

OzFoodNet

Enhancing Foodborne Disease Surveillance Across Australia

NSW FOURTH QUARTER REPORT

October – December 2018



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Highlights Quarter 4, 2018

This report describes data for enteric conditions for quarter 4, 2018. The report is divided into four sections: enteric notifiable diseases highlights, *Salmonella* spotlight, foodborne outbreaks and gastroenteritis outbreaks in institutions. Data in this report have been extracted from the NSW Notifiable Conditions Information Management System, NSW OzFoodNet Outbreak Database, and the NSW Gastroenteritis in Institutions Database. Every endeavour has been made to ensure that the information provided in this document is accurate at the time of writing. However, infectious disease notification data are continuously updated and subject to change.

Increases in paratyphoid, Shiga toxin-producing *E. Coli* (STEC), shigellosis and typhoid were observed in quarter 4, 2018 compared to the five year average for the same period. Moderate decreases were noted in cryptosporidiosis, hepatitis A, hepatitis E, listeriosis, and rotavirus. Long term trends are not available for campylobacteriosis, which became notifiable on 7 April 2017, however notifications received in this quarter (n=2624) are similar to the same quarter in the previous year (n=2622). The long term trends for 13 notifiable enteric conditions in NSW are shown in Figures 1-3.

The most notable increase above average levels in Quarter 4, 2018 was for **shigellosis** (317% increase compared to the five year average for the same period). This increase can be attributed to a change in the national surveillance case definition that was implemented on 1 July 2018, which introduced a new 'probable case' for cases with a detection of *Shigella* on nucleic acid testing only (without isolation of *Shigella* species). Of the 232 shigellosis cases notified in quarter 4, 2018, 64% were probable cases. Eighty-four cases met the confirmed case definition (which requires *Shigella* to be isolated on culture), which is slightly above average (51% increase above the 5 year quarterly average). Further detail is provided on page 7.

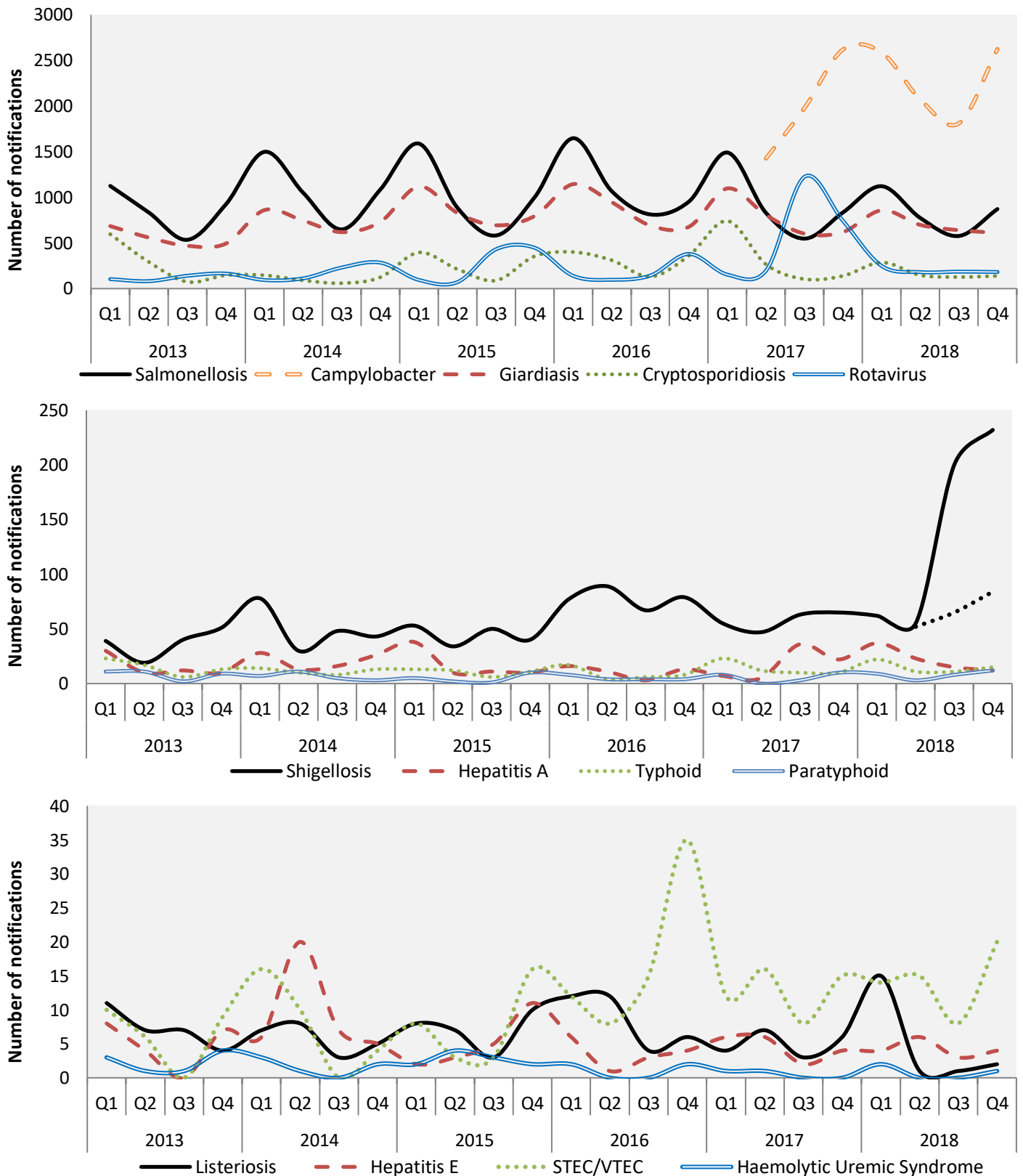
Salmonellosis notifications decreased slightly in quarter 4, 2018 (by 9%) compared to the five-year average for the same period. This was primarily due to the continued decline in *Salmonella* Typhimurium cases (n=284, down 30% compared to the 5 year quarterly average of 406

