

OzFoodNet

Enhancing Foodborne Disease Surveillance Across Australia

NSW ANNUAL REPORT

2018



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SHPN: (HP NSW) 190209
ISSN: 2008-6153

Suggested citation:

Communicable Diseases Branch. *NSW OzFoodNet Annual Surveillance Report: 2018*. Sydney: Health Protection NSW, 2019.

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April, 2019

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GLOSSARY

ACF	Aged-care facility	NA	Not available
CC	Central Coast LHD	NBM	Nepean Blue Mountains LHD
CCC	Childcare centre	NNSW	Northern NSW LHD
DPI	Department of Primary Industries	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>
MDR	Multi-drug resistant	SWS	South Western Sydney LHD
MLVA	Multi-locus variable number tandem repeat analysis	SYD	Sydney LHD
MLST	Multi-locus sequence typing	WGS	Whole genome sequencing
MNC	Mid North Coast LHD	WNSW	Western NSW LHD
N	Number	WS	Western Sydney LHD
		Yr	Year

SUMMARY – ENTERIC INFECTIONS IN NSW

This report summarises NSW enteric disease surveillance data for viral, bacterial and parasitic pathogens for 2018, changes in notifications over time, and other activities in 2018. NSW Health undertakes surveillance of enteric diseases to monitor trends and identify outbreaks, with the aim of implementing control measures to prevent further illness within the community. Disease notification represents only a portion of cases in the community, as it usually relies on people seeing a doctor, and the doctor ordering a test that detects the infection, to generate a notification.

Cases of infection and incidence 2018

- Notifications of enteric conditions: 17,503
- Reported hospitalisations: 581
- Reported deaths: 11
- Notification rate per 100,000 population: 219.11

Notified incidence and reported hospitalisation due to enteric pathogens in NSW, 2018

	5Yr annual mean	N 2018	% change	Notified Rate	Reported Hospitalisation ^a
Campylobacteriosis ^b	n/a	9070	n/a	113.54	12
Salmonellosis	3992	3326	-17%	41.64	227
Giardiasis	3038	2801	-8%	35.06	1
Rotavirus	1067	793	-26%	9.93	48
Cryptosporidiosis	1008	698	-31%	8.74	28
Shigellosis	214	546	156%	6.84	88
Hepatitis A	66	85	30%	1.06	49
Typhoid	47	58	23%	0.73	40
STEC	41	55	33%	0.69	30
Paratyphoid	24	32	34%	0.40	23
Listeriosis	27	19	-31%	0.24	19
Hepatitis E	22	17	-23%	0.21	13
Haemolytic Uremic Syndrome	6	4	-38%	0.05	4
Botulism	1	0	-100%	0.00	0
Cholera	1	0	-100%	0.00	0
TOTAL	n/a	17503	n/a	219.11	581

^a Hospitalisations may be underestimated as counts are limited to those infections investigated by a public health unit

^b Campylobacteriosis became a notifiable condition in April 2017. Data from previous years is not available, thus a 5yr mean cannot be calculated.

Notable changes in 2018 (compared to 5 year annual average, 2013-2017)

- Campylobacteriosis was the highest enteric pathogen notified in 2018. Since its introduction as a notifiable condition in NSW in April 2017, Campylobacteriosis notifications have exceeded all other enteric infections (page 6).
- Shigellosis notifications increased by 156% compared to the five year annual average. 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' category (pages 15-16).
- Increase in notifications of STEC may be driven by the use of a more sensitive test.

Reported enteric disease outbreaks

- 50 foodborne or potentially foodborne disease outbreaks were reported affecting at least 560 people; a 32% increase in the number of reported foodborne or probable foodborne disease outbreaks compared to 2017 (n=38)
- 684 viral or probable viral gastroenteritis outbreaks in institutions were reported, affecting at least 9395 people; a 26% decrease in the number of reported gastroenteritis outbreaks in institutions compared to 2017 (n=921)

CAMPYLOBACTERIOSIS

Campylobacteriosis is a disease caused by bacteria known as *Campylobacter*, usually through contaminated food and contact with unwell animals. It usually causes diarrhoea, abdominal pain, fever, malaise, nausea, and sometimes vomiting. Notified cases are usually only investigated if they are part of, or suspected to be part of, an outbreak.

Summary 2018

- Case count: 9070
- Reported hospitalisations: 12*
- Reported deaths: 0
- Notification rate per 100,000: 113.54

*Hospitalisations may be underestimated as most campylobacteriosis cases are not investigated

Overall trend

- Campylobacteriosis became a notifiable condition on 7 April 2017. Notifications of campylobacteriosis exceeded all other enteric diseases in 2018.

Groups with highest notification rate in 2018

- Age: <5 years (10% of cases – 167.07 per 100,000)
- Sex: Male (55% of cases – 125.68 per 100,000)
- LHD: Murrumbidgee (5% of cases – 170.13 per 100,000)

Seasonality

- Campylobacteriosis notifications were highest in the warmer months, notable in January 2018 (n=943) and November 2018 (n=925)

Outbreaks

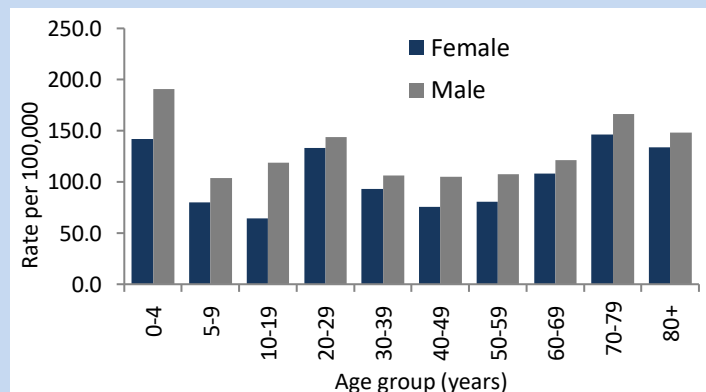
- Cases found to be associated with an outbreak: 7 (0.1%) (pages 30-39)

Notification rate per 100,000 population by year, 2017* – 2018, NSW



* Campylobacteriosis became a notifiable condition on 7 April 2017, therefore 2017 notifications only represents 9 months of data.

Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	n/a	340	n/a	97.3
FW	n/a	18	n/a	59.0
HNE	n/a	997	n/a	106.2
IS	n/a	457	n/a	110.8
M	n/a	413	n/a	170.1
MNC	n/a	255	n/a	113.4
NBM	n/a	364	n/a	93.3
NNSW	n/a	411	n/a	132.8
NS	n/a	1382	n/a	149.4
SES	n/a	1379	n/a	146.5
SNSW	n/a	243	n/a	112.0
SWS	n/a	737	n/a	73.1
SYD	n/a	781	n/a	116.8
WNSW	n/a	321	n/a	114.4
WS	n/a	971	n/a	97.6
NSW	n/a	9070	n/a	113.5

* Became notifiable in 2017; no 5yr average can be reported

SALMONELLOSIS

Salmonellosis is caused by infection with bacteria called *Salmonella*. In Australia, most *Salmonella* infections occur after eating contaminated food; and sometimes after close contact with another person with salmonellosis or animals. Notified cases are usually only investigated if they are part of, or suspected to be part of, an outbreak.

Summary 2018

- Case count: 3326
- Reported hospitalisations: 227*
- Reported deaths: 6
- Notification rate per 100,000: 41.64

*Hospitalisations may be underestimated as not all *Salmonella* cases are investigated

Overall trend

- 20% decrease in the 2018 notification rate compared to the 5 year annual mean (52.31 per 100,000)

Groups with most notifications in 2018

- Age: <5 years (25% of cases – 152.46 per 100,000)
- Sex: Female (51% of cases – 42.11 per 100,000)
- LHD: Northern NSW (7% of cases – 79.79 per 100,000)

Seasonality

- Consistent peaks in summer months (Dec-Feb)

Top serotypes in 2018 (% of all types *Salmonella*) - % change compared to 2017

1. Typhimurium (27%) - ↓ 24%
2. Enteritidis (8%) - ↑ 80%
3. Wangata (6%) - 0%
4. ser 4,5,12:i: - (4%) - ↑ 2%
5. Birkenhead - (4%) - ↓ 24%

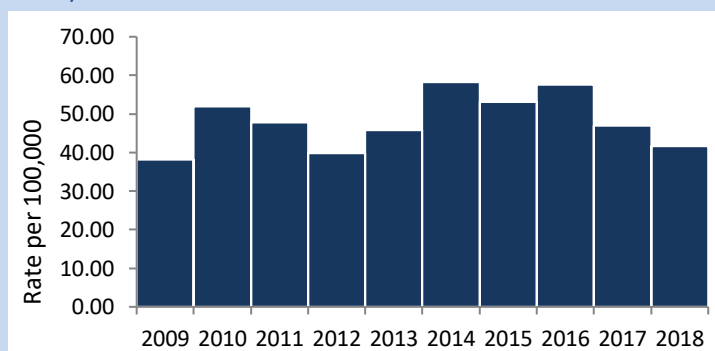
Outbreaks

- Cases found to be associated with a foodborne illness outbreak: 83 (2.5%) (pages 30-39)

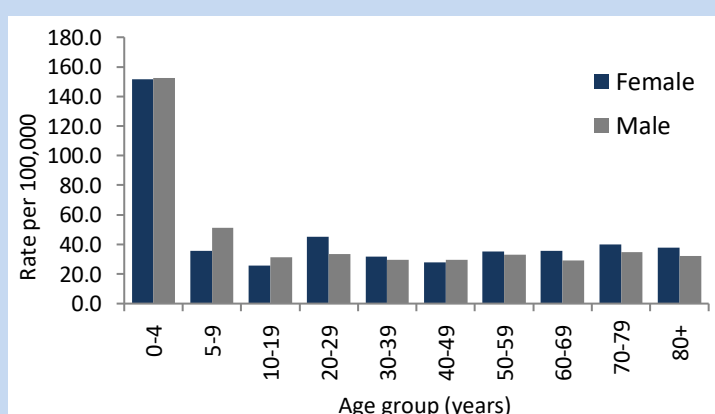
Deaths

Six deaths related to invasive salmonellosis infection were recorded in 2018, all in adults. Four had known pre-existing medical conditions. Three cases were linked to an outbreak of *S. Typhimurium* MLVA 5-17-9-13-490 (pages 30-39). The other three deaths are not related to each other or any outbreak.

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

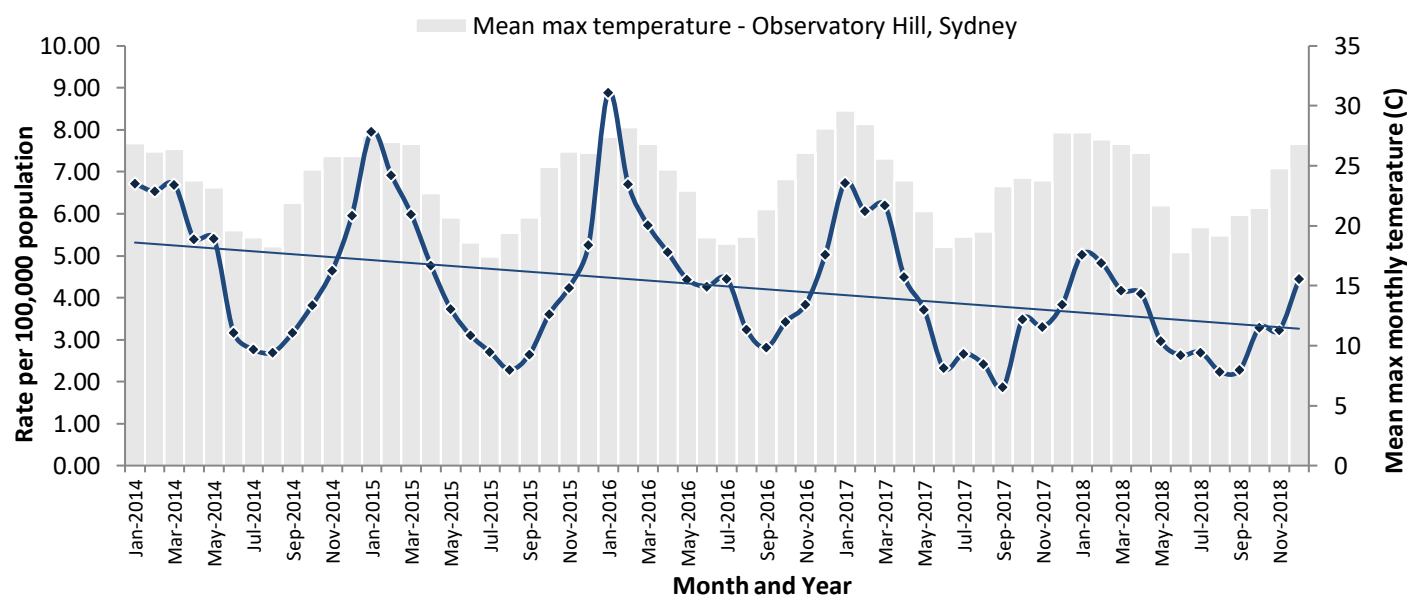
LHD	Count		Rate	
	5Yr mean	2018	5Yr mean	2018
CC	172.6	147	51.3	42.1
FW	21.2	15	68.7	49.1
HNE	437	426	48.0	45.4
IS	192.4	135	48.0	32.7
M	144.2	120	59.9	49.4
MNC	148.2	144	68.8	64.0
NBM	165.6	138	45.0	35.4
NNSW	272.6	247	91.5	79.8
NS	581.6	455	64.6	49.2
SES	524	399	58.5	42.4
SNSW	96.2	74	46.8	34.1
SWS	394.2	336	41.8	33.3
SYD	329.8	239	52.6	35.7
WNSW	103.6	90	37.2	32.1
WS	408.6	359	44.1	36.1
NSW	3992.2	3326	52.3	41.6

*grey shading – >50% increase compared to 5yr mean

Salmonellosis continued

Seasonality and temperature effects

Crude monthly salmonellosis notification rate per 100,000 population and mean maximum monthly temperature* in NSW, 2014 – 2018



*Bureau of Meteorology, mean maximum monthly temperatures taken from Observatory Hill in Sydney

Age group rates

Number and notification rate of salmonellosis in NSW in 2018, compared to the 5 year annual mean, by age group

Age Group	2018			5 year average (2013-2017)		
	Count	% of all cases	Rate	Count	% of all cases	Rate
0-4 yrs	824	25%	152.5	878.4	22%	174.9
5-9 yrs	219	7%	43.6	307.4	8%	63.9
10-19 yrs	267	8%	28.6	388.6	10%	42.3
20-39 yrs	759	23%	34.7	1022	26%	48.3
40-59 yrs	642	19%	31.3	705.4	18%	35.4
60+ yrs	615	18%	34.7	687.8	17%	42.4

Salmonella serotypes

Top 5 *Salmonella* serotypes in NSW, 2014-2018 (number of notifications)

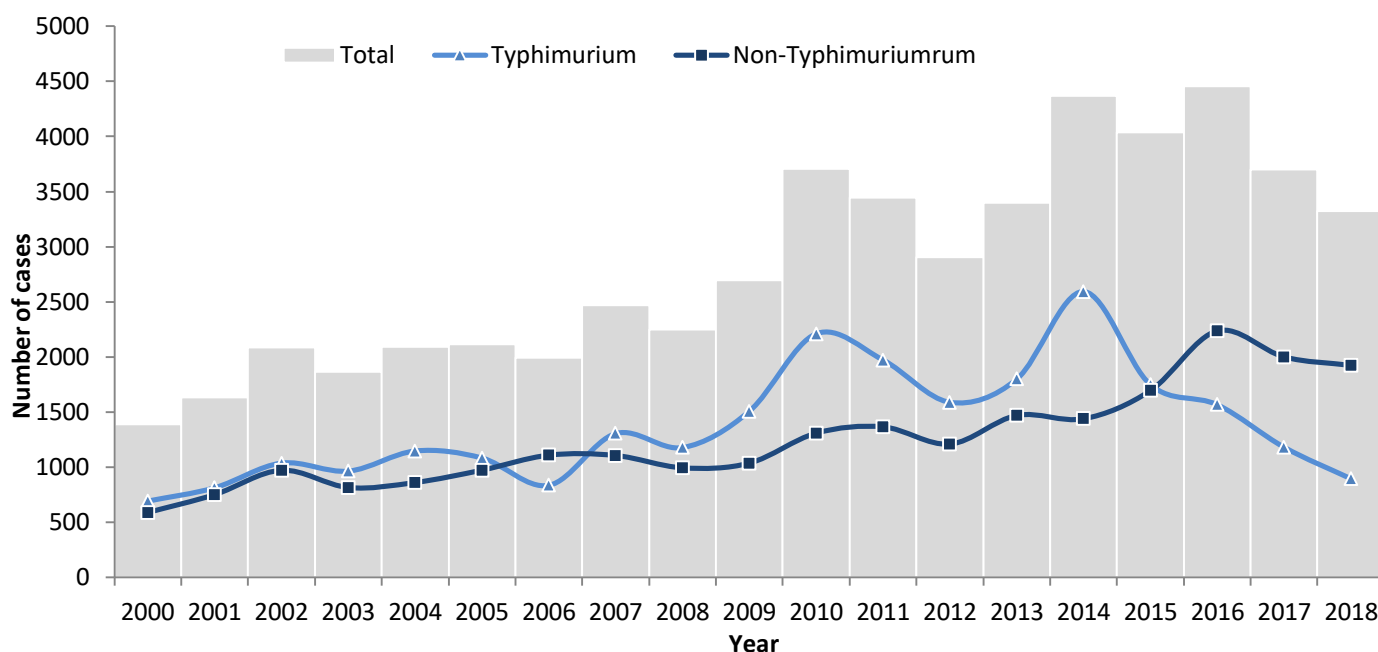
	2014	2015	2016	2017	2018
1	Typhimurium (2592)	Typhimurium (1747)	Typhimurium (1565)	Typhimurium (1179)	Typhimurium (893)
2	Enteritidis (159)	Enteritidis (155)	Enteritidis (243)	Wangata (201)	Enteritidis (281)
3	Virchow (122)	Saintpaul (131)	Virchow (167)	Birkenhead (160)	Wangata (201)
4	Paratyphi B bv Java (100)	Paratyphi B bv Java (122)	Saintpaul (142)	Enteritidis (156)	ser 4,5,12:i:- (137)
5	Wangata (92)	Wangata (105)	Paratyphi B bv Java (125)	ser 4,5,12:i:- (134)	Birkenhead (121)

Salmonellosis continued

Salmonella Typhimurium trends

In 2018, *Salmonella* Typhimurium notifications decreased by 24% when compared to 2017. The NSW Food Authority Foodborne Illness Reduction Strategy has a focus on reducing *Salmonella* Typhimurium and may account for some of the decrease since 2014.

