OzFoodNet

Enhancing Foodborne Disease Surveillance Across Australia.

NSW ANNUAL REPORT

2016

NSW GOVERNMENT Health Communicable Diseases

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GLOSSARY

LHD	Local Health Districts
CC	Central Coast LHD
FW	Far West LHD
HNE	Hunter New England LHD
IS	Illawarra Shoalhaven LHD
M	Murrumbidgee LHD
MNC	Mid North Coast LHD
NBM	Nepean Blue Mountains LHD
NNSW	Northern NSW LHD
NS	Northern Sydney LHD
SES	South Eastern Sydney LHD
SNSW	Southern NSW LHD
SWS	South Western Sydney LHD
SYD	Sydney LHD
WNSW	Western NSW LHD
WS	Western Sydney LHD
NSW	New South Wales
NSWFA	NSW Food Authority
ICPMR	Institute of Clinical Pathology and Medical Research
Yr	Year

SUMMARY – Enteric Infections in NSW

This report summarises NSW enteric disease surveillance data for viral, bacterial and parasitic pathogens for 2016, changes in notifications over time, and other activities in 2016. 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.

Cases of infection and incidence 2016

- Notifications of enteric conditions: 10,386
- Reported hospitalisations: 636
- Reported deaths: 8
- Notification rate per 100,000 population: 134.7

Notified incidence and reported hospitalisation due to enteric pathogens in NSW, 2016

	5Yr annual mean	N 2016	% change	Notified Rate[!]	Reported Hospitalisation[!]
Salmonellosis	3630	4462	23%	57.9	263
Giardiasis	2598	3455	33%	44.8	10
Cryptosporidiosis	726	1194	64%	15.5	66
Rotavirus	1015	754	-26%	9.8	86
Shigellosis	156	305	95%	4.0	63
STEC	22	69	219%	0.9	36
Hepatitis A	63	40	-36%	0.5	18
Typhoid	47	35	-25%	0.5	26
Listeriosis	28	34	21%	0.4	33
Paratyphoid	26	20	-22%	0.3	18
Hepatitis E	22	14	-35%	0.2	13
Haemolytic uremic syndrome	8	4	-50%	0.1	4
Botulism	1	0	-100%	0.0	0
Cholera	1	0	-100%	0.0	0
TOTAL	8342	10386	25%	134.7	636

[!] *incidence and hospitalisation may be underestimated as they are limited to those reported to a public health unit*

Notable changes in 2016 (compared to 5 year annual average, 2011-2015)

- 25% increase in the number of enteric infections
- 23% increase in the number of salmonellosis notifications (pages 6-11)
- 219% increase in Shiga toxigenic *Escherichia coli* (STEC) and 50% decrease in haemolytic uraemic syndrome (HUS) notifications (pages 18-19)
- 64% increase in cryptosporidiosis notification, 49% indicated swimming pool exposure (page 20)
- The increase in notifications of enteric diseases was partially driven by the use of a more sensitive test that is now widely available in NSW

Reported enteric disease outbreaks

- 70 foodborne or potentially foodborne disease outbreaks were reported affecting at least 1,625 people; a 21% increase in the number of reported foodborne or probable foodborne disease outbreaks compared to 2015 (n=58)
- 788 viral or probable viral gastroenteritis outbreaks in institutions were reported, affecting at least 11,605 people; a 73% increase in the number of reported gastroenteritis outbreaks in institutions compared to 2015 (n=455)

SALMONELLOSIS

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

Summary 2016

- Case count: 4462
- Reported hospitalisations: 263
- Reported deaths: 1
- Notification rate per 100,000: 57.9

Overall trend:

- 23% increase in the 2016 notification rate compared to 5 year annual mean (49.0 per 100,000)
- Some of the increase may be due to the increased use of more sensitive tests (pages 27-28)

Groups with highest notification rate in 2016

- Age: <5 years (23% of cases - 197.8 per 100,000)
- Sex: Female (53% of cases - 60.8 per 100,000)
- LHD: Northern NSW (6% of cases - 90.6 per 100,000)

Seasonality

- Consistent peaks in summer months (Jan-Mar)

