 2003 resulted in the hospitalisation of 89 cases. These proportions are not significantly different from those seen in 2002.

Four deaths occurred in three outbreaks in 2003. One death was associated with a Legionella outbreak in an Auckland spa display involving three cases (this outbreak occurred in December 2002, but was not included in the 2002 annual report). During June, one death occurred in an outbreak of *Neisseria meningitidis* at the Waiouru Army camp involving two 18-year-old cases. Two deaths were associated with a norovirus outbreak involving 28 people (age range 60-100) in Canterbury during September, occurring in an acute care hospital ward.

In 2003, outbreaks caused by norovirus were responsible for the bulk of outbreak related hospitalisations (37.8%), with outbreaks caused by unidentified pathogens accounting for 18.3% of hospitalisations (Table 6). All cases involved in outbreaks of Legionellosis and Morbillivirus were hospitalised.

Table 6. Number and Proportion of Hospitalised Cases per Pathogen

Pathogen	Number of Cases (n=2457)	Cases hospitalised (n=82)	Percent of cases Hospitalised	Percent of Hospitalisations
(unidentified)	795	15	1.9%	18.3%
Anti-cholinergic poisoning	4	1	25.0%	1.2%
Bordetella pertussis	12	1	8.3%	1.2%
Campylobacter	140	4	2.9%	4.9%
Hepatitis A virus	14	3	21.4%	3.7%
Influenza virus	35	4	11.4%	4.9%
Legionella	3	3	100.0%	3.7%
Leptospira	4	1	25.0%	1.2%
Measles	23	1	4.3%	1.2%
Morbillivirus	2	2	100.0%	2.4%
Neisseria meningitidis	4	2	50.0%	2.4%
Norovirus	1336	31	2.3%	37.8%
Rotavirus	13	9	69.2%	11.0%
Salmonella	61	1	1.6%	1.2%
Staphylococcus aureus	11	4	36.4%	4.9%

OUTBREAK SETTING

In 2003 the proportions of outbreaks occurring in various settings were the same as those proportions seen in 2002 (Table 7). However, the proportion of cases associated with outbreaks occurring in restaurants/cafés has increased since 2002 (11.7% compared with 7.7%). There has also been an increase in the number of cases associated with outbreaks occurring in rest/retirement homes from 19.8% in 2002 to 27.7% in 2003.

Table 7. The Setting of Outbreaks in 2003

Outbreak Setting	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Commercial Food Operators	**130**	**39.5**	**582**	**19.9**
Restaurant or café	76	23.1	342	11.7
Takeaway	31	9.4	95	3.3
Special event/catered function	2	0.6	31	1.1
Hotel	4	1.2	56	1.9
Supermarket/deli	10	3.0	33	1.1
Other food outlet[a]	7	2.1	25	0.9
Institutions	**66**	**20.1**	**1381**	**47.3**
School	7	2.1	64	2.2
Hostel	4	1.2	20	0.7
Hospital Acute	15	4.6	299	10.2
Hospital Continuing	4	1.2	124	4.2
Rest/Retirement Home	27	8.2	810	27.7
Tangi	1	0.3	7	0.2
Camp	3	0.9	20	0.7
Childcare centre/Pre-school	5	1.5	37	1.3
Community Groups	**3**	**0.9**	**83**	**2.8**
Swim/Spa pool	2	0.6	73	2.5
Community	1	0.3	10	0.3
Workplace	**8**	**2.4**	**63**	**2.2**
Workplace	3	0.9	35	1.2
Farm	4	1.2	24	0.8
Abattoir	1	0.3	4	0.1
Household (home)	**92**	**28.0**	**352**	**12.0**
Other	**30**	**9.1**	**461**	**15.8**
Other Setting	30	9.1	461	15.8
TOTAL	**329**		**2922**	

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

TRANSMISSION

In 2003, the predominant method of transmission involved in most outbreaks was foodborne, though person-to-person outbreaks involved more cases (Table 8). The proportions of outbreaks caused by each mode of transmission are similar to proportions seen in 2002, however the proportion of cases attributable to outbreaks affected by person-to-person, environmental and unknown methods of transmission have all increased (from 37.2%, 0.3% and 9.9% respectively).

