



**OzFoodNet — Enhancing Foodborne Disease
Surveillance Across Australia.**

NSW 2009 OzFoodNet Annual Report

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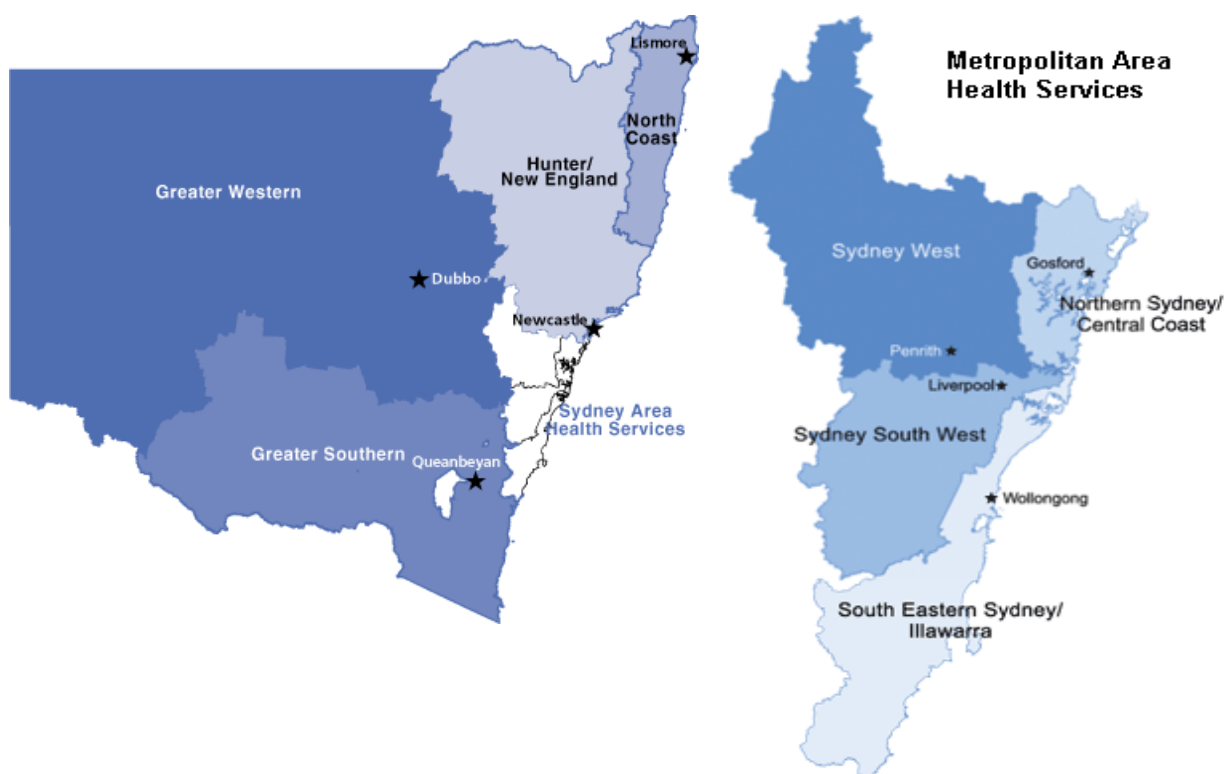
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3. Introduction

This report describes enteric diseases and conditions that are notifiable in NSW. The data in this report are derived from disease surveillance and outbreak investigation activities undertaken by staff from NSW public health units, Communicable Diseases Branch (CDB) of the NSW Department of Health (NSW DOH), OzFoodNet (OFN) staff and the NSW Food Authority.

This report describes diseases notified in NSW by the geographical boundaries of the eight Area Health Services in NSW (Figure 1).

Figure 1: NSW Area Health Service boundaries.



There are two OzFoodNet (OFN) sites in NSW - one based in Sydney at the Communicable Diseases Branch of NSW Department of Health and the other in Newcastle at Hunter New England Population Health.

The Sydney site's primary role is to coordinate, monitor and report state-wide enteric disease surveillance, investigate state-wide outbreaks and to contribute to enteric disease related policy development in NSW. The team at this site consists of an OFN epidemiologist and an OFN surveillance officer.

The Newcastle site's primary role is to investigate outbreaks that occur within the Hunter New England area, assist with the investigation of state-wide outbreaks, and assist in enteric disease research. The Hunter OFN site comprises an OFN epidemiologist, and a part-time research officer. Both sites work closely with a NSW Department of Health enteric diseases epidemiologist and other NSW Department of Health Communicable Disease Branch staff.

The management of suspected foodborne disease outbreaks in NSW is the shared responsibility of NSW Public Health Units, NSW Department of Health, NSW OFN sites and the NSW Food

Authority. NSW Department of Health is responsible for the human health and epidemiological aspects of outbreak investigations and the NSW Food Authority is responsible for the environmental investigation, food testing and food trace-back components of an outbreak investigation. A Memorandum of Understanding between NSW Department of Health and the NSW Food Authority outlines the roles and responsibilities of each agency, and the Investigation of Foodborne Illness Response Protocol describes the interaction and communication between NSW Health and the NSW Food Authority in relation to foodborne illness surveillance and investigations of food-related outbreaks and complaints in NSW.

3.1 Notifiable enteric diseases in NSW

Under the NSW Public Health Act, the following enteric diseases and conditions are notifiable in NSW: salmonellosis, listeriosis, shigellosis, haemolytic uraemic syndrome (HUS), shiga toxin producing *Escherichia coli* (STEC/VTEC) infections, giardiasis, typhoid, paratyphoid, cryptosporidiosis, cholera, institutional gastroenteritis in two or more people, foodborne disease in two or more people, hepatitis A and hepatitis E¹. Individual cases of other enteric diseases such as campylobacter and norovirus infection are not notifiable in NSW.

NSW laboratories report cases of enteric disease infections to public health units (PHUs). Outbreaks of foodborne illness and institutional gastroenteritis (not notifiable by laboratories) are reportable by doctors, hospitals, child care centres and aged care facilities. Notifiable disease data are routinely entered by public health unit staff into the NSW Notifiable Diseases Database (NDD).

3.2 Data sources for this report

Data in this report has been extracted from the NSW Notifiable Diseases Database, NSW OFN Outbreak Database and the NSW Gastroenteritis in Institutions Database, all held by the CDB.

3.3 Methods

We analysed data for the following notifiable enteric pathogens; *Salmonella*[^] (including *Salmonella* Paratyphi), *Salmonella* Typhi, *Listeria monocytogenes*, *Shigella*, HUS and STEC, *Cryptosporidium*, *Giardia* and hepatitis A virus. On 1 March 2010, 2009 data was extracted from NDD using 'Health Outcomes Information and Statistical Toolkit' (HOIST)² using the date that the notification was received by the Public Health Unit. The NSW estimated resident population for 30 June of each year from 2004-2009 was used to calculate crude incidence rates for each disease³.

Data for outbreaks of suspected point-source foodborne enteric diseases were collected from the NSW Food Authority *Notification of Foodborne Illness Outbreak Form*, the Public Health Unit *Environmental Request Form* and the OFN *Outbreak Summary Form* and entered into an MS Access database. Data for enteric disease outbreaks in institutions with suspected person-to-person transmission of a viral pathogen, were entered directly into a NetEpi database ("EntEpi") by Public Health Units. Data from these registers are analysed using MS Excel at the NSW Department of Health. Data were reported as received by the Communicable Diseases Branch on 15 March 2010.

