OzFoodNet — Enhancing Foodborne Disease Surveillance across Australia.

NSW 2011 OzFoodNet Annual Report

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3. Summary

- In 2011, there were 6,482 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 15% increase compared with the average annual disease count for the previous five years.

- Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in NSW during 2011 with a total of 3,473 notifications reported. While the total case count for 2011 was lower than that of 2010, it was still considerably higher than that seen in years prior to 2010.

- Giardiasis was the second most frequently reported enteric condition in 2011. There were 2,362 notifications in the year, an increase of 20% compared with the annual average for the previous five years. No clustering of cases or outbreaks was identified.

- There were 359 cryptosporidiosis notifications received in 2011. This represented a reduction of 50% compared to the annual average for the previous five years (n=723).

- The number of STEC notifications remained steady with 10 cases reported in both 2011 and 2010. There was a 40% decrease when compared to the annual average for the previous five years of 17 cases. All cases were investigated and no epidemiological links were identified.

- In 2011, 48 foodborne or probable foodborne disease outbreaks were reported affecting over 815 people, as well as 530 viral or probable viral gastroenteritis outbreaks in institutions affecting 9,071 people. This was a 20% decrease in the number of reported foodborne or probable foodborne disease outbreaks compared to the year 2010 (n=59), and a 2% increase in the number of reported gastroenteritis outbreaks in institutions compared to the year 2010 (n=517).

- Of the point-source foodborne outbreaks of *Salmonella* Typhimurium, 69% (9/13) were associated with the consumption of food that contained raw or only partially cooked eggs, such as raw egg salad dressing or desserts containing raw egg white (tiramisu), or undercooked egg (fried ice-cream). The cases in these outbreaks constituted 81% (145/178) of all *Salmonella* Typhimurium outbreak related cases.

- Salmonellosis can be a serious disease and results in many hospitalisations and some deaths every year. The incidence of salmonellosis is increasing in Australia every year. This is in contrast to other developed countries where rates of infection are decreasing.

- Contaminated eggs cause a significant proportion of reported *Salmonella* infections in Australia each year. The number and proportion of Salmonellosis outbreaks attributed to eggs and egg-containing dishes has been increasing in recent years.

4. 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 Ministry of Health (NSW MOH), 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 Ministry 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 assist with the investigation of state-wide outbreaks, and assist in policy relevant enteric disease research. The Hunter OFN site comprises an OFN epidemiologist. Both sites work closely with Communicable Disease Branch staff.

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

4.1 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 people[1]. 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).

4.2 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.

4.3 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 April 2012, 2011 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 2006-2011 was used to calculate crude incidence rates for each disease[3].

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 Ministry of Health. Data were reported as received by the Communicable Diseases Branch on 20 April 2011.

[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).

5. Activity during 2011

5.1 Overview

The counts of each notifiable enteric disease[2] for 2011 were compared with the average annual count for the years 2006 to 2011. Results are presented in Table 1. Overall, there were 6,482 enteric disease cases in 2011, a 15% increase compared to the average number of cases for the previous 5 years. This increase was largely due to the reported rise in the number of Salmonellosis and giardia cases.

Table 1: Number of selected enteric diseases during 2011 compared with the average number of cases, NSW 2006-2010

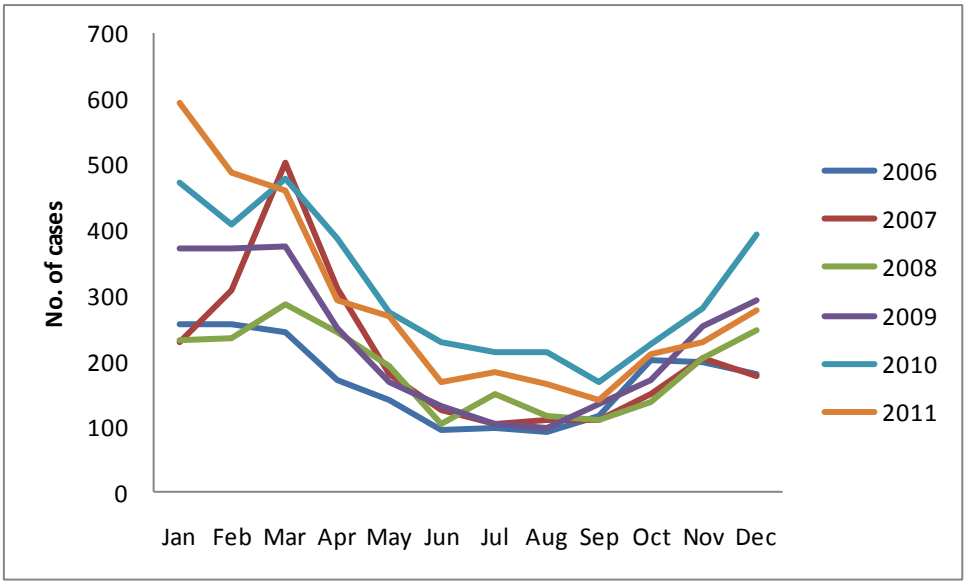
Condition	2011	5 year average	% change
Cholera	0	2	-100%
Cryptosporidiosis	359	723	-50%
Giardiasis	2362	1967	20%
HUS	4	9	-57%
Hepatitis A	57	81	-30%
Hepatitis E	20	13	59%
Listeriosis	21	27	-22%
STEC Infection	10	17	-40%
Salmonellosis (including Paratyphoid)	3473	2658	31%
Shigellosis	131	103	27%
Typhoid	45	36	21%
TOTAL	6482	5637	15%

5.2 Salmonellosis (including Paratyphoid)

Salmonellosis (including paratyphoid) was the most frequently reported enteric condition in NSW during 2011. There were a total of 3,473 cases, which is a 31% increase compared to the average annual count, 2006-2011. Figure 1 shows the monthly comparison of salmonellosis cases from 2006-2011. The highest number of cases on record was reported in 2010. While the total case count for 2011 was lower than that of 2010, it was still considerably higher than that seen in years prior to 2010.

[2] 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: Number of notified salmonellosis cases by month in NSW, 2006 to 2011



* Including paratyphoid cases

5.2.1 Age and sex distribution of people with salmonellosis

The age distribution of cases in 2011 was very similar to that of previous years with 25% of cases aged 20 to 39 years and 24% of cases aged 0 to 4 years. The age specific rate was higher for each age group in 2011 compared with the average rate for the previous 5 years (Table 2). The sex distribution of cases was similar to 2010 with 51% females 49% for males.

Table 2: Number and rate of notified salmonellosis* cases 2011, compared with 2006-2010 average by age group, NSW

Age group (in years)	No. cases 2011	% of all cases 2011	Rate 2011	Average no. cases 2006 - 2010	% of all cases 2006-2010	Average rate 2006 - 2010
0-4	823	24%	172.6	648	24%	141.8
5 - 9	331	10%	74.2	215	8%	48.0
10-19	394	11%	42.5	303	11%	32.1
20-39	856	25%	42.7	689	26%	34.0
40-59	544	16%	28.5	418	16%	21.9
60+	525	15%	36.4	383	14%	28.1
TOTAL	3473	100%	48.2	2656	100%	38.0

5.2.2 Seasonal trends in salmonellosis infections

In 2011, salmonellosis notifications followed the typical seasonal patterns with an increase in the warmer months (Figure 1, above).

5.2.3 Ten most frequently notified Salmonella infections

In 2011 as in previous years, the most frequently notified *Salmonella* serovar was *S.* Typhimurium (57% of all S*almonella* cases). The most marked differences compared with 2010

was an increase in *Salmonella* Wangata (89 in 2011 vs 38 in 2010) and a decrease in *Salmonella* Singapore (27 in 2011 vs 56 in 2010).

Table 3: Top ten Salmonella infections*, in notified cases, NSW 2011

Rank	Salmonella serovar	No. notifications
1	Typhimurium	1972
2	Enteritidis	174
3	Virchow	159
4	Wangata	89
5	Infantis	74
6	Paratyphi B bv Java	72
7	Birkenhead	71
8	Saintpaul	50
9	Bovismorbificans	44
10	Newport	38

*excludes 119 cases that were not typed

NSW *S.* Typhimurium cases are no longer being phage typed. The more discriminative method of MLVA (Multiple-Locus Variable number tandem repeat Analysis) typing is used in NSW. MLVA results were available for 93% (1835/1972) of the *S.* Typhimurium cases. In total, 398 distinct MLVA types were reported. The ten most commonly reported MLVA types shown below represent 49% of all typed cases (table 4).