Table 8. Principal Modes of Transmission for Outbreaks in 2003

Principal Mode of Transmission	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Foodborne	125	36.8	467	16.7
Waterborne	7	2.1	36	1.3
Person to Person	102	30.0	1391	49.9
Environmental	8	2.4	94	3.4
Zoonotic	4	1.2	11	0.4
Unknown	56	16.5	484	17.4

Not Specified	5	1.5	11	0.4
Multiple Modes	33	9.7	295	10.6
TOTAL	**340**		**2789**	

Multiple modes of transmission were implicated in 9.7% of all outbreaks. This often occurs because the faecal-oral route of transmission allows pathogens first to spread from food to exposed susceptible cases and then from person-to-person. Determining the major method of transmission of an outbreak is often impossible. However, in most of these outbreaks, two modes of transmission were apparent (Table 9).

Table 9. Multiple Modes of Transmission of Outbreaks and Cases in 2003

Multiple Modes of Transmission	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Four Modes	1	3.0	6	2.0
Three Modes	8	24.2	65	22.0
Two Modes	24	72.7	224	75.9
TOTAL	**33**		**295**	

In total, 144 outbreaks, involving 638 cases were attributed to foodborne spread. These figures include outbreaks where multiple modes of transmission were suspected (Table 10). Only the proportion of outbreaks and cases attributed to 'other' forms of spread have increased since 2003, whereas the proportions of all other modes of transmission remain the same.

Table 10. Modes of Transmission including multiple modes

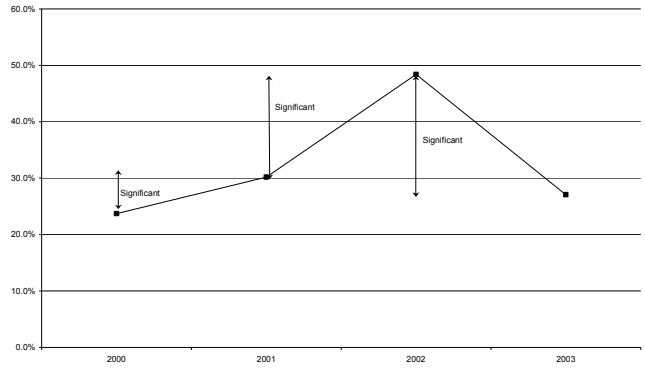
Modes of Transmission (all inclusive)	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Foodborne spread	144	38.1	638	20.3
Waterborne spread	18	4.8	81	2.6
Person-person spread	130	34.4	1666	52.9
Environmental spread	19	5.0	244	7.7
Zoonotic spread	5	1.3	13	0.4
Other forms of spread	62	16.4	508	16.1
TOTAL	**378**		**3150**	

PATHOGENS, FOODS AND FACTORS CONTRIBUTING TO FOODBORNE OUTBREAKS

Specific Foods Implicated in Foodborne Outbreaks

Of the 144 outbreaks associated with the foodborne mode of transmission, 114 had source vehicles identified (79.2%). The proportion of foodborne outbreaks with no source identified has decreased significantly since 2002 reports.

Figure 5. Percentage of Foodborne Outbreaks with Unidentified Sources



Chicken was involved in 32 outbreaks in 2003 (87 cases), in comparison, only 22 were identified in 2002 (210 cases). This indicates that of the foodborne outbreaks for which a source was identified, chicken was implicated in a similar proportion of outbreaks as in 2002, but caused 1.6 times fewer cases.

Fish (including seafood, shellfish) was implicated as the source in a similar proportion of outbreaks and cases as in 2002. The proportion of outbreaks where meat (includes: beef, pork and lamb) was implicated as a source in 2003 is similar to that seen in 2002, however the proportion of cases associated with these outbreaks has increased since 2002.