[^] We defined *Salmonella* as all *Salmonella* serovars, excluding *S. Typhi*, in accordance with the definition of *Salmonella* endorsed by the Communicable Diseases Network of Australia (CDNA).³

4. Summary

- In 2009, there were 6,575 notifications of the enteric diseases cryptosporidiosis, giardiasis, hepatitis A, HUS, listeriosis, salmonellosis (including paratyphoid), Shigellosis, typhoid and infection with shiga toxin producing *Escherichia coli* in NSW. This was a 39% increase compared with the average annual disease count for the previous five years. This was largely due to an outbreak of cryptosporidiosis associated with swimming pools in the beginning of the year 2009, resulting in 1,484 cases rather than the expected 600 cases based on the average annual cryptosporidiosis count for the five years from 2004-2008.
- Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in 2009. There were 2,681 notifications in the year, an increase of 20% compared with the annual average for the previous five years. The increase could be largely explained by an increase in *Salmonella* Typhimurium 170 (accounting for 24% of all *Salmonella* notifications in NSW in 2009) which was observed nationally, and for which a likely source could not be found.
- Giardiasis was the second most frequently reported enteric condition in 2009. There were 2,066 notifications in the year, an increase of 27% compared with the annual average for the previous five years. No clustering of cases was identified, and individual cases of giardiasis are not routinely followed up in NSW.
- The number of shigellosis notifications increased by 62% in 2009, with 155 cases compared with the five-year annual average of 95 cases. A health education campaign was organised following an increase of cases amongst men who have sex with men.
- There was a 52% increase in the number of STEC/VTEC infections in 2009 with 21 cases compared with an annual average for the previous five years of 14 cases. All cases were investigated and no epidemiological links were identified.
- In 2009, 68 foodborne or probable foodborne disease outbreaks were reported affecting over 902 people, as well as 600 gastroenteritis outbreaks in institutions affecting 11,679 people. This was a 26% increase in the number of reported foodborne or probable foodborne disease outbreaks compared to the year 2008 (n=54), and a 2% increase in the number of reported gastroenteritis outbreaks in institutions compared to the year 2008 (n=586).
- There were several point-source foodborne outbreaks of *Salmonella* Typhimurium 170 associated with the consumption of fried ice cream prepared with raw egg, Hollandaise sauce and mayonnaise prepared with raw egg, and chicken/pork rolls.

5. Activity during 2009

5.1 Overview

The counts of each notifiable enteric disease* for 2009 were compared with the average annual count for the years 2004 to 2008. Results are presented in Table 1. Overall, there were 6,575 enteric disease notifications in 2009, a 39% increase in notifications compared with the average for the previous 5 years. This was largely due to an increase in cryptosporidiosis (n=1,484) of 147% and shigellosis (n=155) of 62% compared to the average disease count for the previous five years.

Table 1: Number of selected enteric diseases during 2009 compared with the average number of cases, NSW 2004-2008.

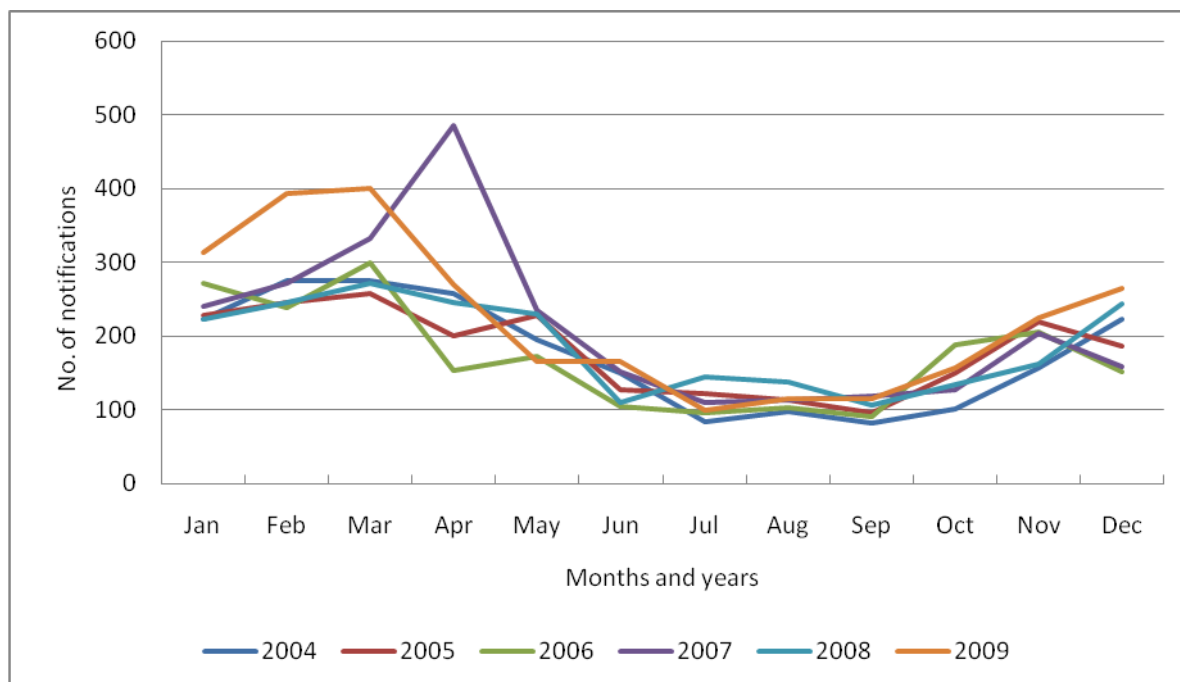
Condition	No. of cases, 2009	Average No. cases, 2004-2008	Change (%)
Cryptosporidiosis	1484	600	147
Giardiasis	2066	1625	27
HUS	3	12	-75
Hepatitis A	94	90	4
Listeriosis	28	27	2
STEC Infection	21	14	52
Salmonellosis (including Paratyphoid)	2681	2231	20
Shigellosis	155	95	62
Typhoid	43	34	26
TOTAL	6575	4729	39

5.2 Salmonellosis (including Paratyphoid)

Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in NSW during 2009. There were a total of 2,681 notifications, which is a 20% increase compared to the average annual count, 2004-2008. Figure 2 shows the monthly comparison of salmonellosis notifications from 2004-2009.

* Notifiable enteric diseases in NSW include cryptosporidiosis, giardiasis, haemolytic uraemic syndrome, salmonellosis (including paratyphoid), shigellosis, listeriosis and hepatitis A, typhoid and Shiga toxin-producing *Escherichia coli* (STEC) infection

Figure 2: Salmonellosis* notifications by month of notification, NSW 2004-2009.



* Including paratyphoid notifications

5.2.1 Age and sex distribution of people with salmonellosis in NSW in 2009

In 2009, the highest number of notifications of salmonellosis (including paratyphoid) was for people aged 20-39 years (n=710, 26%) followed by those aged 0-4 years (n=633, 24%) (Table 2). The highest notification rate during 2009 was among 0-4 year olds with 140.2 cases per 100,000 population reported. Table 2 provides the count and rate of salmonellosis notifications in 2009 and compares this with the average annual count and rate for 2004-2008 by age group.

Table 2: Number and rate of salmonellosis* notifications 2009, compared with 2004-2008 average by age group, NSW.