Table 4. Top ten *S.* Typhimurium MLVA patterns, in notified cases, NSW 2011

Rank	STM MLVA	No. cases	PT
1	3-9-7-13-523	249	170
2	3-10-8-9-523	147	170
3	3-9-8-13-523	112	170
4	3-9-7-14-523	90	170
5	3-12-9-10-550	75	135
6	3-9-7-15-523	59	170
7	3-14-11-12-523	49	135a
8	3-10-14-12-496	46	9
9	3-12-15-13-523	46	9
10	3-13-11-9-523	29	135a

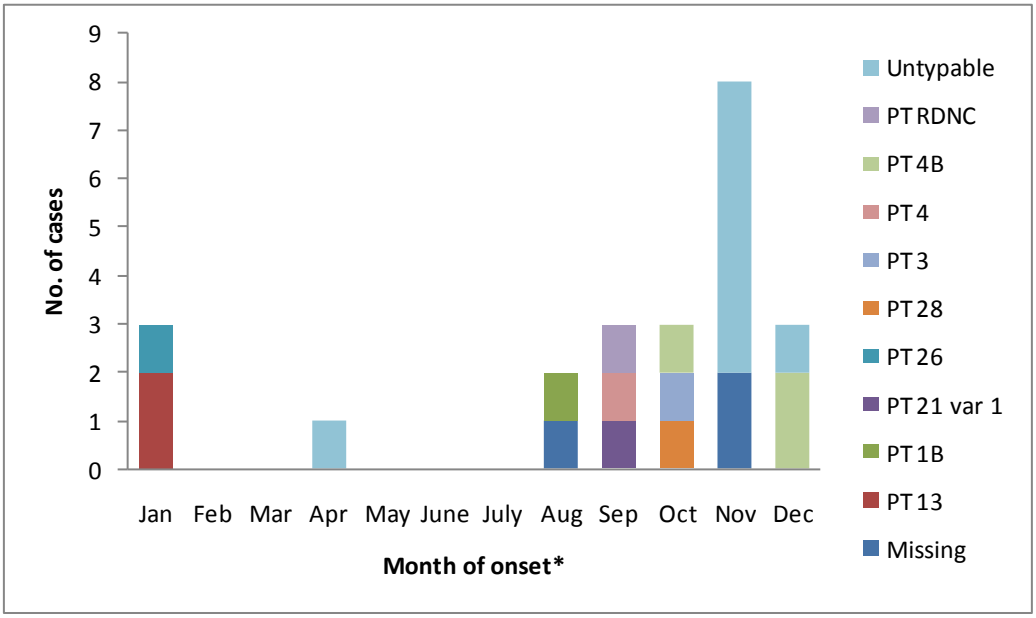
*excludes 137 *S.* Typhimurium cases not further typed

5.2.4 Salmonella Enteritidis Infection

In 2011, there were 174 cases of *S.* Enteriditis infections of varying phage types, which is a 21% increase compared to 144 cases in 2010. The infection was likely acquired overseas for 80% of cases with 48% (67/140) acquired in Indonesia. For the remaining cases, 13% were locally acquired and the place of acquisition was unknown for 6 % cases. Amongst the locally acquired

cases, ten different subtypes were detected. All cases were interviewed and no common links were identified (Figure 2).

Figure 2: Notified locally acquired *Salmonella* Enteritidis infection cases in NSW by month of onset and subtype, 2011



*taken as earlier of symptom onset and specimen date

5.2.5 Salmonella Paratyphi Infection

In 2011 there were 96 *Salmonella* Paratyphi cases reported. Of these 24% (23/96) were *S.* Paratyphi A and 75% (72/96) were *S.* Paratyphi B bv Java. Typing was not available for one case.

Paratyphoid A Infection

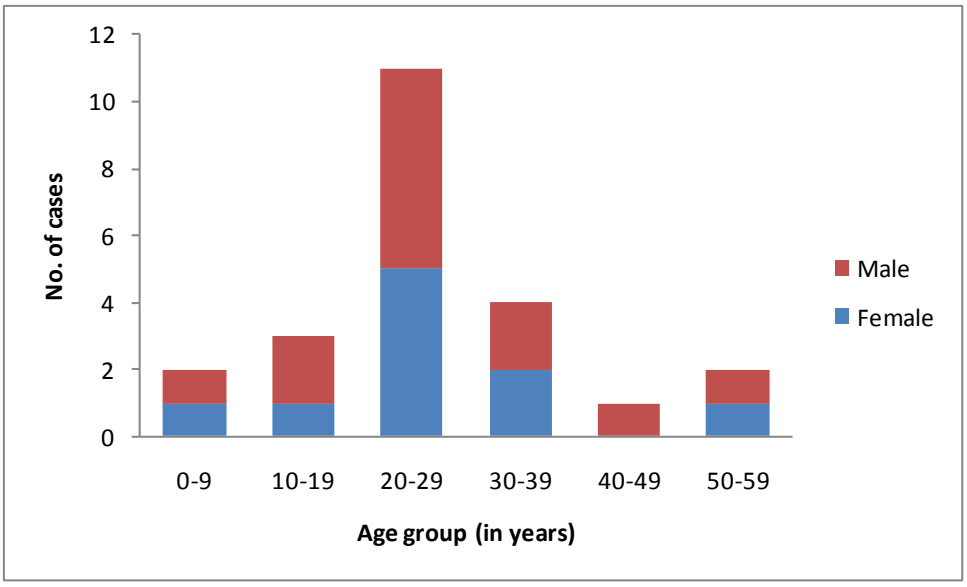
In line with 2010, there were 23 S. Paratyphi A infection cases notified. The symptom profile is shown in Table 5 with fever reported in all cases for which information was available. Hospitalisation was required for 78% (18/23) cases with a median length of stay of 4 days (range 1 to 38 days, unknown length of stay for 3 cases).

Table 5. Symptoms reported for notified paratyphoid A infection cases in NSW, 2011

Symptom	Yes (%)	No (%)	Unknown (%)
Fever	19 (83%)	0 (0%)	4 (17%)
Diarrhoea	11 (48%)	9 (39%)	3 (13%)
Abdominal pain	5 (22%)	12 (52%)	6 (26%)
Headache	9 (39%)	8 (35%)	6 (26%)
Vomiting	6 (26%)	11 (48%)	6 (26%)

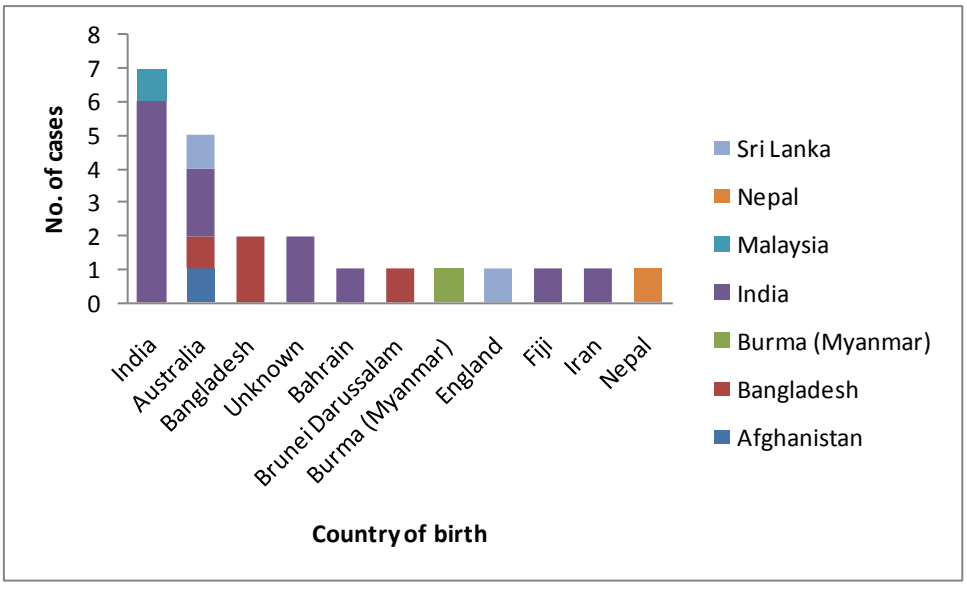
The majority of cases were aged between 20 and 29 years. 57% (13/23) of cases were male (Figure 3).

Figure 3. Notified Paratyphoid A infection cases by age and sex in NSW, 2011



All of these cases acquired their infection while travelling overseas with 57% (13/23) acquiring their infection in India. Seventy-eight percent (18/23) of cases were born outside Australia, 30%, (7/23) born in India) and 56% (10/18) acquired their infection while travelling to their country of birth (Figure 4). Travel was not part of an organised tour for 78% (14/18) cases and unknown for 22% (4/18) cases. English was the primary language spoken for 78% (18/23) cases. Thirteen percent (3/23) of cases were non English speaking and this information was not known for 9% (2/23) cases.

Figure 5. Country of birth by country of disease acquisition for notified Paratyphoid A infection cases in NSW, 2011



***Salmonella* paratyphi B. Biovar Java Infection**

The number of *Salmonella* paratyphi B. Biovar Java infection cases (also called *Salmonella* Java) was consistent with the number reported in 2010. The place of acquisition was overseas for 46% (33/72) of cases, within Australia for 28% (20/72) and unknown for 26% (19/72) of cases.