Number of *Salmonella* Typhimurium infections compared to other *Salmonella* serotypes in NSW, 2000-2018



Salmonella Typhimurium MLVA profiles

MLVA (multiple locus variable number of tandem repeats analysis) is a method used by microbiologists to generate a DNA fingerprint of bacteria, and is used in NSW to distinguish different strains of *Salmonella* Typhimurium.

Top 10 *Salmonella* Typhimurium MLVA profiles, 2014-2018, NSW

	2014	2015	2016	2017	2018
1	3-17-9-11-523 (210)	3-12-11-14-523 (100)	3-26-13-8-523 (202)	3-17-9-11-523 (43)	5-17-9-13-490 (68)
2	3-12-11-14-523 (149)	3-17-9-11-523 (92)	3-25-18-12-523 (56)	3-16-9-7-523 (41)	3-16-10-17-523 (48)
3	3-12-12-9-523 (141)	3-12-12-9-523 (82)	3-12-12-9-523 (49)	3-12-13-9-523 (40)	3-12-13-9-523 (35)
4	3-10-7-12-523 (99)	3-12-13-9-523 (56)	3-12-11-14-523 (46)	3-17-9-12-523 (35)	3-14-10-8-523 (30)
5	3-9-7-12-523 (98)	3-24-13-10-523 (53)	3-10-14-11-496 (44)	3-16-9-11-523 (33)	3-13-12-9-523 (25)
6	3-9-8-12-523 (97)	3-10-8-12-523 (42)	3-9-7-12-523 (40)	3-9-7-14-523 (31)	3-12-12-9-523 (24)
7	3-16-9-11-523 (94)	3-9-7-12-523 (41)	3-24-13-10-523 (36)	3-12-12-9-523 (27)	3-17-9-11-523 (17)
8	3-17-10-11-523 (94)	3-17-8-11-523 (39)	3-17-9-11-523 (30)	3-9-7-12-523 (27)	3-16-10-11-523 (13)
9	3-10-13-11-496 (52)	3-16-9-11-523 (37)	3-10-15-11-496 (28)	3-12-12-10-523 (25)	3-12-14-11-496 (11)
10	3-16-9-12-523 (50)	3-24-14-10-523 (33)	3-9-12-11-496 (23)	3-10-7-12-523 (22)	3-12-14-9-523 (11)

*colour code indicates closely related MLVA patterns

SALMONELLA ENTERITIDIS INFECTION

While *Salmonella* Enteritidis is endemic in commercial poultry farms in most countries, it is not thought to be endemic in Australia. Most NSW cases are acquired overseas. All notified cases of *Salmonella* Enteritidis are investigated in NSW to determine likely place of acquisition (local vs overseas); locally acquired cases are further investigated.

Summary 2018

- Case count: 281
- Reported hospitalisations: 67
- Reported deaths: 1
- Notification rate per 100,000: 3.52

Seasonality

- October peak

Place of acquisition in 2018

- In NSW: 37%
- In Australia & outside NSW: 1%
- Overseas: 61%
- Unknown: 1%

(based on responses from 97% of cases)

Overall trend

- 56% increase in the 2018 notification rate compared to the 5 year annual mean (2.25 per 100,000)

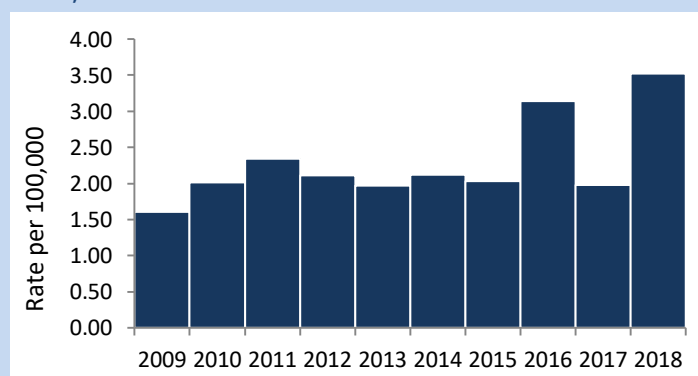
Groups with highest notification rate in 2018

- Age: <5 years (18% of cases – 9.44 per 100,000)
- Sex: Female (52% of cases – 3.66 per 100,000)
- LHD: Northern Sydney (19% of cases – 5.84 per 100,000)

Outbreaks

- An outbreak of locally acquired *S. Enteritidis* linked to eggs occurred in NSW commencing in May 2018 affecting 60 people (21.4% of all cases in 2018) (pages 30-39).

Notification rate per 100,000 population by year, 2009 – 2018, NSW

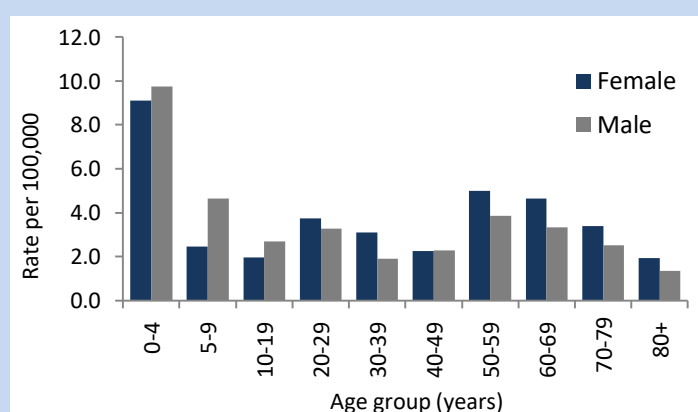


Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	9.2	7	2.7	2.0
FW	0.6	1	1.9	3.3
HNE	17.8	24	2.0	2.6
IS	9.6	13	2.4	3.2
M	4	7	1.7	2.9
MNC	6.4	10	3.0	4.4
NBM	5	7	1.3	1.8
NNSW	9	13	3.0	4.2
NS	30.2	54	3.4	5.8
SES	30	40	3.3	4.3
SNSW	3.8	6	1.8	2.8
SWS	14.6	31	1.5	3.1
SYD	15.2	29	2.4	4.3
WNSW	2.8	6	1.0	2.1
WS	13.6	33	1.5	3.3
NSW	171.8	281	2.2	3.5

*grey shading – >50% increase compared to 5yr mean

Notification rate per 100,000 population by age category and sex, 2018, NSW



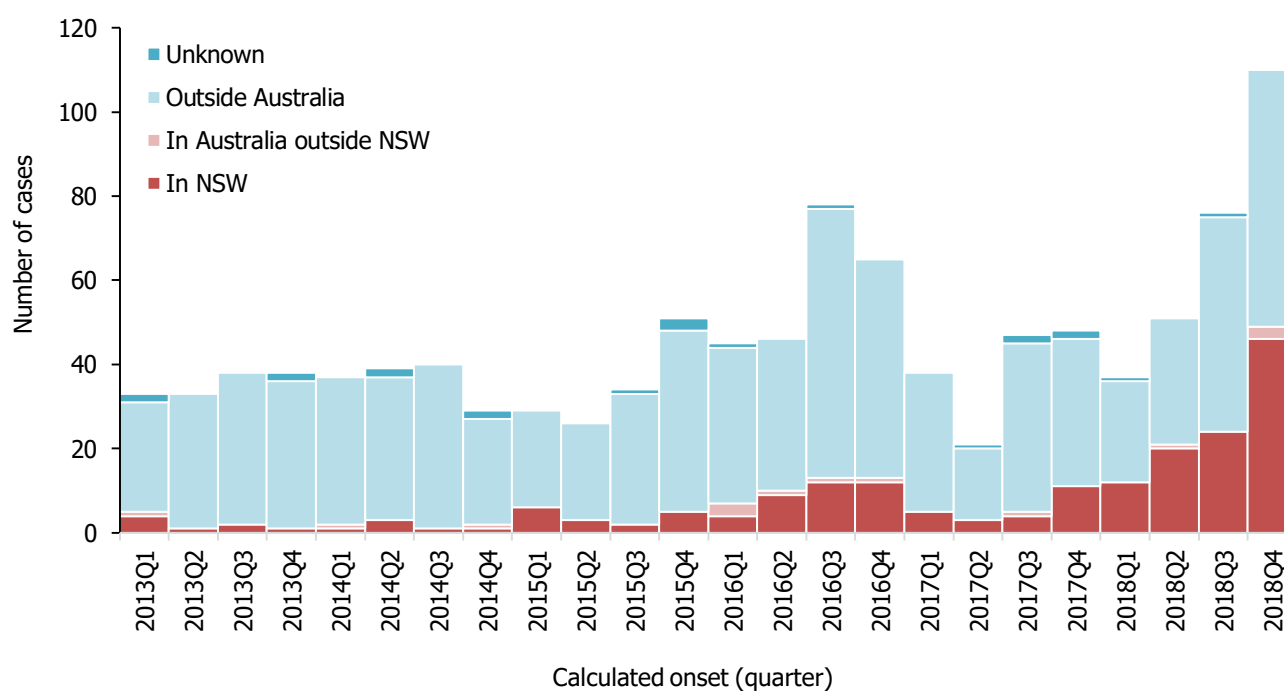
S. Enteritidis continued

Place of acquisition

Number and rate of *Salmonella* Enteritidis notifications by place of acquisition and year, 2013-2018, NSW

Year	Count		Rate (per 100,000)	
	Acquired in NSW	Acquired outside NSW	Acquired in NSW	Acquired outside NSW
2013	8	128	0.11	1.73
2014	6	137	0.08	1.82
2015	16	123	0.21	1.61
2016	37	192	0.48	2.48
2017	23	126	0.29	1.60
2018	101	170	1.26	2.13

Salmonella Enteritidis notifications by quarter and place of acquisition, NSW, 1 Jan 2013 to 31 Dec 2018



SALMONELLA PARATYPHI BIOVAR JAVA INFECTION

All *Salmonella* Paratyphi biovar Java cases are investigated in NSW because it is known to be associated with novel routes of infection. Cases are commonly associated with exposures such as overseas travel, sandpits (associated with outbreaks on the northern beaches of Sydney), aquariums in the home, and imported seafood (both associated with multi-antibiotic resistant *Salmonella* Paratyphi biovar Java organisms).

Summary 2018

- Case count: 109
- Reported hospitalisations: 28
- Reported deaths: 0
- Notification rate per 100,000: 1.36

Place of acquisition in 2018

- In NSW: 46%
- In Australia & outside NSW: 0%
- Overseas 52%
- Unknown: 2%

(based on responses from 88% of cases)

Overall trend

- 6% decrease in the 2018 notification rate compared to the 5 year annual mean (1.46 per 100,000)

Groups with highest notification rate in 2018

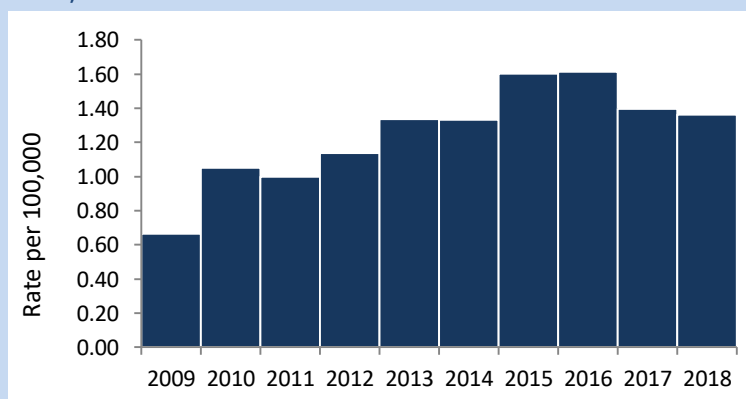
- Age: <5 years (32% of cases – 6.48 per 100,000)
- Sex: Male (57% of cases – 1.56 per 100,000)
- LHD: Northern Sydney (37% of cases - 4.32 per 100,000)

Outbreaks

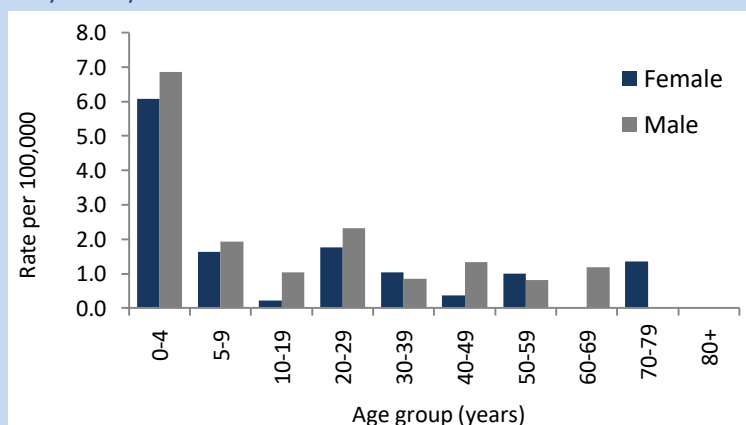
- Cases associated with an outbreak: 0%

Note: Although no cases were found to be associated with an outbreak, NSLHD continues to investigate the relationship between *Salmonella* Paratyphi biovar Java infections in preschool children and sandpits contaminated by local native fauna.

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	4.6	4	1.4	1.1
FW	0.4	0	1.3	0.0
HNE	8.8	4	1.0	0.4
IS	4.6	3	1.1	0.7
M	1	3	0.4	1.2
MNC	1.2	0	0.6	0.0
NBM	5.2	3	1.4	0.8
NNSW	3.2	4	1.1	1.3
NS	48	40	5.3	4.3
SES	11.8	13	1.3	1.4
SNSW	0.8	1	0.4	0.5
SWS	6.2	9	0.7	0.9
SYD	6.2	4	1.0	0.6
WNSW	1.2	2	0.4	0.7
WS	8	18	0.9	1.8
NSW	111.2	109	1.5	1.4

* grey shading – >50% increase compared to 5yr mean

TYPHOID & PARATYPHOID FEVER

Typhoid & paratyphoid fever are caused by an infection with bacteria called *Salmonella Typhi* and *Salmonella Paratyphi*. In Australia, most diagnosed infections are acquired overseas by individuals ingesting contaminated food or water while visiting countries where typhoid or paratyphoid is endemic. All notified cases of typhoid and paratyphoid are investigated in NSW.