cases). *Salmonella* Enteritidis was the second highest notified *Salmonella* serotype in quarter 4, 2018 (n=116). While overseas acquired cases increased (by 61% above the quarterly average), the greatest increase occurred among locally acquired cases (744% above average). This increase is attributed to an outbreak in NSW which commenced in May 2018 and led to the recall of Glendenning Farms eggs in quarter 3 2018 (see the Quarter 3 report). At the end of quarter 4, an additional 26 cases were linked to the outbreak by Whole Genome Sequencing (WGS), for a total of 60 confirmed outbreak cases. A portion of these have been linked to the recalled egg product. Further information is provided on page 9.

Nine **foodborne or suspected foodborne outbreaks** were reported affecting 80 residents of NSW (Table 1), of whom seven were hospitalised (Table 4). A causative agent was linked to a food source in six outbreaks: scombroid poisoning linked to consumption of tuna steaks, scombroid poisoning linked to consumption of fish of unknown variety, *Salmonella* Virchow linked to consumption of chicken and mayonnaise sandwiches and wraps, *Salmonella* Typhimurium linked to eggs in two outbreaks (subsequently found to be related to each other), and *Salmonella* Enteritidis linked to the outbreak of *Salmonella* Enteritidis in Sydney reported in quarter 3 2018 related to eggs. Norovirus was identified as the pathogen in one outbreak but the vehicle of transmission was unknown, and is suspected to have been passed from person-to-person. The two remaining outbreaks were of unknown aetiology.

Highlights continued

Figures 1-3. Number of notifications by year, quarter and disease, Jan 2013 to Dec 2018^{1,2}



¹Campylobacteriosis became notifiable on 7 April 2017. Data is likely to be incomplete for this quarterly report due to the methods of notification from laboratories.

²The shigellosis case definition changed on 1 July 2018 to include probable cases (PCR positive only). The trend number of confirmed cases only, which is comparable to previous counts of shigellosis prior to the case definition change, is given by the black dotted line.

Table 1. Notifiable enteric conditions, quarter 4 2018, by local health district

Notifiable Disease		CC	FW	HNE	IS	M	MNC	NBM	NNSW	NS	SES	SNSW	SWS	SYD	WNSW	WS	NSW
Botulism	Notified, Q4 2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 yr Q4 mean, 2013-2017	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0.2
Campylobacteriosis ^{1,2}	Notified, Q4 2018	102	9	291	165	143	62	115	116	409	371	79	153	206	137	266	2624
	5 yr Q4 mean, 2013-2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera	Notified, Q4 2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 yr Q4 mean, 2013-2017	0	0	0	0	0.2	0	0	0	0	0	0	0	0.4	0	0.2	0.8
Cryptosporidiosis	Notified, Q4 2018	6	0	29	8	2	4	4	8	23	14	7	5	9	9	11	139
	5 yr Q4 mean, 2013-2017	5.8	0.6	53	13.8	17.6	4.8	10.2	13	25	22	5.6	10.4	9.4	21.8	12.2	225.2
Giardiasis ²	Notified, Q4 2018	21	2	72	27	32	22	31	58	90	85	6	47	40	34	44	611
	5 yr Q4 mean, 2013-2017	26.6	1.2	84.6	40.2	30.8	20.6	34.6	26.8	102.0	105.0	15.0	47.6	54.4	25.6	48.6	663.6
Hepatitis A	Notified, Q4 2018	0	0	1	0	0	0	0	0	0	1	0	1	0	0	9	12
	5 yr Q4 mean, 2013-2017	0.8	0	0.4	0.6	0	0.4	0.4	0.4	1	2.6	0.2	2.4	2.6	0	4.4	16.2
Hepatitis E	Notified, Q4 2018	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	4
	5 yr Q4 mean, 2013-2017	0.2	0	0	0	0	0	0	0.2	2	1.4	0	0.8	0.4	0	1.2	6.2
Listeriosis	Notified, Q4 2018	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
	5 yr Q4 mean, 2013-2017	0.2	0	0.8	0.2	0	0.2	0.2	0.2	0.6	0.6	0.4	0.6	0.8	0.2	1	6.2
Paratyphoid	Notified, Q4 2018	1	0	0	0	0	0	0	0	0	2	0	0	0	1	8	12
	5 yr Q4 mean, 2013-2017	0.2	0	0	0.2	0	0	0	0	0.8	1.6	0	0.4	1	0	3	7.2
Rotavirus	Notified, Q4 2018	2	1	9	5	13	0	8	7	24	19	2	30	18	3	41	182
	5 yr Q4 mean, 2013-2017	11.4	2.8	39.6	10.8	13.6	2.2	16.6	15.6	60.8	58.2	6.8	53.6	41.0	14.2	55.8	403.4
Salmonellosis	Notified, Q4 2018	28	4	141	47	35	31	39	55	100	107	21	91	60	20	93	872
	5 yr Q4 mean, 2013-2017	43.0	6.8	112.4	46.6	39.0	36.0	39.2	62.6	135.2	119.8	22.8	89.2	84.8	24.6	96.6	958.6
Shigellosis ³	Notified, Q4 2018	6	0	16	11	1	2	8	18	36	50	4	11	39	6	24	232
	5 yr Q4 mean, 2013-2017	1.8	0.2	2.8	2.0	1.0	0.6	1.0	2.6	4.0	16.4	0.2	3.4	14.6	0.8	4.2	55.6
STEC	Notified, Q4 2018	0	0	2	0	5	0	2	0	1	3	0	0	0	3	4	20
	5 yr Q4 mean, 2013-2017	0.2	0	2.8	0.6	2.4	0.2	0	0.4	0.6	1.4	3.2	0	0	1.8	2.2	15.8
HUS	Notified, Q4 2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	5 yr Q4 mean, 2013-2017	0	0	0.2	0.2	0.4	0	0	0	0.4	0.4	0	0	0	0.2	0.2	2
Typhoid	Notified, Q4 2018	0	0	1	0	0	0	0	0	0	1	0	3	2	0	8	15
	5 yr Q4 mean, 2013-2017	0	0	0.2	0.2	0	0	0.2	0	1	2.8	0	2.2	1.2	0.4	2.8	11
Foodborne ⁴ Outbreaks	Notified, Q4 2018	0	0	4	1	0	0	0	0	1	2	0	0	0	0	1	9
	People affected	0	0	62	8	0	0	0	0	3	6	0	0	0	0	1	80
Salmonella Cluster	Notified, Q4 2018	2	0	6	2	2	4	6	1	2	0	3	0	1	1	2	8
	People affected	6	0	47	5	7	16	17	5	2	0	6	0	2	1	2	116