Age group (in years)	2009			Average 2004-2008		
	No cases	% of all salmonellosis cases	Yearly rate (per 100,000)*	No cases	% of all salmonellosis cases	Yearly rate (per 100,000)**
0-4	633	23.5	140.2	587	26.3	135.4
5-9	213	7.9	48.2	193	8.7	43.8
10-19	315	11.7	34.0	255	11.4	27.8
20-39	710	26.4	35.8	562	25.2	29.0
40-59	425	15.8	22.7	349	15.6	18.9
60+	395	14.7	28.9	284	12.7	22.5
TOTAL	2691	100	38.2	2231	100	

* Including paratyphoid notifications

** Based on 30 June 2004-2009 estimated resident population data (HOIST)

The median age of people with a notifiable *Salmonella* infection in 2009 was 22.6 years. Compared to previous years, the median age remains between 20 and 25 years. The sex distribution of cases was 50.6% for males, 49.0% for females and unknown for 0.4%.

5.2.2 Seasonal trends in salmonellosis notifications

In 2009, salmonellosis notifications followed the typical seasonal patterns with an increase in the warmer months (Figure 2, above).

The increase in cases in February and March 2009 can partially be explained by the increase in *Salmonella* Typhimurium 170 cases observed nationwide. The increase was investigated by OFN epidemiologists in each state by following up *Salmonella* Typhimurium 170 clusters based on MLVA type (3-9-7-12-523, 3-9-7-13-523, and 3-9-8-12-523* in NSW). A cause for this national outbreak could not be found.

5.2.3 Geographic distribution of salmonellosis cases by AHS

The number of salmonellosis notifications (including paratyphoid) by Area Health Service are presented in Table 3. The 2009 annual notification rate ranged from 18.4 cases per 100,000 population in Greater Western Area Health Service (Bathurst office) to 54.9 cases per 100,000 population in North Coast Area Health Service (Lismore office). The highest annual rate in the Lismore office, was followed by South Eastern Sydney Illawarra Area Health Service (Randwick office) with a notification rate of 48.4 per 100,000 population). Goulburn, Port Macquarie, Hornsby, Randwick, and Penrith offices had a considerably higher annual rate of notifications in 2009 compared to their average annual rate for 2004-2008.

* MLVA method and type designation were as described by Wang et al (2008) with modification of the fifth locus designation using the original size ⁵.

Table 3: Count and rate of salmonellosis* notifications 2009, compared with 2004-2008 average by Area Health Service, NSW.

Area Health Service	Public Health Unit	No. cases, 2009	2009 rate / 100,000****	Average No. cases, 2004-2008	Average yearly rate / 100,000 (range) 2004-2008 ****
Greater Southern**	Albury office	87	32.2	71	26.6(23.1-30.6)
	Goulburn office	71	33.0	49	23.5(18.9-27.6)
Greater Western**	Dubbo office	41	39.3	31	29.5(23.2-40.5)
	Bathurst office	32	18.4	37	21.5(14.6-27.7)
	Broken Hill office	14	31.7	11	23.4(13.2-39)
Hunter New England**	Newcastle office	195	32.6	174	29.9(25.5-33.5)
	Tamworth office	80	44.2	75	42.1(33.1-56.1)
North Coast**	Lismore office	160	54.9	193	68.5(51-75.5)
	Port Macquarie office	109	36.7	80	28.1(24.3-32.7)
Northern Sydney Central Coast***	Hornsby office	389	47.3	281	35(29.5-42.6)
	Gosford office	87	27.8	101	32.8(18-46.2)
South East Sydney Illawarra***	Wollongong office	98	25.7	82	22.1(16.2-26.2)
	Randwick office	386	48.4	272	33.6(31.2-36.7)
Sydney South West***	Camperdown office	232	40.5	178	34.1(28.5-44.7)
	Liverpool office	282	33.1	236	28.7(26.3-31.7)
Sydney West***	Parramatta office	288	35.6	251	32.9(26.4-39.5)
	Penrith office	133	41.3	108	34(29-38.9)

* Including paratyphoid notifications

** Rural AHS

*** Urban AHS

**** Based on 30 June 2004-2009 estimated resident population data (HOIST)

5.2.4 Ten most frequently notified *Salmonella* infections

In 2009, the most frequently notified *Salmonella* serovar was *S. Typhimurium* (54% of all *Salmonella* notifications, n=1,439). Of the *S. Typhimurium* serovars, the most frequently notified phage type was 170 (n=654), an increase of 189.4 % compared to 2008 (n=226) (which was also an increase of 66.2% compared to 2007 (n=136)). *Salmonella* Typhimurium 170 accounted for 24.3% of all *Salmonella* notifications in NSW in 2009 (Table 4). The second most frequent *Salmonella* infection notified was *S. Typhimurium* phage type 135 (n=131, 5%). For 265 (18.4%) *S. Typhimurium* notifications, a phage type was not recorded.

There were a few changes to the list of 10 most frequent *Salmonella* serovars reported in 2009 compared with 2008. In 2009, *S. Stanley* and *S. Montevideo* appeared in the top ten of *Salmonella* serovars, and *S. typhimurium* 126 and *S. Paratyphi b bv java Dundee var 2*, new to the 2008 top ten disappeared again from the 2009 top ten.

Table 4: Top ten *Salmonella* serovars, NSW 2009.

Rank	<i>Salmonella</i> serovar	No. of notifications	Percent (%)
1	<i>S. Typhimurium</i> - phage 170	654	24.3
2	<i>S. Typhimurium</i> - untyped	265	9.9
3	<i>S. Typhimurium</i> - phage 135	131	4.9
4	<i>S. Typhimurium</i> - phage 9	97	3.6
5	<i>S. Stanley</i>	57	2.1
6	<i>S. Birkenhead</i>	54	2.0
7	<i>S. Montevideo</i>	45	1.7
8	<i>S. Infantis</i>	44	1.6
9	<i>S. Typhimurium</i> - phage 44	42	1.6
10	<i>S. Typhimurium</i> - phage 135A	40	1.5

5.2.5 *Salmonella* Enteritidis

In 2009, there were 91 notifications of *S. Enteritidis* infections of varying phage types which is similar to the number of notifications in 2008 (n=101). The median age of cases was 30 years. Ages ranged from 8 months to 82 years. Seventy-five cases (82%) reported overseas travel during the incubation period (for 6 cases the country was unknown) and 16 cases (17.5%) were locally acquired (Table 5).

Table 5: S. Count and phage-type of S. Enteritidis notifications in NSW by country of likely exposure, 2009.

Country of likely exposure	No. of notifications*	Phage types
Bali	32	1 (2), 21 (3), 4 (1), 6A (14), untyped (12)
Australia (NSW)	10	1 (1), 21 (1), 26 (1), 4 (1), 9 (1), 6A (1), untyped (4)
Thailand	9	1 (1), 14B (1), 21 (2), 6A (4), untyped (1)
Overseas / unknown country	7	1D (1), 6 (1), 6A (1), 8 (1), 21 (1), RDNC 011 (1), untyped (1)
China	3	1 (1), untyped (2)
Fiji	4	26 (4)
Africa	2	21 (1), untyped (1)
Jordan	2	4 (1), untyped (1)
Malaysia	2	4 (1), untyped (1)
Sudan	2	21 (1), untyped (1)
Borneo	1	untyped
Brazil	1	4
Dubai	1	8
Germany	1	8
Hawaii	1	26
Hong Kong	1	Untyped
Hungary	1	13A
India	1	Untyped
Indonesia	1	6A
Iran	1	4
Italy	1	Untyped
Lebanon	1	<i>S. enteritidis</i> phage 21
Mauritius	1	Untyped
Pacific Islands	1	26
Philippines	1	21
Singapore	1	1
Taiwan	1	9
Malaysia / Singapore	1	21
USA	1	26 (1)
Vietnam	1	Untyped

5.2.6 *Salmonella* Paratyphi

In 2009, there were 57 cases of paratyphoid fever (*S. paratyphi* a var (n=21), *S. paratyphi* b bv java (n=24), *S. paratyphi* b bv java dundee var 2 (n=12)) notified compared to 28 cases in 2008 (*S. paratyphi* a RDNC (n=1), *S. paratyphi* a var (n=26), *S. Paratyphi* C (n=1)). The median age of paratyphoid cases was 21 years, and the mean age was 23 years. Ages ranged from 8 months to 74 years. Males (n=39) represented 68% of the cases.