For cases acquired locally, 75% (15/20) were less than 10 years of age. Contact with fish tanks is known to be associated with *Salmonella* Java infections and in previous years, infections have been epidemiologically and microbiologically associated with sandpits in children's playgrounds in northern Sydney. Of the 20 locally acquired cases, exposure to fish tanks was reported for 20% (4/20) cases and 55% (11/20) cases lived/visited northern Sydney. Two cases (10%) did not report either fish tank or northern Sydney exposure and the information likely source of infection was not available for the remaining 15% (3/20) cases.

The overseas acquired *Salmonella* Java infection cases were most commonly aged between 20 and 29 years and 48% (16/33) were male (Figure 6). However, unlike paratyphoid A, the most commonly reported country of birth was Australia (42% of all cases and 88% of cases where country of birth was known). Travel to Indonesia was reported for 70% (23/33) of cases with travel to Bali specifically reported for 74% (17/23) of these cases (Figure 7).

Figure 6. Overseas acquired *Salmonella* Java cases by age and sex in NSW, 2011

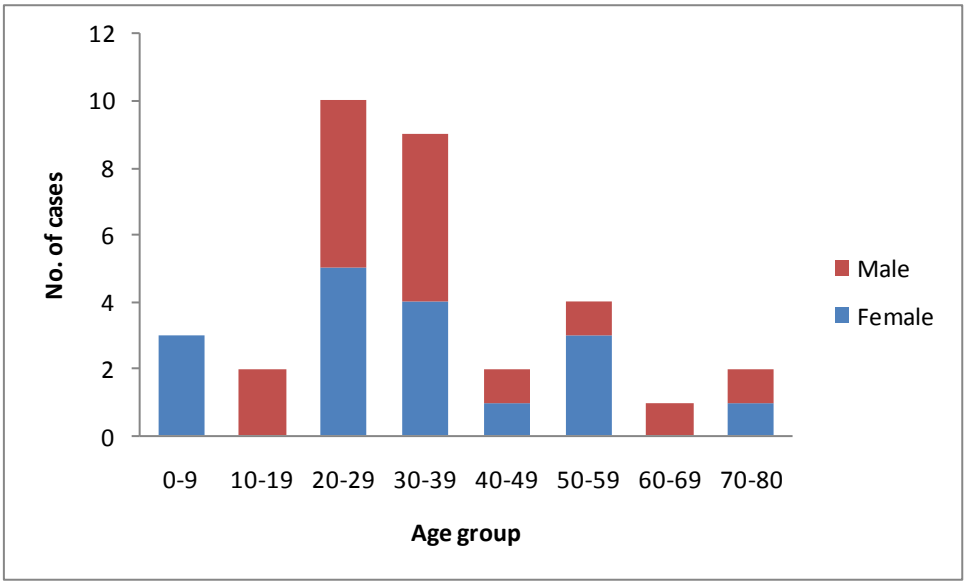
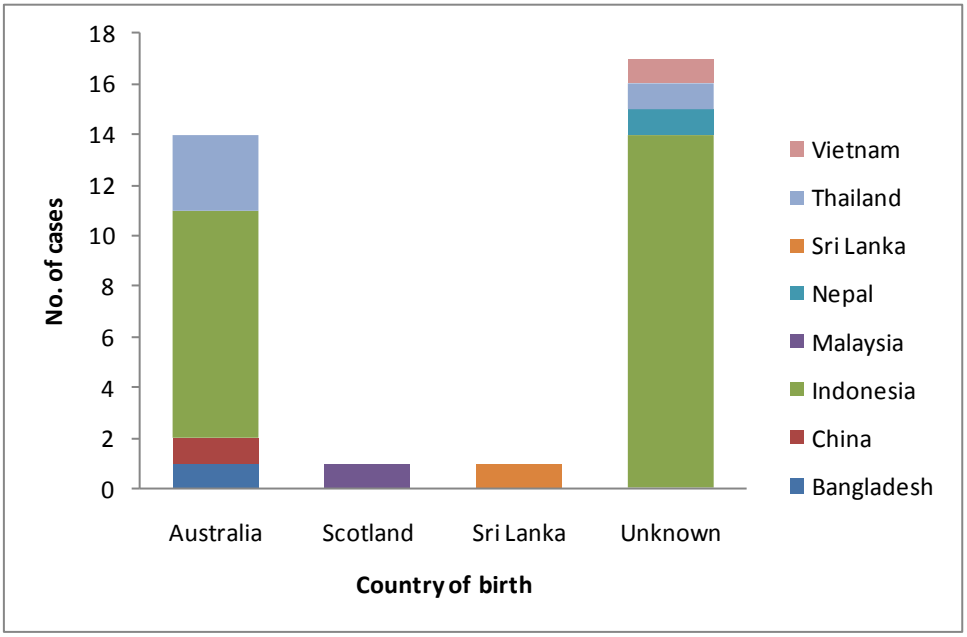


Figure 7. Overseas acquired *Salmonella* Java cases by country of birth and place of disease acquisition, 2011



5.3 Typhoid fever

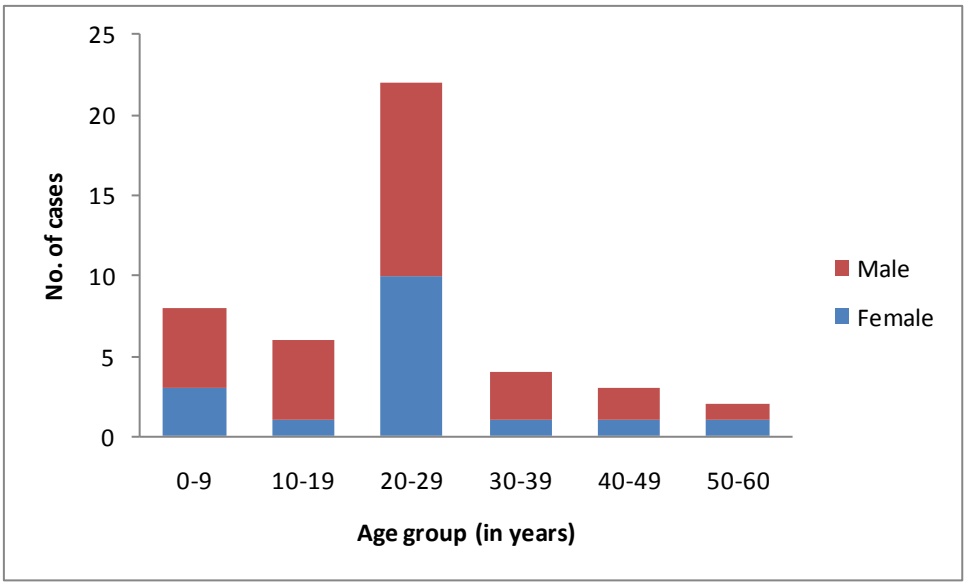
In 2011, there were 45 cases of typhoid fever reported, which is an increase on the 28 cases reported in 2010 but similar to the annual count for 2009 and 2008. The symptom profile is shown in Table 6 with fever being present for 98% of cases. Hospitalisation was required for 93% (42/45) cases. Of the 26 cases with available data on the length of hospitalisation, the median length of stay was 5.5 days (range 2 to 17 days).

Table 6. Symptoms reported by notified typhoid cases in NSW, 2011

Symptom	Yes (%)	No (%)	Unknown (%)
Fever	44 (98%)	0 (0%)	1 (2%)
Headache	22 (49%)	8 (18%)	15 (33%)
Diarrhoea	29 (64%)	13 (29%)	3 (7%)
Constipation	2 (4%)	20 (44%)	23 (51%)

Consistent with paratyphoid A, the majority of typhoid cases were aged between 20 and 29 years. Over half (62%) of the cases were male. (Figure 8).