Summary 2018

- Case count: 90
- Reported hospitalisations: 63
- Reported deaths: 0
- Notification rate per 100,000: 1.13

Overall trend

- 21% increase in the 2018 notification rate compared to the 5 year annual mean (0.93 per 100,000)

Groups with highest notification rate in 2018

- Age: 20-29 years (31% of cases - 2.72 per 100,000)
- Sex: Male (56% of cases – 1.26 per 100,000)
- LHD: Western Sydney (40% of cases – 3.62 per 100,000)

Seasonality

- Peaks typically in summer months (Jan-Feb)

Place of acquisition in 2018

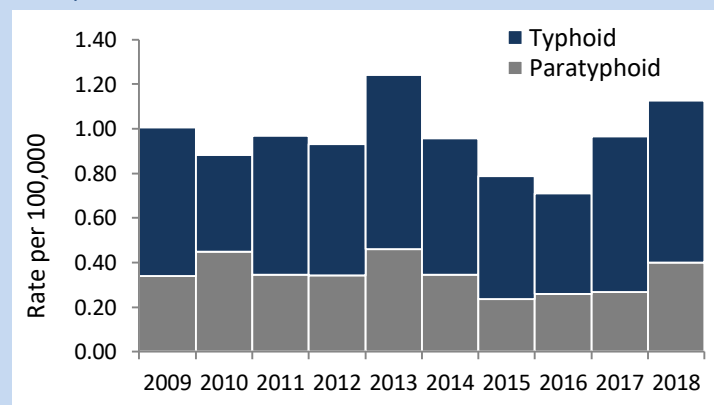
- In NSW: 1%
- In Australia & outside NSW: 0%
- Overseas: 95%
- Unable to be determined: 3%

(based on responses from 98% of cases)

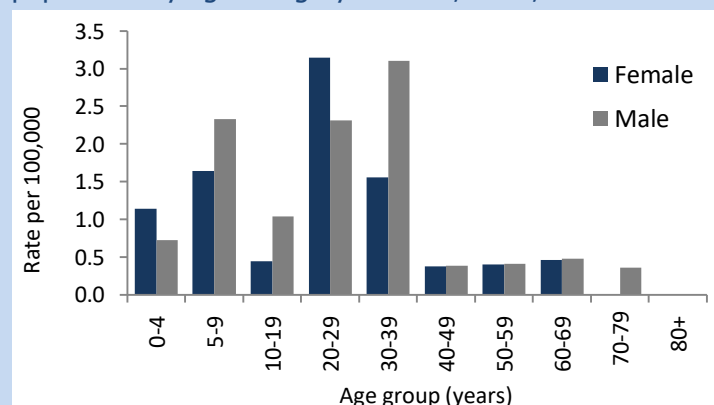
Outbreaks

- There have been no known local typhoid outbreaks in Australia since 1977

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Typhoid and paratyphoid notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	0.6	1	0.2	0.3
FW	0	0	0.0	0.0
HNE	1.6	5	0.2	0.5
IS	1.8	0	0.5	0.0
M	0.6	0	0.2	0.0
MNC	0.4	1	0.2	0.4
NBM	1.4	3	0.4	0.8
NNSW	0.2	3	0.1	1.0
NS	7.4	9	0.8	1.0
SES	11.4	15	1.3	1.6
SNSW	0.6	0	0.3	0.0
SWS	9.8	6	1.0	0.6
SYD	9.8	10	1.6	1.5
WNSW	0.6	1	0.2	0.4
WS	24.8	36	2.7	3.6
NSW	71	90	0.9	1.1

* grey shading – >50% increase compared to 5yr mean

Typhoid and Paratyphoid continued

Country where infection acquired

Country of acquisition for overseas^a acquired typhoid and paratyphoid cases, 2018

County of acquisition	Paratyphoid	Typhoid	Total
India	18	31	49
Pakistan	3	5	8
Bangladesh	3	4	7
Nepal	0	4	4
Indonesia	2	2	4
Egypt	0	1	1
Laos	0	1	1
Malaysia	0	1	1
New Zealand ^b	0	1	1
Samoa	0	1	1
South Africa	0	1	1
Cambodia	3	0	3
Peru	1	0	1
Unable to be determined	2	5	7
Total	32	57	89

- a. One typhoid case was acquired in Australia in 2018. This case had not travelled overseas during their exposure period. Testing of household contacts identified that one household member had an asymptomatic typhoid infection. The asymptomatic case had not travelled overseas in 2018, but had travelled overseas previously. An investigation was conducted, including whole genome sequencing to determine relatedness of infections. The two cases were found to be highly related to each other. It is thought that the asymptomatic case acquired the infection overseas, while the other acquired the infection from the household member in Australia. No other locally acquired cases were reported, and no other sequenced typhoid cases were found to be related.
- b. One typhoid case had travel only to New Zealand during the incubation period, which does not have endemic typhoid. The case shared a unit with other travellers while on holiday, and it is possible that the case was in contact with an undiagnosed typhoid case during this period. No other risk factors were identified.

SHIGELLOSIS

Shigellosis is a disease caused by infection with *Shigella* bacteria. It causes diarrhoea and is easily spread among people. All cases of shigellosis are investigated in NSW to determine if the infection was acquired overseas or from local sources. *Shigella* can be spread person-to-person or via contaminated food.

Summary 2018

- Case count: 546
- Reported hospitalisations: 88
- Reported deaths: 1
- Notification rate per 100,000: 6.84

Overall trend

- 144% increase in the 2018 notification rate compared to the 5 year annual mean (2.8 per 100,000).
- The change in the national case definition on 1 July 2018, to include probable cases accounts for some of the increase in notifications (page 16).

Groups with highest notification rate in 2018

- Age: 30-39 years (22% of cases – 10.52 per 100,000)
- Sex: Male (63% of cases – 8.61 per 100,000)
- LHD: Sydney (19% of cases – 15.70 per 100,000)

Seasonality

- No significant trend (slight peak in Oct-Nov)

Place of acquisition in 2018

- In NSW: 37%
- In Australia & outside NSW: 2%
- Overseas: 56%
- Unknown: 5%

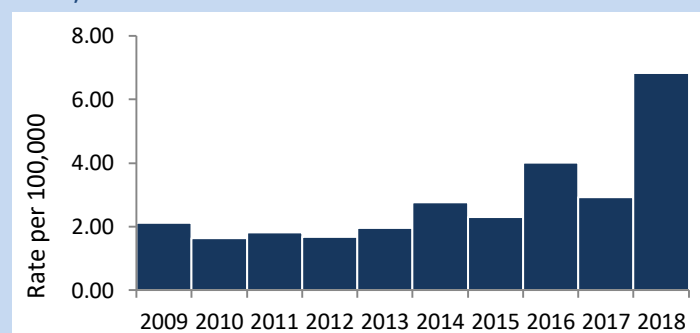
(based on responses from 71% of cases)

Risk exposures reported (locally acquired only)*

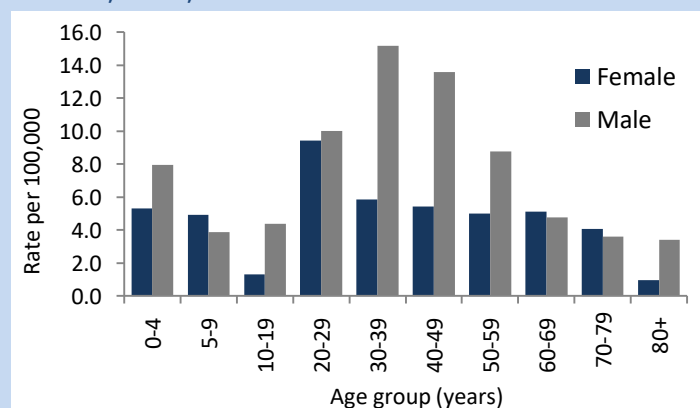
- Men who have sex with men (MSM): 68%
- Contact with a confirmed/possible case: 17%
- Unknown: 15%

Note: Some cases may report more than one risk factor

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



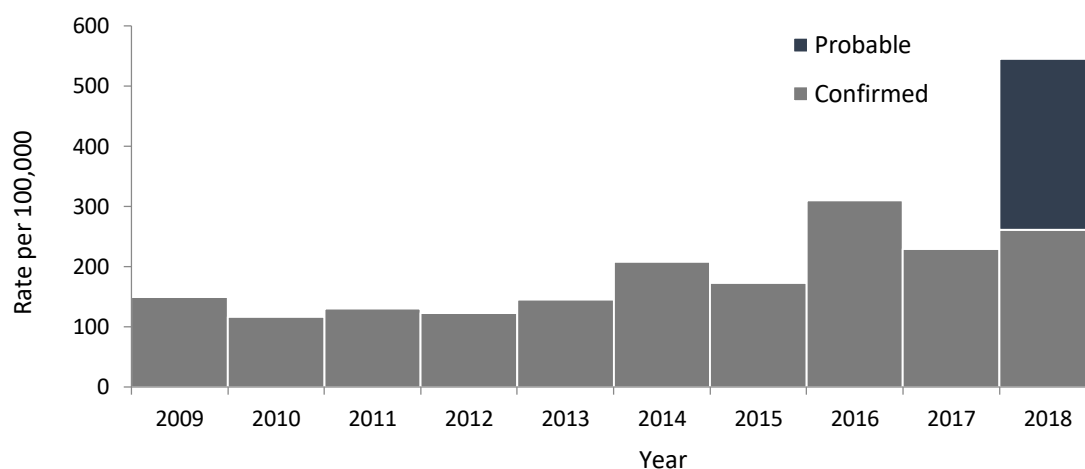
Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	9.8	14	2.9	4.0
FW	0.2	1	0.6	3.3
HNE	8.8	32	1.0	3.4
IS	5.2	19	1.3	4.6
M	2.4	5	1.0	2.1
MNC	2.2	6	1.0	2.7
NBM	5.2	18	1.4	4.6
NNSW	8	34	2.7	11.0
NS	23.6	75	2.6	8.1
SES	62.8	122	7.0	13.0
SNSW	1.4	16	0.7	7.4
SWS	12.8	36	1.3	3.6
SYD	50.8	105	8.0	15.7
WNSW	2	9	0.7	3.2
WS	18.4	54	2.0	5.4
NSW	213.6	546	2.8	6.8

* grey shading – >50% increase compared to 5yr mean

Shigellosis continued

Shigellosis notifications by classification (confirmed or probable) 2009-2018, NSW



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*.

Place where infection acquired

Country of acquisition for shigellosis cases, by classification, 2018, NSW

County of acquisition	Confirmed	Probable	Total
Indonesia	19	9	28
India	13	23	36
Philippines	6	7	13
Thailand	5	3	8
Fiji	4	8	12
Sri Lanka	4	0	4
Lebanon	3	5	8
Morocco	3	2	5
Spain	3	0	3
USA	3	1	4
Other	45	43	88
Missing	2	8	10
Total	110	109	219

Reported risk exposures for those infections acquired in Australia

Reported risk exposure for shigellosis cases with infection acquisition in Australia, by classification, 2018, NSW

Reported risk exposure	Confirmed		Probable	
	N	%	N	%
Men who have sex with men (MSM)	92	74%	10	38%
Contact with another known or possible case	22	18%	4	15%
Unknown	11	9%	12	46%
Total	125	100%	26	100%

Emergence of multi-drug resistant *Shigella sonnei* biotype G

In early 2018 NSW public health units noted that antibiotic resistance profiles amongst some notified shigellosis cases were showing resistance against an increased number of antibiotics. Health Protection NSW investigated the antibiotic sensitivities of shigellosis cases over a 6 month period (from November 2017 to April 2018) and found a cluster of multi-drug resistant (MDR) *Shigella sonnei* biotype G emerged during this period amongst men who have sex with men (MSM). The 25 organisms in this cluster (27% of cases in the period) were resistant to ciprofloxacin, cotrimoxazole, ampicillin/amoxicillin and azithromycin. This means that there is no recommended oral antibiotic available for these infections. If a patient with this infection required antibiotic treatment (such as if they present with severe illness), they would need to be referred to hospital for intravenous antibiotics (ceftriaxone or cefotaxime).

Whole genome sequencing of the cluster indicates that all isolates were clonal and fell into one of three genetically-related clusters. Two clusters (termed 'A' and 'B') were highly related to each other, and phylogenetic analysis indicated the strain was a recent introduction with the index patient in the cluster, who reported overseas travel to Europe prior to onset.

The vast majority of MDR *Shigella* organisms in clusters A and B were from patients who acquired their infection through male-to-male sexual contact in NSW. Two patients denied any sexual contact with faecal exposure, including one female. No other patients reported overseas travel.

In response to these findings NSW Health convened an expert panel, which advised on clinical guidelines and community messaging. An [alert](#) was sent to specialist clinicians, laboratories and hospital emergency departments. NSW community organisations have commenced an awareness campaign for MSM and HIV positive people. The information was shared with state and territory counterparts, and with Therapeutic Guidelines Limited.

NSW Health continues to investigate and respond to notifications of multi-drug resistant *Shigella sonnei* biotype G.

Further information can be found online at <https://www.health.nsw.gov.au/Infectious/alerts/Pages/shigella-drug-resistance.aspx>.

LISTERIOSIS

Listeriosis is an illness usually acquired after eating foods contaminated with the bacterium *Listeria monocytogenes*. Listeriosis is a serious disease in pregnant women and their fetuses, the elderly and people with weakened immune systems. All notified cases of listeriosis are investigated in NSW.

Summary 2018

- Case count: 19
- Reported hospitalisations: 19
- Reported deaths: 4
- Notification rate per 100,000: 0.24

Overall trend

- 34% decrease in the 2018 notification rate compared to the 5 year annual mean (0.36 per 100,000)

Groups with highest notification rate in 2018

- Age: 80+ years (53% of cases – 2.84 per 100,000)
- Sex: Female (53% of cases - 0.25 per 100,000)
- LHD: Southern NSW (16% of cases – 1.38 per 100,000)

Deaths

Four deaths occurred in people aged 70-91 years old, 50% male, from Southern NSW, South Eastern Sydney and Northern Sydney regions.

Place of acquisition in 2018

- In NSW: 88%
- In Australia & outside NSW: 0%
- Overseas: 0%
- Unknown: 13%

(based on responses from 84% of cases)

Seasonality

- Peak in summer (Dec-Feb)

Outbreaks

- Cases found to be associated with a foodborne illness outbreak: 6 (31.6%) (pages 30-39)

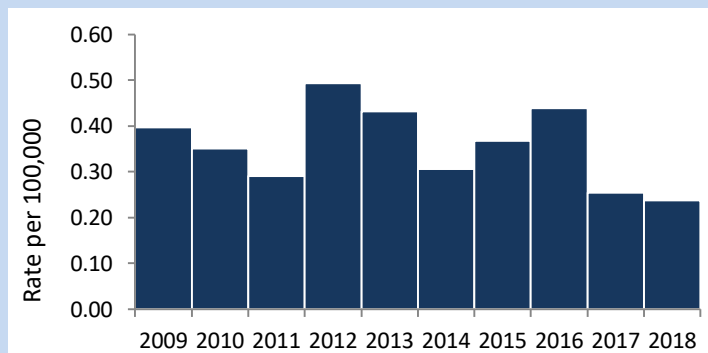
Most common comorbidities reported

- Heart disease: 7
- Cancer: 6

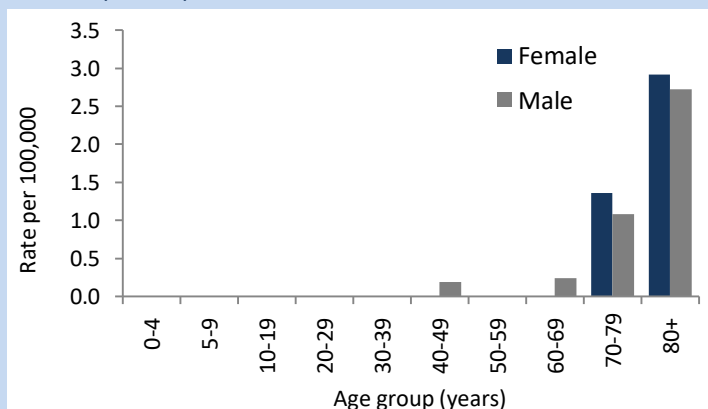
Perinatal

- There were no perinatal cases in 2018

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

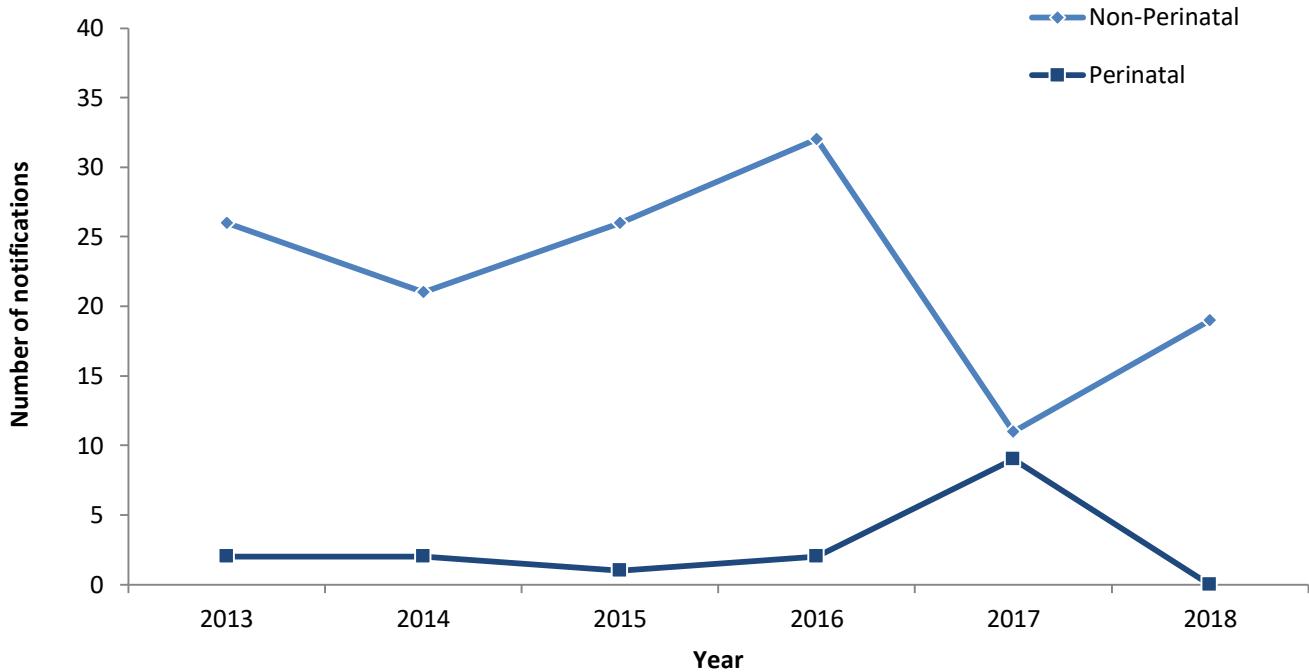
LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	1	0	0.3	0.0
FW	0	0	0.0	0.0
HNE	2.2	0	0.2	0.0
IS	2	2	0.5	0.5
M	0.6	0	0.2	0.0
MNC	0.2	1	0.1	0.4
NBM	0.4	1	0.1	0.3
NNSW	0.8	1	0.3	0.3
NS	4.2	5	0.5	0.5
SES	3.6	4	0.4	0.4
SNSW	1.4	3	0.7	1.4
SWS	4.4	0	0.5	0.0
SYD	2.8	2	0.4	0.3
WNSW	0.6	0	0.2	0.0
WS	3	0	0.3	0.0
NSW	27.4	19	0.4	0.2