5.3 Typhoid

In 2009, there were 43 cases of typhoid reported, which is an increase of 34.5% compared to the average count for the previous five years (average of 29 cases). The median age of typhoid cases was 24.1 years and the mean age was 23.1 years. Ages ranged from 7 months to 62.2 years. Females (n=21) represented 53.8% of cases. Thirty-eight cases (97.4%) had a recorded history of overseas travel prior to illness. It is likely that the cases acquired typhoid in India (n=19), Thailand (n=5), Indonesia (n=4), Bangladesh (n=5), Pakistan (n=2), Cambodia (n=1), Sierra Leone (n=1) and Hong Kong (n=1). One case reported no overseas travel during the incubation period, but 2 household contacts had recently arrived from Africa.

5.4 Giardiasis

As in previous years, giardiasis was the second most frequently reported enteric disease in NSW in 2009 with 2,066 notifications received, which is a 27% increase compared to the annual average 2004 to 2008. The median age of cases was 28.5 years: mean age was 26.3 years. Ages ranged from neonates to 92.2 years. Males represented 50% of the cases (1039). 74.9% of cases were residents of urban Area Health Services. Giardiasis is transmitted by the faecal oral route from person-to-person or by ingestion of faecally contaminated water. No clustering of cases was identified. Individual cases of giardiasis are not routinely investigated in NSW.

5.5 Shigellosis

In 2009, 155 cases of shigellosis were reported in NSW, which is a 49% increase compared to 2008 (n=104) and a 63% increase compared to the previous five year average (n=95). The most common *Shigella* species reported was *Shigella sonnei* (including biotype A and biotype G) (n=115; 74%) followed by *Shigella flexneri* (n=24; 15%) (Table 6). The median as well as the average age of shigellosis cases in NSW in 2009 was 38.6 years. Ages ranged from 1.1 years to 87.2 years. Males (n=115) represented 74% of cases.

The 49% increase compared to 2008 is largely explained by the continuing increase of *Shigella sonnei* biotype G cases from 21 cases in 2007 to 50 in 2008 and 85 in 2009. The South East Sydney Public Health Unit area received the majority of *Shigella sonnei* G cases in 2008 and 2009 (27/50 (54%) of all cases in 2008 and 47/85 (55%) of all cases in 2009). The majority of cases in this area were male (81% in 2008 and 98% in 2009). Only clusters of *Shigella* infections require investigation in NSW. Shigellosis has been associated with men who have sex with men in Sydney⁴. The demographics of *Shigella sonnei* G cases suggests this remains a problem in 2009. Interventions included alerting general practitioners to be aware of potential cases, and a health education campaign amongst men who have sex with men, run through non-governmental organizations.

Table 6: Count of Shigella cases for 2009 by species and sex, compared with the 2004-2008 average, NSW

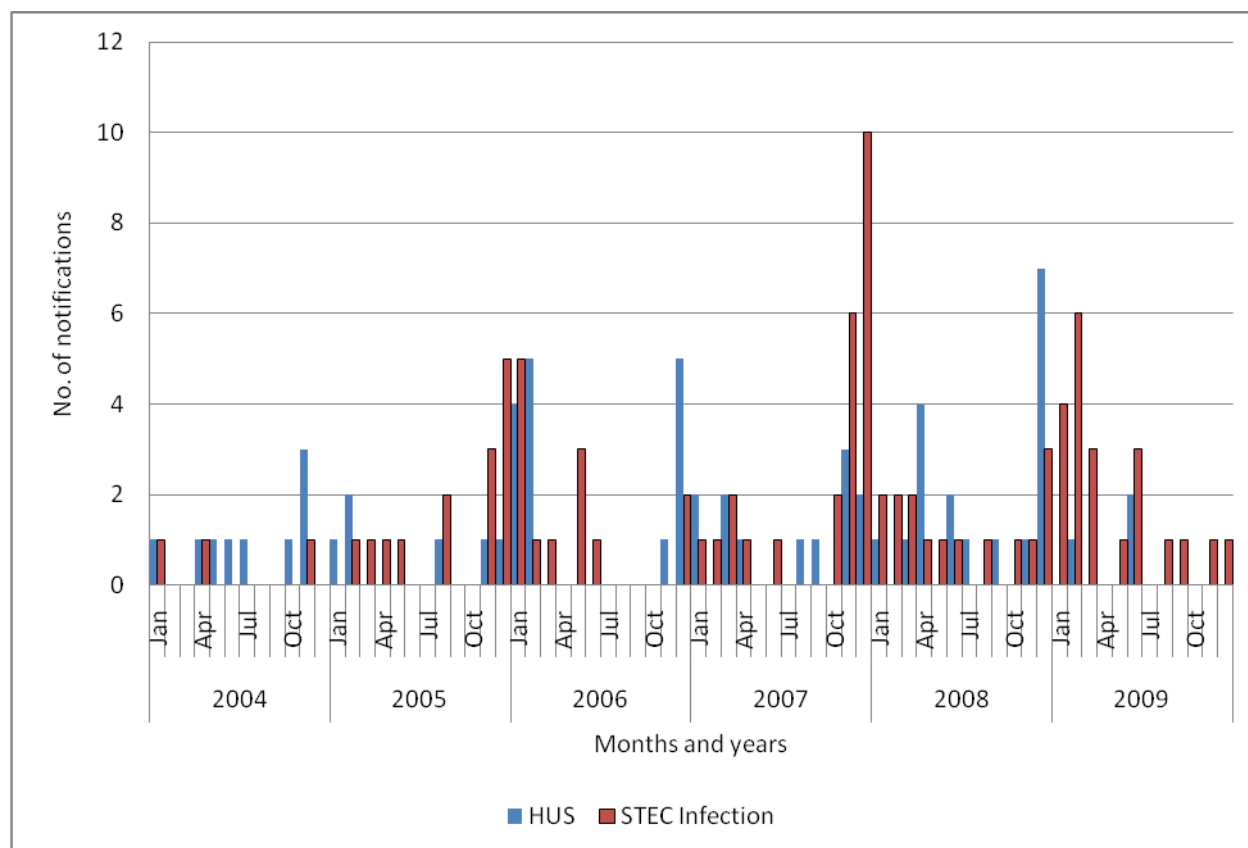
<i>Shigella</i> species	Average no. notifications 2004-2008			Notifications 2009		
	Female	Male	Total	Female	Male	Total
<i>Shigella sonnei</i> Biotype G	12.0	16.2	28.2	10	75	85
<i>Shigella flexneri</i>	10.8	18.8	29.6	12	12	24
<i>Shigella sonnei</i>	8.2	8.2	16.4	5	13	18
<i>Shigella sonnei</i> Biotype A	7.6	5.8	13.4	6	6	12
<i>Shigella boydii</i>	1.0	1.2	2.2	2	3	5
<i>Shigella dysenteriae</i>	0.8	0.2	1	1	2	3
Unknown	1.8	1.8	3.6	4	4	8
TOTAL	42.2	52.2	94.4	40	115	155

5.6 STEC and HUS

In 2009 there were 21 cases of STEC notified in NSW, an increase of 40% compared with 2008 (15 cases) and a 52% increase compared to the average annual count for the previous five years (14 cases). The median age of STEC cases was 45 years; the mean age was 40.7 years. Ages ranged from 1.4 to 90.9 years. Females (n=12) represented 57% of cases. Serotype information was available for 11 of 21 cases: O111 (n=3), O157 (n=6), O49 (n=1), O103 (n=1).