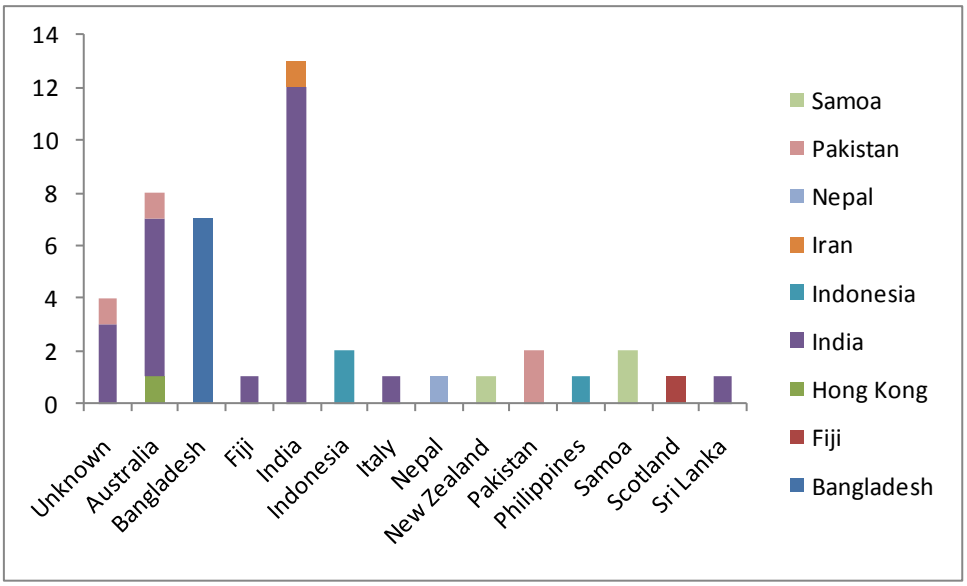
Figure 8. Typhoid cases in NSW by age group and sex, 2011



All of the cases acquired their infection overseas. Approximately half of the cases (24/45) were infected while travelling in India (Figure 9). Of the 29 cases with information on the number of days spent overseas, the median length of stay was 31 days (range 7 to 182 days). This travel was not part of an organised tour for 67% (30/45) cases. The type of travel was unknown for the remaining 33% (15/45) cases.

The country of birth was outside Australia for 73% (33/45) cases, Australia for 9% (8/45, all non Aboriginal or Torres Strait Islanders) and unknown for 9% (4/45). India was the most commonly reported country of birth accounting for 28% (13/45) cases. Of the overseas born cases, 79% acquired their infection while travelling to their country of birth (Figure 10). The primary language was English for 69% (31/45) of cases, language other than English for 24% of cases and not reported for 7% (3/45) of cases.

Figure 9. Country of birth by country of disease acquisition for typhoid cases in NSW, 2011



The majority of cases were not employed in an occupation that is considered at high risk of transmission to others (Table 8).

Table 8. Occupation of notified typhoid fever cases, NSW 2011

Occupation	No. cases
No high risk occupation	35
Food Handler (includes Cook, Chef, Waiter)	4
Unknown	2
Other	2
Aged Care Worker	1
Healthcare Worker	1
Total	45

5.4 Giardiasis

In 2011, giardiasis was the second most frequently reported enteric disease in NSW with 2362 notifications received, representing a 20% increase when compared to the average annual notifications for the previous five years. The median age of cases was 29 years, with ages ranging from 0-96 years. Males represented 50.2% of cases, and 75% of cases were residents of the greater Sydney metropolitan area. No clustering of cases or outbreaks were identified, and individual cases of giardiasis are not routinely investigated in NSW.

5.5 Shigellosis

In 2011, 131 cases of shigellosis were reported in NSW, which is a 15% increase compared to 2010 (n=114) and a 27% increase compared to the previous five year average (n=103).

The most common *Shigella* species reported was *Shigella sonnei* (including biotype A and biotype G) (n=87; 66%) followed by *Shigella flexneri* (n=33; 25%) (Table 6). The median age and average age of shigellosis cases in NSW in 2011 was 38.1 and 37.7 years respectively. Ages ranged from 0.7 years to 79.4 years. Males (n=86) represented 66% of cases.

For six *Shigella* types (*Shigella boydii, Shigella flexneri 3a/4/4a/variant X, and Shigella sonnei biotype A)* there was a much higher number of notifications in adult men compared to adult women in 2011 (26 men and 2 women). The men were aged between 19 and 67 years and 11 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 Sydney[4]. Only one cluster was indentified - 3 cases of *Shigella flexneri* variant X with onset dates in December. These men reported casual sex with other men prior to disease onset. Single cases of *Shigella* infections are not always investigated for sexual exposures in NSW.

Overseas travel was reported by 34% (45/131) of cases. The most frequently reported travel destination was Indonesia (12 cases, 27%), followed by India (5 cases, 11%). *Shigella sonnei* biotype G was the most common overseas acquired subtype of *Shigella* (23 cases, 51%).

Table 9. Number of Shigella cases for 2011 by species and sex, compared with the 2006-2010 average, NSW

	Average no. notifications 2006-2010			Notifications 2011		
***Shigella* species**	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**
Shigella sonnei biotype G	13.4	32	45.4	21	34	55
Shigella flexneri	9.8	16.4	26.2	13	20	33
Shigella sonnei (untyped or other)	4.6	8.2	12.8	5	14	19
Shigella sonnei biotype A	3.6	5.4	9	2	11	13
Shigella boydii	1.4	1.8	3.2	0	4	3
Unknown	2.6	2.2	4.8	4	3	7
Shigella dysenteriae	0.6	0.8	1.4			
TOTAL	**36**	**66.8**	**102.8**	**45**	**86**	**131**

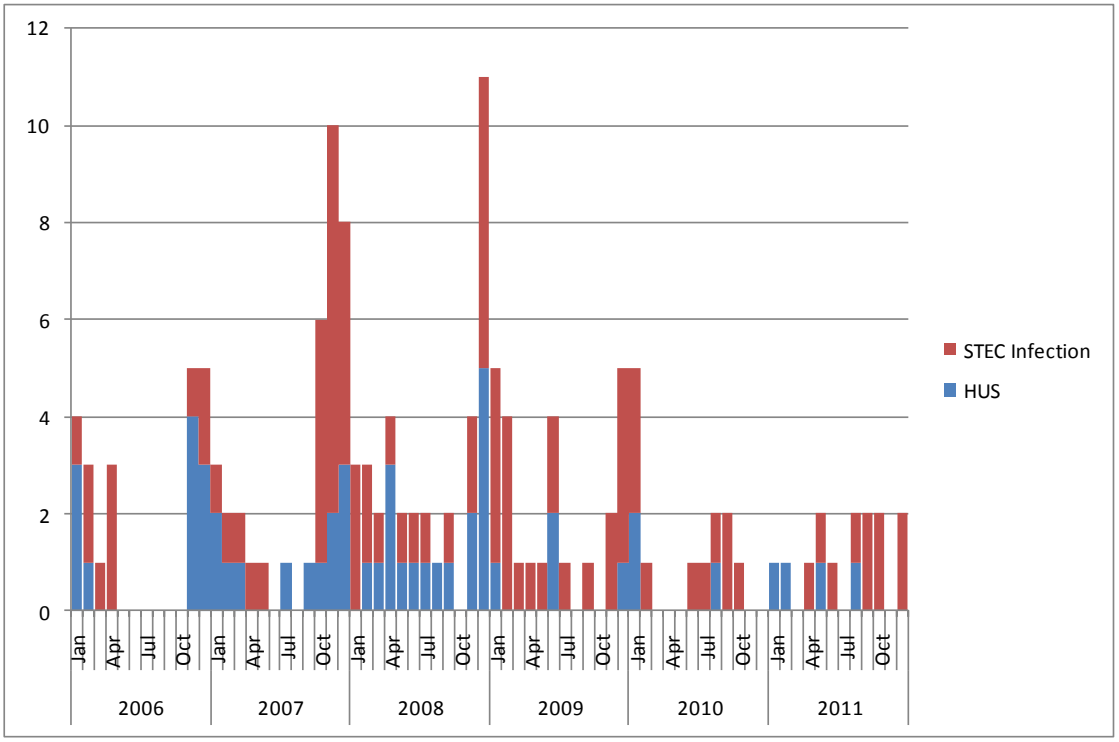
5.6 STEC and HUS

Notifications of Shiga toxin producing *Escherichia coli* (STEC) remained steady when compared to the previous year with 10 reports received in 2011. This represented a 40% decrease in notifications when compared to the annual five year average from 2006-10 (17 cases).

The median age of cases was 50.25 years, with an age range of 0.5 – 73 years. Fifty percent of cases were female (n=5). Serotype information was available for six cases, however serotypes were different for each patient: O22, O26, O111, O119, O41:H14 and ONT: H11. Specimens from the remaining cases were unable to be cultured.

There were four cases of haemolytic uraemic syndrome (HUS) notified in 2011 which is a 57% decrease compared to the average annual count for the previous five years (9 cases). The age range for cases was 0.5-85 years. One case had both HUS and STEC infection (serotype O41:H14). Two cases reported having a diarrhoeal illness prior to onset of HUS symptoms; however STEC was not detected in stool specimens collected from either patient as a result of the HUS diagnosis.

Figure 9. STEC and HUS notification by month, NSW 2006-2011



5.7 Listeriosis

There has been a slight decrease in listeriosis cases reported in recent years with 21 cases for 2011 compared with 26 in 2010 (Figure 10). Four cases died (19% CFR). The majority of cases were aged over 65 years and had immunosuppressive conditions. (Figure 11) One case however, was aged less than 65 years and was not known to have any immunosuppressive condition. There was one perinatal case notified and both mother and baby survived. 57% of cases were male. There was no consumption of specific foods or other risk factors common to the reported cases.