Table 11. Food Implicated in Foodborne Outbreaks

Source of Infection	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Beef	2	1.4	12	1.9
Chicken	23	16.0	63	9.9
Chicken Burger	2	1.4	4	0.6
Chicken Liver	2	1.4	8	1.3
Chicken OR Untreated Water	1	0.7	3	0.5
Chicken Pie	2	1.4	4	0.6
Chicken Pizza	2	1.4	5	0.8
Contaminated Fruit	1	0.7	12	1.9
Dairy	2	1.4	5	0.8
Eggs	2	1.4	5	0.8
Falafel[a]	1	0.7	2	0.3
Fish, Seafood, Shellfish	16	11.1	47	7.3
Lamb	2	1.4	4	0.6
Mayonnaise	1	0.7	3	0.5
Meat[b]	10	6.9	43	6.7
Meat OR Untreated Water	1	0.7	2	0.3
Mixture[c]	22	15.3	77	12.1
Pork	6	4.2	19	3.0
Rice	2	1.4	13	2.0
Tahini	2	1.4	6	0.9
Unknown	39	27.1	288	45.1
Vegetables	2	1.4	8	1.3
Water	1	0.7	5	0.8
TOTAL	**144**		**638**	

[a] Served as a kebab – may have included imported Tahini

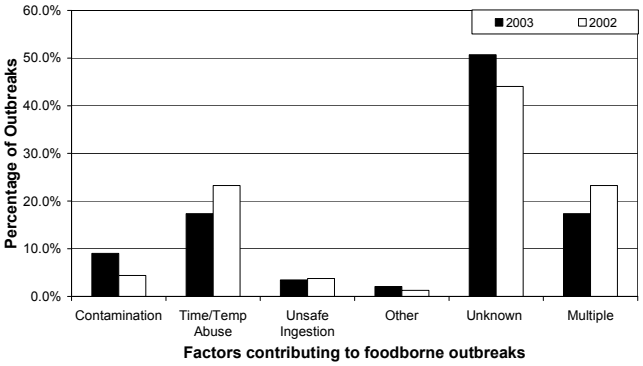
[b] Infers a mixture of meat products e.g. beef, lamb, pork, chicken etc.

[c] Infers a mixture of products e.g. egg, pork, lamb, chicken, vegetables etc.

Contributing Factors to Foodborne Outbreaks

There were no significant differences in the proportion of factors that were identified to have influenced foodborne outbreaks in 2003 from those in 2002. Unknown factors remain the single predominant 'factor', although this may be due to default choices when investigating the outbreak and entering the data. Time and temperature abuse, and multiple factors influence a similar proportion of foodborne outbreaks.

Figure 6. Proportion of Foodborne Outbreaks with Contributory Factors



PATHOGENS AND FACTORS CONTRIBUTING TO WATERBORNE OUTBREAKS

There were seven waterborne *Campylobacter* spp. outbreaks (26 cases), four of which had no factors implicated in transmission, two of which were related to contamination of source water, and one was linked to both contaminated source water and treatment process failure.

Two waterborne *Giardia* spp. outbreaks (9 cases) had no factors contributing to them. Neither did the one waterborne *Bacillus cereus* outbreak (6 cases), the one waterborne *Cryptosporidium* spp. outbreak (4 cases), the one waterborne VTEC/STEC outbreak (2 cases) or the one waterborne *Salmonella* spp. outbreak (2 cases).

There was a waterborne outbreak with an unidentified pathogen (6 cases), and this had no contributing factors either.