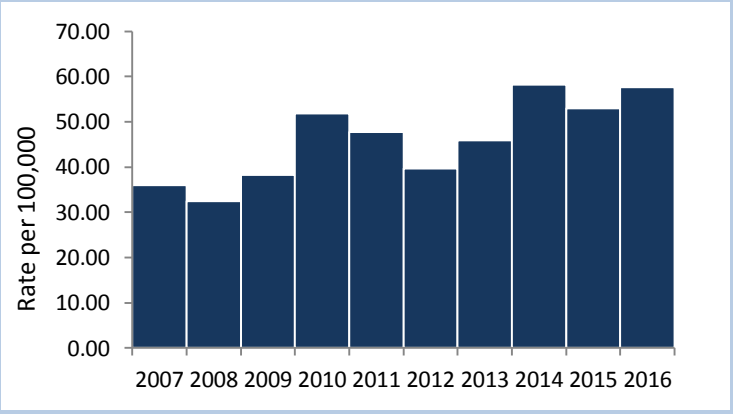
Top serotypes in 2016 (% of all types salmonella) - % change compared to 2015

1. Typhimurium (42%) - ↓ 10%
2. Enteritidis (6%) - ↑ 57%
3. Virchow (4%) - ↑ 66%
4. Saintpaul (4%) - ↑ 7%
5. Paratyhi B bv java (3%) - ↑ 2%

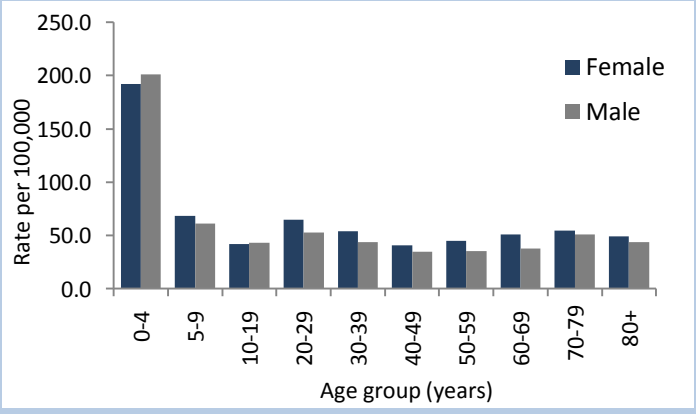
Outbreaks

- Cases found to be associated with an outbreak: 9.0% (pages 29-38)