* grey shading – >50% increase compared to 5yr mean

Listeriosis continued

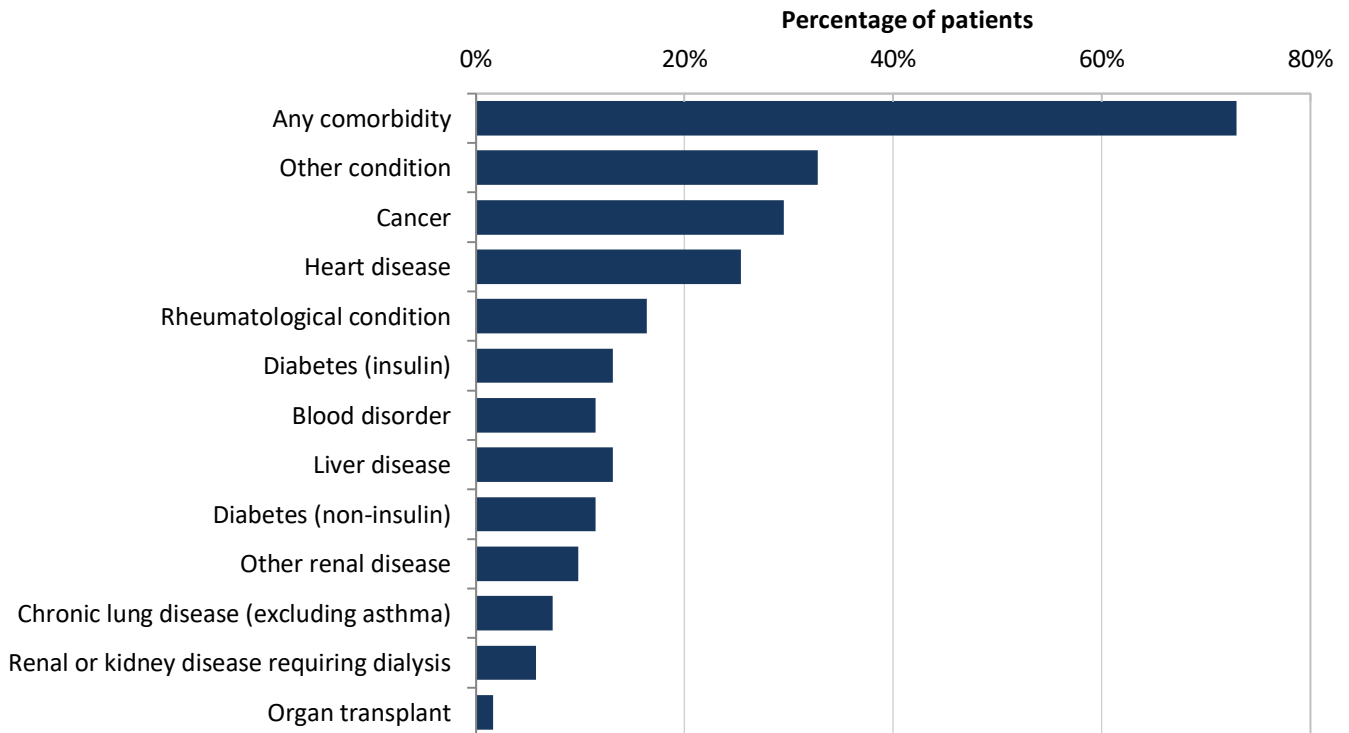
Perinatal cases

Perinatal and non-perinatal reported listeriosis, 2013-2018, NSW



Reported comorbidities

Proportion of listeriosis patients who reported a comorbidity or condition, 2014-2018, NSW



SHIGA TOXIN PRODUCING *E. COLI* INFECTION (STEC)

STEC is a bacterial infection that can cause serious disease, including bloody diarrhoea, and sometimes haemolytic uraemic syndrome (HUS). Infection usually results from consuming contaminated food or water, or from contact with infected animals or people. All notifications of STEC infection are investigated in NSW.

Summary 2018

- Case count: 55
- Reported hospitalisations: 30
- Reported deaths: 1
- Notification rate per 100,000: 0.69

Overall trend

- 28% increase in 2018 notification rate compared to 5 year annual mean (0.54 per 100,000)
- The introduction of a more sensitive test and a change in the case definition in 2015 may account for some of the increase in notifications.

Groups with highest notification rate in 2018

- Age: 80+ years (16% of cases – 2.55 per 100,000)
- Sex: Female (62% of cases - 0.85 per 100,000)
- LHD: Murrumbidgee (16% of cases – 3.71 per 100,000)

Seasonality

- Peaks in May, November and December 2018 (n=7 each month)

Place of acquisition in 2018

- In NSW: 77%
- In Australia & outside NSW: 2%
- Overseas: 8%
- Unknown: 13%

(based on responses from 95% of cases)

Risk exposures reported (locally acquired only)

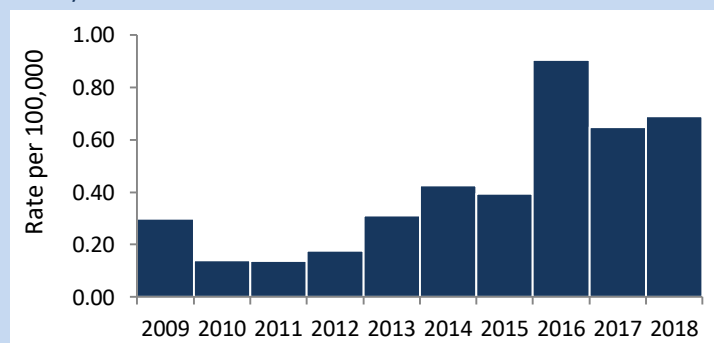
- Ate beef during incubation: 49%
- Any restaurant during incubation: 44%
- Animal contact: 25%
- Farm exposure: 22%

Note: Cases may report more than one risk factor

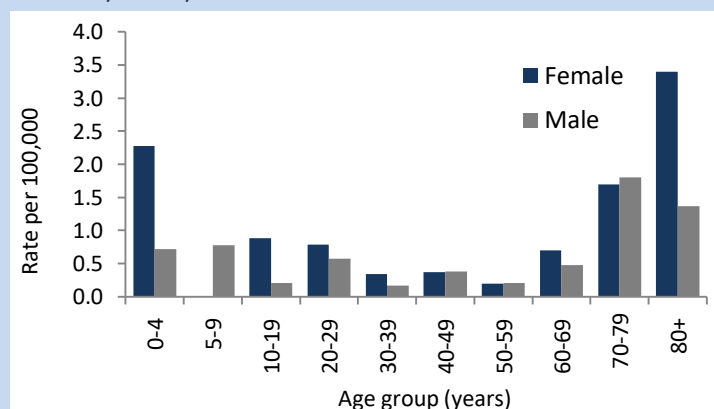
Deaths

One death occurred in an overseas visitor aged in her 60s, who developed HUS and subsequent multi-organ failure. The infection is believed to have been acquired in NSW.

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	0.8	1	0.2	0.3
FW	0.4	0	1.3	0.0
HNE	7.6	6	0.8	0.6
IS	2	0	0.5	0.0
M	5.6	9	2.3	3.7
MNC	0.4	0	0.2	0.0
NBM	0.4	3	0.1	0.8
NNSW	1.2	0	0.4	0.0
NS	0.8	1	0.1	0.1
SES	4.4	3	0.5	0.3
SNSW	5.6	7	2.7	3.2
SWS	1.2	2	0.6	0.9
SYD	1	0	0.2	0.0
WNSW	3.6	9	1.3	3.2
WS	6	14	0.6	1.4
NSW	41.2	55	0.5	0.7

* grey shading – >50% increase compared to 5yr mean

HAEMOLYTIC URAEMIC SYNDROME (HUS)

HUS is a clinical syndrome characterized by progressive renal failure that is associated with haemolytic anaemia and thrombocytopenia. In patients with HUS associated with diarrhoea, STEC is the primary cause. All notified cases of HUS are investigated in NSW.

Summary 2018

- Case count: 4
- Reported hospitalisations: 4
- Reported deaths: 1
- Notification rate per 100,000: 0.05

Overall trend

- 40% decrease in 2018 notification rate compared to 5 year annual mean (0.08 per 100,000)

Groups with highest notification rate in 2018

- Sex: Male (75% of cases - 0.08 per 100,000)
- Age: 60-69 years (67% of cases – 0.24 per 100,000)
- LHD: Western Sydney (75% of cases – 0.30 per 100,000)

Seasonality

- Peaks in summer months (Dec-Feb)

Place of acquisition in 2018

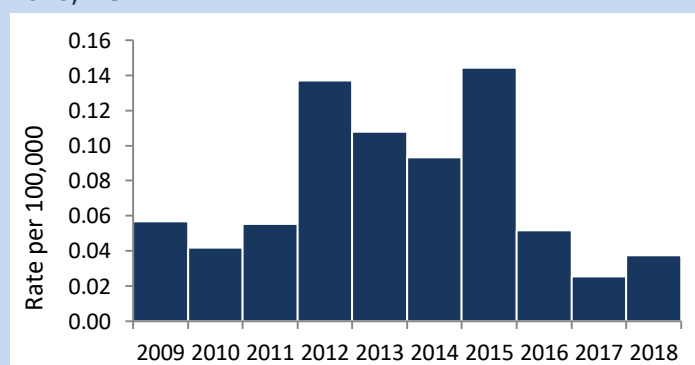
- In NSW: 100%
- In Australia & outside NSW: 0%
- Overseas: 0%
- Unknown: 0%

(based on responses from 100% of cases)

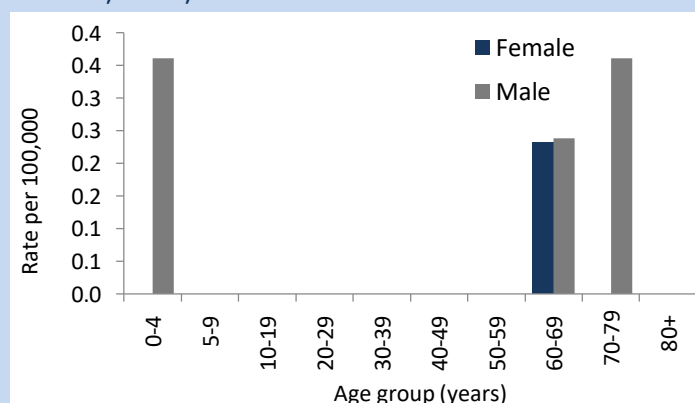
Bacterial infection

- STEC infections were identified in all notified HUS cases in 2018 (1=O126; 1=O91:H21; 2=serogroup unknown)
- No common source was identified for the four cases, none of which clustered in time by serogroup

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	0	1	0.0	0.3
FW	0.2	0	0.6	0.0
HNE	1.2	0	0.1	0.0
IS	0.8	0	0.2	0.0
M	0.4	0	0.2	0.0
MNC	0	0	0.0	0.0
NBM	0.2	0	0.1	0.0
NNSW	0.2	0	0.1	0.0
NS	1	0	0.1	0.0
SES	0.8	0	0.1	0.0
SNSW	0	0	0.0	0.0
SWS	0.6	0	0.1	0.0
SYD	0.2	0	0.0	0.0
WNSW	0.6	0	0.2	0.0
WS	0.2	3	0.0	0.3
NSW	6.4	3	0.1	0.0

* grey shading – >50% increase compared to 5yr mean

CRYPTOSPORIDIOSIS

Cryptosporidiosis is a disease caused by swallowing the *Cryptosporidium* parasite, most commonly in contaminated water. It mainly causes diarrhoea and abdominal cramps. All cases of cryptosporidiosis are investigated in NSW. When an investigation finds multiple cases have attended the same recreational water facility, further investigation and controls may be initiated.

Summary 2018

- Case count: 698
- Reported hospitalisations: 28
- Reported deaths: 0
- Notification rate per 100,000: 8.74

Overall trend

- 34% decrease in the 2018 notification rate compared to 5 year annual mean (13.21 per 100,000)
- Increased use of a more sensitive tests may account for some of the increase in notifications in previous years (page 26)

Groups with highest notification rate in 2018

- Age: <5 years (34% of cases – 43.48 per 100,000)
- Sex: Female (55% of cases – 9.61 per 100,000)
- LHD: Western NSW (11% of cases – 27.08 per 100,000)

Seasonality

- Peaks in summer to autumn months (Jan-Apr)

Place of acquisition in 2018

- In NSW: 67%
- In Australia & outside NSW: 4%
- Overseas: 20%
- Unknown: 9%

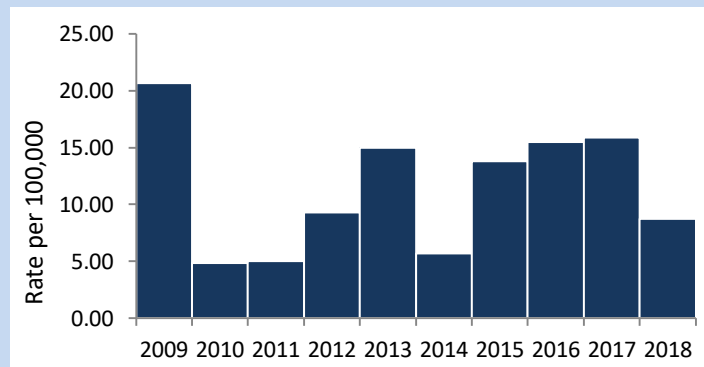
(based on responses from 68% of cases)

Risk exposures reported (locally acquired only)

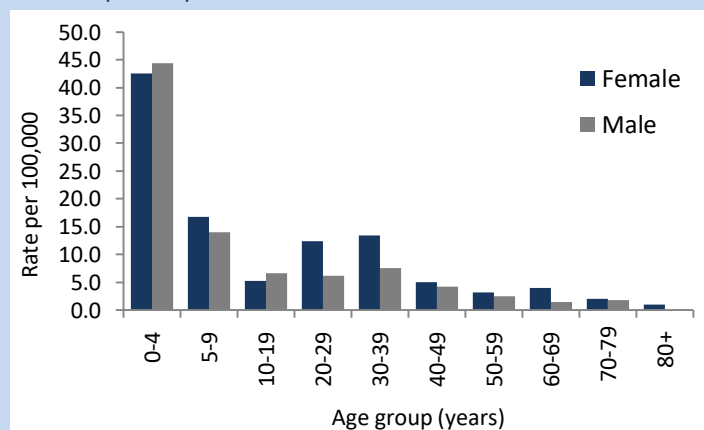
- Public swimming pool: 35%
- Farm animal exposure: 10%
- Tank water: 10%

Note: Some cases may report more than one risk factor

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	36	36	10.7	10.3
FW	1.2	0	3.9	0.0
HNE	142.8	99	15.6	10.5
IS	55.6	52	13.8	12.6
M	44	22	18.3	9.1
MNC	26	25	12.0	11.1
NBM	48.4	27	13.1	6.9
NNSW	64	35	21.4	11.3
NS	155	83	17.2	9.0
SES	134.8	86	15.0	9.1
SNSW	19.4	14	9.4	6.5
SWS	68.4	36	7.2	3.6
SYD	72.8	59	11.6	8.8
WNSW	55.2	76	19.8	27.1
WS	84.4	48	9.0	4.8
NSW	1008	698	13.2	8.7

* grey shading – >50% increase compared to 5yr mean

GIARDIASIS

Giardiasis is an infection mainly of the small intestine caused by the parasite *Giardia lamblia*. Giardiasis has been reported in humans and in a variety of animals. Notified cases of giardiasis are not routinely followed up in NSW.