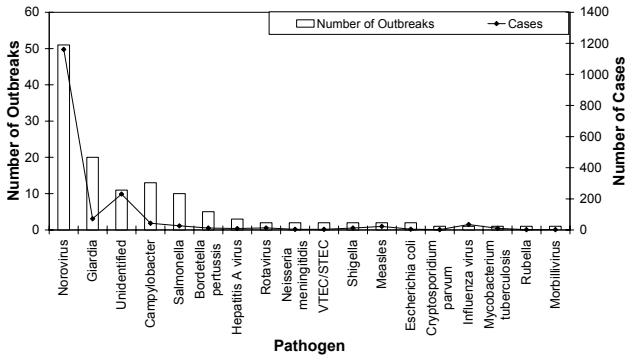
PATHOGENS AND FACTORS CONTRIBUTING TO PERSON-TO-PERSON OUTBREAKS

Four person-to-person outbreaks (59 cases) reported no contributing factors, one of which was an outbreak with an unidentified pathogen, another was *Giardia* spp. (3 cases), and the remaining two were norovirus outbreaks (56 cases).

One hundred and two person-to-person outbreaks (1388 cases) involved exposure to infected people, though this same factor contributed to a total of 123 outbreaks (1590 cases).

The remaining three person-to-person outbreaks (17 cases) were contributed to by poor hygiene of cases and unknown factors.

Figure 7. Pathogens involved in Person to Person Outbreaks in 2003



PATHOGENS AND FACTORS CONTRIBUTING TO ENVIRONMENTAL OUTBREAKS

Two environmental *Cryptosporidium* spp. outbreaks (73 cases) were associated with no environmental risk factors.

The most common risk factor for 15 environmental outbreaks (163 cases) was exposure to a contaminated environment. These outbreaks include seven norovirus outbreaks (135 cases), three lead absorption outbreaks (10 cases), 2 *Giardia* spp. outbreaks (9 cases), and one outbreak each of *Campylobacter* spp. (4 cases), *Legionella* spp. (3 cases) and one outbreak with an unidentified pathogen (2 cases).

PATHOGENS LINKED TO ZOONOTIC OUTBREAKS

Campylobacter spp. caused two zoonotic outbreaks (5 cases), and one zoonotic outbreak was caused by each of *Legionella* spp. (4 cases), *Giardia* spp. (2 cases) and *Salmonella* spp. (2 cases).

OUTBREAK RECOGNITION, INVESTIGATION AND CONTROL

Reporting Delays

The date that outbreaks were reported on EpiSurv is defined as the report date upon which the Public Health Service (PHS) was aware of the outbreak. Some variability in time taken to report can arise from the time for PHS staff to report to EpiSurv, rather than the time from general practitioners report to the PHS.

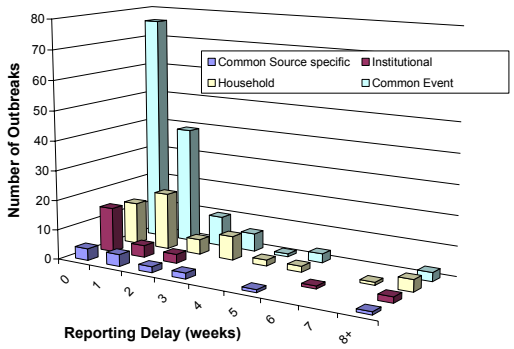
The date of onset of illness was recorded for 298 outbreaks (87.6%), which is a decrease in the proportion of outbreaks for which this data was recorded since 2002 (95.8%).

However, of those outbreaks, 94.6% (282) were reported within one calendar month (30 days), and this proportion has increased since 2002 (85.4%).

A further 8.4% (25) were recorded on EpiSurv between one and three months of the date of onset. Ten outbreaks (3.3%) were reported between three and six months of the date of onset, and three more (1.0%) were between six months to a year following initial date of onset. One outbreak of Legionellosis occurred in 2002 and was reported in 2003. These delays are of similar proportion to those seen in 2002.

Different types of outbreaks caused different delays in reporting. Figure 8 shows that the majority of common event outbreaks were reported in the first three weeks following the onset of illness. Institutional outbreaks mimic this trend, however, household outbreaks are reported up to 6 weeks after onset of illness.

Figure 8. Reporting Delays for Outbreak Types



When comparing the average delay period (in days) of different outbreak types, the median is the most useful measurement of central tendency for skewed distributions.

