



OzFoodNet — Enhancing Foodborne Disease Surveillance Across Australia.

NSW 2010 OzFoodNet Annual Report

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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.

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 Public Health Unit.

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. 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: cholera, cryptosporidiosis, giardiasis, hepatitis A and haemolytic uraemic syndrome (HUS), hepatitis E, listeriosis, paratyphoid, rotavirus, shiga toxin producing *Escherichia coli* (STEC/VTEC) infections, shigellosis, salmonellosis, typhoid, institutional gastroenteritis in two or more people, and foodborne disease in two or more people¹. Individual cases of other enteric diseases such as campylobacter and norovirus infection are not notifiable in NSW.

NSW laboratories report cases of notifiable enteric diseases to public health units (PHUs). Outbreaks of foodborne or suspected foodborne illness and institutional gastroenteritis 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 Conditions Information Management System (NCIMS).

3.2 Data sources for this report

Data in this report has been extracted from the NSW Notifiable Conditions Information Management System, 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*¹ (including *Salmonella* Paratyphi), *Salmonella* Typhi, *Listeria monocytogenes*, *Shigella*, HUS and STEC, *Cryptosporidium*, *Giardia* and hepatitis A virus. On 3 March 2011, 2010 data was extracted from NCIMS using 'Health Outcomes Information and Statistical Toolkit' (HOIST)² using the date of onset of disease. The NSW estimated resident population for 30 June of each year from 2005-2010 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 1 March 2010.

¹ 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).

4. Summary

- In 2010, there were 6,665 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 27% increase compared with the average annual disease count for the previous five years.
- Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in 2010. There were 3,744 notifications in the year, an increase of 60% compared with the annual average for the previous five years and the largest number of notifications on record in NSW. The increase could be largely explained by an ongoing increase of *Salmonella* Typhimurium 170 notifications (accounting for at least 14%² of all *Salmonella* notifications in 2010 and 24% of all *Salmonella* notifications in NSW in 2009). This increase has been observed nationally, and is the subject of an investigation at the time of writing of this report.
- Giardiasis was the second most frequently reported enteric condition in 2010. There were 2,295 notifications in the year, an increase of 28% 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 cryptosporidiosis cases decreased dramatically (58 %) compared to the annual average for the previous five years and compared to the previous year
- There was a 44% decrease in the number of STEC/VTEC infections in 2010 with 10 cases compared to an annual average for the previous five years of 18 cases. All cases were investigated and no epidemiological links were identified.
- In 2010, 59 foodborne or probable foodborne disease outbreaks were reported affecting over 728 people, as well as 517 viral or probable viral gastroenteritis outbreaks in institutions affecting 9,359 people. This was a 15% decrease in the number of reported foodborne or probable foodborne disease outbreaks compared to the year 2009 (n=68), and a 16% decrease in the number of reported gastroenteritis outbreaks in institutions compared to the year 2009 (n=600).
- There were several point-source foodborne outbreaks of *Salmonella* Typhimurium associated with the consumption of aioli prepared with raw eggs, chicken kebabs, deep fried ice-cream prepared with raw eggs, and pork rolls. There was one outbreak of *Salmonella* Infantis in an aged care facility associated with the consumption of fluid thickener thought to be cross-contaminated with chicken mince.

² The true percentage is higher as 19% of phage types for *Salmonella* Typhimurium isolates were unknown at the time of writing this report.

5. Activity during 2010

5.1 Overview

The counts of each notifiable enteric disease³ for 2010 were compared with the average annual count for the years 2005 to 2009. Results are presented in Table 1. Overall, there were 6,665 enteric disease notifications in 2010, a 27% increase compared to the average number of notifications for the previous 5 years. The number of cryptosporidiosis cases decreased with 58% compared to the average disease count for the previous five years. The number of salmonellosis notifications increased with 60% compared to the average disease count for the previous five years.

Table 1: Number of selected enteric diseases during 2010 compared with the average number of cases, NSW 2005-2009

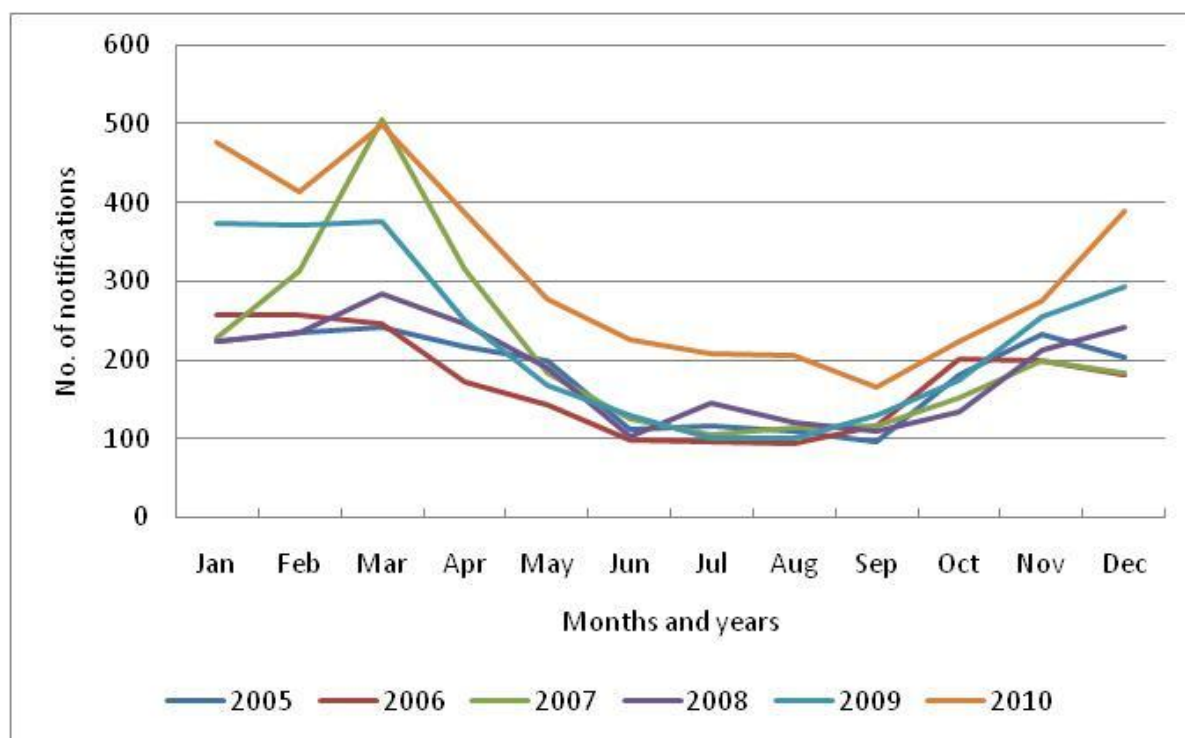
Condition	No. of cases, 2010	Average No. cases, 2005-2009	Change (%)
Cholera	1	2	-50
Cryptosporidiosis	347	823	-58
Giardiasis	2295	1798	28
HUS	3	11	-73
Hepatitis A	83	81	3
Hepatitis E	15	11	34
Listeriosis	26	27	-3
STEC Infection	10	18	-44
Salmonellosis (including Paratyphoid)	3744	2346	60
Shigellosis	114	107	6
Typhoid	27	36	-25
TOTAL	6665	5259	27

5.2 Salmonellosis (including Paratyphoid)

Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in NSW during 2010. There were a total of 3,744 notifications, which is a 60% increase compared to the average annual count, 2005-2009. Figure 1 shows the monthly comparison of salmonellosis notifications from 2005-2010. The year 2010 had the highest age-standardised notification rate on record (51.4 per 100,000 population). This increase has been observed nationally, and an expert group has been established to identify possible causes.