In 2009 there were three cases of HUS reported. One of these was also diagnosed with STEC O111. The three cases were 1, 7 and 9 years old (median age 7; mean age 5.9 years). All three cases were female.

Figure 3: STEC and HUS notification by month, NSW 2004-2009.



5.7 Listeriosis

In 2009, there were 27 listeriosis cases reported, which is a decrease of 20% compared to the 34 cases in 2008 but an 8% increase compared to the previous five year median of 25 cases per year. Four cases were neonates. Excluding the four neonates, ages ranged from 26.3 years to 87.4 years with a median age of 65.1 years. Of the 23 non-neonate cases, 12 were male (52%). Of all 27 cases, five were perinatal cases (4 neonates and 1 maternal case), six were immunocompromised or had underlying disease, 12 were 65 years or older. Three cases did not fall in any of these high risk categories. Two of these three had consumed high risk foods and for one case there were no obvious risk factors. Five deaths (18.5%) due to listeriosis were reported, three were aged 65 or older, one was immunocompromised and one 60 year old female had no obvious risk factors. All isolates were sent to the Queensland Public Health Microbiology Laboratory, for serotyping and binary typing. The results for 10 isolates are pending (Table 7). Two NSW cases with *Listeria monocytogenes* binary gene type 82, serotype 1/2c were associated with an outbreak across Australia associated with consuming chicken wraps on a commercial flight. No epidemiological links between the other cases could be found.

Figure 4: Listeriosis notifications by month, NSW 2007 – 2009.

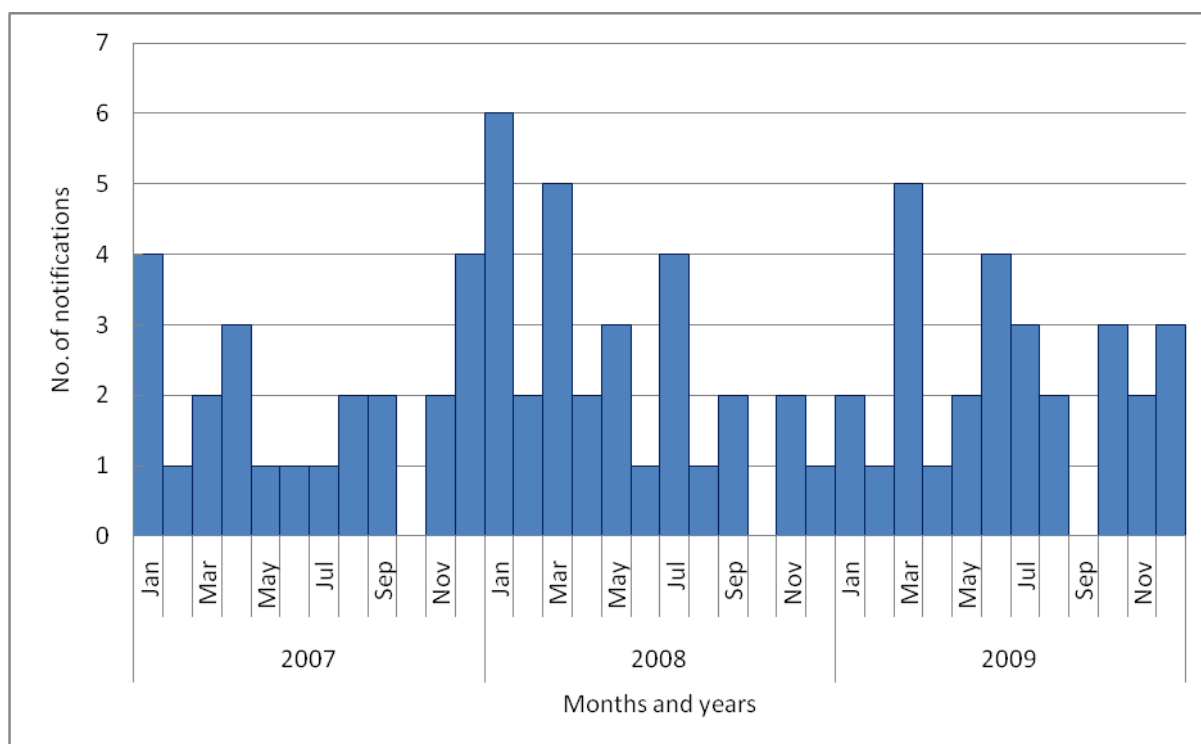


Table 7: Binary type and serotype of *Listeria monocytogenes* isolates, NSW 2009.

Test	Binary type	Serotype	No. of isolates
	26	1/2a	1
	82	1/2c	2
	83	1/2c	1
	147	1/2a	1
	154	1/2a	2
	155	4b	1
	158	1/2b	4
	159	4b	1
	190	4b	6
	254	4b	3
	255	4b	4
	Untyped		1
Total			27

5.8 *Cryptosporidiosis*

There were 1,484 cases of cryptosporidiosis reported in NSW in 2009, a 199% increase compared to 2008 (n=496) and a 147% increase compared to the annual average 2004-2008 (n=600). The median age of cryptosporidiosis cases was 7.3 years and the mean age was 15.9 years. Ages ranged from two months to 96.8 years. Females (n=778) represented 52.4% of cases. The increase in notifications is explained by a large outbreak of cryptosporidiosis associated with swimming in public swimming pools in the beginning of the year, resulting in 1,484 cases rather than the expected 600 cases based on the average annual cryptosporidiosis count for the five years from 2004-2008. NSW Department of Health issued several public health alerts through the media, and the NSW Department of Health's Environmental Health Branch worked with the affected swimming pools to reduce the risk of further transmission.

5.9 *Hepatitis A*

There were 93 cases of hepatitis A infection reported in NSW in 2009, an increase of 45% compared to 2008 (n=64) and a 4% increase compared to the average of 90 cases per year in the previous five years. The median age of cases was 28.8 years; the mean age was 31.6 years. Ages ranged from 1.3 years to 97.8 years. Males (n=47) represented 50% of the cases.

Overseas travel during the incubation period was reported in 65 cases (69.9%), to India (n=7), Lebanon (n=7), Thailand (n=7), Indonesia (n=5), Vanuatu (n=5), Fiji (n=4), Pakistan (n=4), Egypt (n=3), South Korea (n=3), Philippines (n=3), Nepal (n=2), Western Samoa (n=2), and one case in each of the following countries: Afghanistan, Bangladesh, Ethiopia, Europe (unspecified country), and one case in each of the following countries: Afghanistan, Bangladesh, Ethiopia, Europe (unspecified country), Greece, North Korea, Malaysia, Morocco, Papua New Guinea, South Africa, Sudan, Syria, and Ukraine. Travel history was unknown for one case (1.5%).