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

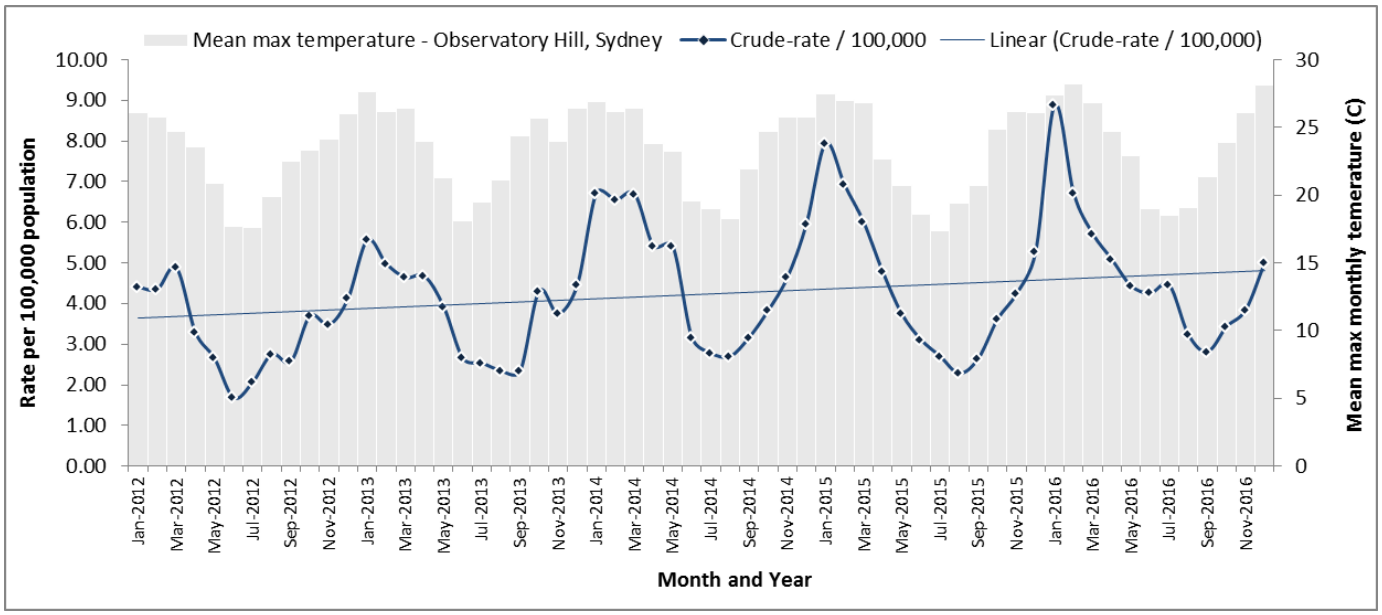
	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	142.6	191	43.4	56.3
FW	21.6	10	69.6	32.5
HNE	413.8	420	46.2	45.6
IS	161.2	226	41.0	55.8
M	144.6	155	60.5	64.1
MNC	135.2	160	64.3	73.3
NBM	145	186	40.6	49.5
NNSW	224.2	272	76.8	90.2
NS	521.2	679	59.1	74.6
SES	472.2	632	54.2	69.4
SNSW	85.6	109	42.8	52.2
SWS	386	449	42.6	46.5
SYD	309.2	385	51.1	60.2
WNSW	95.4	121	34.6	43.3
WS	370.6	467	41.7	49.3
NSW	3630.2	4462	48.9	57.6

*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, 2012 – 2016.



**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 2016, compared to the 5 year annual mean, by age group.

Age Group	2016			5 year annual mean		
	Count	% of all cases	Rate	Count	% of all cases	Rate
0-4 yrs	1010	23%	207.5	806	22%	165.6
5-9 yrs	318	7%	68.5	315.4	9%	67.9
10-19 yrs	395	9%	43.3	377	10%	41.4
20-39 yrs	1153	26%	56.0	947.6	26%	46.0
40-59 yrs	786	18%	40.1	611	17%	31.2
60+ yrs	797	18%	52.2	570.6	16%	37.3

Salmonella serotypes

Top 5 *Salmonella* serotypes in NSW, 2012-2016 (number of notifications)