³ 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 1: Salmonellosis* notifications by month of notification, NSW 2005-2010



* Including paratyphoid notifications

5.2.1 Age and sex distribution of people with salmonellosis

In 2010, the highest number of notifications of salmonellosis (including paratyphoid) was for people aged 20-39 years (n=969, 26%) followed by those aged 0-4 years (n=848, 23%) (Table 2). The highest notification rate during 2010 was among 0-4 year olds with 181.8 cases per 100,000 population reported. Table 2 provides the count and rate of salmonellosis notifications in 2010 and compares this with the average annual count and rate for 2005-2009 by age group.

Table 2: Number and rate of salmonellosis* notifications 2010, compared with 2005-2009 average by age group, NSW

Age group (in years)	2010			Average 2005-2009		
	No cases	% of all salmonellosis cases	Yearly rate (per 100,000)*	No cases	% of all salmonellosis cases	Yearly rate (per 100,000)**
0-4	848	23.1	181.8	580	25.0	131.7
5-9	315	8.6	71.2	266	8.4	44.1
10-19	409	11.1	43.9	593	11.5	28.8
20-39	969	26.4	48.1	371	25.6	30.1
40-59	554	15.1	29.3	194	16.0	20.0
60+	579	15.8	41.2	312	13.5	24.0
TOTAL	3674	100.0	51.4	2317	100.0	32.4

* Including paratyphoid notifications

** Based on estimated resident population data on 30 June of each year from 2005-2010 (HOIST)

The median age of people with a notifiable *Salmonella* infection in 2010 was 29 years, which is an increase compared to previous years when the median age was between 20 and 25 years. The sex distribution of cases was 50.9% for females, 48.8% for males and missing or unknown for 0.6%.

5.2.2 Seasonal trends in salmonellosis notifications

In 2010, salmonellosis notifications followed the typical seasonal patterns with an increase in the warmer months (Figure 1, above). The decrease of salmonellosis notifications during winter months was smaller than expected based on observations from previous years. The reason for this cannot wholly be attributed to point-source outbreaks and appears to have been a community-wide outbreak with an unknown source of infection.

The increase in cases in February and March 2010 can be partially explained by a large outbreak of *Salmonella* Typhimurium PT 9 (MLVA type 3-26-16-12-526⁴) associated with eating products containing aioli prepared with raw eggs from a take-away food business. This outbreak accounted for 102 of the notifications.

5.2.3 Ten most frequently notified *Salmonella* infections

In 2010 as in previous years, the most frequently notified *Salmonella* serovar was *S.* Typhimurium (55.9% of all *Salmonella* notifications, n=2,054). There were a few changes to the list of 10 most frequent *Salmonella* serovars reported in 2010 compared with 2009. In 2010, *S.* Singapore and *S.* Enteritidis appeared in the top ten of *Salmonella* serovars, and *S.* Stanley and *S.* Montevideo, new to the 2009 top ten disappeared again from the 2010 top ten. For 8.0% the serovar was unknown (see Table 3).

Of the *S.* Typhimurium serovars, the most frequently notified phage type was 170 (n=536) although for 19.4% of *S.* Typhimurium notifications the phage type was unknown at the time of writing of this report. The second most frequent notified phage type of *S.* Typhimurium infection was *S.* Typhimurium phage type 9 (n=184, 5%).

Table 3: Top ten *Salmonella* infections, NSW 2010

Rank	<i>Salmonella</i> serovar	No. of notifications	Percent (%)
1	<i>S.</i> Typhimurium - untyped	713	19.4
2	<i>S.</i> Typhimurium – phage 170	536	14.6
3	<i>S.</i> Enterica – serovar unknown	293	8.0
4	<i>S.</i> Typhimurium - untypable	234	6.4
5	<i>S.</i> Typhimurium – phage 9	184	5.0
6	<i>S.</i> Infantis	143	3.9
7	<i>S.</i> Birkenhead	102	2.8
8	<i>S.</i> Typhimurium – phage 135	79	2.1
9	<i>S.</i> Singapore	56	1.5
10	<i>S.</i> Enteritidis - untyped	51	1.4

⁴ Multiple-locus variable number of tandem repeats analysis (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.

5.2.4 *Salmonella* Enteritidis

In 2010, there were 144 notifications of *S. Enteritidis* infections of varying phage types, which is a 59% increase compared to the 91 notifications in 2009. The median age of cases was 28 years (ranging from 5 months to 79 years). 126 cases (88%) reported overseas travel during the incubation period (for 1 case the country was unknown) and 12 cases (8%) were locally acquired (Table 4). The most common phage type of *S. Enteritidis* was PT 1b (n=20 cases) (Table 5).

Table 4: Count of *S. Enteritidis* notifications in NSW by country of likely exposure, 2010.

Country of likely exposure	No. of notifications
Indonesia	54
Thailand	15
Australia	12
Malaysia	8
Singapore	5
Vietnam	5
East Timor	3
Mauritius	3
Lebanon	3
Japan	3
USA	2
Fiji	2
Hong Kong (SAR of China)	2
China (excludes SARs and Taiwan)	2
Former Yugoslav Republic of Macedonia (FYROM)	2
Italy	2
China	2
Middle East	2
Argentina	1
Greece	1
Turkey	1
Egypt	1
India	1
Cruise	1
Morocco	1
Hungary	1
Philippines	1
Zimbabwe	1
Phillipines	1
Egypt	1
Portugal	1
Unknown	4
Total	144

Table 5: Count of S. Enteritidis notifications in NSW by country of likely exposure, 2010

PT	Nr. of notifications
1b	20
13	14
6a	13
1	13
1a	12
RDNC	6
21c	6
21 var	4
4	5
13a	4
3a	3
12	2
8	2
4b	2
26	2
21	2
21b, 14b, 2, 35, 5a, 59	1 notification for each
Unknown	19
Untypable	9
Total	144

5.2.5 *Salmonella* Paratyphi

In 2010, there were 31 cases of paratyphoid fever (*S. paratyphi* A (n=24), *S. paratyphi* B (n=7)) notified compared to 21 cases in 2009. 87% (27/31) of these cases reported overseas travel to countries such as Bangladesh (n=9) and India (n=9). The median age of paratyphoid cases was 23 years, and the average age was 25 years. Ages ranged from 1 to 66 years. Males (n=18) represented 58% of the cases.