Legend: Blue shading refers to a 100% or greater increase in the number of notifications compared to the five year quarterly average. Notes: ¹ Campylobacteriosis became notifiable on 7 April 2017, 5 year quarterly average data not available (NA); ² Data is likely to be incomplete for this quarterly report due to changes in the methods of notification from laboratories; ³ Case definition changed on 1 July 2018 to include 'probable' cases; ⁴ Foodborne or potentially foodborne outbreaks.

Table 2. Notifiable enteric conditions, quarter 4 2018, by overseas or local acquisition

Notifiable Disease	Place infection acquired	NSW, Q4 2018	5 yr Q4 mean 2013-2017	2018 % change
<i>Salmonella</i> Enteritidis	Locally acquired	54	6.4	744%
	Overseas acquired	61	37.8	61%
	Unknown	1	4.0	-75%
Hepatitis A	Locally acquired	3	3.4	-12%
	Overseas acquired	9	12.4	-27%
	Unknown	0	0.4	-100%
Hepatitis E	Locally acquired	2	1.8	11%
	Overseas acquired	1	4.0	-75%
	Unknown	1 ^b	0.9	17%
Paratyphoid	Locally acquired	0	0.0	0%
	Overseas acquired	12	6.6	82%
	Unknown	0	0.7	0%
STEC	Locally acquired	15	11.2	34%
	Overseas acquired	1	1.0	0%
	Unknown	4 ^c	3.6	11%
Shigellosis ^a	Locally acquired	54	29.0	86%
	Overseas acquired	104	19.2	442%
	Unknown	74	7.4	900%
Typhoid	Locally acquired	0	1.0	-100%
	Overseas acquired	14	10.0	40%
	Unknown	1 ^d	0.0	-

Legend: Blue shading refers to a 100% or greater increase in the number of notifications compared to the five year quarterly average.

^a The shigellosis case definition changed on 1 July 2018 to include probable cases (PCR positive only). As per the [NSW Shigellosis Control Guidelines for Public Health Units](#), place of infection is only investigated for probable shigellosis cases if (a) they meet criteria for "considered to be at greater risk of ongoing transmission", or (b) they subsequently become a confirmed case.

^b This unknown case had both close contact with a known case in NSW, as well as relevant travel history.

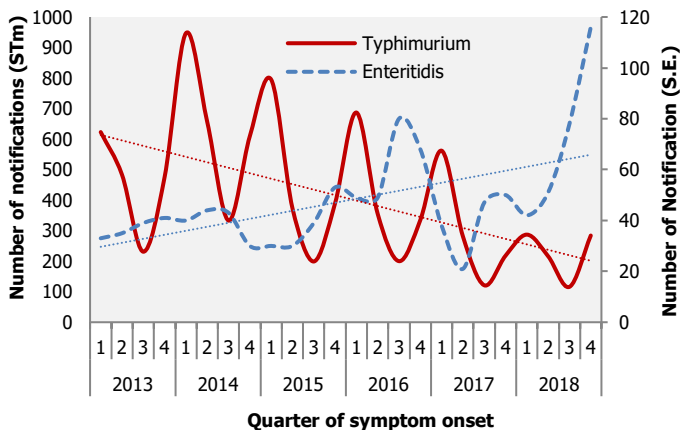
^c Of the four unknown cases, one case may have been acquired in NSW or interstate; one case may have been acquired in NSW or overseas. Two were lost to follow-up.

^d This case is believed to have been a carrier of typhoid, with no symptoms of typhoid and multiple opportunities for overseas acquisition in the 2-10 years prior to detection.