Figure 10. Listeriosis notifications by year, NSW 2006 – 2011

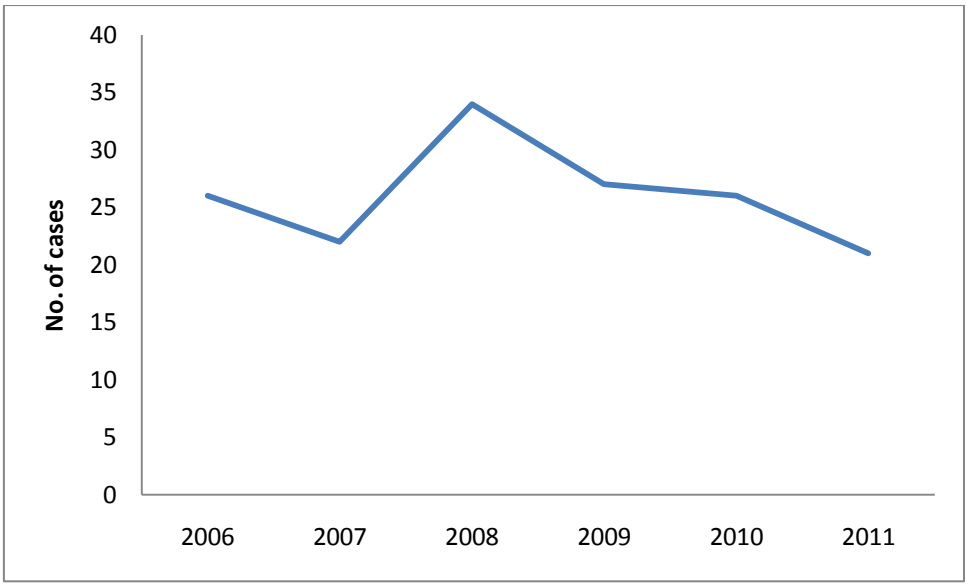
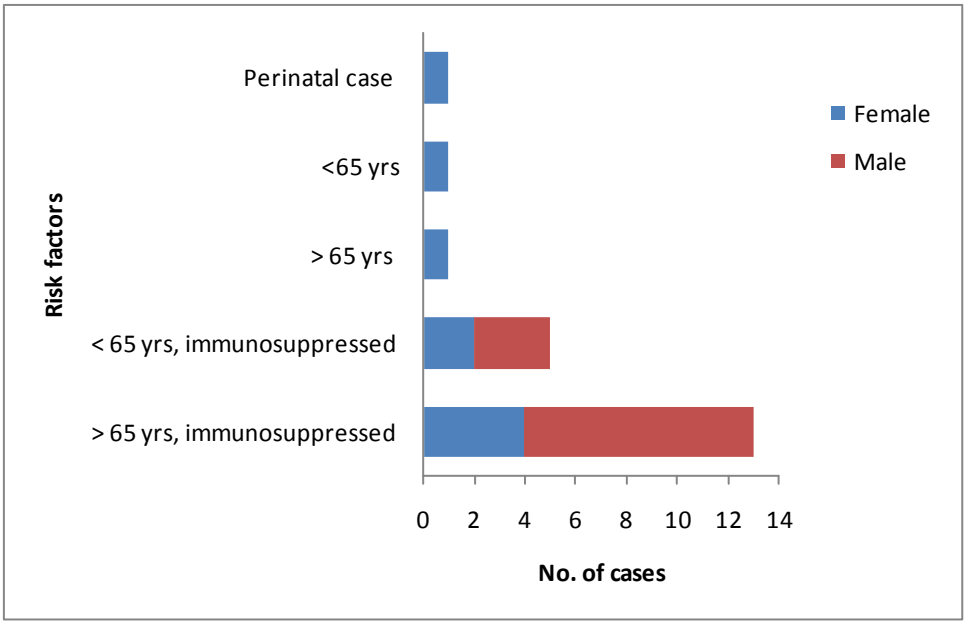


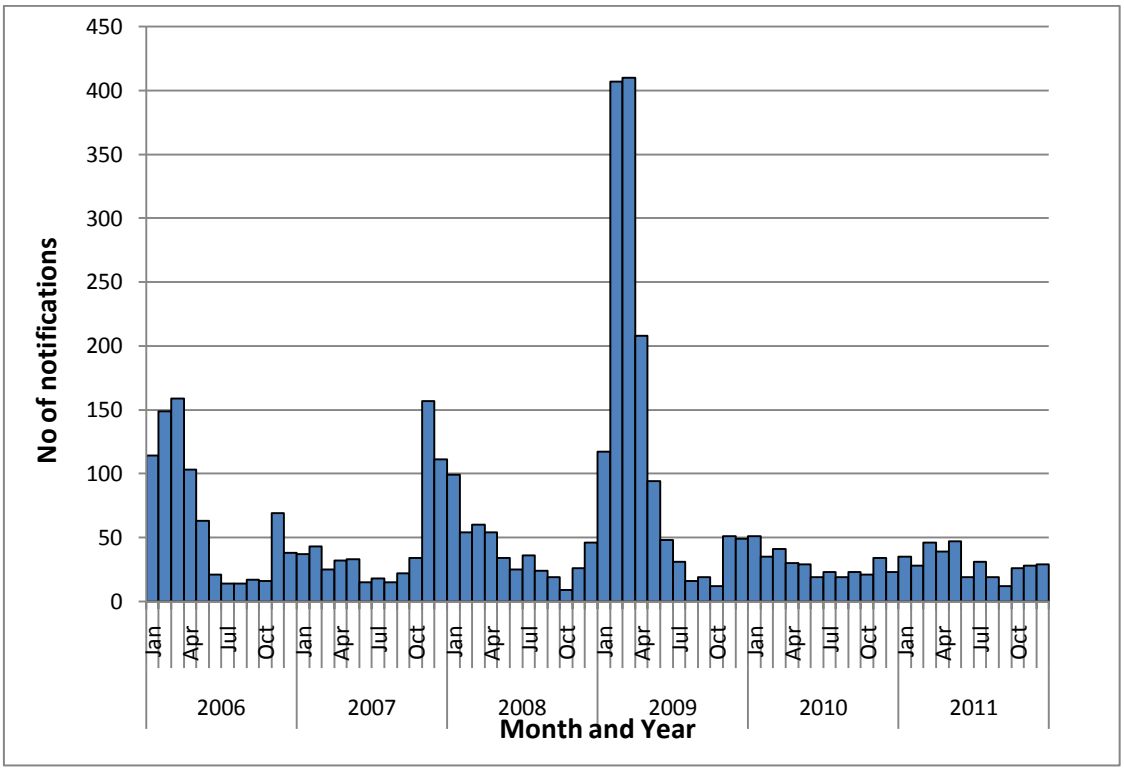
Figure 11. Listeriosis cases by risk factor and sex in NSW, 2011



5.8 Cryptosporidiosis

There were 359 cases of cryptosporidiosis reported in NSW in 2011, a 50% decrease compared to the annual five year average from 2006-2010 (n=723). The median age of cryptosporidiosis cases was 9 years, with ages ranging from 5 months to 79 years. Males represented 55% of cases (n=199). No clusters or outbreaks were identified in 2011. The large number of notifications in 2009 was due to an outbreak associated with swimming pools (Figure 12.)

Figure 12. Cryptosporidiosis notifications by month, NSW 2006 – 2011



5.9 Hepatitis A

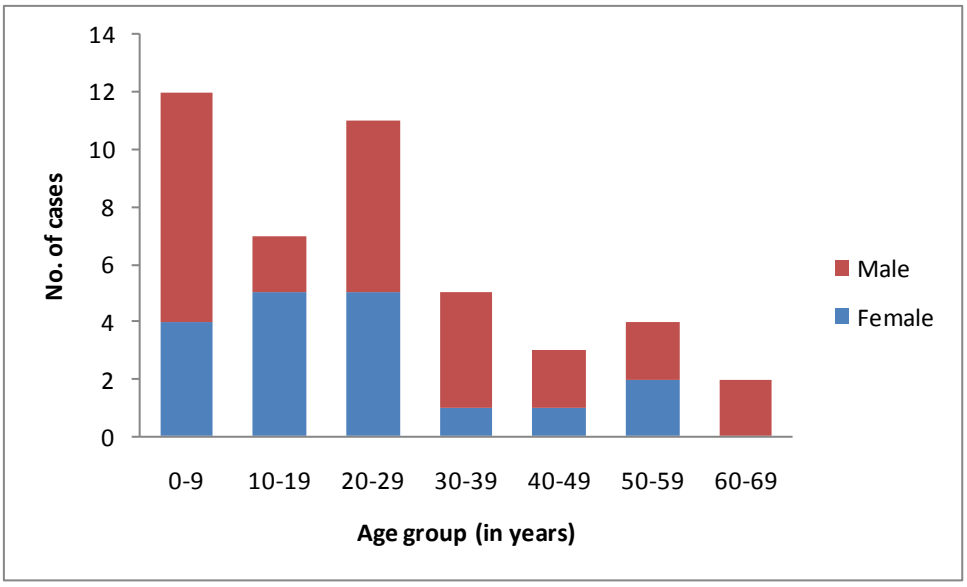
There were 57 cases of hepatitis A infection reported in 2011; the lowest annual count on record. Hospitalisation was required for 42% (24/57) cases with a median length of stay of 2 days.