Table 12 displays the mean and the median number of days delay for reporting. Most outbreaks were reported within five days of onset of illness, apart from those related to a common source dispersed throughout the community, which often took up to two weeks to be reported.

The reporting delay for community wide person-to-person transmission outbreaks was of 12.5 days in 2002, and 25.5 days in 2003. This is the only type of outbreak in which there was an increase in reporting delay since 2002.

Table 12. Average Reporting Delay for Different Types of Outbreaks

Type of Outbreak	Number	Cases	Mean Delay (days)	Median Delay (days)	Skewed
Common Source	**166**	**816**	**4.0**	**3.0**	**NO**
Attended Common Event	140	540	8.8	3.0	YES
Common Source dispersed in Community	11	130	10.8	10.0	NO
Common Source in Specific Place	15	146	-7.7[a]	6.0	YES
Community-wide person to person transmission	**10**	**106**	**34.1**	**25.5**	**YES**
Transmission within defined setting	**115**	**1685**	**21.7**	**11.0**	**YES**
Institutional	57	1513	17.9	7.0	YES
Household	58	172	25.4	14.5	YES
Other	**7**	**21**	**38.6**	**9.0**	**NO**
Unknown	**25**	**64**	**15.6**	**2.0**	**YES**
TOTAL	**298**	**2628**	**17.9**	**5.0**	**YES**

[a] This may be due to an error in data entry

Means of Recognition and Linkage between Cases

One hundred and ninety one outbreaks (1689 cases) were recognised via multiple means, and had more than one linkage method between cases. A further 149 outbreaks (involving 1100 cases) were recognised by a single set of circumstances. Outbreaks were most often identified by cases that have had contact with other cases, being linked to a common source (food, water or an environmental site) or having attended a common event.

Table 13. Recognition of Outbreaks

Means of Recognition	Number of Outbreaks	Percent of Outbreaks	Number of Cases	Percent of Cases
Increase in Incidence	8	2.4	153	5.5
Attended Common Event	26	7.6	190	6.8
Cases linked to Common Source	41	12.1	233	8.4
Person to Person Contact	63	18.5	416	14.9
Common Organism	5	1.5	72	2.6
Multiple Means	191	56.2	1689	60.6
Other Means	4	1.2	33	1.2
No Means of Recognition	2	0.6	3	0.1
TOTAL	**340**		**2789**	

Control Measures

Specific action was taken to control 236 outbreaks (69.4%) during 2003, while 24.4% of outbreaks (83) had no control measures reported. Two hundred and eighteen outbreaks were controlled by more than one control measure. The control measures that were applied are described in Table 14.

Table 14. Control Measures Taken for Outbreaks in 2003

Control Measures Taken[a]	Number of Outbreaks	
Controlled Outbreaks	**236**	
Controlled at source	228	
Closed		13
Modified Procedures		94
Cleaned		52
Removed		5
Treatment		15
Isolation		46
Health Education & Advice		167
Health Warning		21
Vector Control	5	
Vector Treated		3
Vector Removed		3
Contacts & Potential Contacts	31	
Chemoprophylaxis		4
Vaccination		3
Health Education and Advice		28
Not Controlled	**83**	
Unknown	**21**	
TOTAL	**340**	

[a] More than one control measure was taken for at least 90 outbreaks

The proportion of outbreaks that were controlled at the source has increased since 2002 (60.7%) to 96.6% (228), and of those control measures taken at the source, the proportion of outbreaks controlled via health education and advice has also increased (73.2% in 2003 compared with 60.7% in 2002. However, control via the modifications of procedures has decreased (41.2% compared with 54.2%) in the same period 2002.

REFERENCES

1. **Anon.** National Population Estimates (December 2003 quarter) - Hot off the Press. 2003. http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/0/4c2567ef00247c6acc256e36007c4914/$FILE/ATTQ60BZ/alltabls.xls **Accessed: Mar. 2004**