Salmonella Spotlight

In quarter 4 2018, 18.5% of notified enteric infections were salmonellosis. The number of salmonellosis notifications was 9.1% lower in this quarter compared to the 5 year quarterly average. One third (33%) of the 872 *Salmonella* notifications were *S. Typhimurium* (284 cases). This is a 30% reduction in *S. Typhimurium* notifications compared to the five year average for this quarter (406 cases). Since 2011, there has been an overall decline in *S. Typhimurium* notifications (Figure 4). This can in part be attributed to the NSW Food Safety Strategy 2015-2021, which aims to reduce *Salmonella* notifications by 30% through improved food safety practices, verification programs, and training across the retail sector.

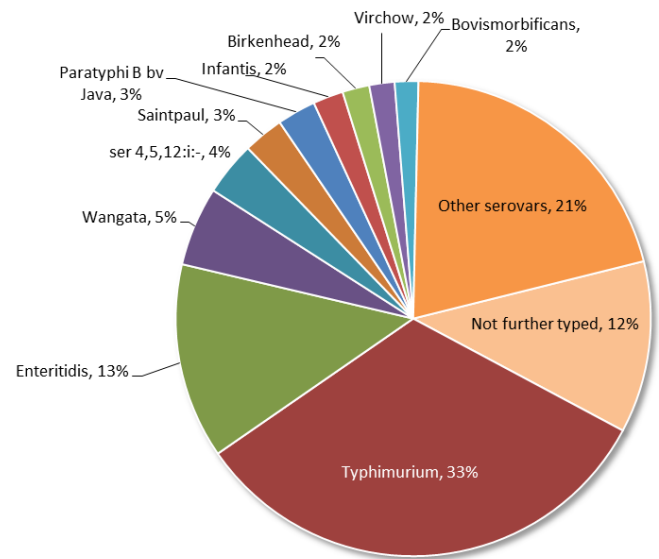
Figure 4. Trends, by quarters, for key *Salmonella* serovars in NSW from 2013-2018



S. Enteritidis notifications accounted for 13% of all *Salmonella* notifications in quarter 4, 2018. An increase above the quarterly average occurred among both overseas acquired cases (61% above the quarterly average) and locally acquired cases (713% above the quarterly average). Cases linked to an outbreak of locally acquired *S. Enteritidis*, described in the Q3 2018 report, continued to be detected in Q4, 2018. This outbreak is further described on page 9.

S. Wangata and ser 4,5,12:I were the third and fourth most notified serovars in quarter 4, 2018, respectively (Figure 5). *S. Wangata* is suspected to be associated with environmental exposures. *S. ser 4,5,12:I* is a monophasic variant of *S. Typhimurium*, which has been recognised as an cause of infection worldwide in recent years.

Figure 5. Proportion of *Salmonella* serovars, quarter 4, 2018 (N=872)



The majority (95%) of *S. Typhimurium* isolates were typed using MLVA. In quarter 4, the most common MLVA profile (5-17-9-13-490) made up 26% of all the *S. Typhimurium* typed (Table 3) and was linked to an outbreak that predominately occurred in the Hunter New England region. The investigation of this outbreak is further described on page 9.

Table 3. Top 12 *Salmonella* Typhimurium MLVA patterns, quarter 4, 2018 (N=284)

MLVA	Notifications	% of <i>S. Tm</i>
5-17-9-13-490	70	26%
3-16-10-17-523	9	3%
3-24-15-10-523	6	2%
3-12-13-9-523	5	2%
3-13-12-9-523	5	2%
3-15-10-13-523	5	2%
5-15-16-11-490	5	2%
3-11-11-11-523	4	1%
3-13-10-9-523	4	1%
3-14-17-9-523	4	1%
3-23-13-12-523	4	1%
6-14-15-12-490	4	1%
Top 12 total	125	46%

Shigella Spotlight

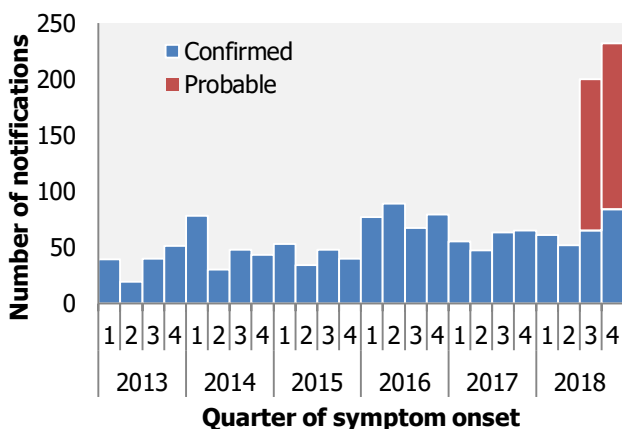
The national shigellosis case definition changed on 1 July 2018 to include 'probable cases.' Probable cases include those with a detection of *Shigella* on nucleic acid testing only (PCR). The ipaH gene used as the target for all current nucleic acid tests for *Shigella* is common to both *Shigella* species and enteroinvasive *Escherichia coli* (EIEC). Thus, PCR tests are unable to differentiate between shigellosis cases and EIEC cases. Cases with detections of this gene by PCR, without culture, are classified as 'probable' *Shigella*.

This section describes shigellosis notifications in NSW by classification (confirmed, probable) to allow comparison with previous years. The number of shigellosis notifications, by classification, is shown for each quarter in Figure 6.

In quarter 4, 2018, 84 confirmed cases of shigellosis were notified in NSW. This is a 51% increase compared to the five year average of confirmed shigellosis notifications for this quarter (56 cases). In addition, 148 probable cases of shigellosis were notified.