Summary 2018

- Case count: 2801
- Reported hospitalisations: 1*
- Reported deaths: 0
- Notification rate per 100,000: 35.06

*Hospitalisations may be underestimated as most giardiasis cases are not investigated

Overall trend

- 12% decrease in 2018 notification rate compared to 5 year average (39.81 per 100,000)
- Increased use of more sensitive tests may account for some of the increase in notifications since 2013 (page 27)

Groups with highest notification rate in 2018

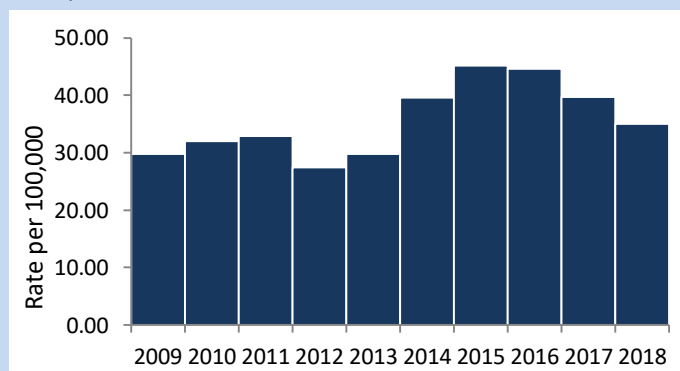
- Age: <5 years (20% of cases – 103.61 per 100,000)
- Sex: Male (52% of cases – 36.37 per 100,000)
- LHD: Northern NSW (7% of cases – 63.96 per 100,000)

Seasonality

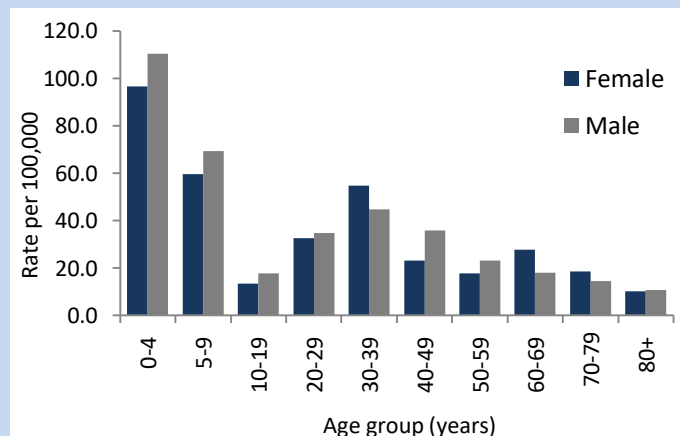
- Peaks in summer months (Feb-Mar)

Note: Risk factor information is not available as cases are not routinely followed up

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	122.8	132	36.5	37.8
FW	4	7	12.9	22.9
HNE	390.8	332	42.8	35.4
IS	183.8	141	45.9	34.2
M	112	112	46.5	46.1
MNC	75.6	91	35.0	40.5
NBM	138.4	104	37.6	26.7
NNSW	107.4	198	35.9	64.0
NS	499.8	425	55.4	45.9
SES	529.2	436	58.9	46.3
SNSW	59	30	28.8	13.8
SWS	191.2	205	20.2	20.3
SYD	270.8	230	43.0	34.4
WNSW	117.8	140	42.3	49.9
WS	235.2	218	25.3	21.9
NSW	3038.2	2801	39.7	35.1

* grey shading – >50% increase compared to 5yr mean

HEPATITIS A

Hepatitis A is caused by a viral infection of the liver. The virus is mainly spread by the faecal-oral route, usually by consuming contaminated food or water or by direct contact with an infected person. All notified cases of hepatitis A are investigated in NSW.

Summary 2018

- Case count: 85
- Reported hospitalisations: 49
- Reported deaths: 0
- Notification rate per 100,000: 1.06

Overall trend

- 24% increase in the 2018 notification rate compared to 5 year average (0.86 per 100,000)

Groups with highest notification rate in 2018

- Age: 20-29 years (27% of cases – 2.24 per 100,000)
- Sex: Male (59% of cases – 1.26 per 100,000)
- LHD: Sydney (18% of cases – 2.24 per 100,000)

Seasonality

- Peaks in summer months (Jan-Feb)

Place of acquisition in 2018

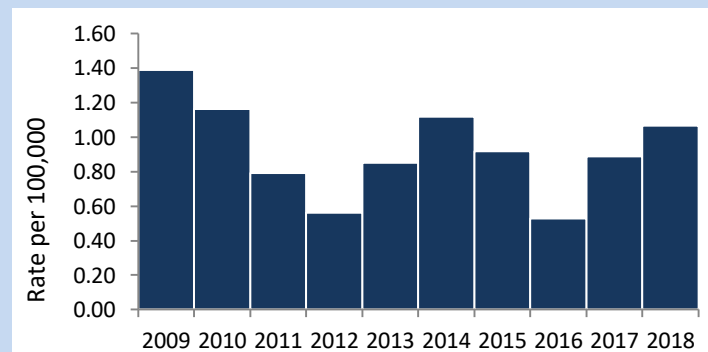
- In NSW: 33%
- In Australia & outside NSW: 2%
- Overseas: 60%
- Unknown: 5%

(note: data available on 98% of cases)

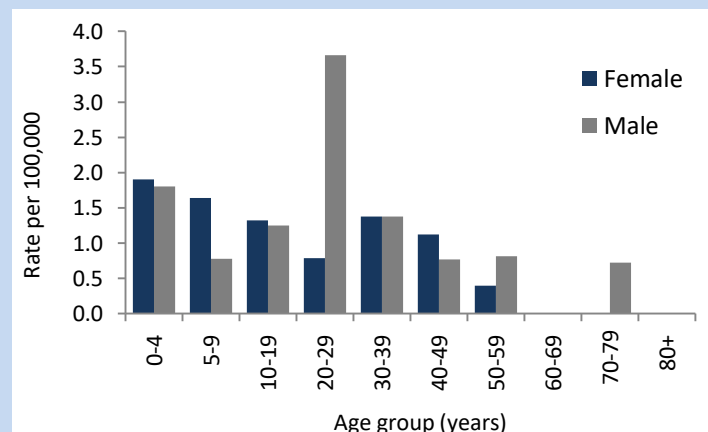
Outbreaks

- Fifteen cases (18%) were associated with a multi-state outbreak of hepatitis A associated with frozen pomegranate arils (pages 30-39).
- Twelve cases (14%) were related to strains of infection circulating in person-to-person outbreaks in Australia and Europe, previously reported in the 2017 NSW OzFoodNet Annual Report. Of these, five were most likely acquired in NSW, two were acquired in Australia outside NSW, three were acquired overseas and two were unable to be determined.

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	2.2	1	0.7	0.3
FW	0	2	0.0	6.6
HNE	2.6	6	0.3	0.6
IS	1.8	3	0.4	0.7
M	0	3	0.0	1.2
MNC	0.6	0	0.3	0.0
NBM	2.2	1	0.6	0.3
NNSW	2.2	1	0.7	0.3
NS	6.2	4	0.7	0.4
SES	10.6	14	1.2	1.5
SNSW	0.6	0	0.3	0.0
SWS	9.6	13	1.0	1.3
SYD	8.2	15	1.3	2.2
WNSW	1.2	2	0.4	0.7
WS	17.6	20	1.9	2.0
NSW	65.6	85	0.9	1.1

* grey shading – >50% increase compared to 5yr mean

Hepatitis A continued

Place infection was acquired

Hepatitis A notifications by place of acquisition, 2018 compared to the previous 5 year annual mean, NSW

Place of acquisition	5 year annual mean		2018	
	Count	%	Count	%
Acquired in NSW	18.4	28%	28	33%
Acquired in Australia outside NSW	0.2	0%	2	2%
Acquired outside Australia	46.2	70%	51	60%
Unknown	0.8	1%	4	5%
Total	65.6	100%	85	100%

Country infection was acquired

Hepatitis A notifications by country of acquisition, 2018 compared to the previous 5 year annual mean, NSW

Country of acquisition	5 year average		2018	
	Count	%	Count	%
Australia	18.6	28%	31	37%
India	7.4	11%	13	15%
Tonga	0.2	0%	7	8%
Bangladesh	2.4	4%	4	5%
Pakistan	4.8	7%	4	5%
Philippines	4	6%	4	5%
Fiji	4.4	7%	3	4%
France	0.2	0%	2	2%
Lebanon	2	3%	2	2%
Peru	0.2	0%	2	2%
Other*	18.8	29%	9	11%
Missing and unknown	2.6	4%	4	5%
Total	65.6	100%	85	100%

*any county with only 1 notification is included in other category

HEPATITIS E

Hepatitis E is caused by a viral infection of the liver. The virus is mainly spread by the faecal-oral route, usually by consuming contaminated food or water or by direct contact with an infected person. All cases of hepatitis E are investigated in NSW.

Summary 2018

- Case count: 17
- Reported hospitalisations: 13
- Reported deaths: 0
- Notification rate per 100,000: 0.21

Overall trend

- 26% decrease in 2018 notification rate compared to 5 year average (0.29 per 100,000)

Groups with highest notification rate in 2018

- Age: 20-29 years (29% of cases - 0.49 per 100,000)
- Sex: Male (65% of cases – 0.28 per 100,000)
- LHD: Sydney (24% of cases - 0.6 per 100,000 respectively)

Place of acquisition in 2018

- In NSW: 19%
- In Australia & outside NSW: 6%
- Overseas: 63%
- Unknown: 13%

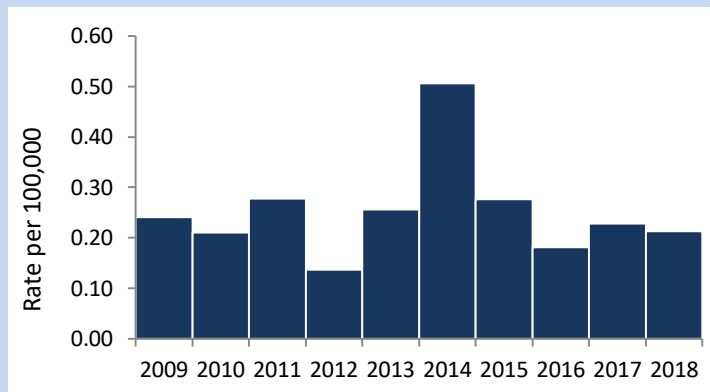
(note: data available on 94% of cases)

Risk exposures reported (locally acquired)*

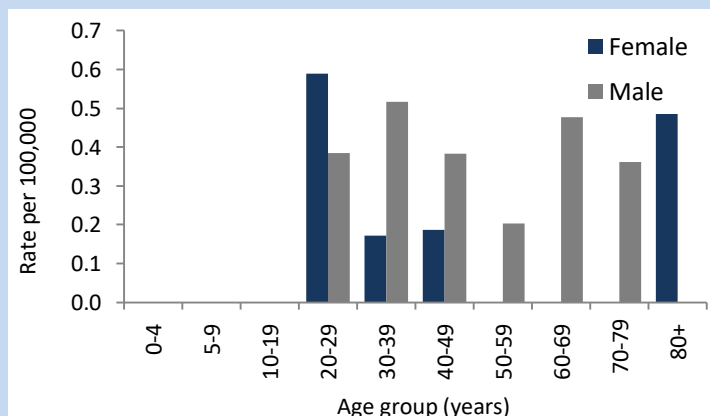
- Pork consumption: 50%
- Shellfish consumption: 67%

*Note: only four locally acquired cases were reported in 2018. Food consumption known for three of four cases.

Notification rate per 100,000 population by year, 2009 – 2018, NSW



Notification rate per 100,000 population by age category and sex, 2018, NSW



Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5yr mean	2018
CC	0.2	1	0.1	0.3
FW	0	0	0.0	0.0
HNE	0.8	0	0.1	0.0
IS	0	0	0.0	0.0
M	0	1	0.0	0.4
MNC	0	1	0.0	0.4
NBM	0.2	2	0.1	0.5
NNSW	0.2	0	0.1	0.0
NS	5	2	0.6	0.2
SES	4.2	0	0.5	0.0
SNSW	0	0	0.0	0.0
SWS	2.6	2	0.3	0.2
SYD	2.6	4	0.4	0.6
WNSW	0	0	0.0	0.0
WS	6.2	4	0.7	0.4
NSW	22	17	0.3	0.2

* grey shading – >50% increase compared to 5yr mean

ROTAVIRUS INFECTION

Rotavirus is a viral infection that causes gastroenteritis. Globally, rotavirus is the most common cause of severe gastroenteritis in early childhood. A vaccine is available and is provided free for children less than 6 months of age in NSW. Single notified cases of rotavirus are not routinely followed up in NSW.

Summary 2018

- Case count: 793
- Reported hospitalisations: 48*
- Reported deaths: 0
- Notification rate per 100,000: 9.93

*Hospitalisations may be underestimated as not all rotavirus cases are investigated

Overall trend

- 29% decrease in 2018 notification rate compared to 5 year average (13.98 per 100,000)

Seasonality

- Peaks in spring (Sep-Nov)

Groups with highest notification rate in 2018

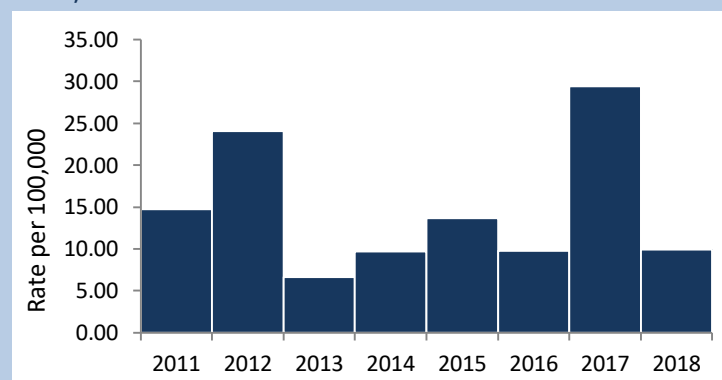
- Age: <5 years (40% of cases – 58.65 per 100,000)
- Sex: Female (54% of cases – 10.58 per 100,000)
- LHD: Sydney (14% of cases – 16.14 per 100,000)

Outbreaks

- Cases found to be associated with an institutional outbreak: 238 cases (30%) associated with 108 institutional outbreaks

Note: Rotavirus was made notifiable in 2010.