The other 28 cases of hepatitis A infection did not report overseas travel, or overseas travel was unknown (n=3). Five of the 28 cases were most likely secondary cases as they had been in contact with hepatitis A cases who acquired their infection overseas. Of the remaining 23 cases, 15 were followed up as part of a multi-jurisdictional outbreak investigation of locally-acquired hepatitis A in Australia. Of all locally acquired cases reported in NSW from 1 July 2009 (the beginning of the outbreak) six were laboratory confirmed to be hepatitis A genotype 1B, which was the same strain as other cases implicated in the outbreak. For the other nine genotyping was not available. The outbreak investigation continues into the year 2010.

6. Enteric Outbreaks in NSW during 2009

In 2009, there were a total of 668 gastrointestinal outbreaks reported in final summary form to the Communicable Diseases Branch. There were 68 suspected foodborne outbreaks and 600 gastrointestinal outbreaks in institutions.

6.1 Foodborne and suspected foodborne outbreaks

In 2009, 68 foodborne or probable foodborne disease outbreaks affecting over 903 people were reported to the NSW Department of Health. Of these, 74 people (8.2%) were hospitalised compared with 32 of 665 (4.8%) in 2008. In 2009, two deaths (both residents of the same aged care facility) were associated with a suspected foodborne outbreak. The agents responsible for the outbreak were reported for 10 (15%), which is a decrease from the previous year where the responsible agent was reported for 41% of the outbreaks.

In 2009 in NSW, 37.7% of all cases (340/902) and 75.7% of all hospitalisations (56/74) associated with the reported foodborne and suspected foodborne outbreaks, were due to salmonellosis which was identified in 35% (n=24) of all outbreaks.

Of the 24 outbreaks associated with *Salmonella* infection, 17 were caused by *Salmonella* Typhimurium, two by *Salmonella* Virchow, and one each by *Salmonella* Chester, *Salmonella* Heidelberg, *Salmonella* Stanley, *Salmonella* Montevideo and *Salmonella* Singapore (Table 9). The second most frequently identified agent was norovirus (9 outbreaks, 13%). For 32 reported outbreaks (47%) the agent could not be identified (Table 8).

Investigations of outbreaks of *Salmonella* Chester, *Salmonella* Virchow, and *Salmonella* Singapore found associations with the consumption of freshly prepared chilli sauce, bread rolls with pork filling, and fried ice cream prepared with raw eggs. The outbreak investigations of *Salmonella* Montevideo, *Salmonella* Virchow, *Salmonella* Heidelberg and *Salmonella* Stanley could not find an association with a food type (Table 8).

There were 17 outbreak investigations of *Salmonella* Typhimurium 170 in NSW in 2009 (Table 8 and 9). Of the six outbreaks of *Salmonella* Typhimurium MLVA type 3-9-8-12-523, two were associated with the consumption of Hollandaise sauce and mayonnaise prepared with raw egg respectively. Two were possibly associated with the consumption of mayonnaise prepared with raw egg, and cross-contamination with raw mince through piping bag, of chocolate, custard and cream cakes. The other two could not be associated with a food.

Of the four outbreaks of *Salmonella* Typhimurium 170 MLVA type 3-9-7-13-523, one was associated with the consumption of chicken/pork rolls, one possibly associated with the consumption of bacon and beef burgers, and for the other two no food association could be found. Of the two outbreaks of *Salmonella* Typhimurium 170 MLVA type 3-9-8-13-523 one could be associated with the consumption of a layered chocolate cake, prepared with cream and ganache icing (no raw eggs used) and the other could not be associated with a food. A public health alert was issued in April, about some of these outbreaks, with the aim of raising awareness about the risk of consuming raw eggs.

Summary information about other foodborne outbreak investigations conducted in 2009 can be found in the quarterly reports. There may have been underreporting of foodborne and suspected foodborne outbreaks in the months April to June due to public health resources being directed to the H1N1 influenza response.

Table 8: Foodborne disease outbreaks reported in NSW, 2009.

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
NSCC0020	Jan	restaurant	Histamine	2	1	M	N	Tinned anchovies imported from Morocco
GW0003	Jan	national franchised fast food	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	3	1	D	D	Suspected bacon and beef burgers
SESILL0041	Jan	restaurant	<i>Salmonella</i> Chester	14	2	M	D	Fresh chillies used to prepare chilli sauce
HUN0408	Jan	private residence	<i>Salmonella</i> Typhimurium MLVA 3-15-16-14-523	4	1	D	D	Unknown
GS0006	Jan	take-away	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	2	1	D	C	Suspected chicken salad roll with homemade mayonnaise
SSW0024	Jan	bakery	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	9	1	D	D	Suspected cross-contamination with raw mince through piping bag, of chocolate, custard and cream cakes
SSW0025	Jan	aged care	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	4	0	D	N	Unknown
NSCC0019	Jan	institution	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	40	5	A	C	Hollandaise sauce prepared with raw eggs
SESILL0042	Jan	commercial caterer	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	68	14	AM	C	Mayonnaise prepared with raw eggs

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
HUN0409	Feb	restaurant	Unknown	5	0	D	D	Unknown
SW0022	Feb	aged care facility	C.perfringens enterotoxin A	25	0	M	D	Suspected vegetable gravy
GS0007	Feb	take-away	Unknown	6	6	D	N	Unknown
GS0005	Feb	take-away	<i>Salmonella</i> Typhimurium 170	3	1	M	D	Unknown
SSW0026	Feb	school	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	37	0	D	C	Unknown
SSW0029	Feb	commercial caterer	<i>Salmonella</i> Montevideo	10	2	D	D	Unknown
NSCC0022	Mar	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-12-523	33	9	AM	C	Fried ice cream prepared with raw eggs
NSCC0021	Mar	restaurant	<i>Salmonella</i> Virchow	3	1	D	N	Unknown
GS0004	Mar	restaurant	Campylobacter	4	0	D	N	Suspected steak with chips and salad
SESILL0043	Mar	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	2	1	D	D	Unknown
SSW0031	Mar	bakery	<i>Salmonella</i> Virchow	10	3	D	C	Suspected bread Rolls with Pork Filling
HUN0410	Mar	aged care	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-12-523	26	2	D	D	Unknown
SSW0028	Mar	restaurant	Unknown	10	0	D	D	Unknown

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SW0023	Mar	bakery	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	8	1	D	D	Suspected chicken/pork rolls
HUN0412	Apr	restaurant	Norovirus	16	0	D	C	Unknown
SESILL0045	Apr	other	Unknown	7	0	D	D	Unknown
SW0025	Apr	restaurant	Unknown	5	0	D	CC	Suspected lasagna, chicken caesar salad
SW0030	Apr	aged care	<i>Clostridium</i> <i>Perfringens</i>	16	2	D	C	Unknown
SW0024	May	other	Unknown	15	0	D	CC	Unknown
HUN0411	May	take-away	Unknown	4	1	D	D	Unknown
GW0004	May	restaurant	Unknown	3	1	M	D	Unknown
HUN0413	June	commercial caterer	Unknown	23	0	D	C	Unknown
SESILL0046	June	restaurant	Unknown	15	2	D	D	Unknown
NSCC0023	July	restaurant	Unknown	6	0	D	D	Unknown
SESILL0048	July	restaurant	Unknown	2	0	D	N	Unknown
HUN0414	Aug	restaurant	Norovirus	31	0	D	C	Unknown
GS0009	Aug	not applicable	Unknown	Unknown	0	D	N	Suspected rural water supply