The proportion of infections acquired overseas was high among both confirmed (40%) and probable (47%) shigellosis cases in this quarter (Table 4). However, the primary country of acquisition varied between confirmed cases (Indonesia, 21%) and probable cases (India, 21%) (Table 5). The possible inclusion of EIEC cases in those classified as probable shigellosis may explain the difference in primary country of acquisition.

Figure 6. Number of shigellosis notifications by year, quarter and classification, Jan 2013 to Dec 2018



Public health units are required to attempt to interview all confirmed shigellosis cases to determine how the infection was acquired. Probable shigellosis cases are only required to be interviewed if they are suspected to be at high risk of transmission. The proportion of shigellosis cases reporting contact with a confirmed or suspected case (possible secondary) was low among both confirmed cases (12%) and probable cases (7%) in quarter 4, 2018 (Table 4). However, the proportion of cases reporting male-to-male sexual contact (MSM) prior to their infection was much higher among confirmed cases (50%) compared to probable cases (3%) (Table 4). This is most likely attributed to more targeted requests for culture testing by doctors of patients with high risk factors for transmission of *Shigella* infection, which includes MSM contact.

Table 4. Shigellosis cases notified and interviewed in quarter 4, 2018, by reported risk exposure and classification

Exposures	Confirmed cases		Probable cases	
	N	%	N	%
Overseas travel	34	40%	70	47%
Sexual activity with faecal exposure during incubation period	40	48%	7	5%
Male-to-male sexual contact	42	50%	5	3%
Contact with confirmed or suspected case	10	12%	10	7%
Total	84	100%	92	62%

Table 5. Top 5 countries of acquisition, shigellosis cases notified in quarter 4, 2018, by classification

Rank	Confirmed cases		Probable cases	
	Country	N (%)	Country	N (%)
1	Indonesia	7 (21%)	India	15 (21%)
2	Fiji	2 (2%)	Fiji	7 (10%)
3	Lebanon	2 (2%)	Cambodia	4 (6%)
4	Philippines	2 (2%)	Mexico	4 (6%)
5	Thailand	2 (2%)	Indonesia	3 (4%)

Foodborne and suspected foodborne outbreaks

NSW Health investigates all potential foodborne disease outbreaks. Gastroenteritis and foodborne outbreaks are identified via a range of mechanisms, including reports from the public, general practitioners, institutions such as residential care facilities and child care centres, emergency departments, analysis of surveillance data, and reports to the NSW Food Authority's (NSWFA) Consumer Complaints Line. The most notable outbreaks are described on pages 8-9.

Table 4. Foodborne and potentially foodborne disease outbreaks investigated in NSW, quarter 4 2018

PHU ID	Month ¹	Setting	Agent responsible	No. ill	Lab confirmed	No. Hospitalised	Evidence	Responsible vehicles	Contributing factors
HUN0522	October	Take-away	Salmonella Virchow	3	3	0	D	Chicken and Mayonnaise sandwich/wrap	Inadequate cleaning of equipment
HUN0523	October	Restaurant	Norovirus	29	1	0	D	Unknown	Suspected person to food to person
NS201801	October	Restaurant	Salmonella Enteritidis	3	3	1	D	Eggs	Unknown
SES201802	October	Private residence	Salmonella Typhimurium MLVA 5-15-16-11-490	5	2	Unknown	D	Unknown	Unknown
SES201803	November	Private residence	Scombroid	1	0	0	D	Tuna steak	Toxic substance or part of tissue
WS201801	November	Take-away	Scombroid	1	0	0	D	Fish	Toxic substance or part of tissue
HUN0524	November	Aged care	Salmonella Typhimurium MLVA 5-17-9-13-490	17	13	4	D	Eggs	Cross contamination from raw ingredients
HNE201802	December	Take-away	Salmonella Typhimurium MLVA 5-17-9-13-490	13	13	Unknown	D	Eggs	Cross contamination from raw ingredients
IS201803	December	Restaurant	Unknown	8	Unknown	1	D	Unknown	Unknown

¹ Month of outbreak is the month of onset of first case or month of notification/investigation of the outbreak.

Evidence category:

- A** Analytical epidemiological association between illness and 1 or more foods.
- D** Descriptive evidence implicating the suspected vehicle or suggesting foodborne transmission.
- M** Microbiological confirmation of agent in the suspected vehicle and cases.

Notable Foodborne Outbreaks

Key points

- Products containing undercooked eggs and cross-contamination of foods during food preparation are the most common source of salmonellosis in NSW. People should follow the NSW Food Authority's [egg recommendations](#) to prepare eggs safely at home. Restaurants, cafes, bakeries, caterers and manufacturers that make raw egg dressings, desserts and sauces are required to follow [Food Safety Guidelines for the Preparation of Raw Egg Products](#) or use alternatives to raw eggs in ready to eat foods.
- Whole genome sequencing, and in particular, the sharing of outbreak sequences with other Health departments or international databases, can identify further cases associated with outbreak investigations. In quarter 4 2018, the identification of a *Salmonella* isolate from a case associated with an outbreak on a cruise ship on an international database, helped to identify the likely origin of an outbreak of *Salmonella* as originating from an international port.

NSW *Salmonella* Enteritidis outbreak linked to local eggs

The initial investigation and subsequent recall of eggs relating to an increase in locally acquired *S. Enteritidis* cases in the metropolitan Sydney area was described in the quarter 3 2018 report. Following the egg recall in September, locally acquired *S. Enteritidis* cases with the outbreak strain continued to be detected during quarter 4 2018 and the increase remained under active investigation.