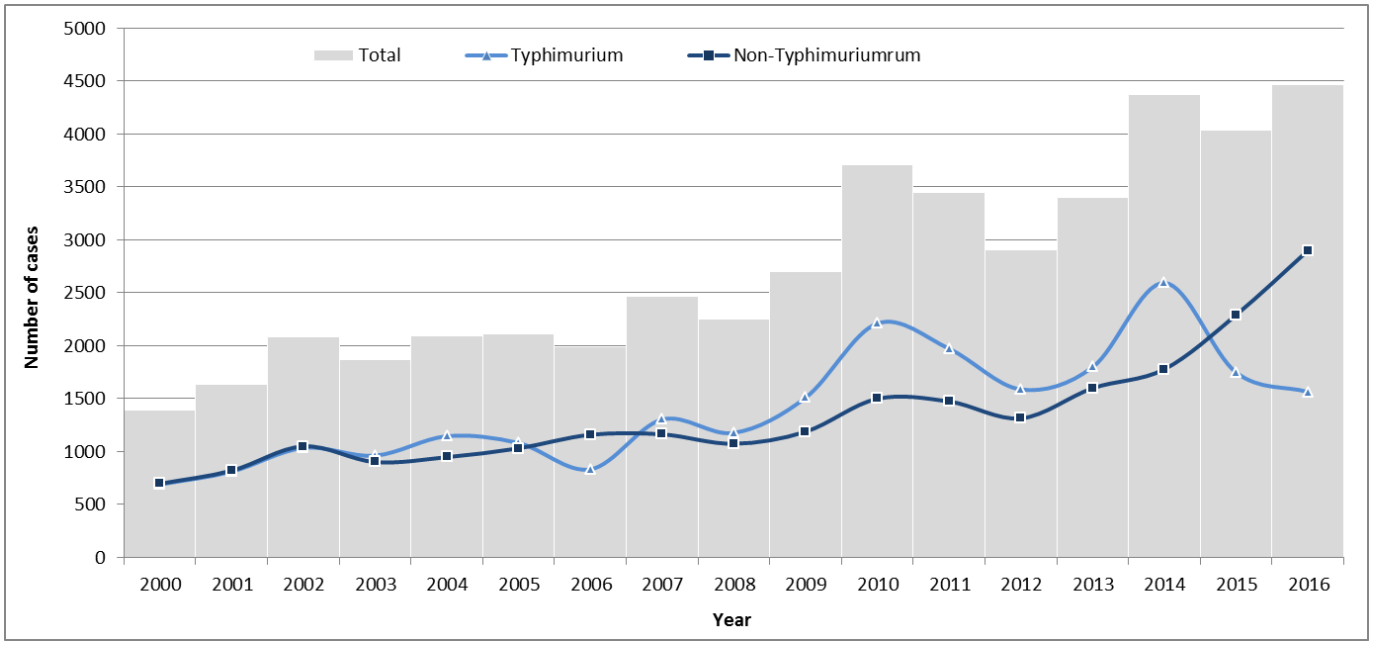
	2012	2013	2014	2015	2016
1	Typhimurium (1587)	Typhimurium (1798)	Typhimurium (2593)	Typhimurium (1747)	Typhimurium (1564)
2	Enteritidis (153)	Enteritidis (147)	Enteritidis (159)	Enteritidis (154)	Enteritidis (242)
3	Virchow (90)	Virchow (116)	Virchow (122)	Saintpaul (131)	Virchow (166)
4	Paratyphi B bv Java (83)	Paratyphi B bv Java (99)	Paratyphi B bv Java (100)	Paratyphi B bv Java (122)	Saintpaul (140)
5	Singapore (61)	Birkenhead (76)	Wangata (92)	Wangata (105)	Paratyphi B bv Java (125)

Salmonellosis continued

Salmonella Typhimurium trends

In 2016, *S.* Typhimurium notifications decreased by 10.5% when compared to 2015. The NSW Food Authority strategy has a focus on reducing *S.* Typhimurium and may account for some of the decrease in 2016.

Number of *S.* Typhimurium and non-*S.* Typhimurium infections in NSW, 2000-2016



*S.*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, 2012-2016, NSW

	2012	2013	2014	2015	2016
1	3-17-9-12-523 (150)	3-17-9-12-523 (159)	3-17-9-11-523 (210)	3-12-11-14-523 (100)	3-26-13-8-523 (202)
2	3-9-8-13-523 (124)	3-9-8-13-523 (83)	3-12-11-14-523 (149)	3-17-9-11-523 (92)	3-25-18-12-523 (56)
3	3-9-7-13-523 (100)	3-9-7-13-523 (74)	3-12-12-9-523 (141)	3-12-12-9-523 (82)	3-12-12-9-523 (49)
4	3-16-9-12-523 (66)	3-10-14-12-496 (61)	3-10-7-12-523 (99)	3-12-13-9-523 (56)	3-12-11-14-523 (46)
5	3-10-8-9-523 (50)	3-10-7-14-523 (55)	3-9-7-12-523 (98)	3-24-13-10-523 (53)	3-10-14-11-496 (44)
6	3-9-8-12-523 (38)	3-13-11-9-523 (48)	3-9-8-12-523 (97)	3-10-8-12-523 (42)	3-9-7-12-523 (39)
7	3-9-8-14-523 (38)	3-9-7-14-523 (45)	3-16-9-11-523 (94)	3-9-7-12-523 (41)	3-24-13-10-523 (36)
8	3-9-9-13-523 (37)	3-23-23-11-523 (43)	3-17-10-11-523 (94)	3-17-8-11-523 (39)	3-17-9-11-523 (30)
9	3-9-9-12-523 (34)	3-10-8-9-523 (39)	3-10-13-11-496 (52)	3-16-9-11-523 (37)	3-10-15-11-496 (27)
10	3-12-11-13-523 (29)	3-17-9-11-523 (39)	3-16-9-12-523 (50)	3-24-14-10-523 (33)	3-9-12-11-496 (23)