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SSW0034	Aug	restaurant	Unknown	2	0	D	N	Unknown
HUN0415	Aug	private residence	Unkown	8	0	D	D	Unknown
SW0031	Aug	restaurant	Unknown	28	2	D	D	Unknown
SSW0033	Aug	commercial caterer	Norovirus	33	0	D	C	Unknown
SSW0032	Aug	restaurant	Norovirus	27	0	D	D	Unknown
SESILL0051	Sep	camp	Unknown	31	0	D	D	Unknown
GW0005	Sep	commercial caterer	Norovirus	Unkn own	0	M	D	Unknown
SESILL0050	Sep	aged care	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-13-523	9	1	D	N	Unknown
HUN0416	Sep	not applicable	norovirus	22	0	D	C	Unknown
GW0006	Sep	restaurant	Unknown	10	0	D	D	Unknown
SSW0036	Sep	commercial caterer	Unknown	12	0	D	D	Unknown
HUN0418	Sep	unknown	Unkown	8	0	D	C	Unknown
SESILL0049	Sep	restaurant	Unknown	3	0	D	C	Unknown
SSW0038	Sep	unknown	<i>Salmonella</i> Heidelberg	7	1	D	D	Unknown
HUN0417	Sep	restaurant	Norovirus	13	0	D	C	Suspected salad items

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
GS0008	Oct	other	Norovirus	20	2	D	N	Unknown
SESILL0052	Oct	restaurant	Unknown	4	0	D	D	Suspected salad items
SSW0035	Oct	other	Unknown	24	0	D	D	Unknown
NSCC0024	Oct	fair/festival/ mobile service	Unknown	3	1	D	D	Suspected prawns and calamari
GS0011	Oct	other	Unknown	24	0	D	N	Unknown
SESILL0053	Oct	restaurant	Unknown	4	0	D	D	Unknown
GS0010	Oct	private residence	Unknown	8	0	D	C	Unknown
NSCC0026	Oct	commercially manufactured	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-13-532	4	0	M	D	Layered chocolate cake, prepared with cream and ganache icing (no raw eggs used)
SESILL0054	Oct	restaurant	Unknown	7	0	D	D	Unknown
SSW0037	Nov	restaurant	<i>Salmonella</i> Typhimurium MLVA 3-12-12-13- 523	3	0	M	D	Cooked pork mince and leftover food (mix of tofu, rice, duck)
NSCC0025	Nov	commercially manufactured	Unknown	28	0	D	C	Unknown
SESILL0057	Nov	take-away	<i>Salmonella</i> Stanley MLVA 2-15 (14)-0- 0-496	32	7	D	D	Suspected salads, wraps, burgers
HUN0419	Dec	restaurant	<i>Salmonella</i> Singapore	3	0	M	D	Fried ice cream prepared with raw eggs

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SESILL0055	Nov	restaurant	Unknown	7	0	D	C	Unknown
SSW0039	Nov	private residence	<i>Salmonella</i> Typhimurium MLVA 3-13-9-11-550	6	2	D	D	Suspected tiramisu prepared with raw eggs
SESILL0056	Dec	other	Unknown	12	0	D	C	Unknown
GS0012	Dec	take-away	Norovirus	30	0	D	D	Unknown

*Evidence: D=Descriptive evidence implicating the suspected vehicle or suggesting foodborne transmission; A=Analytical association between illness and food; M=Microbiological confirmation in the suspected vehicle and cases; AM=Analytical and microbiological evidence.

**Epi Study: C=Cohort study; CC=Case control study; D=Descriptive case series; N=Individual patient data not collected

Table 9: Salmonellae by serotype, phage type and MLVA type associated with foodborne outbreaks in NSW, 2009.*

<i>Salmonella</i> serotype	Phage type	MLVA type	No. of outbreaks
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-8-12-523	6
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-7-13-523	4
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-8-13-523	2
<i>Salmonella</i> Virchow			2
<i>Salmonella</i> Chester			1
<i>Salmonella</i> Heidelberg			1
<i>Salmonella</i> Montevideo			1
<i>Salmonella</i> Singapore			1
<i>Salmonella</i> Stanley		MLVA 2-15 (14)-0-0-496	1
<i>Salmonella</i> Typhimurium		MLVA 3-12-12-13-523	1
<i>Salmonella</i> Typhimurium		MLVA 3-13-9-11-550	1
<i>Salmonella</i> Typhimurium		MLVA 3-15-16-14-523	1
<i>Salmonella</i> Typhimurium		MLVA 3-9-7-12-523	1
<i>Salmonella</i> Typhimurium	170	Unknown	1

* MLVA method and type designation were as described by Wang et al (2008) with modification of the fifth locus designation using the original size^v.

6.2 Summary of significant foodborne outbreaks during 2009

***Salmonella* Chester** was confirmed in 6 of 14 cases from 6 groups of people who ate chilli sauce prepared at a restaurant on three consecutive days in January 2009. The food handler who prepared the chilli sauce was asymptomatic but two submitted stool samples were both positive for *Salmonella* Chester, and the food handler was excluded from work. The chilli sauce and the raw chillies used to prepare the sauce were also positive for *Salmonella* Chester. The chillies could not be traced back to determine the source of infection. It remains unclear whether the food handler infected others, or whether the food handler became infected through consuming the chillies. A third stool sample from the food handler was negative for *Salmonella*.

An outbreak of ***Salmonella* Typhimurium 170, MLVA 3-9-7-12-523** was identified through five complaints to the NSW Food Authority and two notifications from hospitals about people with gastroenteritis after eating at a Japanese Tepanyaki restaurant. A cohort study was conducted using a convenience sample from the booking list for a 12 day period. Approximately 46 people representing 308 people were asked whether anyone in their group had developed gastroenteritis and what they had eaten. 33/308 (11%) people were defined as cases. Fried ice cream was statistically significantly associated with gastroenteritis (RR: 257.88, 95% CI: 36.39-1827.54). Thirty-two cases (97%) had eaten fried ice cream. Two people had eaten fried ice cream and had not developed symptoms. *Salmonella* Typhimurium 170, 3-9-7-12-523 was cultured in 12 cases. The same MLVA type was also cultured in samples of fried ice cream, raw beef and a dish cloth from the restaurant.

An outbreak of diarrhoea, vomiting, abdominal cramps and other symptoms of gastroenteritis in a group of approximately 120 people attending a barbecue at a bowling club was investigated through a cohort study in which 83 people were interviewed. Of these, 68 were identified as cases with a median incubation period of 18 hours (range 4-81.5 hours) and a median duration of illness of 3.5 days (range 1-9.5 days). Faecal specimens were collected from 30 cases, of which 24 were confirmed to be *Salmonella Typhimurium* 170, MLVA 3-9-8-12-523. Illness was significantly associated with consumption of both the lettuce (RR=1.4 95%CI 1.0-2.0, p=0.02 and russian salad (RR=1.8 95%CI 1.2-2.9, p<0.001). Having russian salad, or any salad item, on the plate whether it was eaten or not, further increased the relative risk to 3.0 and 3.3 respectively. The russian salad was prepared with homemade raw egg mayonnaise. The NSW FA inspected both the bowling club and the house of the family who prepared the food. Samples taken from the homemade raw egg mayonnaise and some ingredients for the salad were also positive for *Salmonella* 170, MLVA 3-9-8-12-523.