There were also 70 notifications of *Salmonella* paratyphi B. biovar Java (also called *Salmonella* Java) in 2010 compared to 36 cases in 2009. The most common phage type was Dundee (n=19, 27%). 51% (n=36) of *Salmonella* Java notifications were probably acquired in Australia, with 21/36 (58%) of the cases living in North Sydney, an area where *Salmonella* Java infections have been epidemiologically and microbiologically associated with sandpits in children's playgrounds. In the past the council put up warning signs. Now the approach is to test playgrounds linked to a case of *Salmonella* Java. If positive the local council closes the playground and replaces the sand with bark. The median age of *Salmonella* Java cases was 9 years with an average age of 8.4 years. Ages ranged from 1 to 12 years.

5.3 Typhoid fever

In 2010, there were 27 cases of typhoid fever reported, which is a decrease of 25% compared to the average count for the previous five years (average of 36 cases). The median age of typhoid cases was 25.4 years and the average age was 25.6 years. Ages ranged from 1 year and 9 months to 46 years and 5 months. Males (n=16) represented 57.1% of cases. All 27 cases had a recorded history of overseas travel prior to illness. It is likely that the cases acquired typhoid in India (n=15), Bangladesh (n=2), Pakistan (n=2), Fiji (n=2), Papua New Guinea (n=2) Thailand (n=2), Indonesia (n=1), and Samoa (n=1).

5.4 Giardiasis

As in previous years, giardiasis was the second most frequently reported enteric disease in NSW in 2010 (after salmonellosis) with 2,295 notifications received, which is a 28% increase compared to the annual average 2005 to 2009. The median age of cases was 23 years: average age was 27 years. Ages ranged from 0 to 99 years. Males represented 49.8% of the cases, and 76 % of cases were residents of urban areas. Giardiasis is transmitted by the faecal oral route from person-to-person or by ingestion of faecally contaminated untreated water. No clustering of cases was identified. Individual cases of giardiasis are not routinely investigated in NSW.

5.5 Shigellosis

In 2010, 115 cases of shigellosis were reported in NSW, which is a 26% decrease compared to 2009 (n=155) and a 6.5% increase compared to the previous five year average (n=107).

The most common *Shigella* species reported was *Shigella sonnei* (including biotype A, biotype F and biotype G) (n=87; 76%) followed by *Shigella flexneri* (n=21; 18%) (Table 5). 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.

There was a higher number of *Shigella sonnei* biotype A notifications in men compared to women in 2010. The men were aged between 23 and 69 years and eight lived in the south-east of inner Sydney, a popular area of residence with gay men. Shigellosis has been associated with men who have sex with men in Sydney⁴. However, as onset dates of these cases were not clustered, this was not further investigated. Single cases of *Shigella* infections are not investigated in NSW.

Table 6: Count of Shigella cases for 2010 by species and sex, compared with the 2005-2009 average, NSW

<i>Shigella</i> species	Average no. notifications 2005-2009			Notifications 2010		
	Female	Male	Total	Female	Male	Total
<i>Shigella sonnei</i> biotype G	11.6	29.6	41.2	24	30	54
<i>Shigella flexneri</i>	10.2	18.2	28.4	12	9	21
<i>Shigella sonnei</i> (other biotype or untyped)	6.6	9.4	15.8	6	9	15
<i>Shigella sonnei</i> biotype A	7	5.2	12.2	2	16	18
<i>Shigella boydii</i>	1	2.2	3.2	2	1	3
<i>Shigella dysenteriae</i>	0.8	0.6	1.4		1	1
Unknown	2.6	2.4	5	2	1	3
TOTAL	39.8	67.6	107.2	48	67	115

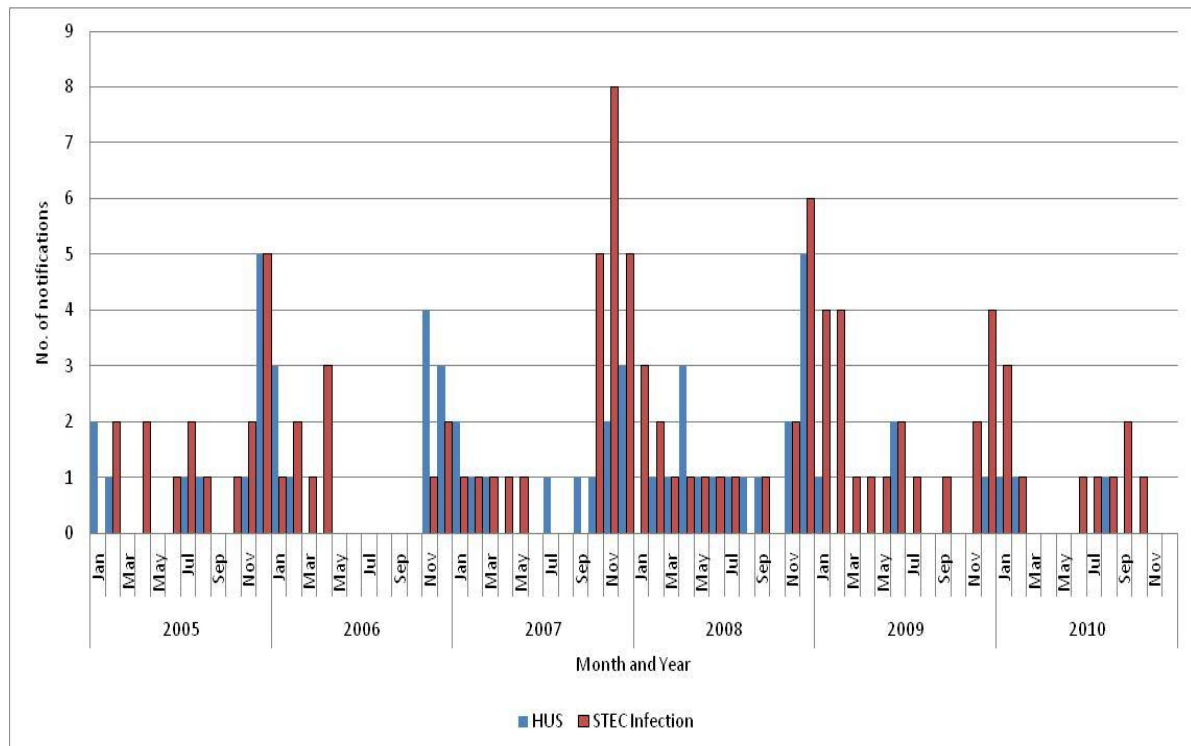
5.6 STEC and HUS

In 2010 there were 10 notifications of Shigatoxigenic E. Coli (STEC) in NSW, a decrease of 52% compared with 2009 (21 cases) and a 44% decrease compared to the average annual count for the previous five years (18 cases).