One point source cluster was linked to the outbreak during quarter 4 2018 when three unrelated cases reported dining at the same yum cha restaurant on the same day in October 2018. The NSW Food Authority inspected the venue, but no evidence of the recalled eggs from September were found on site. Several food samples and swabs were collected by the NSW Food Authority, and all tested negative for *Salmonella*. The venue was found to have inadequate sanitiser in use, and was serving fried ice cream. A prohibition order was issued regarding the sale of fried ice cream.

To the end of quarter 4 2018, a total of 58 cases of this outbreak strain of *S. Enteritidis* were notified in NSW residents since the first case in May 2018. In addition,

infections in two residents from other Australian jurisdictions who had travelled to Sydney, and one person where travel to NSW could not be established, were linked to the outbreak by whole genome sequencing. Potential exposures within the state of residence were investigated and ruled out.

Salmonella Enteritidis is endemic in commercial poultry farms in most countries, but it is not thought to be endemic in Australia. The serovar has the potential to affect the internal egg contents, meaning that the way to prevent infection is by thorough and complete cooking; by contrast, more common *Salmonella* strains in NSW such as *S. Typhimurium*, are thought to be transmitted on the external surface of the egg (either by faecal contamination or cracks in the egg shell).

Investigation into the source of introduction and the spread of the infection continued into the first quarter of 2019, leading to the subsequent [recall](#) of other egg brands. Further information will be provided in the next quarterly report. Active surveillance for and investigation of locally-acquired *S. Enteritidis* infections is ongoing.

Salmonella Typhimurium outbreak with MLVA profile 5-17-9-13-490 linked to an egg farm

An outbreak of *Salmonella* Typhimurium with MLVA profile 5-17-9-13-490 was identified in November 2018, affecting residents across three states and territories. This MLVA profile had not previously been identified in humans in NSW since MLVA was routinely introduced in 2010.

Between November and December 2018, 13 cases of *Salmonella* were detected in two aged care facilities that were geographically distinct, but operated by the same company. Twelve were confirmed as *S. Typhimurium* with MLVA 5-17-9-13-490 cases, and one was *Salmonella* PCR positive case. A further four possible cases with symptoms were identified, but no specimen was collected. Of the 17 unwell, 14 were residents and three were staff members. Symptom onsets occurred between 12 November 2018 and 2 December 2018. Seven cases presented to hospital and four cases were admitted. Three resident deaths occurred during the outbreak in persons who had acquired a *Salmonella* infection. The NSW Food Authority conducted site inspections and collected environmental samples from both aged care facilities. The dishwashers at both facilities were not operating at an adequate sanitising temperature. One boot swab specimen in an entrance

hallway was positive for *S. Typhimurium* 5-17-9-13-490. Trace-back of the eggs used at each aged care facility subsequently identified a common egg grading facility.

In December 2018, community cases with this MLVA profile were identified in NSW and a wider outbreak investigation was commenced. Two point source clusters with case onset dates in quarter 4 2018 were identified.

In the first cluster, 13 cases were linked to exposures at a bakery, of which 12 were *S. Typhimurium* MLVA 5-17-9-13-490 and one was positive for *Salmonella* by PCR. Symptom onsets occurred between 7 December 2018 and 16 December 2018. The majority of cases consumed a pork roll. Officers from the local council and the NSW Food Authority investigated. Poor temperature control and failure to comply with the NSW Food Authority raw egg guidelines were identified, and a prohibition order relating to raw egg use was issued. The outbreak strain was not detected in the environmental samples that were collected. This indicates that measures taken by the venue had addressed the risk, and there is no ongoing risk associated with this venue. Trace-back of the eggs used subsequently identified a common egg grading facility to the aged care facility outbreak.

In the second point source cluster linked to this outbreak in quarter 4 2018, three cases of *S. Typhimurium* MLVA 5-17-9-13-490 were linked to a café. Symptom onsets occurred between 5 December 2018 and 27 December 2018. All cases consumed eggs as a part of their meal. Local council conducted a site inspection and identified a number of sanitation issues, and an improvement notice was issued. Trace-back of the eggs used subsequently identified the egg grading facility in common with the outbreaks described above.

Between 10 October and 31 December 2018, 72 cases of *S. Typhimurium* with MLVA pattern 5-17-9-13-490 and related MLVA patterns, and two *Salmonella* PCR positive cases were linked to this outbreak. Of these, 37 cases were linked to point source clusters, 23 were in NSW residents not linked to clusters and 12 were in residents outside NSW. Trace-back of the eggs used subsequently identified the same common egg grading facility in each cluster.

Eggs are a healthy and nutritious food, however this outbreak highlights that eggs need careful handling to keep them safe. Foods containing undercooked eggs and contamination of foods with raw egg during food preparation are the most common source of salmonellosis in NSW. To reduce the risk of *Salmonella* infection from

eggs at home, people are advised to follow the NSW Food Authority's [egg safety recommendations](#). Restaurants, cafes, bakeries, caterers and manufacturers that use raw (unpasteurised) egg to make dressings, desserts and sauces are required to follow [Food Safety Guidelines for the Preparation of Raw Egg Products](#) or use alternatives to raw eggs in ready to eat foods. Safer alternatives include commercially produced dressings and sauces, or pasteurised egg products.