Notification rate per 100,000 population by year, 2011 – 2018, NSW

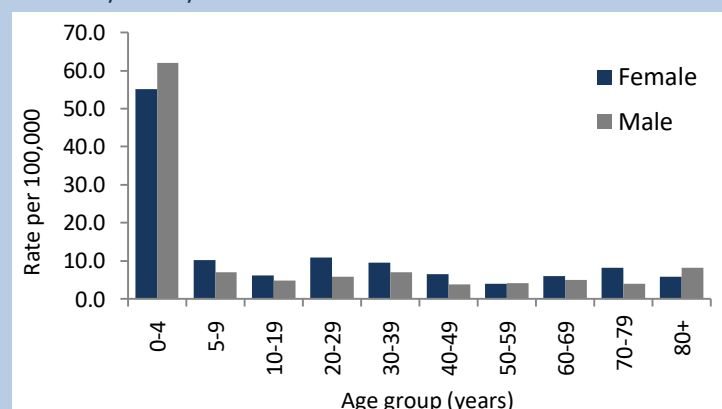


Number of cases and rates (per 100,000) by Local Health District, 2018, NSW

LHD	Count		Rate	
	5Yr mean	2018	5Yr mean	2018
CC	28.8	16	8.5	4.6
FW	5.8	2	18.8	6.6
HNE	100.2	32	11.0	3.4
IS	26.6	16	6.6	3.9
M	30.8	25	12.8	10.3
MNC	6.4	1	3.0	0.4
NBM	44	32	11.8	8.2
NNSW	60.2	41	20.1	13.2
NS	161.4	117	17.8	12.6
SES	174.6	121	19.2	12.9
SNSW	14	7	6.8	3.2
SWS	127	131	13.2	13.0
SYD	92.8	108	14.5	16.1
WNSW	45.8	6	16.4	2.1
WS	148.2	138	15.7	13.9
NSW	1067.2	793	13.8	9.9

* grey shading – >50% increase compared to 5yr mean

Notification rate per 100,000 population by age category and sex, 2018, NSW



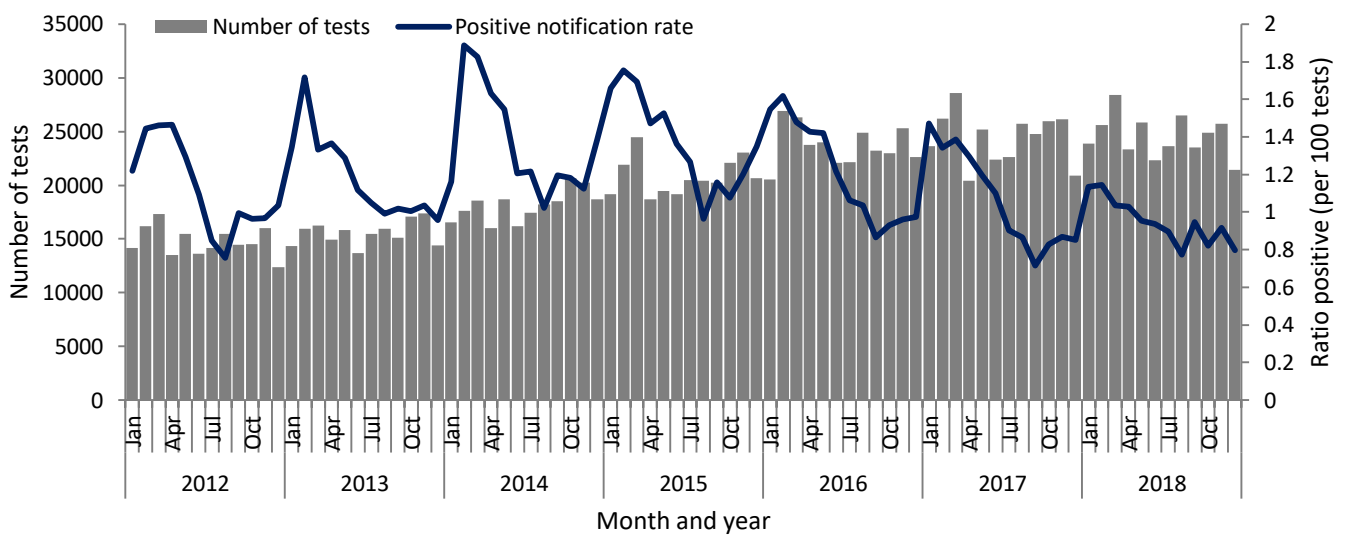
DENOMINATOR DATA

Laboratory testing data from 14 public and private laboratories was collected for *Cryptosporidium*, *Giardia*, *Salmonella* and *Shigella* from 2012. In January 2014, an additional private laboratory was added. The positive notification ratio is the ratio of positive results to total laboratory tests performed from participating laboratories.

Summary for 2018:

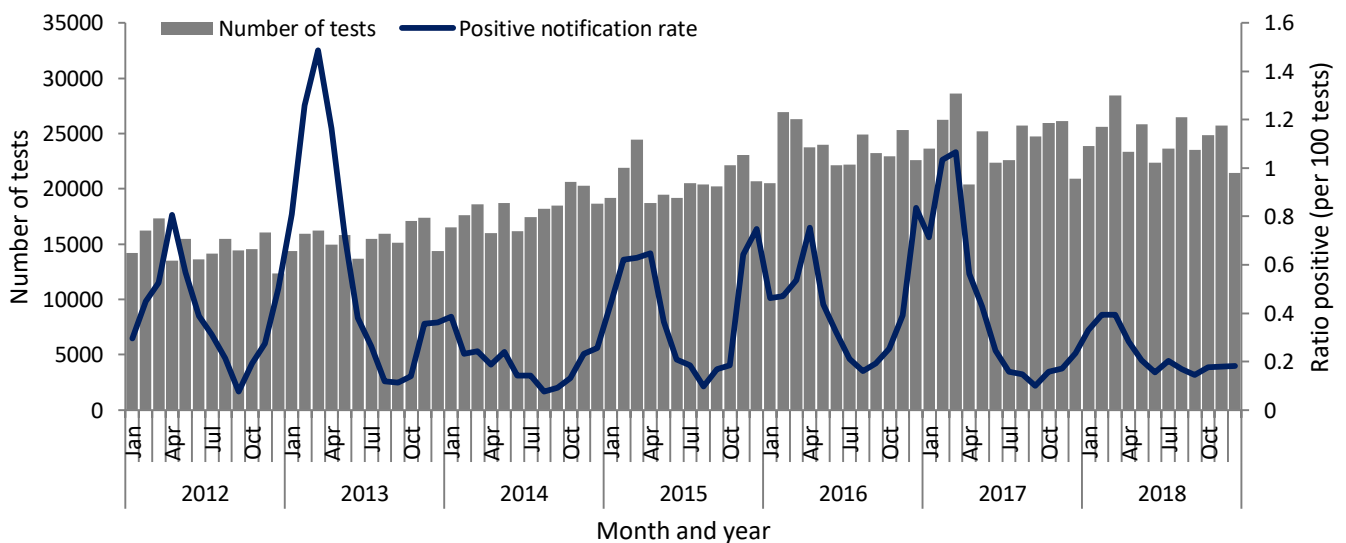
- *Giardia* positive notification rates peaked during late-summer at 1.15 (per 100 tests performed)
- *Cryptosporidium* positive notification rates peaked during late-summer at 0.39 (per 100 tests performed)
- *Salmonella* positive notification rates followed the seasonal pattern, peaking in January at 1.64 (per 100 tests performed)
- *Shigella* positive notification rate was highest in November at 0.34 (per 100 tests performed)

Number of *Giardia* tests performed by 15 laboratories and rate positive by month and year, NSW, 2012–2018*



* These 15 laboratories account for approximately 90% of all tests performed in NSW.

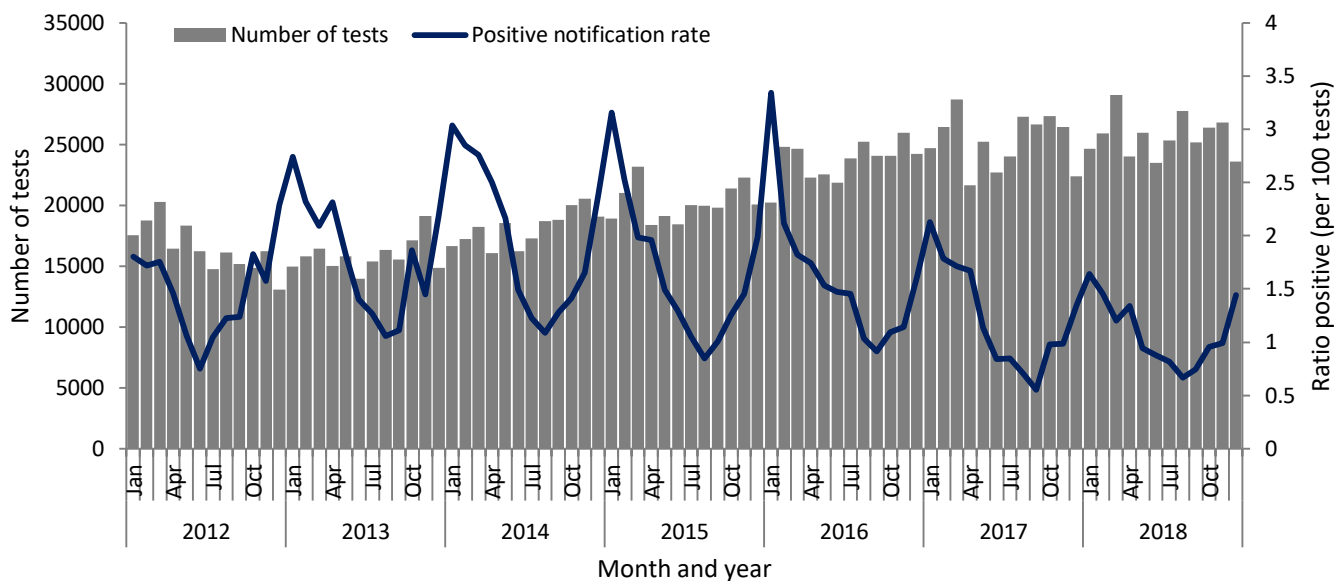
Number of *Cryptosporidium* tests performed by 15 laboratories and rate positive by month, NSW, 2012–2018*



* These 15 laboratories account for approximately 90% of all tests performed in NSW.

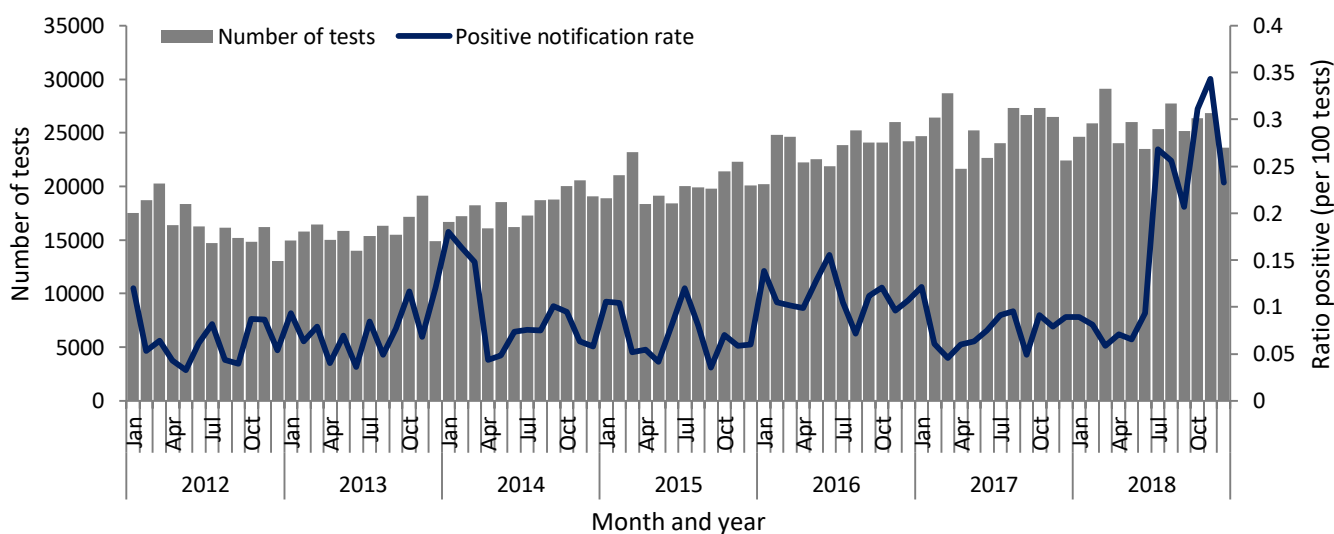
Denominator data continued

Number of *Salmonella* tests performed by 15 laboratories and rate positive by month, NSW, 2012–2018*



* These 15 laboratories account for approximately 90% of all tests performed in NSW.

Number of *Shigella* tests[^] performed by 15 laboratories and rate positive by month, NSW, 2012–2018*



* These 15 laboratories account for approximately 90% of all tests performed in NSW.

[^] 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 (PCR).

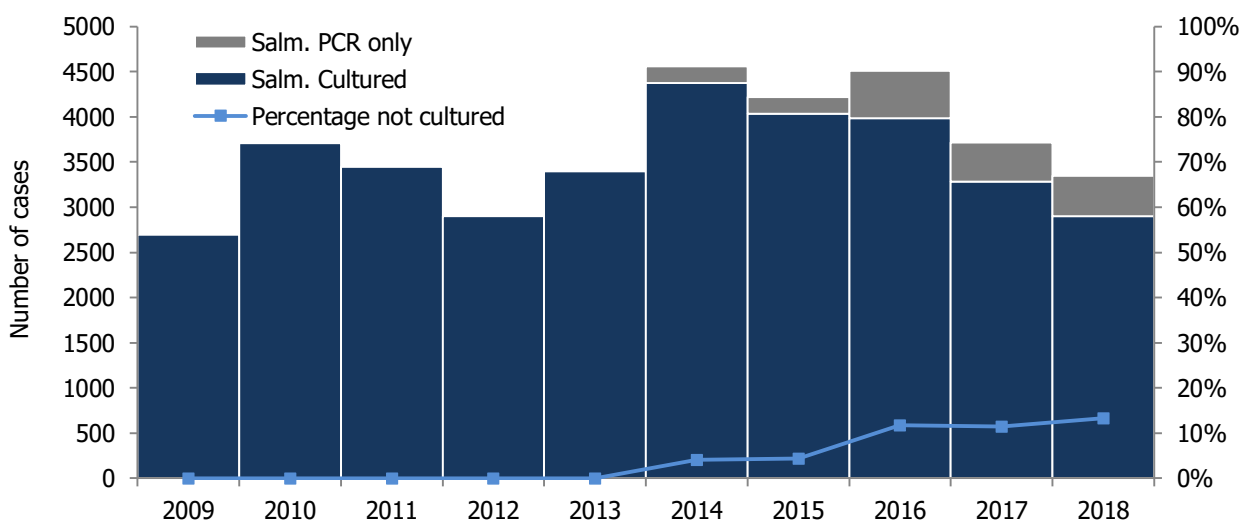
CULTURE INDEPENDENT TESTING

Culture independent testing (CIDT) does not require isolation and identification of living micro-organisms but works by detecting the presence of specific antigens using polymerase chain reaction (PCR). CIDT was introduced by NSW laboratories in 2014. These tests can be conducted more rapidly and yield results sooner than can be reached through traditional culturing methods. Culture is needed, however, to further characterise the organisms that cause infections.

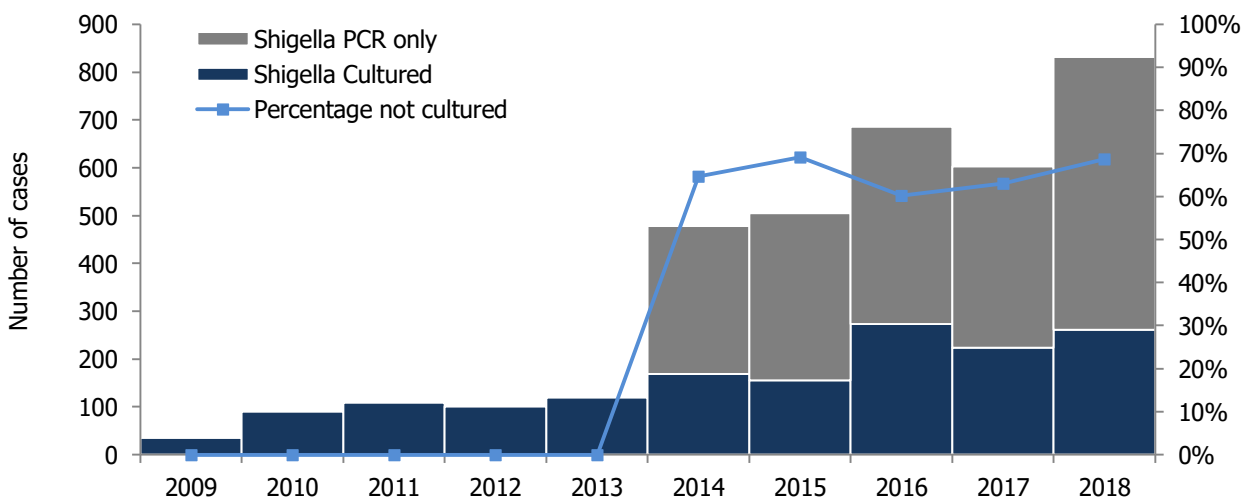
Summary for 2018:

- 13% of *Salmonella* notifications in 2018 were based on diagnosis by PCR methods only.
 - Some laboratories in NSW do not culture *Salmonella* unless it has been requested by the treating doctor.
- 69% of *Shigella* notifications in 2019 could not be cultured or were not cultured.
 - 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).
 - PCR positive *Shigella* samples should be routinely cultured because the antigen target for *Shigella* is also found in enteroinvasive *E. coli*. As such *Shigella* PCR reports that are not culture confirmed are not counted as confirmed cases in NSW.
 - Culture for *Shigella* has a high false negative rate due to the fastidious nature of the organism.

The number of *Salmonella* notifications, by test type, and the percentage PCR only, in NSW, 2009 – 2018



The number of *Shigella* notifications, by test type, and the percentage with only PCR positive result in NSW, 2009 - 2018



SURVEILLANCE OF FOODBORNE OUTBREAKS

A food-borne disease outbreak may be defined as a situation where two or more people who are linked in time or place report acute onset of enteric or other symptoms caused by ingestion of infectious agents or toxins that may have been acquired by consuming contaminated food or drink. These investigations follow the identification of disease clusters or reports of illness in two or more people who consumed the same food. Investigations are commenced when complaints are received by the NSW Food Authority, or when reported directly to public health units.