In accordance with previous years, the majority of cases (77%) were acquired overseas in countries where hepatitis is known to be endemic. Locally acquired cases accounted for 21% (12/57) of cases and there was 1 case for which the place of likely acquisition was unknown.

Hepatitis A cases acquired overseas

There were 44 overseas acquired cases reported in 2011. Of these, 59% (26/44) were male and the majority were aged less than 30 years (Figure 13).

Figure 13. Overseas acquired hepatitis A cases by age and sex, 2011

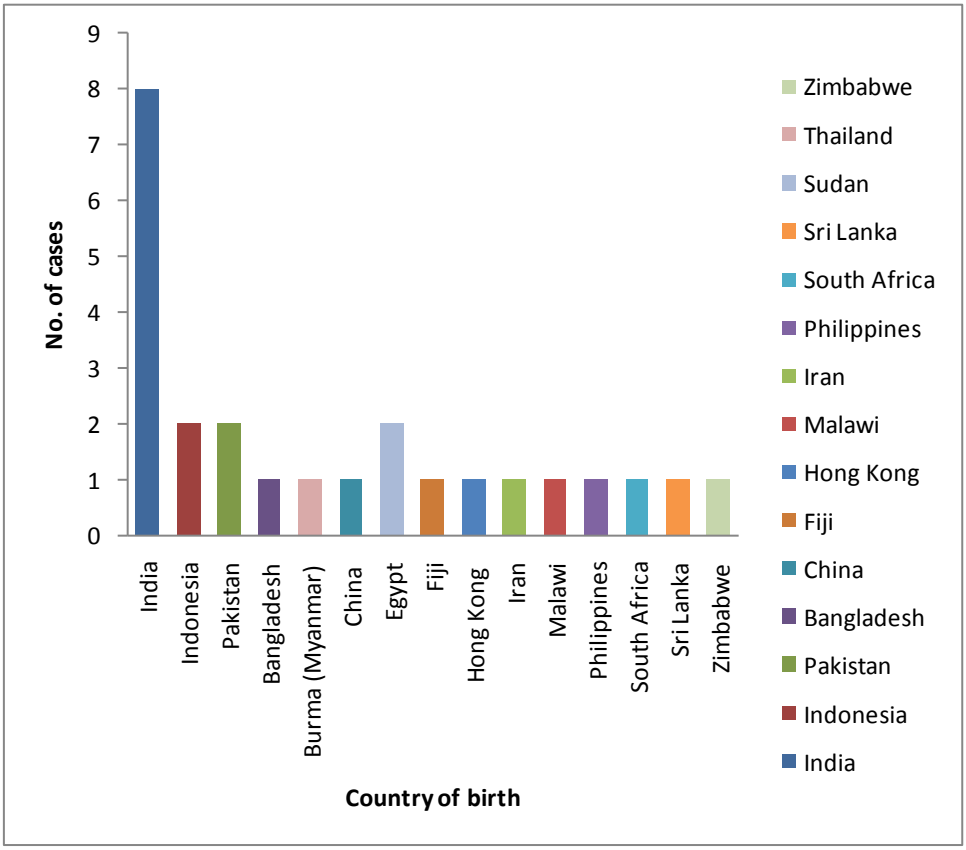


Of the 44 overseas acquired cases, 41% (18/44) cases were Australian born, 57% (25/44) were born outside Australia in countries endemic for hepatitis A and for one case the country of birth was unknown. Approximately half of the overseas born cases spoke English as a primary language.

The majority of overseas born cases (88%, 22/25) acquired their infection while travelling to their country of birth (Figure 16). The 18 Australian born cases acquired their infection in 13 different countries in South East Asia, the Pacific, Middle East and Sub-Saharan Africa. None of these cases were Aboriginal or Torres Strait Islanders. The median length of travel of 62 days (range 2 to 206 days) was longer for the Australian born cases compared with a median of 37 days (range 7 to 202 days) for the overseas born cases. Of all overseas acquired cases, only one case reported travelling as part of an organised tour.

The majority of cases were not vaccinated (84%, 36/43). The only overseas born case who was reportedly vaccinated received the vaccine approximately 3.5 years prior travel. Of the two Australian born vaccinated cases, one reported receiving the vaccine approximately 12 years prior to travel and the other 2 days prior to travel. The number of vaccine doses was not available.

Figure 14. Overseas born hepatitis A cases by country of birth and country of disease acquisition, 2011



Of the 12 locally acquired cases, 58% (7/12) were male and the median age was 25 years (range 8 to 79 years). One case was Aboriginal. Half of the cases (n=6) were Australian born with remaining cases from New Zealand (n=3), China (n=1), Bangladesh (n=1) and unreported (n=1).

There were two clusters identified amongst the locally acquired cases. One locally acquired case (whose only risk factor was seafood consumption) infected two household contacts. One of these cases had received the hepatitis A vaccine as part of the public health follow up of the index case but developed symptoms 8 days following vaccination. The other case had not been vaccinated. Another locally acquired case (whose only risk factor was berry consumption) infected his brother. He had received the hepatitis A vaccine following exposure to his brother but developed symptoms of hepatitis A 14 days later.

Of the seven remaining locally acquired cases, one reported close contact with a girlfriend who had reportedly developed illness following travelling to SE Asia. The only risk factor reported was the consumption of seafood for one case and the consumption of fresh/frozen berries for another case. Injecting drug use was the only exposure for one case and no risk factors were identified for the remaining three locally acquired cases.

6. Enteric Outbreaks in NSW during 2011

In 2011, there were a total of 578 gastrointestinal outbreaks reported in final summary form to the Communicable Diseases Branch. There were 48 suspected foodborne outbreaks and 530 viral or probable viral gastrointestinal outbreaks in institution or community settings.

6.1 Foodborne and suspected foodborne outbreaks

In 2011, 48 foodborne or suspected foodborne disease outbreaks affecting over 815 people were reported to the NSW Ministry of Health. Of these, 49 people (6.0%) were hospitalised compared with 78 of 729 (10.7%) in 2010. In 2011, no deaths were associated with a suspected foodborne outbreak.

In 2011 in NSW, 30.9% of all cases (252/815) and 57.1% of all hospitalisations (28/49) associated with the 48 reported foodborne and suspected foodborne disease outbreaks, were due to salmonellosis which was identified in 33% (n=16) of the outbreaks. Of the 16 outbreaks associated with *Salmonella* infection, 13 (81%) were caused by *Salmonella* Typhimurium, two *Salmonella* Singapore, and one with *Salmonella* Muenchen (Table 10).

Of the 13 outbreaks associated with *Salmonella* Typhimurium (see table 11 for MLVA types) infection in NSW in 2011, 11 had compelling epidemiological and or microbiological evidence implicating a food vehicle. For 9 (82%) of these outbreaks, the responsible vehicles were items containing raw or undercooked egg. The other two had associations with prawn dumplings and apple turnovers.

The two outbreaks of *Salmonella* Infantis were associated with roast chicken prepared at a delicatessen then thought to be cross-contaminated by raw product. The *Salmonella* Muenchen was associated with ham sold from a butcher.

In seven more outbreaks, norovirus (3), *Campylobacter jejuni* (2), *Clostridium perfringens* (1), and scombroid poisoning (1) were each identified as the agent responsible. The outbreak of scombroid poisoning in four people was associated with the consumption of tuna fish fillets in a salad (Table 11).