6.3 Institutional gastrointestinal outbreaks

In 2009, PHUs reported 600 gastroenteritis outbreaks in institutional settings likely to be due to person-to-person transmission of viral gastroenteritis. The outbreaks affected 11,679 people compared with 586 outbreaks affecting 10,641 people in 2008. Of these outbreaks, 317 (52.8%) occurred in aged care facilities, 143 (23.8%) in childcare centres, 116 (19.3%) in hospitals, three (0.5%) in schools and 21 (3.5%) in other settings (Table 9).

Norovirus and rotavirus were the two most commonly identified pathogens during outbreak investigations. Norovirus was identified in 228 (38%) and rotavirus in 20 (3.3%) of the 600 outbreak investigations. Other pathogens identified during outbreak investigations were *Shigella* (n=10 outbreaks), *Cryptosporidium* (n=10), *Clostridium difficile* (n=9), *Campylobacter* (n=6), *Giardia intestinalis* (n=4), *Clostridium perfringens* (n=3), and *Salmonella* (n=2 outbreaks). In x outbreak investigations, more than one pathogen was identified. The aetiology was unknown for 84 (14%) of the outbreaks. For 50 outbreaks (8.3%) no stool or other samples were collected for testing. Although laboratory evidence was not always available, the epidemiological information indicated person-to-person transmission of a viral pathogen in 438 (73%) of the outbreaks.

Table 10: Number of gastroenteritis outbreaks in institutions in NSW, and number of cases by institution, 2006 – 2009.

Institution	2006		2007		2008		2009	
	No. outbreaks	No. cases	No. outbreaks	No. cases	No. outbreaks	No. cases	No. outbreaks	No. cases
Aged Care	254	7536	290	254	7536	290	317	7681
Hospital	92	1693	92	92	1693	92	116	1632
Childcare	80	1233	101	80	1233	101	143	1981
School	1	7	9	1	7	9	3	68
Other	9	172	11	9	172	11	21	317
TOTAL	436	10641	503	436	10641	503	600	11679

7. Activity in NSW during 2009

7.1 Improving Surveillance

- **Communication:** The Hunter New England, NSW and ACT OzFoodNet sites and the NSW Food Authority held weekly teleconferences to discuss notifications and suspected clusters and outbreaks, and to communicate progress on recent investigations. From November 2009, these teleconferences were joined by staff from the NSW Enteric Reference Laboratory at the Centre for Infectious Diseases and Microbiology, at the Institute of Clinical Pathology and Medical Research (ICPMR). Throughout the year, the enteric diseases / OFN team communicated on a regular basis with Public Health Units and the NSW Food Authority regarding clusters and outbreaks of enteric diseases.
- **Reporting:** Fortnightly, quarterly and annual reports were prepared for OzFoodNet and distributed to public health units. Weekly, quarterly and annual reports were also prepared for publication on the NSW Department of Health website and the NSW Public Health Bulletin.
- **Laboratory methods:** In 2009, the molecular microbiology method, Multi Locus Variable Number Tandem Repeat Analysis (MLVA) continued to be an important tool for the identification of *Salmonella* Typhimurium outbreaks and cluster investigations. This laboratory method allowed for the detection of strains within certain serovar or phage types.
- A Working Group to investigate **surveillance of Campylobacter infections** in NSW was formed in September 2009. Some of the issues under consideration are: the inclusion of campylobacter as a notifiable disease following implementation of electronic notifications, the campylobacter data collected over recent years as part of sentinel surveillance and targeted studies, and the benefits of providing data to the NSW Food Authority for regulatory work.

7.2 OzFoodNet studies

- Indigenous identification in NDD data analysis project. In 2009, a manuscript titled "We don't know if we don't ask: opportunities for improving Indigenous identification in General Practice" has been submitted for publication and is currently under review. Additionally, a submission was made to the Royal Australian College of General Practitioners practice accreditation process, which aims to increase the requirement for recording indigenous status of patients in General Practice records.
- Exposure information for six cases with confirmed *Salmonella* Mississippi was provided to the National *Salmonella* Mississippi case-control study.
- Analysis of data from the listeriosis case control study was finalised, resulting in a manuscript being submitted for publication. Isolates collected as part of the study were forwarded to the Microbiological Diagnostic Unit in Melbourne to assist in developing molecular typing methods for listeriosis.
- A proposal to evaluate the timeliness of MLVA typing in NSW was drafted.

7.3 Guidelines and policy

- The enteric diseases / OFN team reviewed the Notifiable Diseases Manual's guidelines on gastroenteritis outbreaks in institutions.
- Protocols on public health action relating to Hepatitis E, Shigellosis, Rotavirus, and Hepatitis A were reviewed and updated.
- The Memorandum of Understanding between NSW Department of Health and the NSW Food Authority was reviewed as a result of recommendations made in a number of outbreak investigation debriefs.
- New South Wales contributed to the Commonwealth's submission to the draft Primary Production and Processing Standard for Eggs.

7.4 Publications

- Roberts-Witteveen AR, Durrheim DN, Merritt TD, Munnoch SA. Estimate of the number of Campylobacter infections in the Hunter region, NSW, 2004-2007 NSW Public Health Bulletin 2009; 20(11-12): 184-191
- Dalton CB, Merritt TD, Durrheim DN, Munnoch S, Kirk MD. A structured framework for improving outbreak investigation. Biomedcentral 2009; 9:472.
- Roberts-Witteveen AR, Campbell BA, Merritt TD, Massey PD, Shadbolt CT, Durrheim DN. Egg-associated *Salmonella* outbreak in an aged care facility, New South Wales, 2008. Communicable Diseases Intelligence 2009; 33(1): 49-52.

7.5 Communication

NSW OzFoodNet sites continued regular communication with a range of intra- and inter-sectoral partners to share knowledge and build capacity to manage and control foodborne diseases in NSW, including:

- Weekly teleconferences with Hunter New England and ACT OFN sites and the NSW FA on surveillance and control of food borne illness were conducted (see also explained above)
- Regular outbreak team teleconferences and meetings for relevant outbreak investigations
- Regular debrief meetings for relevant outbreak investigations
- Monthly teleconferences with the Infectious Diseases Network. This group includes PHU Directors and Public Health Nurses and Surveillance Officers, and CDB staff.
- Monthly teleconferences with the national OzFoodNet network
- Continued liaison with the NSW Food Authority to develop policy to reduce the use of raw egg products in commercial settings
- Face to face meetings with OFN national network in Brisbane, Canberra, Perth and Newcastle
- Face to face meeting with NSW Department of Health, OzFoodNet (NSW and HNE site), NSW Food Authority and ICPMR to discuss laboratory and public health issues
- Regular meetings of the Campylobacter working group
- Participation in all multi-jurisdictional outbreak investigations with other OFN sites

7.6 Prevention Measures

- Public health alerts were released about food borne infections after an increase of *Salmonella* infections was reported, and about hygiene in swimming pools, after an increase of cryptosporidiosis was reported.
- A precautionary warning about the association between consuming semi-dried tomatoes and acquiring hepatitis A infection was issued through the media.
- An alert to general practitioners to be aware of potential cases of shigellosis, and a health education campaign amongst men who have sex with men to prevent transmission of *Shigella* was organised through the NSW Department of Health and non-governmental organizations.

8. References

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⁴ O'Sullivan, Delpech V, Pontivivo G, Karagiannis T, Marriott D, Harkness J, McAnulty JM. 2002. Shigellosis linked to sex venues, Australia. *Emerg Infect Dis*, 8(8):862-864.

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