The median age of STEC cases was 43 years (average 42 years). Ages ranged from 11 to 66 years. Females (n=6) represented 60% of cases. Serotype information was available for 5 of 10 cases: O157 (n=1) and O157:H- (n=4). The other specimens were unable to be cultured.

There were 3 cases of haemolytic uraemic syndrome (HUS) notified in 2010 which is a 73% decrease compared to the average annual count for the previous five years (11 cases). The HUS was thought to be caused by an infection with *Streptococcus pneumoniae* (serotype 19A) in one case. The clinical presentation and risk exposures were suggestive of an STEC infection but could not be laboratory confirmed in the other 2 cases.

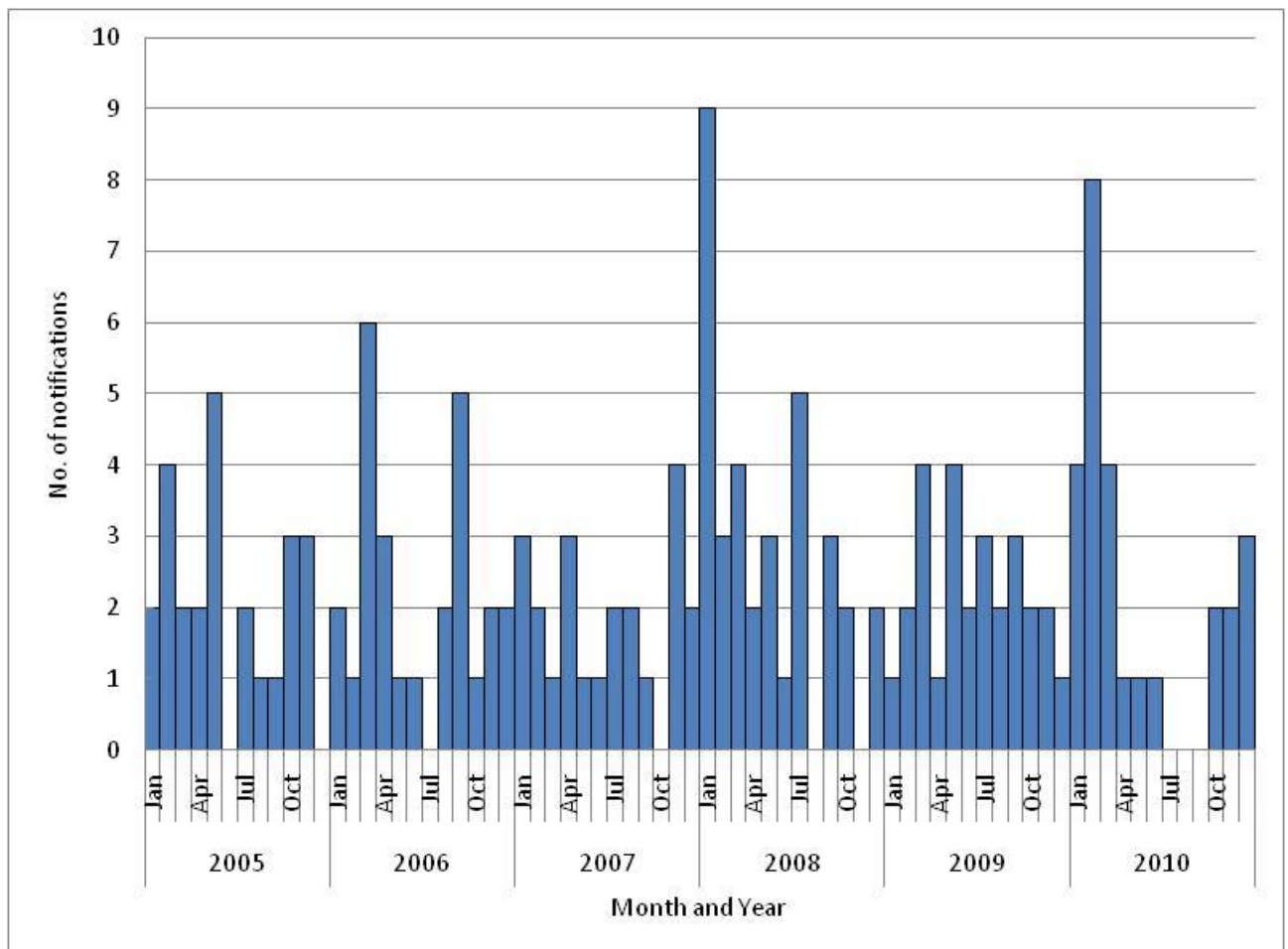
Figure 2: STEC and HUS notification by month, NSW 2005-2010



5.7 Listeriosis

In 2010, there were 26 listeriosis cases reported, which is a similar number to the 27 notifications in 2009 and the previous five year median of 27 cases per year. There were no perinatal cases of listeriosis in 2010. Ages ranged from 44 to 98 years with a median age of 78 years. The majority of cases were female (n=16, 62 %). Of the 26 cases, none were perinatal cases, 9 were immunocompromised or had underlying disease and 20 cases were 65 years or older. There was no consumption of specific foods or other risk factors common to the reported cases. Three NSW cases were associated with a multi-jurisdictional outbreak investigation of listeriosis affecting nine people.