***Salmonella* Virchow linked to chicken and mayonnaise sandwiches/wraps**

A small cluster of *Salmonella* Virchow in a regional local health district was investigated by the local public health unit in October 2018. The three unrelated cases were aged between two and 32 years of age, and developed symptoms between the afternoon of 21 September and morning of 22 September 2018. Two of the three cases reported consuming a chicken and mayonnaise sandwich and/or wrap from the same bakery in the seven days prior to their onset of illness, although neither case could recall the date of consumption. The third case, the young child, was not able to be linked to the venue directly, but it was reported that the parents regularly shopped in the same area.

An environmental inspection of the venue identified the use of a raw egg butter in the sandwiches and wraps, as well as issues with sanitisation. The NSW Food Authority issued a prohibition order on the use of raw egg products at the venue. Several environmental specimens were collected but none were positive for *Salmonella*. No further cases were subsequently identified, and there is no ongoing risk relating to the bakery.

***Salmonella* Typhimurium 3-24-15-10-523 on a Cruise ship**

In November 2018, the Cruise Ship Health Surveillance Program run by South Eastern Sydney Public Health Unit commenced an investigation into a cluster of *Salmonella* Typhimurium cases on a cruise ship. A total of 13 cases were identified by PCR and/or culture across 5 voyages between 19 October and 12 December 2018. The first of these voyages was a cruise from South East Asia to Australia. Food exposure analysis from patient interviews was not able to identify a food or exposure common to all cases. However, eggs were consumed by nine of the 13 (69%) cases and were considered the highest risk.

Environmental health officers from the public health unit inspected the vessel on three occasions in November and

December 2018, and collected food and environmental samples. All samples tested negative and no issues were identified. On advice from the NSW Food Authority, the vessel engaged a private food safety consultant to review cooking and storage processes on board the vessel whilst at sea, with the primary findings of the inspection being that the kitchen, handling and processing were well run. The consultant was unable to identify the cause or likely source of the *Salmonella*. All samples collected by the private consultant were negative, except for one sample of an uncooked raw meat product which was found to be positive for *S. Litchfield* and was unrelated to the cluster of cases.

MLVA typing was performed on 11 of the 12 samples for which a positive culture was available, and all were found to be MLVA 3-24-15-10-523. WGS was performed on six of the isolates and confirmed that they were highly related. Further investigation of this outbreak strain by searching for matches in an international sequencing database identified another case which was notified to another country. That country's Health department confirmed that the case travelled on the cruise ship from 3 to 19 October 2018, and disembarked before the vessel left South East Asia. Based on this finding, it is likely that the product responsible for this cluster was brought on board the vessel in a South East Asian port.

***Salmonella* Enteritidis on a Cruise ship**

In December 2018, the Cruise Ship Health Surveillance Program run by South Eastern Sydney Public Health Unit investigated a *Salmonella* Enteritidis cluster on a cruise ship. In total 6 cases were notified. Four cases were passengers who travelled on a voyage from South East Asia arriving in Sydney on 1 December 2018, one case was a travel agent who consumed lunch on board the vessel on 1 December 2018, and one case was identified from 12 specimens collected on board the vessel during a voyage arriving in Sydney on 13 December 2018. Onset of symptoms occurred between 20 November and 8 December, with half occurring on 1 December.

Analysis of whole genome sequences of these six isolates showed that they were highly related to each other, and were also related to other otherwise unrelated *S. Enteritidis* cases who were found to have acquired their infection in a South East Asian country. It is therefore likely that a food product was brought on board the vessel at a South East Asian port, which may have been responsible for the illness. Stool samples tested from unwell passengers on the following two voyages arriving in Sydney on 20 December 2018 and 5 January 2019 were negative for *Salmonella*. The vessel was advised of these findings to inform future risk mitigation strategies.

Institutional gastrointestinal outbreaks

From 1 October to 31 December 2018, a total of 99 outbreaks of suspected viral gastrointestinal illness in institutions were reported in NSW affecting at least 1259 people (Table 6). This represents an decrease of 53% compared to the average number of outbreaks reported during the same quarter from 2013 to 2017 (n=184), and a decrease of 46% compared to the mean number of people affected as a result of the gastroenteritis outbreaks during the same quarter from 2013 to 2017 (n=2719).

Of the 99 outbreaks, 63 (64%) occurred in child care centres, 33 (33%) in aged care facilities, 2 (2%) in hospitals and 1 (1%) in other facilities (Table 6). Outbreaks among each facility type were within average levels (Figure 8).

Overall, 14% of staff members and 13% of non-staff became sick during gastroenteritis outbreaks in quarter 4 (Table 6). The highest attack rate for gastrointestinal disease for staff was in child care centres (17%) and for non-staff was in students at a school dormitory (31%). Outbreaks lasted seven days on average (Table 6).

One or more stool samples were collected in 33 (33%) of the outbreaks. Norovirus was identified in 15 (45%) of these outbreaks and rotavirus was identified in one (3%) outbreak. The majority of results of the other samples were negative, or not reported (Table 6).

Public health units monitor gastroenteritis outbreaks in institutions and provide advice on control measures.