For 25 (52%) 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 24 (50%) 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 10. Foodborne disease outbreaks reported in NSW, 2011

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; N=Not enough evidence to implicate specific vehicle **Epi Study: C=Cohort study; CC=Case control study; D=Descriptive case series; N=Individual patient data not collected								
HUN0436	Jan	grocery store/delicatessen	Salmonella Singapore	45	2	AM	C	Roast chicken pieces served cold
HUN0437	Jan	grocery store/delicatessen	Salmonella Singapore	10	0	M	D	Roast chicken pieces served cold
HUN0438	Jan	restaurant	Salmonella Typhimurium (historically PT 135 or 3) MLVA 3-13-14-9/10-523	11	1	AM	D	Caesar salad dressing - raw egg
NSCC27205	Jan	bakery	Salmonella Typhimurium (historically PT 135) MLVA 3-12-9-10-550	9	0	D	D	unknown
SSW26824	Jan	take-away	Salmonella Typhimurium (historically PT 44) MLVA 3-10-8-9-523	85	17	M	D	Vietnamese pork/chicken/salad rolls containing Raw Egg Butter
SSW26850	Jan	restaurant	Unknown	7	0	D	D	Unknown
SSW27042	Jan	school	Salmonella Typhimurium (historically PT 170) MLVA 3-9-8-13-523	17	1	A	C	Apple turnover
SW26843	Jan	restaurant	Unknown	5	0	D	D	Unknown
HUN0439	Feb	restaurant	Campylobacter	11	0	AM	C	Chicken liver pate on toast
HUN0440	Feb	restaurant	Unknown	3	0	D	D	Unknown
NSCC27162	Feb	restaurant	Salmonella Typhimurium MLVA 3-11-11-10-523	10	0	D	D	Dessert containing raw egg custard
SSW27185	Feb	restaurant	Salmonella Typhimurium (historically PT 170) MLVA 3-9-7-14-523	6	2	M	D	Fried Ice cream
SSW27231	Feb	restaurant	Unknown	36	0	D	D	Suspected dessert

ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
WS2011018	Feb	institution	Clostridium Perfringens	6	0	D	N	Unknown
HUN0441	Mar	restaurant	Unknown	7	0	D	D	Unknown
SSW27388	Mar	restaurant	Norovirus	49	Unknown	D	D	Suspected person-person
HUN0442	Apr	restaurant	Unknown	3	0	D	D	Suspect prawn and pesto pizza
HUN0446	Apr	private residence	Salmonella Typhimurium (historically PT 135a) MLVA 3-13-12-10-523	3	0	D	D	Suspect homemade hollandaise sauce or semi-freddo containing minimally/uncooked eggs
SSW27693	Apr	restaurant	Unknown	6	0	N	D	Unknown
WS27585	Apr	Other	Unknown	80	0	N	point source cohort	Unknown
HUN0443	May	commercial caterer	Norovirus G II-6	23	0	A	C	Suspect chocolate and mandarin pie
HUN0444	May	restaurant	Salmonella Typhimurium (historically PT 44)	8	0	AM	D	Chicken/corn soup or a chicken based dish. Sample of raw chicken had the same serovar and MLVA as cases.
SSW27721	May	take-away	Unknown	4	0	N	D	Unknown
SSW27725	May	restaurant	norovirus	79	12	M	C	person to person transmission via infected food handler
SSW27744	May	restaurant	Salmonella Typhimurium (historically PT 135)MLVA 3-13-11-9-523	4	2	A	D	Suspect prawn dumplings prepared with minced prawn, coriander and egg to bind
NSCC28295	Jul	take-away	Unknown	3	1	N	N	UNKNOWN
NSCC28296	Jul	restaurant	Unknown	13	0	D	C	unknown
SESI28164	Jul	restaurant	Unknown	2	0	N	N	Unknown

ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SESI28261	Jul	restaurant	Unknown	2	0	N	N	Unknown
SSW28242	Jul	restaurant	Salmonella Typhimurium (historically PT 170) MLVA 3-9-8-14-523	13	1	D	D	Tiramisu containing raw egg
HUN0447	Aug	restaurant	Salmonella Typhimurium (historically PT 170) MLVA 3-9-7-13-523	6	0	D	D	Suspect raw egg dressing/food cross contaminated by raw egg
HUN0448	Aug	restaurant	Salmonella Typhimurium (historically PT 170) MLVA 3-9-7-15-523	3	0	D	D	Suspect raw egg mayonnaise
SESI28430	Aug	commercial caterer	Unknown	25	0	N	C	Unknown
SESI28502	Aug	restaurant	unknown	11	0	N	D	Unknown
HUN0449	Sep	restaurant	Unknown	3	0	D	D	Unknown
HUN0450	Sep	restaurant	Campylobacter	2	0	D	D	Unknown
NSCC28654	Sep	commercial caterer	Unknown	87	0	A	C	Salad of poached prawns with Thai herbs
NSCC28731	Sep	restaurant	Unknown	4	0	N	D	unknown
WS28609	Sep	restaurant	Unknown	6	0	D	N	madras chicken curry with rice
HUN0451	Oct	camp	Unknown	8	4	D	D	Suspect cooked pasta
SSW28955	Oct	bakery	Unknown	3	0	D	D	Unknown
HUN0452	Nov	commercial caterer	Unknown	16	0	AM	C	Suspect lamb curry
SESI29258	Nov	restaurant	Scombroid	4	4	D	D	Salad containing fresh cooked tuna

ID number	Month of onset	Setting	Pathogen	No. ill	No. hospitalised	Evidence*	Epi. Study**	Responsible vehicle
SSW29128	Nov	restaurant	Unknown	12	0	D	N	Unknown
WS29045	Nov	restaurant	Salmonella Typhimurium (historically PT 9) MLVA 3-10-14-12-496	3	1	D	D	Unknown
WS29223	Nov	restaurant	Unknown	34	0	D	C	Unknown
SESI29303	Dec	private residence	Unknown	9	0	D	N	Unknown

Table 11. Salmonellae by serotype, likely phage type and MLVA type associated with foodborne outbreaks in NSW, 2011*

Salmonella serotype	Phage type	MLVA type	No. of outbreaks (cases)
Salmonella Typhimurium	170	MLVA 3-9-7-13-523	1 (6)
Salmonella Typhimurium	170	MLVA 3-9-7-14-523	1 (6)
Salmonella Typhimurium	170	MLVA 3-9-7-15-523	1 (3)
Salmonella Typhimurium	170	MLVA 3-9-8-13-523	1 (17)
Salmonella Typhimurium	170	MLVA 3-9-8-14-523	1 (13)
Salmonella Typhimurium	44	MLVA 3-10-8-9-523	2 (93)
Salmonella Typhimurium	135	MLVA 3-12-9-10-550	1 (9)
Salmonella Typhimurium	135	MLVA 3-13-11-9-523	1 (4)
Salmonella Typhimurium	135a	MLVA 3-13-12-10-523	1 (3)
Salmonella Typhimurium	9	MLVA 3-10-14-12-496	1 (3)
Salmonella Typhimurium	?	MLVA 3-11-11-10-523	1 (10)
Salmonella Typhimurium	?	MLVA 3-13-14-9/10-523	1 (11)
Salmonella Singapore			2 (56)
Salmonella Muenchen			1 (18)

* 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 2011

Salmonellosis outbreak linked to raw egg mayonnaise
A PHU was notified on 3January 2011 by an Emergency Department (ED) doctor of an increase in ED presentations with gastrointestinal symptoms. Analysis of cases' information implied a point source – the consumption of pork/chicken/salad rolls from a Vietnamese bakery in the area. The rolls were prepared with raw egg mayonnaise. Approximately 147 clinical cases presented to EDs and GPs. Fifty-eight people were interviewed who provided information on 85 people ill. Forty-nine of these people had a sample taken and 47 were positive for ***Salmonella* Typhimurium PT 44** (MLVA 3-10-8-9-523). The bakery was inspected by the NSWFA and closed for clean up and disinfection. Food samples (13 from 21 samples- including raw egg butter, pate, chicken, pork and salad items) and environmental swabs (5 from 11 samples- including the chilled food display unit, metal tongs, mixing bowl) taken on that day were positive for ***Salmonella* Typhimurium PT 44** (MLVA 3-10-8-9-523). After closure and environmental cleaning, the proprietor applied for a certificate of clearance following subsequent negative results from further environmental swabs. Staff skills and knowledge were assessed and found to be inadequate so the bakery remained closed until these skills were considered to be satisfactory. Lack of records/supplier information prevented trace back of the eggs to a supplier or farm. (SSW26824)

Salmonellosis outbreak linked to poor storage of chicken and cross contamination
OzFoodNet (Hunter New England) investigated two outbreaks of ***Salmonella* Singapore** in February 2011, which were associated with a buffet served on a cruise boat. The first outbreak was associated with an 80th birthday party held on 30 January 2011, with 41/57 people reporting a *Salmonella*-like illness. *Salmonella* Singapore was isolated in five stool specimens, with *Salmonella* spp detected from a stool specimen collected from a sixth patient. A cohort study was conducted, with roast chicken pieces (RR 5.70, 95% CI 0.93-35.19), silverside (RR 1.32 95% CI 0.97-1.81) and potato salad (RR 1.60, 95% CI 1.08- 2.36) found to have an association

with illness. In multivariate analysis, only roast chicken had a statistically significant association with illness (OR 26.4, 95% CI 2.85-244.43). Through contacting people through the caterer's booking lists, we identified a second function group with attendees experiencing a similar illness (held 29 January 2011). Ten people (one with laboratory confirmed *Salmonella* Singapore infection) from this function (denominator unconfirmed, suspect 35 people) were also ill. Similar foods, including roast chicken, were served to the second function. In addition, 5/7 food handlers associated with the cruise boat were also ill with a similar illness – all five cases reported consuming food at function held on the 30 January. The chicken for both functions was purchased from a supermarket at the same time, and taken back to the cruise owner's food premises where it was plated and stored. *Salmonella* Virchow PT 34 was isolated from a sample of chicken obtained from the supermarket; however other food samples and swabs taken from both the supermarket and the cruise owner's premises were negative for pathogens. It is suspected that the outbreak was caused through cross contamination between raw and cooked product, and temperature abuse of the cooked product. (HUN0436 and HUN0437)