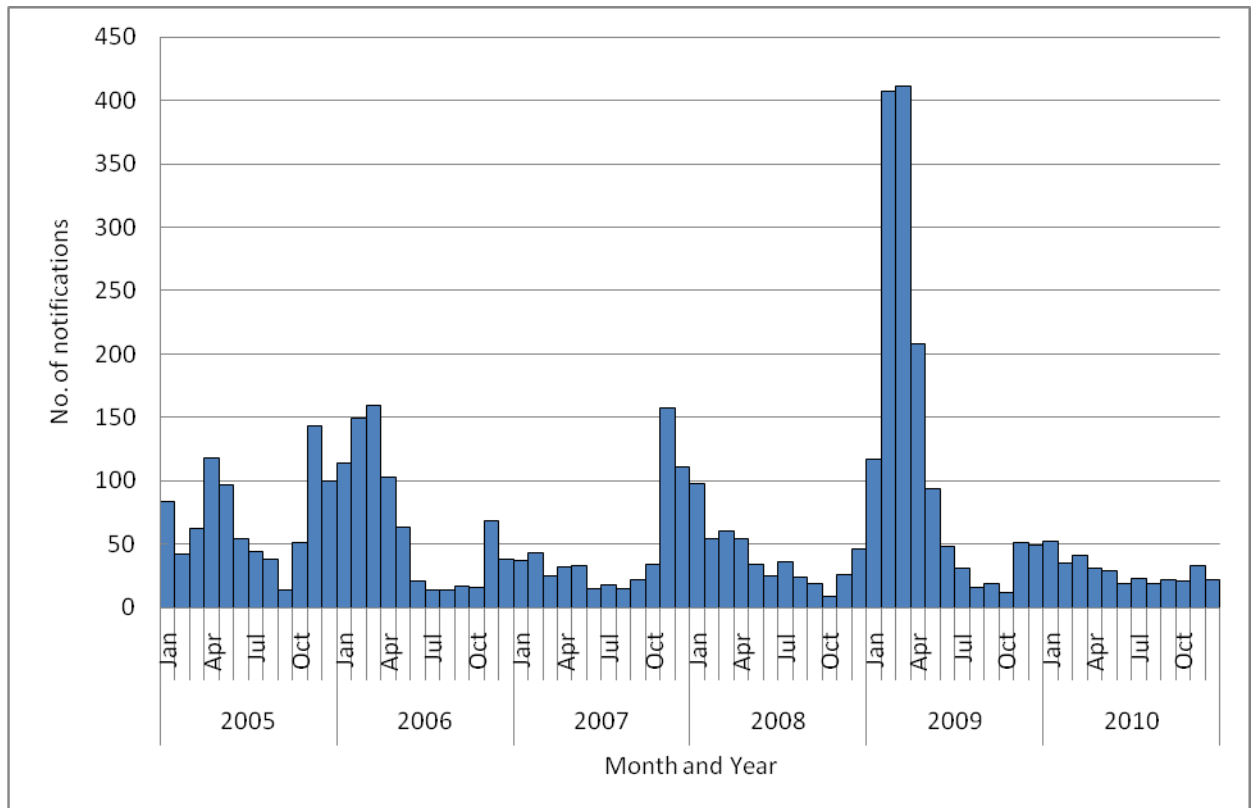
Figure 3: Listeriosis notifications by month, NSW 2005 – 2010



5.8 Cryptosporidiosis

There were 347 cases of cryptosporidiosis reported in NSW in 2010, a 58% decrease compared to the annual average 2005-2009 (n=1798). The median age of cryptosporidiosis cases was 23 years and the average age was 26 years. Ages ranged from 0 months to 91 years. Males (n=184) represented 53% of cases. The large number of notifications in 2009 was due to an outbreak associated with swimming pools.

Figure 5: Cryptosporidiosis notifications by month, NSW 2005 – 2010



5.9 Hepatitis A

There were 83 cases of hepatitis A infection reported in NSW in 2010, a decrease of 11% compared to 2009 (n=94) and a similar number of notifications compared to the average of 81 cases per year in the previous five years. The median age of cases was 21 years; the average age was 27 years. Ages ranged from 2 years to 88 years. Males (n=43) represented 52% of the cases.

The majority of cases (63%, n=52) probably acquired their infection outside of Australia as they reported overseas travel in their exposure period to countries where hepatitis A is known to be endemic. These countries included Fiji (n=11), India (n=9), Iraq (n=6), Pakistan (n=5), Philippines, China, Korea, Samoa, Nepal and Vanuatu (n=2 for each country) and Egypt, Indonesia, Afghanistan, Papua New Guinea, France, Russian federation and Sri Lanka (n=1 for each country). For 2 cases that reported overseas travel, the destination country was unknown.

The rest of the cases (37%, n=31) did not report overseas travel. Of these, nine cases were associated with an outbreak. Four people (3 children and one teacher) from the same classroom at a primary school were identified as co-primary cases, with secondary transmission occurring in family and friends (n=5). An index case or a common exposure could not be identified, and none of the co-primary cases reported overseas travel. Isolates collected from all cases were typed as genotype 1A. Of the other 22 cases that did not report overseas travel in their exposure period, ten were secondary cases to a person that probably did acquire their infection from overseas, and one reported travel to Queensland in their exposure period. The other 12 cases did not report any obvious risk factors or epidemiological links to confirmed hepatitis A cases.

6. Enteric Outbreaks in NSW during 2010

In 2010, there were a total of 576 gastrointestinal outbreaks reported in final summary form to the Communicable Diseases Branch. There were 59 suspected foodborne outbreaks and 517 viral or probable viral gastrointestinal outbreaks in institutions.

6.1 Foodborne and suspected foodborne outbreaks

In 2010, 59 foodborne or suspected foodborne disease outbreaks affecting over 728 people were reported to the NSW Department of Health. Of these, 78 people (10.7%) were hospitalised compared with 74 of 903 (8.2%) in 2009. In 2010, two deaths (both residents of the same aged care facility) were associated with a suspected foodborne outbreak.

In 2010 in NSW, 56.5% of all cases (411/728), 96.2% of all hospitalisations (75/78) and both deaths associated with the 59 reported foodborne and suspected foodborne disease outbreaks, were due to salmonellosis which was identified in 42% (n=25) of the outbreaks. Of the 25 outbreaks associated with *Salmonella* infection, 22 (88%) were caused by *Salmonella* Typhimurium, and one each by *Salmonella* Infantis, *Salmonella* Saintpaul and *Salmonella* Singapore (Table 6).

Of the 22 outbreaks associated with *Salmonella* Typhimurium (see table 6 and 7 for MLVA types) infection in NSW in 2010, 6 had compelling epidemiological and microbiological evidence implicating a food vehicle. For 4 of these outbreaks (all PT 170), the responsible vehicles were tartare sauce, mayonnaise and fried ice cream prepared with raw egg, and kebabs containing chicken, hummus, and/or tabouli. For one outbreak of *Salmonella* Typhimurium PT 9 there was an association with aioli prepared with raw egg, and an outbreak of *Salmonella* Typhimurium PT 204 could be linked to consumption of barbecued pork.

Investigation of an outbreak of *Salmonella* Infantis in an aged care facility found a strong epidemiological association with the consumption of fluid thickener that was suspected to be cross-contaminated with raw chicken mince (a batch of raw chicken mince tested positive for *Salmonella* Infantis) through dirty utensils.

In four more outbreaks, *Campylobacter jejuni*, *Clostridium perfringens*, norovirus and histamine poisoning were each identified as the agent responsible. The outbreak of histamine poisoning in five people was associated with the consumption of mahi-mahi fish fillets (Table 6).

For 29 (49%) reported outbreaks the pathogen could not be identified. Possible reasons for this include: cases with gastrointestinal disease do not always seek medical care; not every doctor requests a stool specimen from cases; cases may no longer be excreting the pathogen when they submit the stool specimen; the very low infective dose of a number of pathogens makes it difficult for the laboratories to find it in one stool specimen.