Figure 8. Number of reported outbreaks of gastrointestinal illness in institutions, quarter 4 2018 compared to the 5 year quarterly average, by month and facility type

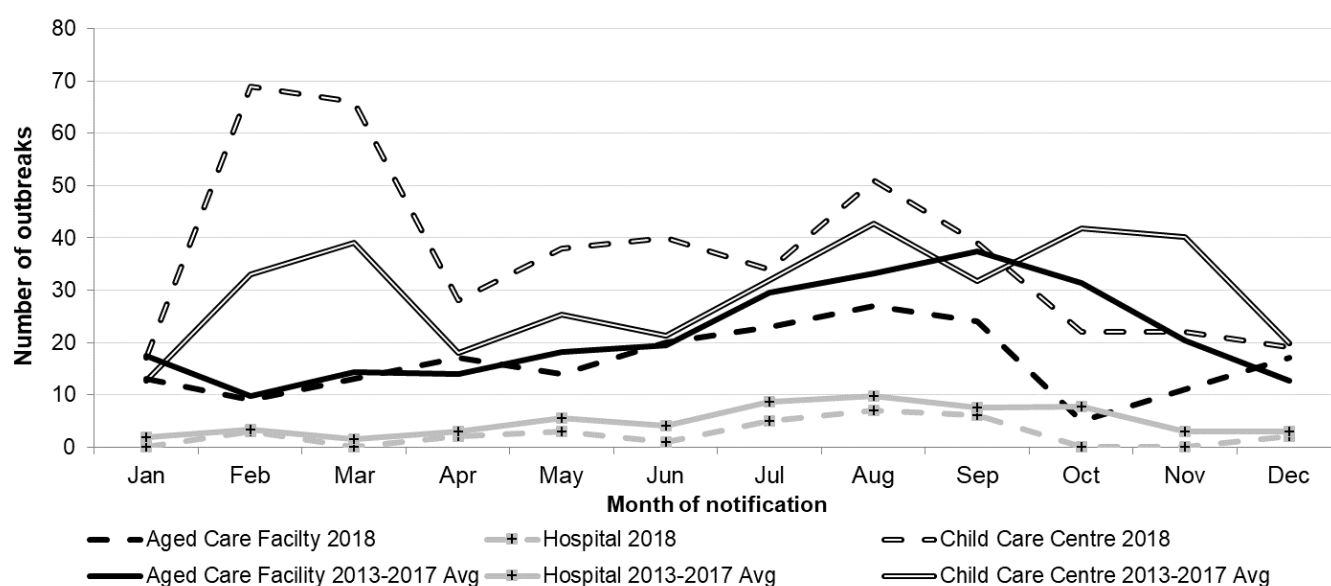


Table 5. Outbreaks of gastroenteritis in institutions reported in NSW, quarter 4 2018, by local health district²

Facility type	Q1 2018	HNE	IS	M	MNC	NBM	NNSW	NS	SES	SNSW	SWS	SYD	WNSW	WS	NSW
ACF	No. of outbreaks	6	2	5	0	2	2	1	2	0	6	2	1	4	33
	Staff affected	18	5	31	0	5	5	1	4	0	31	5	10	14	129
	Non-staff affectede	64	13	53	0	24	26	5	5	0	51	21	23	60	345
CCC	No. of outbreaks	8	2	8	1	16	0	5	4	3	2	5	1	8	63
	Staff affected	12	14	20	4	47	0	9	19	9	2	4	2	34	176
	Non-staff affectede	64	29	97	11	133	0	31	55	43	9	32	11	53	568
Hospital	No. of outbreaks	0	0	0	0	1	0	0	0	0	0	1	0	0	2
	Staff affected	0	0	0	0	2	0	0	0	0	0	6	0	0	8
	Non-staff affectede	0	0	0	0	2	0	0	0	0	0	6	0	0	8
Other ¹	No. of outbreaks	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Staff affected	3	0	0	0	0	0	0	0	0	0	0	0	0	3
	Non-staff affectede	22	0	0	0	0	0	0	0	0	0	0	0	0	22

¹ Other= school dormitory

² CC & FW did not report any outbreaks of gastroenteritis in institutions in this period

Table 6. Outbreaks of gastroenteritis in institutions reported in NSW, quarter 4 2018, by facility type

Setting	No of Outbreaks (n)	Staff Affected (n: attack rate)	Non-staff affected (n: attack rate)	Average duration of outbreak (days)	Outbreaks with stool collected (n: %)	Outbreaks with pathogen found (n: pathogen found)
ACF	33	129: 7%	345: 16%	5	23: 70%	13: norovirus
CCC	63	176: 17%	568: 11%	9	8: 13%	1: norovirus & 1: rotavirus
Hospital	2	8: 15%	8: 29%	3	2: 100%	1: norovirus
Other ¹	1	3: 15%	22: 31%	8	0: 0%	-
Total	99	316: 14%	943: 13%	7	33: 33%	15: norovirus & 1: rotavirus

¹ Other= school dormitory

GLOSSARY

ACF	Aged-care facility	NBM	Nepean Blue Mountains LHD
CC	Central Coast LHD	NNSW	Northern NSW LHD
CCC	Childcare centre	NS	Northern Sydney LHD
FW	Far West LHD	NSW	New South Wales
HNE	Hunter New England LHD	NSWFA	NSW Food Authority
HUS	haemolytic uraemic syndrome	Q	Quarter
ICPMR	Institute of Clinical Pathology and Medical Research	SES	South Eastern Sydney LHD
IS	Illawarra Shoalhaven LHD	SNP	single nucleotide polymorphisms
LHD	Local Health Districts	SNSW	Southern NSW LHD
M	Murrumbidgee LHD	STEC	Shiga toxin-producing <i>Escherichia Coli</i>
MLVA	Multi-locus variable number tandem repeat analysis	SWS	South Western Sydney LHD
MLST	Multi-locus sequence typing	SYD	Sydney LHD
MNC	Mid North Coast LHD	WGS	Whole genome sequencing
N	Number	WNSW	Western NSW LHD
NA	Not available	WS	Western Sydney LHD
		Yr	Year