Norovirus infection outbreak linked to an ill food handler

Two separate complaints were received from the NSWFA about several groups of people developing vomiting and diarrhoea as the result of a norovirus outbreak after eating at a bowling club on the weekend. The venue only served food in the weekends. On Saturday, there were 265 patrons and on Sunday 150 people. PHU staff interviewed 110 patrons of which 79 (70%) reported being unwell with gastroenteritis. Twelve people were hospitalised and 2 stool specimens returned positive norovirus results. The cohort study could not identify any particular food associated with illness. There were reports of the chef working while experiencing gastroenteritis symptoms. The NSWFA issued a prohibition order to prevent food handlers with gastrointestinal symptoms from preparing food until medical clearance was obtained. The order was lifted after requirements were met with regards to sanitation of food contact surfaces, skills and knowledge regarding food preparation and good hygiene, and health of persons who handle food. The stool sample submitted by the chef was negative for norovirus and bacterial pathogens. There were 4 positive environmental norovirus results: the metal handle of a ladle from the kitchen, a swab from a tap in the ladies toilet, a microwave metal door release and an oven handle. The outbreak was most likely caused by norovirus transmitted from person to person via the infected food handler (SSW27725).

Salmonellosis outbreak linked to raw egg dessert

This outbreak of ***Salmonella* Typhimurium PT 170** (MLVA 3-9-8-14-523) was identified through a complaint in July about a Sydney restaurant to the NSWFA. Interviews with the group of four found that the three ill people had consumed a tiramisu made with raw egg. One of these cases submitted a specimen which was positive for *Salmonella* Typhimurium MLVA 3-9-8-14-523. Interviews with other *Salmonella* Typhimurium cases with the same MLVA pattern identified ten additional ill people who also consumed the tiramisu at this restaurant. Of all of the cases from this outbreak, six submitted stool specimens which were positive for *Salmonella* Typhimurium, all with the same MLVA pattern. The NSWFA inspected the premises and reported the only food safety concern was the use of raw eggs to make tiramisu. Due to the risk associated with potential contamination of raw eggs with *Salmonella*, the business agreed not to serve raw egg goods unless it was made from a pasteurised egg product. (SSW28242).

Scombroid poisoning linked to imported tuna

An outbreak of scombroid poisoning was notified to the PHU by an ED doctor after people presented with signs and symptoms consistent with scombroid poisoning (skin flushing, headache, palpitations, tremor, tachycardia, hypertension, diarrhoea). Four cases in total were reported. The cases all reported eating a fresh tuna salad from an organic café. Onset of illness ranged from 20 minutes to a few hours. The NSWFA requested the café owner remove the tuna

salad from the menu. The NSWFA inspected the premises and sampled the remaining tuna, which only a small amount remained; histamine was detected within acceptable levels. Due to the high sales of the product and low report of cases, the conclusion was that only a small portion of the tuna product used for the salad that day was affected. Histamine is produced by bacteria in fish which have not been quickly chilled after capture, or which have not been stored at correct temperature prior to consumption. As there did not appear to be any opportunities for temperature abuse at the café it is likely that the histamine was already present in the tuna. Histamine is not killed by cooking. The product was imported from Indonesia by a company in Queensland. (SESI29258)

Campylobacterosis outbreak linked to undercooked chicken liver pate

In February, OzFoodNet (HNE) was notified of an outbreak of campylobacteriosis associated with an 80th Birthday held at a restaurant. Eleven from 34 people (2 laboratory confirmed *Campylobacter* spp) became unwell with a diarrhoeal illness a median of 44 hours after consuming the meal. Chicken liver pate consumed as a canapé was the only food item that was found to have a statistically significant association with illness (RR 7, 95% CI 1.04-45.44 p=0.004). NSW Food Authority reviewed the preparation of the pates, and identified that the undercooking of the centre of the livers was not an adequate kill step for bacteria. All food samples (including a sample of pate that was not part of the batch consumed by the implicated function) and environmental swabs were negative for pathogens. At a national level, there have been four outbreaks of *Campylobacter* infection associated with pate (using undercooked poultry livers) investigated by OzFoodNet sites since 2008. In response, Food Standards Australia New Zealand have produced a fact sheet on the safe preparation of liver. (HUN0439).

6.3 Viral gastrointestinal outbreaks

In 2011, PHUs reported 530 gastroenteritis outbreaks in institutional or community settings likely to be due to person-to-person transmission of viral gastroenteritis. The outbreaks affected 9,218 people compared with 517 outbreaks affecting 9,359 people in 2010. Of these outbreaks, 242 (45.7%) occurred in aged care facilities (average 22 cases per outbreak), 164 (30.9%) in childcare centres (average 13 cases per outbreak), 101 (19.1%) in hospitals (average 15 cases per outbreak), 10 (1.9%) in residential care facilities (average 10 cases per outbreak), 3 (0.6%) in schools (average 21 cases per outbreak), 3 (0.6%) in rehabilitation facilities (average 13 cases per outbreak) and 7 (1.3%) in other settings (average 27 cases per outbreak) (Table 12).

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 173 (32.6%) outbreak investigations, rotavirus in 24 (4.5%) outbreak investigations and adenovirus in 1 (0.1%) outbreak investigation. In 37 outbreak investigations more than one pathogen was identified.

Other potential pathogens identified in one or more stool specimens collected during outbreak investigations were *Clostridium difficile* (range of 1-4 specimens in 18 outbreaks), *Campylobacter* (range of 1-2 specimens in 4 outbreaks), *Giardia intestinalis* (range of 1-2 specimens in 4 outbreaks), *Clostridium perfringens* (1 specimen in 1 outbreak), adenovirus (1 specimen each in 4 outbreaks), and *Salmonella* (1 specimen each in 4 outbreaks). These bacteria 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 29/43 (67%) of the outbreaks where one of these pathogens was identified, it was identified in tandem with a viral pathogen.

The aetiology was not lab confirmed for 329 (62.1%) of the outbreaks. For 198 outbreaks (37.5%) 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 12. Number of (probable) viral gastroenteritis outbreaks and number of cases by setting, NSW 2008 – 2011

	2008		2009		2010		2011	
Institution	**No. outbreaks**	**No. cases**	**No. outbreaks**	**No. cases**	**No. outbreaks**	**No. cases**	**No. outbreaks**	**No. cases**
Aged Care	334	7536	317	7681	248	5166	242	5293
Hospital	114	1693	116	1632	73	1603	101	1476
Childcare	122	1233	143	1981	183	2441	164	2052
School	3	7	3	68	3	29	3	64
Other	10	172	21	317	10	119	20	333
TOTAL	**586**	**10641**	**600**	**11679**	**517**	**9359**	**530**	**9218**

7. Activity in NSW during 2011

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 Ministry of Health website and the NSW Public Health Bulletin.
- Laboratory methods: In 2011, ICPMR started providing the OzFoodNet sites with weekly alerts of clusters of *Salmonella* Typhimurium based on MLVA type.
- MLVA data is uploaded directly to the Notifiable Conditions Information Management System to improve timeliness.
- The working group set up to investigate surveillance of *Campylobacter* infections in NSW continued its activities in 2011. Some of the issues under consideration are: the inclusion of *Campylobacter* infection as a notifiable disease following implementation of electronic notifications, the *Campylobacter* infection 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

- *Salmonella* Mississippi. Five cases were interviewed as part of the National Case Control Study. Two cases were recruited, and three were deemed ineligible for the inclusion into the study. Recruitment has now ceased.
- STm 193/S Monophasics: Nine cases were interviewed as part of the national STm193/Monophasic Salmonella study.
- *Salmonella* Wangata: OzFoodNet commenced interviewing newly notified S Wangata cases after an increase in notifications were identified. Ten cases with specimen collection dates in December were interviewed with a hypothesis generating, trawler and environmental questionnaire. It is hypothesised that this is predominantly an environmental serovar, based on the geographical clustering of cases. Interviews are ongoing in 2012.
- Salmonella MLVA timeliness project. Work continued on this project in 2011, with the first draft of the report submitted to the working group in November.
- The National OzFoodNet STEC/HUS questionnaire was finalised. This was adopted by OzFoodNet sites in June 2011, and is now in use nationally.

9. References

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