Summary 2018

- Foodborne outbreaks investigated: 50
- Outbreak related cases: 560

Overall trend

- Number of outbreaks equal to 5 year annual mean (50 outbreaks)
- 21% decrease in the number of outbreak-related cases compared to 5 year annual mean (708 people ill)

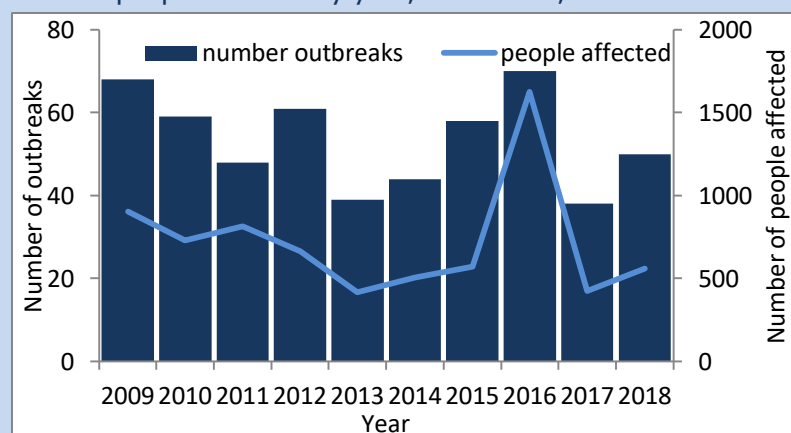
Causative agent in 2018

- Unknown: 54%
- *Salmonella*: 22%
- Fish poisoning: 14%
- *Listeria monocytogenes*: 2%
- Hepatitis A: 2%
- Norovirus: 2%
- *Campylobacter* species: 2%
- *Clostridium perfringens*: 2%

Contributing factors in 2018

- Unknown: 62%
- Improper food handling/preparation: 14%
- Biotoxins in fish: 14%
- Person to food to person: 6%

Number of foodborne or suspected foodborne outbreaks and number people affected by year, 2009-2018, NSW



Number of foodborne outbreaks and number of people affected by local health district, 2018, NSW

LHD	2018	No. ill
CC	2	15
FW	0	0
HNE	10	129
IS	3	23
M	0	0
MNC	1	4
NBM	4	119
NNSW	0	0
NS	4	14
SES	11	121
SNSW	0	0
SWS	4	38
SYD	7	51
WNSW	0	0
WS	2	9
NSW*	2	37

*Outbreaks affecting more than one LHD, counting NSW resident cases only

Foodborne outbreak by causative agent and year, 2013-2018, NSW

Causative agent	2013	2014	2015	2016	2017	2018
Unknown	17	9	25	34	21	27
<i>Salmonella</i> (all serotypes)	12	26	23	20	9	11
<i>Salmonella</i> Typhimurium	(9)	(26)	(19)	(14)	(4)	(6)
Norovirus	6	1	2	7	4	1
<i>Campylobacter</i>	1	0	2	2	3	1
<i>Clostridium perfringens</i>	2	0	1	0	0	1
Fish poisoning	0	4	4	4	1	7
<i>Listeria</i>	1	1	0	1	0	1
Hepatitis E	0	1	0	0	0	0
STEC	0	1	0	0	0	0
Hepatitis A	0	0	1	0	0	1
<i>Shigella</i>	0	1	0	2	0	0
Total outbreaks	39	44	58	70	38	50

Foodborne outbreaks continued

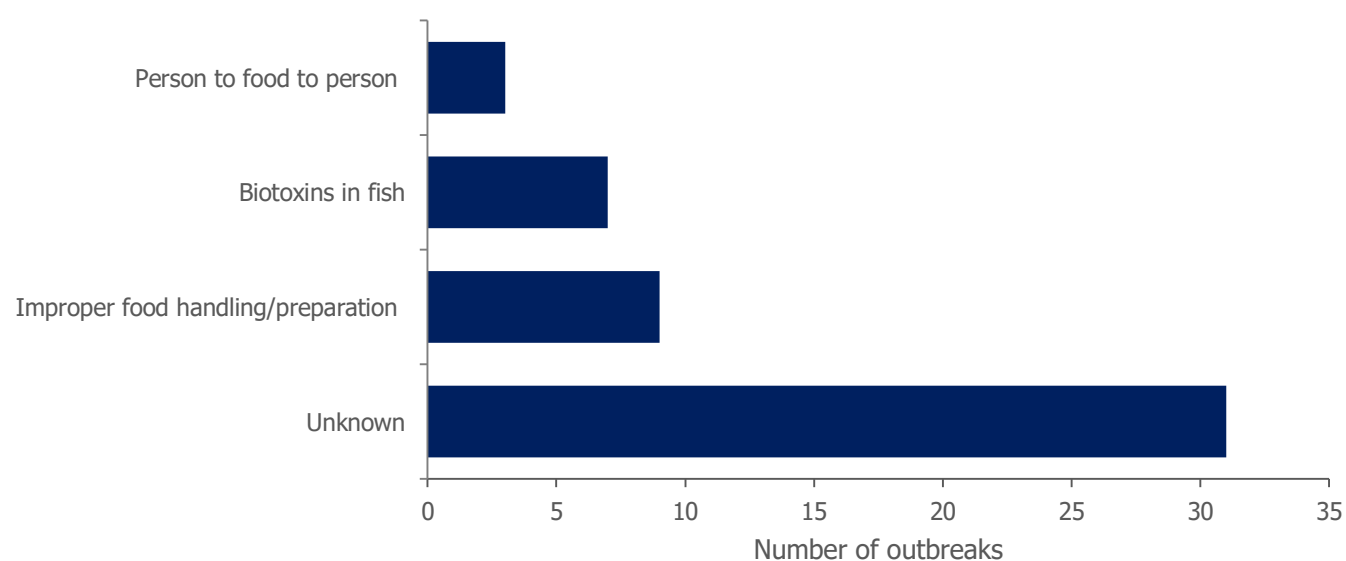
Description of outbreaks by causative agent

Number of outbreaks, number ill and number hospitalised by causative agent, 2018, NSW

Causative agent	Number of outbreaks	Number ill	Ratio ill per outbreak	Number hospitalised	Ratio hospitalised per outbreak
Unknown	27	311	11.5	11	0.4
<i>Salmonella</i> Typhimurium	6	88	14.7	6	1.0
Other <i>Salmonella</i>	5	46	9.2	5	1.0
Norovirus	1	29	29.0	0	0.0
Fish poisoning	7	17	2.4	5	0.7
<i>Clostridium perfringens</i>	1	23	23.0	0	0.0
<i>Campylobacter</i>	1	9	9.0	0	0.0
<i>Listeria monocytogenes</i>	1	6	6.0	6	6.0
Hepatitis A	1	31	31.0	26	26.0
Total	50	560	11.2	59	1.2

Summary foodborne outbreaks by contributing factors

Foodborne outbreaks by contributing factors, 2018, NSW



OUTBREAK SUMMARY 2018

Foodborne and potentially foodborne disease outbreaks investigated in NSW, 2018

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence *	Epi. Study **	Suspected / Responsible vehicle	Contributing factors
IS201802	May	Restaurant	<i>Campylobacter</i> species	7	1	Unknown	D	N	Unknown	Unknown
MNC201801	Mar	Private residence	Ciguatera Fish Poisoning	4	0	0	D	N	Mackerel	N/A
NBM201802	Sep	Aged care	<i>Clostridium Perfringens</i>	23	3	0	D	N	Unknown	Cooked food storage at improper temperature
MJOI201802	Jun	Imported food	Hepatitis A	31 [^]	31	26	AM	CC	Imported frozen pomegranate	Ingestion of contaminated raw products
MJOI201801	Jan	Community	<i>Listeria monocytogenes</i>	22 ^{^^}	22	22	M	C	Rockmelon	Inadequate disinfection of product
HUN0523	Oct	Restaurant	Norovirus	29	1	0	D	C	Unknown	Person to food to person
SES60705	Sep	Restaurant	<i>Salmonella</i> Enteritidis	30	7	1	ADM	C	Eggs	Cross contamination from raw ingredients
NS201801	Oct	Restaurant	<i>Salmonella</i> Enteritidis	3	3	1	D	N	Eggs	Unknown
SYD201802	Apr	Restaurant	<i>Salmonella</i> Infantis	4	3	1	D	N	Unknown	Unknown
HUN0519	May	Not applicable	<i>Salmonella</i> Javiana	6	6	2	D	N	Unknown	Unknown

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

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

[^] Hepatitis A MJOI201802 = 31 cases nationally, including 15 cases in NSW

^{^^} *Listeria monocytogenes* MJOI201801 = 22 cases nationally, including 6 cases in NSW

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence *	Epi. Study **	Suspected / Responsible vehicle	Contributing factors
SYD201801	Apr	Child care	<i>Salmonella</i> Typhimurium MLVA 3-13-10-9-523	15	12	0	M	N	Unknown	Food handler contamination
SWS201801	Sep	Restaurant	<i>Salmonella</i> Typhimurium MLVA 3-16-10-17-523	17	7	2	AD	C	Raw egg tiramisu	Ingestion of contaminated raw products
NBM201801	Jan	Unknown	<i>Salmonella</i> Typhimurium MLVA 3-9-7-14-523	21	21	Unknown	D	D	Unknown	Unknown
SES201802	Oct	Private residence	<i>Salmonella</i> Typhimurium MLVA 5-15-16-11-490	5	2	Unknown	D	N	Unknown	Unknown
HUN0524	Nov	Aged care	<i>Salmonella</i> Typhimurium MLVA 5-17-9-13-490	17	13	4	D	D	Eggs	Cross contamination from raw ingredients
HNE201802	Dec	Take-away	<i>Salmonella</i> Typhimurium MLVA 5-17-9-13-490	13	13	Unknown	D	N	Unknown	Cross contamination from raw ingredients
HUN0522	Oct	Take-away	<i>Salmonella</i> Virchow	3	3	0	D	C	Chicken and Mayonnaise sandwich/ wrap	Inadequate cleaning of equipment
IS201801	Feb	Private residence	Scombroid	6	0	3	D	N	Tuna (yellow fin)	Toxic substance or part of tissue

* 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.

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^ Hepatitis A MJOI201802 = 31 cases nationally, including 15 cases in NSW

^^ *Listeria monocytogenes* MJOI201801 = 22 cases nationally, including 6 cases in NSW

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence *	Epi. Study **	Suspected / Responsible vehicle	Contributing factors
HUN0520	Mar	Private residence	Scombroid	2	0	0	D	D	Tuna steaks	Toxic substance or part of tissue
SES201801	Mar	Take-away	Scombroid	2	0	2	D	N	Canned tuna	Toxic substance or part of tissue
NS59560	May	Private residence	Scombroid	1	0	Unknown	D	N	Tuna steaks	Toxic substance or part of tissue
SES201803	Nov	Private residence	Scombroid	1	0	0	D	N	Tuna steak	Toxic substance or part of tissue
WS201801	Nov	Take-away	Scombroid	1	0	0	D	N	Fish	Toxic substance or part of tissue
HUN0518	Jan	Restaurant	Unknown	31	0	0	D	N	Unknown	Unknown
LIV58136	Jan	Restaurant	Unknown	7	0	0	D	N	Unknown	Unknown
LIV58283	Feb	Commercial caterer	Unknown	10	0	0	D	N	Unknown	Unknown
CC58319	Feb	Take-away	Unknown	5	0	2	D	N	Unknown	Unknown
LIV58315	Feb	Restaurant	Unknown	4	0	0	D	N	Lebanese pizza	Unknown
NS58585	Feb	Restaurant	Unknown	3	0	0	D	N	Unknown	Unknown
SES58671	Mar	Restaurant	Unknown	25	0	0	D	N	Unknown	Unknown
NBM59073	Apr	Camp	Unknown	31	Unknown	4	D	N	Unknown	Unknown
SYD59077	Apr	Unknown	Unknown	3	Unknown	Unknown	D	N	Unknown	Unknown
SYD59176	Apr	Commercial caterer	Unknown	23	1	0	D	N	Unknown	Suspected person to food to person
HNE59240	Apr	Restaurant	Unknown	14	Unknown	2	D	N	Unknown	Unknown
NBM59279	Apr	Commercial caterer	Unknown	44	0	Unknown	D	N	Unknown	Suspected person to food to person

* 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

^ Hepatitis A MJOI201802 = 31 cases nationally, including 15 cases in NSW

^^ Listeria monocytogenes MJOI201801 = 22 cases nationally, including 6 cases in NSW

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence *	Epi. Study **	Suspected / Responsible vehicle	Contributing factors
HUN0521	May	Restaurant	Unknown	4	0	0	D	N	Red velvet pancakes	Unknown
CC59570	May	Restaurant	Unknown	10	Unknown	Unknown	D	N	Unknown	Unknown
SES59593	Jun	Restaurant	Unknown	5	Unknown	Unknown	D	N	Unknown	Unknown
SES59722	Jun	Restaurant	Unknown	7	0	Unknown	D	N	Unknown	Unknown
SES59775	Jun	Restaurant	Unknown	8	1	Unknown	D	N	Unknown	Unknown
NS60089	Jul	Restaurant	Unknown	7	0	0	D	N	Unknown	Unknown
SES60107	Jul	Restaurant	Unknown	4	0	0	D	N	Unknown	Unknown
SYD201803	Jul	Restaurant	Unknown	2	Unknown	Unknown	D	N	Unknown	Unknown
WS59962	Jul	Take-away	Unknown	8	Unknown	Unknown	D	N	Unknown	Unknown
SYD60008	Jul	Restaurant	Unknown	2	Unknown	Unknown	D	N	Unknown	Unknown
SES60521	Aug	Commercial caterer	Unknown	19	0	1	D	C	Unknown	Unknown
SYD201804	Aug	Take-away	Unknown	2	0	0	D	N	Unknown	Unknown
HNE60547	Aug	Restaurant	Unknown	10	Unknown	Unknown	D	N	Unknown	Unknown
SES60904	Sep	Restaurant	Unknown	15	Unknown	1	D	N	Unknown	Unknown
IS201803	Dec	Restaurant	Unknown	8	Unknown	1	D	N	Unknown	Unknown

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

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

^ Hepatitis A MJOI201802 = 31 cases nationally, including 15 cases in NSW

^^ *Listeria monocytogenes* MJOI201801 = 22 cases nationally, including 6 cases in NSW

SIGNIFICANT ENTERIC OUTBREAKS 2018

Multi-state outbreak of *Listeria monocytogenes* MLST 240 associated with rockmelon (MJOI201801)

Twenty-two people were infected with the same strain of *Listeria monocytogenes* MLST 240, in four Australian states: New South Wales (6), Victoria (8), Queensland (7) and Tasmania (1). Onset of symptoms occurred between 17 January and 10 April 2018. All patients were hospitalised, and seven deaths and one miscarriage were reported. The average age of patients was 70 years old, with a range from 0 (born pre-term) to 94 years.

Rockmelons produced by a NSW grower were identified as the source of the outbreak, and a recall of the products from this farm commenced on 27 February 2018. The outbreak strain of *Listeria monocytogenes* was detected on rockmelons from this producer collected from retail and wholesale marketplaces, and on the farm. The New South Wales Food Authority worked closely with the producer to identify the cause of the outbreak. Farm processes were in line with industry standards. It is likely that extreme weather events including localised flooding and dust storms combined to result in conditions of increased *Listeria* contamination, which existing sanitation processes at the facility reduced but did not eliminate entirely. Significant changes were implemented on the farm prior to the farm going back into production, including a test and hold protocol. Food safety and agricultural authorities are continuing to work with growers in the melon industry to implement improved control measures and awareness of external threats to food safety, such as adverse environmental conditions.

Rockmelon is considered a high-risk food for listeriosis. People vulnerable to listeriosis infection should not eat rockmelon, pre-cut fruit, soft cheeses or other foods likely to be contaminated with the *Listeria* bacteria. For further information, see the [listeriosis factsheet](#).

Multi-state outbreak of hepatitis A associated with frozen pomegranate arils (MJOI201802)

Thirty-one people were infected with the same strain of hepatitis A genotype IB in seven Australian states and territories: New South Wales (15 cases), Victoria

(6 cases), Western Australia (4 cases), Northern Territory (2 cases), South Australia (2 cases), Queensland (1 case) and Australian Capital Territory (1 case). Onsets ranged from 31 January 2018 to 8 December 2018. Cases included 18 females and 12 males, age range 4 to 74 years (median 30 years), with 26 of the 31 cases (84%) hospitalised for their illness. One death in a non-NSW resident was reported, but the cause of death is yet to be determined. Three cases were secondary infections, epidemiologically linked to an earlier confirmed case and thought to have been acquired by sexual contact.

Imported frozen pomegranate arils were identified as the source of the outbreak through case interviews and in an analytical study (OR 43.4, 95% CI 4.2 – 448.8, P=0.002). This product was stocked exclusively by one particular supermarket chain and distributed to all states and territories. Food Standards Australia and New Zealand (FSANZ) coordinated a national consumer level recall of the product on 7 April 2018. The investigation of the Australian food processor that repackaged the product found they were operating with all appropriate hygiene and food safety control processes, concluding that the local food processor had no process deficits to suggest it was the cause of the contamination, and that contamination most likely occurred before the product arrived in Australia. Hepatitis A genotype IB is endemic in Egypt where the product was grown. The last two cases with onsets on 2 June 2018 and 8 December 2018 were not aware of the recall and had continued to consume the implicated product up until their respective onset dates.