For 29 (49%) of the suspected foodborne outbreaks, a (suspected) responsible vehicle could not be found. Possible reasons for this include the delay between consumption of foods and reporting of illness, making it difficult for cases to recall foods and ingredients consumed, and for the NSW Food Authority to obtain specimens of implicated foods and timely environmental samples. In addition, not all reported outbreaks can be properly investigated due to factors such as lack of cooperation from cases (an outbreak is often reported by one case, representing many cases who may not want to collaborate) and prioritisation of resources.

Table 6: Foodborne disease outbreaks reported in NSW, 2010

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
*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								
HUN0420	Jan	take-away	Unknown	3	0	D	D	Suspected assorted pizzas
HUN0421	Jan	take-away	<i>Salmonella</i> Singapore	5	0	D	D	Suspected foods containing eggs (egg and salad wrap, egg salad)
NC0008	Jan	restaurant	Suspected histamine poisoning	5	0	D	D	Mahi-mahi fish fillets
SESILL0057	Jan	restaurant	<i>Salmonella</i> Typhimurium 9 MLVA 3-10-15-12-496	2	1	D	D	Suspected steamed pork buns
SSW0038	Jan	aged care	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	2	0	D	D	Suspected those eating pureed food but unable to specify
SSW0042	Jan	bakery	<i>Salmonella</i> Typhimurium 6 MLVA 3-14-8-12-523	10	0	D	D	Suspected Vietnamese pork roll containing raw egg mayonnaise
SW0032	Jan	private residence	<i>Salmonella</i> Typhimurium 170 MLVA 3-10-7-15-523 & 3-9-7-15-523	5	4	D	D	Suspected mayonnaise prepared with raw eggs
SW0033	Jan	restaurant	Unknown	25	0	D	D	Unknown
GS0013	Jan	restaurant	<i>Salmonella</i> Typhimurium 9 MLVA 2-27-16-12-526	168 (104 lab confirmed)	19	AM	C	Aioli prepared with raw egg

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
NSW0019	Feb	restaurant	<i>Salmonella</i> Typhimurium 170a MLVA 3-11-11-9-523	3	0	D	D	Unknown
SESILL0058	Feb	restaurant	Unknown	3	0	D	D	Suspected chicken or beef
SSW0040	Feb	restaurant	Unknown	4	0	D	N	Unknown
SSW0041	Feb	restaurant	Unknown	4	0	D	D	Unknown
SW0034	Feb	take-away	<i>Salmonella</i> Typhimurium 204 MLVA 3-11-10-9-523	4	3	M	D	Barbecued pork
NSCC0028	Mar	commercial caterer	Unknown	50	0	A	C	Unknown
CCA0038	Mar	take-away	Unknown	3	1	D	D	Unknown
HUN0422	Mar	commercial manufactured food	Unknown	3	0	D	D	Suspected orange and mango fruit drink
SSW0039b	Mar	private residence	<i>Salmonella</i> Typhimurium 170 MLVA 3-10-7-15-523 & 3-9-7-15-523	9	1	D	D	Suspected tiramisu prepared with raw eggs
SESILL0061	Mar	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-12-523	6	3	M	D	Tartare sauce prepared with raw egg
HUN0424	April	take-away	Norovirus	13	0	D	D	Susp. foodhandler contamination of a variety of ready to eat foods: sandwiches, salads, wraps

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
NC0009	April	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-12-523	19	0	D	D	Suspected peanut/cashew mix
SESILL0060	April	national franchised fast food	<i>Salmonella</i> Typhimurium 9 MLVA 3-10-13-12-496	4	1	D	D	Suspected chicken pieces from franchised restaurant
SSW0043	April	aged care	<i>Salmonella</i> Infantis	26	5	A	C	Suspected fluid thickener contaminated by raw chicken mince
SESILL0062	April	take-away	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	9	0	M	D	Mayonnaise made with raw egg
SES0053	May	restaurant	<i>Campylobacter jejuni</i>	10	0	AM	C	Susp. cross-contamination from raw chicken from which campylobacter was isolated
HUN0425	May	take-away	Unknown	2	0	D	D	Susp. Mongolian lamb/fried rice
HUN0426	May	restaurant	Unknown	32	1	D/A	C	Unknown
HUN0427	May	restaurant	Unknown	7	0	D	N	Unknown
HUN0428	May	commercial caterer	<i>Salmonella</i> Saintpaul	7	3	D	D	Suspected meal of salmon, with pumpkin and cous cous salad, with a parsley aioli
SW0035	June	restaurant	Unknown	7	0	D	D	Unknown
SWS0008	June	restaurant	Unknown	12	0	D	D	Unknown
SWS0009	June	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	16	9	D	D	Suspected fried rice

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
WS0058	June	restaurant	Unknown	3	0	D	D	Unknown
WSA0057	June	restaurant	Unknown	4	0	D	N	Unknown
WSA0058	June	take-away	Unknown	9	0	D	N	Unknown
HUN0429	June	restaurant	Unknown	11	0	D	D	Unknown
NSCC0029	June	take-away	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-14-523 & 3-9-7-15-523 & 3-9-7- 13-523	45	8	M	D	Chicken, hummus, tabouli
SESILL0065	July	aged care	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	7	0	A	C	Suspected those on a minced or pureed diet but unable to specify.
SESILL0066	July	private residence	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	9	5	D	D	Suspected mousse cake with raw eggs
NSCC0030	Aug	restaurant	Unknown	27	0	A	C	Suspect assorted wraps (roast beef, chicken and vegetable- unable to specify)
GS0015	Aug	restaurant	<i>Salmonella</i> Typhimurium 9 MLVA 3-21-12-13-523	9	UK	D	D	Unknown
SESILL0064	Aug	restaurant	Unknown	11	0	D	N	Unknown
SSW0044	Aug	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	14	4	M	D	Fried ice-cream made with raw egg

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
HUN0430	Sept	restaurant	Unknown	4	0	D	D	Unknown
WS0061	Sept	aged care	<i>Clostridium Perfringens</i>	8	1	D	N	Unknown
WS0062	Sept	aged care	Unknown	16	0	D	N	unknown
WS26242	Oct	take-away	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	15	3	D	D	Suspected Vietnamese pork rolls
HUN0432	Oct	restaurant	Unknown	5	0	D/A	C	Unknown
SESI0067	Oct	take-away	Unknown	6	0	D	D	Unknown
SSW2010092	Oct	hospital	<i>Campylobacter jejuni</i>	3	NA	D	N	Unknown
GS0016	Nov	commercial caterer	<i>Salmonella</i> Typhimurium PT 135a MLVA 3-14-8-14-523	7	2	D	D	Unknown
HUN0433	Nov	restaurant	Unknown	6	0	D	D	Unknown
SESI26415	Nov	restaurant	Unknown	3	0	D	D	Unknown
SESI26683	Nov	restaurant	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-8-13-523	2	1	D	D	Suspected salmon patties made with egg
SSW26772	Dec	take-away	<i>Salmonella</i> Typhimurium 170 MLVA 3-9-7-13-523	8	3	D	D	Suspected pork rolls
HUN0434	Dec	institution	Unknown	5	0	D	D	Unknown

Area Health Service/ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SESI26628	Dec	restaurant	Unknown	3	0	D	D	Unknown
SESI26630	Dec	restaurant	Unknown	5	0	D	D	Unknown
SSW26708	Dec	restaurant	Unknown	5	0	D	D	Unknown

Table 7: Salmonellae by serotype, phage type and MLVA type associated with foodborne outbreaks in NSW, 2010*

<i>Salmonella</i> serotype	Phage type	MLVA type	No. of outbreaks (cases)
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-7-13-523	9 (82)
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-7-15-523	3 (19)
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-7-12-523	2 (25)
<i>Salmonella</i> Typhimurium	170	MLVA 3-10-7-15-523	2 (5)
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-7-14-523	1 (16)
<i>Salmonella</i> Typhimurium	170	MLVA 3-9-8-13-523	1 (2)
<i>Salmonella</i> Typhimurium	170a	MLVA 3-14-8-14-523	1 (7)
<i>Salmonella</i> Typhimurium	9	MLVA 3-10-13-12-496	1 (4)
<i>Salmonella</i> Typhimurium	9	MLVA 3-10-15-12-496	1 (2)
<i>Salmonella</i> Typhimurium	9	MLVA 3-21-12-13-523	1 (9)
<i>Salmonella</i> Typhimurium	9	MLVA 3-27-16-12-526	1 (168)
<i>Salmonella</i> Typhimurium	135a	MLVA 3-11-11-9-523	1 (7)
<i>Salmonella</i> Typhimurium	204	MLVA 3-11-10-9-523	1 (4)
<i>Salmonella</i> Typhimurium	6	MLVA 3-14-8-12-523	1 (10)
<i>Salmonella</i> Infantis			1 (26)
<i>Salmonella</i> Saintpaul			1 (7)
<i>Salmonella</i> Singapore			1 (5)

* 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 2010

An outbreak of *Salmonella* Typhimurium PT 9 (MLVA 2-27-16-12-526) associated with eating products containing aioli prepared with raw eggs from a take-away burger business was investigated. 189 people who ate at the outlet in a period of six days were interviewed and 168 of these reported symptoms of diarrhoea and/or vomiting, fever, abdominal pain, myalgia and bloody stools. Stool specimens for 104 of these people were laboratory confirmed *Salmonella* Typhimurium 9 MLVA type 2-27-16-12-526. This same type of *Salmonella* was also isolated from aioli prepared with raw egg and from swabs of two chopping boards. The business was closed under a NSW Food Authority prohibition order and reopened after implementation of revised cleaning and sanitising procedures and on the provision that they would cease the production of raw egg sauces. The egg farm that supplied the eggs used to prepare the aioli was inspected but no *Salmonella* was detected (GS0013).

Two separate complaints through the NSW Food Authority, enhanced surveillance of gastroenteritis cases presenting to local emergency departments, and enhanced surveillance of *Salmonella* laboratory notifications, established an outbreak of 31 confirmed cases of *Salmonella* Typhimurium PT 170 MLVA 3-9-7-13-523 (n=1), MLVA type 3-9-7-14-523 (n=16), and MLVA type 3-9-7-15-523 (n=14). Illness in these confirmed outbreak cases was associated with consuming kebabs (30 cases), mainly those filled with chicken, hummus, tabouli, lettuce, and tomato, or with consuming crepes (1 case) from a food outlet in a shopping centre. In addition, 14 probable cases (people with symptoms of gastroenteritis who consumed kebabs from the same food outlet did not submit stool specimens for diagnosis) were also identified. Samples of cooked chicken kebab, hummus and tabouli and several environmental samples were positive for *S. Typhimurium* MLVA 3-9-7-15-523. One environmental swab was positive for

both STm 170 (3-9-7-15-523) and STm 193. A sample of marinated raw chicken was positive for *Salmonella* Infantis. The business temporarily closed under a prohibition order from the NSW FA. The business has ceased preparing chicken kebab logs on site which should substantially reduce the risk of cross contamination of foods (NSCC0029).

An outbreak of salmonellosis in an aged care facility was investigated. In total, 26 people were affected. Twenty-two residents and one staff member (not the index case) tested positive for *Salmonella* Infantis and a further three residents had symptoms consistent with salmonellosis but were not tested. The NSW FA inspected the premises and found the facility to be clean and well maintained. No high risk foods were being served to residents. Numerous food and environmental samples were obtained. A sample of raw chicken mince tested positive for *Salmonella* Infantis. Epidemiological analysis resulted in a strong association with the consumption of thickened fluids. However, a sample of the batch of powder used to thicken fluids at the time of the outbreak tested negative for all pathogens. Cross contamination from the chicken mince to the thickened fluid powder was suspected as a possible cause of the outbreak but could not be confirmed. Control actions were discussed with the facility to further reduce the possibility of any future outbreak linked to thickened fluids (SSW0043).

Two groups of diners reported developing symptoms of gastroenteritis after consuming meals from a Chinese restaurant over a one-week period. In addition, active case finding identified an additional 3 people who also reportedly ate at the same restaurant during the exposure period. In total 14/15 people developed symptoms consistent with salmonellosis, with six stool specimens (from people from all three groups) positive for *Salmonella* Typhimurium 170 (MLVA: 3-9-7-13-523). A common food to all cases was deep fried ice-cream, made with unpasteurised whole egg. The NSW Food Authority conducted an environmental investigation and collected a number of food samples and environmental swabs. The same type of *Salmonella* as in the cases was isolated from samples of raw and cooked deep fried ice-cream. The Authority issued a formal warning letter to the premises advising that raw egg be no longer used in the preparation of deep fried ice-cream, and issued them with a Penalty Infringement Notice (SSW0044).

Through surveillance of routine laboratory *Salmonella* notifications, a cluster of 14 *Salmonella* Typhimurium 170 MLVA type 3-9-7-13-523 in the Parramatta area was identified. Twelve from 14 people were interviewed and 9 reported eating at the same Vietnamese bakery. 7/9 ate Vietnamese pork rolls, and 2/9 ate something else. A further 6 people with symptoms and exposure to the bakery (Vietnamese pork rolls) were identified through interviews with the first 9 cases. The NSW Food Authority inspected the premises and took samples of foods as well as environmental swabs, although staff were seen disinfecting the area. All food samples were negative for *Salmonella*, only a drag swab of a dry food bin was positive for the same *Salmonella* type as was identified in the cases. An improvement notice was issued in regard to observed hygiene issues (WS26242).