In response to this outbreak the Australian Department of Agriculture and Water Resources commenced a 100 per cent inspection and testing of future consignments from the Egyptian manufacturer of the pomegranate arils linked to the outbreak.

***Salmonella* Typhimurium in a Child Care Centre (SYD201801)**

An outbreak of *Salmonella* affecting 13 children and two staff members at a single child care centre in inner Sydney was investigated by the local public health unit in April. The outbreak was reported to the

public health unit in a timely manner by the affected child care centre after they were informed that a staff member who prepared food was diagnosed with *Salmonella*.

The cases occurred over an 8 day period, however there was a 4 day break in attendance at the centre during this time for the Easter public holidays. The most common reported symptoms included diarrhoea (15), fever (6), and vomiting (6), with symptoms occurring for an average duration of 4 days. Ten cases presented to a general practitioner, four cases to an emergency department, and one case did not seek medical attention. No cases were hospitalised. The first (index) case was the identified food handler.

Twelve of the 15 cases submitted a stool sample for testing, and 11 of these were found to be positive for *Salmonella* Typhimurium. The MLVA profile for these samples identified 10 cases with MLVA 3-13-12-9-523 and 1 case with MLVA 3-13-7-9-523.

The NSW Food Authority was informed and a site inspection was undertaken. The inspection did not find any issues with food handling practices or maintenance of hygienic standards at the centre. No food samples were available for testing, however environmental swabs were collected. One environmental sample (a kitchen boot swab) was also found to be positive for *Salmonella* Typhimurium with MLVA 3-13-10-9-523. This result combined with the temporal distribution of cases suggests that the outbreak was likely caused by a combination of food handler infection and cross contamination in the kitchen. The business implemented additional cleaning and no further cases were detected.

NSW *Salmonella* Enteritidis outbreak linked to local eggs

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). All *S. Enteritidis* cases are routinely interviewed in NSW using a nationally standardised questionnaire to determine source of illness. Most

infections are acquired overseas, and cases without travel are further interviewed about food exposures.

A slight increase in *S. Enteritidis* cases was detected in June 2018. Case investigation determined that a higher number of cases than expected reported no history of travel, and that all cases either lived in or had travelled to the metropolitan Sydney region during their respective exposure periods. Results from whole genome sequencing (WGS) found that a portion of these infections were closely related.

A breakthrough in the investigation occurred when a birthday cake was strongly implicated as the likely cause of illness among a family of cases. An uneaten portion of the cake was found to be positive for *S. Enteritidis* and closely linked by WGS to the outbreak sequence. Trace back of the various ingredients in the cake identified the eggs used to make the cake were supplied by a local egg farm which supplied the metropolitan Sydney area.

The NSW Food Authority inspected the egg producer and the associated egg packing facility. Environmental samples obtained during inspections of the facilities were found to be positive for *S. Enteritidis*, and WGS confirmed the strain on the farm was related to the cluster of human cases. Biosecurity measures at the property were immediately implemented by the NSW Department of Primary Industries (DPI), and the biosecurity response plan for the detection of *S. Enteritidis* in Australian eggs was activated. The NSW Food Authority issued a product recall on 8 September 2018 for all eggs produced at the facility, sold under the brand Glendenning Farms.

Four days later, on 12 September 2018, a second cluster of illness potentially linked to a Sydney cafe was identified through the NSW *Salmonella* SMS Project. This project sends all notified *Salmonella* cases with a mobile phone number an SMS requesting details of any food venues where they had eaten in the three days prior to illness onset. SMS responses from two cases indicated that two school groups from separate areas of regional NSW who visited Sydney in early September had fallen ill with *Salmonella*-like illness. Both school groups stayed at the same accommodation facility and ate food provided by the venue's associated café. 30 attendees across both school groups reported symptoms, and six cases across both school groups were later confirmed as *S.*

Enteritidis. One additional case was *Salmonella* positive by PCR only. WGS confirmed the six infections were related to the outbreak. A cohort study was undertaken of one of the school groups and the highest attack rate implicated a chicken, lettuce and mayonnaise sandwich. The NSW Food Authority inspected the café and confirmed only a commercial mayonnaise was used on site. However it was established that the café had been using the brand of recalled eggs onsite when the students were in Sydney. One composite kitchen surface swab was found to be positive for *S. Enteritidis*, which was found to be related on WGS to the outbreak sequence. As a result, while the school group did not directly consume eggs at the café, this cluster of illness is attributable to cross contamination in the kitchen at the time of food preparation.

Despite the egg recall, locally acquired *S. Enteritidis* cases occurring among residents of, or visitors to, metropolitan Sydney continued to occur during quarter 4 2018. One point source cluster linked to the outbreak was investigated during this final quarter for 2018. Three unrelated cases reported dining at a 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.

Between 18 May and 31 December 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.

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 eggs of other brands. Active surveillance for and investigation of locally-acquired *S. Enteritidis* infections is ongoing.

***Salmonella* Typhimurium 3-16-10-17-523 outbreak linked to raw egg tiramisu**

An outbreak affecting 17 out of at least 24 people who dined at an Italian restaurant in South Western Sydney was detected by the NSW Salmonella SMS Project. The local public health unit investigation found that seven cases of *Salmonella* occurred among three groups of diners, all of whom attended the restaurant on the same day in September for a Fathers' Day lunch. Symptom onset occurred over a three day period, with the majority of cases reporting onset 24 hours after the meal. The most common reported symptoms were abdominal pain (16), diarrhoea (13), fever (12), vomiting (9), and headache (9).

The seven notified cases were positive for *Salmonella* Typhimurium, with MLVA profile 3-16-10-17-523. Two additional cases with this MLVA profile from within one of the family groups fell ill in the days after the initial group, but are both thought to be secondary infections.

The public health unit conducted a cohort study of the 24 diners, and consumption of tiramisu was found to have the highest attack rate and the highest odds ratio (10.0). Eighty three% of the ill people reported eating the tiramisu.

The NSW Food Authority was informed and a site inspection was undertaken. The food and processing practices of the restaurant were found to be acceptable and no food samples or environmental swabs tested positive for *Salmonella*. The inspection did however identify that raw eggs had been used to prepare a tiramisu desert served on the day, which was made on-site. The NSW Food Authority served the business with a prohibition order preventing the preparation and service of raw egg food. No further cases in relation to the restaurant were reported.

Aged Care Facility *Clostridium perfringens* outbreak

An outbreak of gastroenteritis affecting at least 21 residents and 2 staff members of an aged care facility in regional NSW was identified in September. Symptoms occurred over a five day period, with the only reported symptom being diarrhoea. Six cases were reviewed by a general practitioner and had stool specimens collected for testing. Three of these cases tested positive for *Clostridium perfringens*.

At the time of the notification to the public health unit, rapid advice and education was provided to facility management. This was effective in preventing further cases.

The majority of *Clostridium perfringens* outbreaks are associated with undercooked meats, often when large quantities of food are prepared for a large group of people and left to sit out for long periods of time. The facility menu at the time of the outbreak was found to include roast pork, roast lamb, and chicken soup. Some food items were noted to be listed on the menu multiple days in a row.

The NSW Food Authority undertook a review of the venue's compliance history, and processing and hygiene at the facility were reviewed. No significant issues were identified. No food samples were available for testing.

Despite not being able to identify a food source for the toxin, the outbreak was contained through early notification, education and careful application of the NSW Food Authority's [Guidelines for Food Service to Vulnerable Persons](#).

Multi-state *Salmonella* Typhimurium MLVA 5-17-9-13-490 outbreak 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 positive for *Salmonella* by PCR only. 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 only. 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 cases positive for *Salmonella* by PCR (no culture) 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 a common egg grading facility among all clusters.

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* 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.

INSTITUTIONAL GASTROINTESTINAL OUTBREAKS

Viral gastroenteritis is highly infectious and outbreaks are very common and can be difficult to control. Outbreaks often occur in institutional settings, such as residential care facilities, educational institutions, or health care facilities. Gastroenteritis among two or more people of any age from an institution and linked in time should be notified to the local PHU. This is to ensure that the institution implements appropriate control and prevention strategies.

Summary 2018

- Number of outbreaks: 684
- Number of people affected: 9395
- Number of outbreaks with at least one stool sample collected: 229 (33%)

Overall trend (compared to 5 year average)

- 2% decrease in the number of outbreaks
- 11% decrease in the number of people affected

Seasonality

- Child care centres: Peaked in February and August
- Aged care facilities and hospitals: Peaked in August

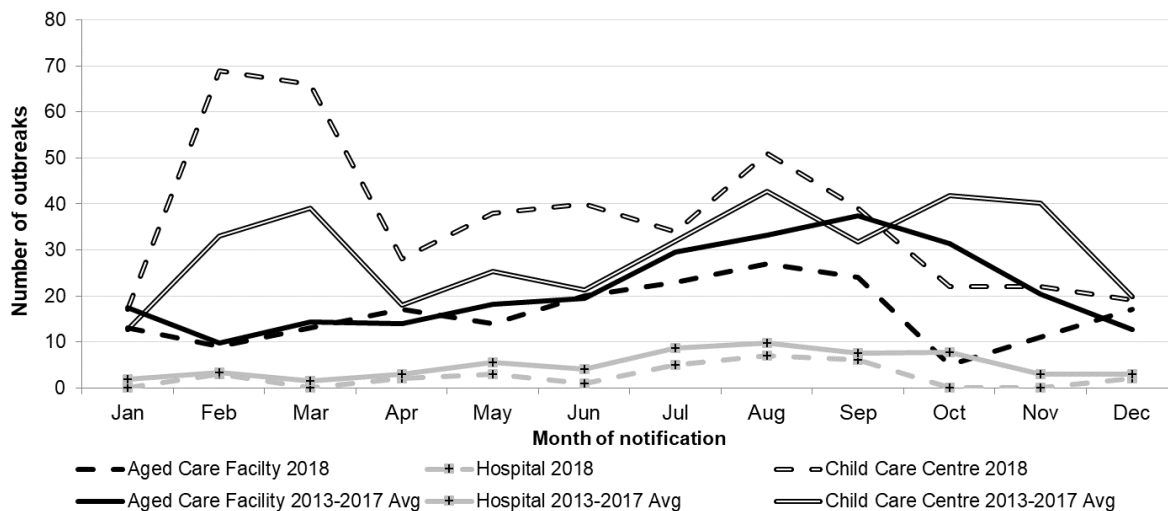
Groups with highest frequency in 2018

- Facility type: child care centres, 445 (65%) of outbreaks
- Attack rate in staff: hospitals at 24%
- Attack rate in non-staff: hospital patients at 39%
- Average duration of outbreaks: schools at 11 days

Causative agent

- Norovirus (laboratory confirmed): 17% of outbreaks (50% of outbreaks with a stool sample collected)

Number of reported outbreaks of gastrointestinal illness in institutions in 2018 and average of the previous 5 years by month and facility type



Characteristics of outbreaks of gastrointestinal illness in institutions reported to NSW in 2018

Setting	No of Outbreaks (n)	Staff Affected (n: attack rate)	Non-staff affected (n: attack rate)	Avg duration of outbreak (days)	Outbreaks with stool collected (n: %)	Outbreaks with cause found (n: pathogen)
Aged Care	193	771: 6%	2431: 19%	6	155: 80%	81: norovirus 4: rotavirus
Child care	445	1143: 16%	4148: 11%	8	47: 11%	16: norovirus 3: rotavirus
Hospital	28	138: 24%	230: 39%	6	20: 71%	13: norovirus
School	7	20: 12%	418: 21%	11	2: 29%	1: norovirus
Other*	11	11: 15%	85: 23%	2	5: 45%	4: norovirus
TOTAL	684	2083: 13%	7312: 15%	7	229: 33%	115: norovirus 7: rotavirus

*Military facilities, camps, other residential care facilities

METHODS

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), Health Protection NSW, OzFoodNet (OFN) staff and the NSW Food Authority (NSWFA).

There are two OzFoodNet (OFN) sites in NSW - one based in Sydney at the Communicable Diseases Branch, Health Protection NSW 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 developing enteric disease policy. The Hunter OFN site comprises an OFN epidemiologist and a research officer. Both sites work closely with the Manager, Enteric Diseases and other Communicable Disease Branch staff.

The management of suspected foodborne disease outbreaks in NSW is the shared responsibility of NSW public health units, Health Protection NSW, NSW OFN sites and the NSW Food Authority. NSW 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 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.

Notifiable enteric diseases in NSW

Under the Public Health Act 2010 (NSW), the following enteric diseases and conditions are notifiable in NSW: botulism, *Campylobacter*, cholera, cryptosporidiosis, giardiasis, hepatitis A, 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. In 2015 paratyphoid was separated from *Salmonella* into a separate disease. Individual cases of other enteric diseases such as 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).

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 Health Protection NSW.

Methods

We analysed data for the following notifiable enteric pathogens; *Salmonella*, *Salmonella* Paratyphi, *Salmonella* Typhi, *Listeria monocytogenes*, *Shigella*, HUS and STEC, *Cryptosporidium*, *Giardia*, *Campylobacter*, rotavirus and hepatitis A & E viruses. There were no cases of botulism or cholera in 2018.

On 30 March 2019, 2018 data was extracted from NCIMS using Secure Analytics for Population Health Research and Intelligence (SAPHaRI)ⁱⁱ using the

ⁱ We define *Salmonella* as all *Salmonella* serovars, excluding *S. Typhi* and *S. Paratyphi*, in accordance with the definition of *Salmonella* endorsed by the Communicable Diseases Network of Australia (CDNA).

ⁱⁱ NSW Health Notifiable Conditions Information Management System (NCIMS), Communicable Diseases Branch and Centre for Epidemiology and Evidence, NSW Ministry of Health.

Methods continued

date of onset of disease. The counts of each notifiable enteric diseaseⁱⁱⁱ for 2018 were compared with the average annual count for the years 2013 to 2017. The NSW estimated resident population for 30 June of each year from 2013-2018 was used to calculate crude incidence rates for each disease.^{iv}

Individual factors such as place of acquisition, possible risk exposures, and hospitalisation are reported for cases where that information has been collected by the public health unit. "Unknown" place of acquisition usually indicates that the person was in more than one place during their exposure period, so that the place of acquisition cannot be definitively assigned. Possible risk factors are those reported by the case on questioning, and cannot be attributed as the source unless further investigation is undertaken.

Laboratory testing data from 14 public and private laboratories is available for 2012 and 2013 for *Cryptosporidium*, *Giardia*, *Salmonella* and *Shigella*. In January 2014, an additional private laboratory was added. Care should be taken when interpreting trends using data prior to 2014. In addition, there is some duplication of the number of tests undertaken where more than one method of testing is used. Faecal specimens are tested for both *Cryptosporidium* and *Giardia* by nucleic acid amplification test (NAAT). The laboratory testing data does not provide any information on whether there are repeat tests performed on the same individual.

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

Notification data for *Campylobacter*, *Cryptosporidium*, *Giardia*, *Salmonella* and *Shigella* were analysed for the period between 1 January 2013 and 31 December 2018, based on the specimen date. The ratio of positive notifications was calculated by dividing the overall positive results notified to NSW Health by all laboratories, by the total number of tests performed as reported from the participating laboratories. The overall positive results included in the analysis are for individual people notified with each condition reported from all laboratories. However, the testing data are for individual tests reported from participating laboratories and may include multiple specimens per individual. As such, the ratio of positive notifications per test may be an underestimate of the per cent of people tested that are positive for the condition.

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 NCIMS by public health units. Data from these registers are analysed using MS Excel at Health Protection NSW.

^{iv} Australian Bureau of Statistics. Estimated resident populations based on 2011 Census counts and mid-series experimental population projections.

ACKNOWLEDGEMENTS

The NSW OzFoodNet Annual Report 2018 was possible due to the collaborative work of many people, some mentioned by name here, who contribute in varying capacities to the management of communicable enteric diseases in NSW:

- NSW Public Health Unit staff for surveillance, reporting and investigation of enteric disease cases, clusters and outbreaks
- HAPS, ICPMR, IMVS, MDU and other public and private laboratory staff in New South Wales, Queensland, Victoria and South Australia
- Enteric diseases and OzFoodNet team, Communicable Diseases Branch, Health Protection, NSW
- Hunter New England OzFoodNet team and Dr Tony Merritt, Dr Craig Dalton and Dr David Durrheim, Hunter New England Local Health District
- Dr Vicky Sheppard, Director, Communicable Diseases Branch
- Dr Jeremy McNulty, Director, Health Protection, NSW
- Clinicians across NSW who assist in the diagnosis and follow up enteric disease
- The New South Wales Food Authority for management of environmental aspects of outbreak investigations
- Local Councils in NSW that contribute to enteric disease investigations
- Sheena Adamson, Laboratory Liaison Officer and Daneeta Hennessy, WGS Epidemiologist with Health Protection, NSW
- All OzFoodNet epidemiologists and collaborators
- Partners in NSW Department of Primary Industries and associated stakeholders