6.3 Institutional gastrointestinal outbreaks

In 2010, PHUs reported 517 gastroenteritis outbreaks in institutional settings likely to be due to person-to-person transmission of viral gastroenteritis. The outbreaks affected 9,359 people compared with 600 outbreaks affecting 11,679 people in 2009. Of these outbreaks, 248 (48.0%) occurred in aged care facilities (median 17 cases per outbreak), 183 (35.4%) in childcare centres (median 11 cases per outbreak), 73 (14.1%) in hospitals (median 13 cases per outbreak), 3 (0.6%) in schools (median 10 cases per outbreak) and 10 (1.9%) in other settings (median 10 cases per outbreak) (Table 8).

Norovirus and rotavirus were the two most commonly identified pathogens in stool specimens collected during outbreak investigations. Norovirus was identified in one or more stool specimens in 166 (32.1%) outbreak investigations, and rotavirus in 40 (7.7%) outbreak investigations. In 30 outbreak investigations more than one pathogen was identified.

Other pathogens identified in one or more stool specimens collected during outbreak investigations were *Cryptosporidium* (1 specimen in 1 outbreak), *Clostridium difficile* (range of 1-4 specimens in 12 outbreaks), *Campylobacter* (range of 1-2 specimens in 6 outbreaks), *Giardia intestinalis* (1 specimen each in 2 outbreaks), *Clostridium perfringens* (1 specimen each in 3 outbreaks), *Blastocystis hominis* (range of 1-2 specimens in 3 outbreaks) and *Salmonella* (3 specimens in 1 outbreak). These non-viral pathogens were believed to be incidental findings and not the cause of the outbreak, as the clinical symptoms and the epidemiology of the outbreaks indicated person-to-person transmission of a viral pathogen. In fact, in 21/30 (70%) of the outbreaks where one of these pathogens was identified, it was identified in tandem with a viral pathogen.

The aetiology was unknown for 322 (62.3%) of the outbreaks. For 205 outbreaks (39.7%) no stool or other samples were collected for testing. Although laboratory evidence was not available for these outbreaks, the epidemiological information indicated person-to-person transmission of a viral pathogen.

Table 8: Number of (probable) viral gastroenteritis outbreaks and number of cases by institution, NSW 2007 – 2010

Institution	2007		2008		2009		2010	
	No. outbreaks	No. cases	No. outbreaks	No. cases	No. outbreaks	No. cases	No. outbreaks	No. cases
Aged Care	290	6917	334	7536	317	7681	248	5166
Hospital	92	1752	114	1693	116	1632	73	1603
Childcare	101	1315	122	1233	143	1981	183	2441
School	9	213	3	7	3	68	3	29
Other	11	297	10	172	21	317	10	119
TOTAL	503	10494	586	10641	600	11679	517	9359

7. Activity in NSW during 2010

7.1 Improving Surveillance

- Communication: The HNE, NSW and ACT OzFoodNet sites, the NSW Food Authority and the NSW Enteric Reference Laboratory at ICPMR held weekly teleconferences to discuss notifications and suspected clusters and outbreaks, and to communicate progress on recent investigations. 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 2010, ICPMR started providing the OzFoodNet sites with weekly alerts of clusters of *Salmonella* Typhimurium based on MLVA type.
- The working group set up to investigate surveillance of *Campylobacter* infections in NSW continued its activities in 2010. 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.
- The Notifiable Conditions Information Management System (NCIMS) replaced the Notifiable Diseases Database

7.2 OzFoodNet studies

- Exposure information for five cases with confirmed *Salmonella* Mississippi was provided to the national *Salmonella* Mississippi case-control study.
- A project aimed at evaluating the timeliness of MLVA typing in NSW was commenced. Data cleaning and linkage have been completed and data analysis is underway.
- The NCIMS outbreak working group was initiated to review the outbreak functionality of the newly introduced NCIMS. The group identified features required to support outbreak investigation, reviewed existing features and provided recommendations for desirable enhancements.
- *Campylobacter* data (collected as part of a national campylobacter spp case control study) are being analysed
- After conducting a literature review and consultations with stakeholders, a national STEC risk factor questionnaire was developed. A national questionnaire was one of the recommendations from a national debrief of the 2009 multi-jurisdictional outbreak of STEC infection.
- The findings and recommendations of the indigenous identification in NDD data analysis project study were published in the Medical Journal of Australia; *Closing the Gap - Better health intelligence is required*. The material was presented to the Australian Health Protection Committee, and a recommendation was made to systematically capture indigenous status at the time that pathology request forms are completed.
- A contribution was made to a national working group that developed and implemented objectives and processes for coordinated national surveillance of listeriosis monocytogens in humans.

7.3 Guidelines and policy

- The NSW control guidelines for gastroenteritis outbreaks in an institution were reviewed and updated.
- The Hospital Gastro Pack was revised and a Child Care Centre Gastro Pack was created.
- The NSW Public Health Units response protocols for shigellosis and rotavirus were reviewed and updated.
- A fact sheet was created for hepatitis E and norovirus and published on the NSW Health internet.
- A response protocol is being created for weekly alerts of clusters of *Salmonella* Typhimurium based on MLVA type, from the NSW Enteric Reference Laboratory at ICPMR
- The NSW FA and NSW Health Investigation of Foodborne Illness Response Protocol – Operations Procedures Manual was finalised

7.4 Publications

- Merritt AD, Roberts-Witteveen AR, Durrheim DN. Closing the Gap – better health intelligence is required. *Med J Aus.* 2010 Sep 6; 193(5):309
- [Dalton CB](#), [Merritt TD](#), [Unicomb LE](#), [Kirk MD](#), [Stafford RJ](#), [Lalor K](#); [OzFoodNet Working Group](#). A national case-control study of risk factors for listeriosis in Australia. [Epidemiol Infect.](#) 2011 Mar;139(3):437-45. Epub 2010 Apr 30.

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
- Face to face meetings with OFN national network in Newcastle, Melbourne and Canberra

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.
- In response to the Hepatitis A outbreak in the lower Hunter area, an alert was forwarded to GP's in the lower Hunter area.

8. References

- ¹ New South Wales Department of Health. Circular 2004/32: Notification of Infectious Diseases under the Public Health Act 1991. Issued 22 June 2004. Sydney: NSW.
- ² New South Wales Department of Health. Notifiable Diseases Database System (NDD) (HOIST). Communicable Diseases Branch and Epidemiology and Research Branch.
- ³ Australian Bureau of Statistics. Estimated resident populations based on 2001 Census counts and mid-series experimental population projections.
- 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.
- ⁵ Wang Q, Kong F, Jelfs P, Gilbert GL. 2008. Extended phage locus typing of *Salmonella enterica* serovar Typhimurium, using multiplex PCR-based reverse line blot hybridization. *J Med Microbiol*, 57:827-38.