**colour code indicates closely related MLVA patterns*

Salmonella Enteritidis infection

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

Summary 2016

- Case count: 242
- Reported hospitalisations: 42
- Reported deaths: 0
- Notification rate per 100,000: 3.1

Overall trend:

- 55% increase in 2016 notification rate compared to 5 year annual mean (2.1 per 100,000) (page 10)

Groups with highest notification rate in 2016

- Age: <5 years (17% of cases - 7.8 per 100,000)
- Sex: Female (52% of cases - 3.2 per 100,000)
- LHD: Mid North Coast (5% of cases - 5.5 per 100,000)

Seasonality

- October peak

Place of acquisition in 2016

- In NSW: 15%
- In Australia & outside NSW: 2%
- Overseas: 79%
- Unknown: 4%

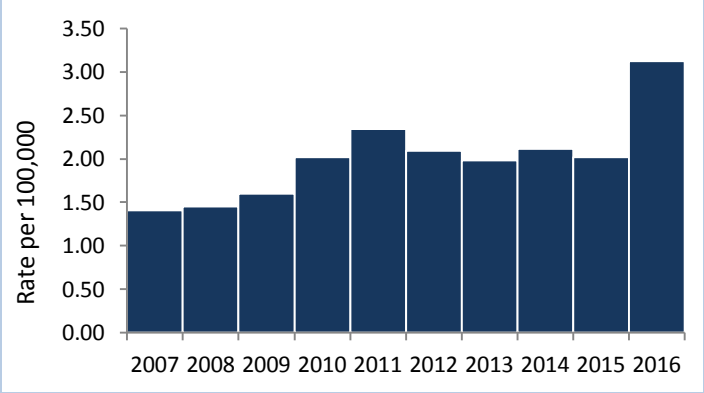
(note: data available on 90% of cases)

Outbreaks

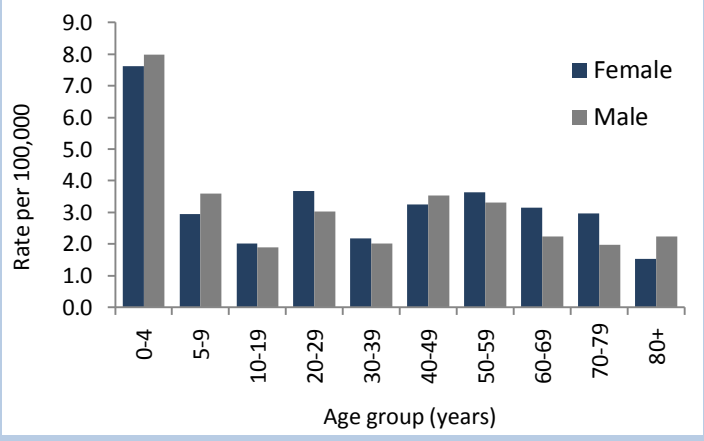
- Cases found to be associated with an outbreak: 0.8%*

*The 19 outbreak cases were associated with a cluster investigated in 2017. The cluster will be included in the 2017 annual report.

Notification rate per 100,000 population, by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex from 2016, NSW



Number of cases and rate (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	7.6	14	2.3	4.1
FW	0.6	1	1.9	3.3
HNE	19	23	2.1	2.5
IS	8.2	15	2.1	3.7
M	2.2	2	0.9	0.8
MNC	3.8	12	1.8	5.5
NBM	4	6	1.1	1.6
NNSW	7.8	11	2.7	3.6
NS	27.8	42	3.2	4.6
SES	32.8	34	3.8	3.7
SNSW	4	6	2.0	2.9
SWS	11.4	25	1.3	2.6
SYD	14.8	19	2.5	3.0
WNSW	2.8	2	1.0	0.7
WS	9.6	30	1.1	3.2
NSW	156.4	242	2.1	3.1

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

S. Enteritidis continued

Place of acquisition

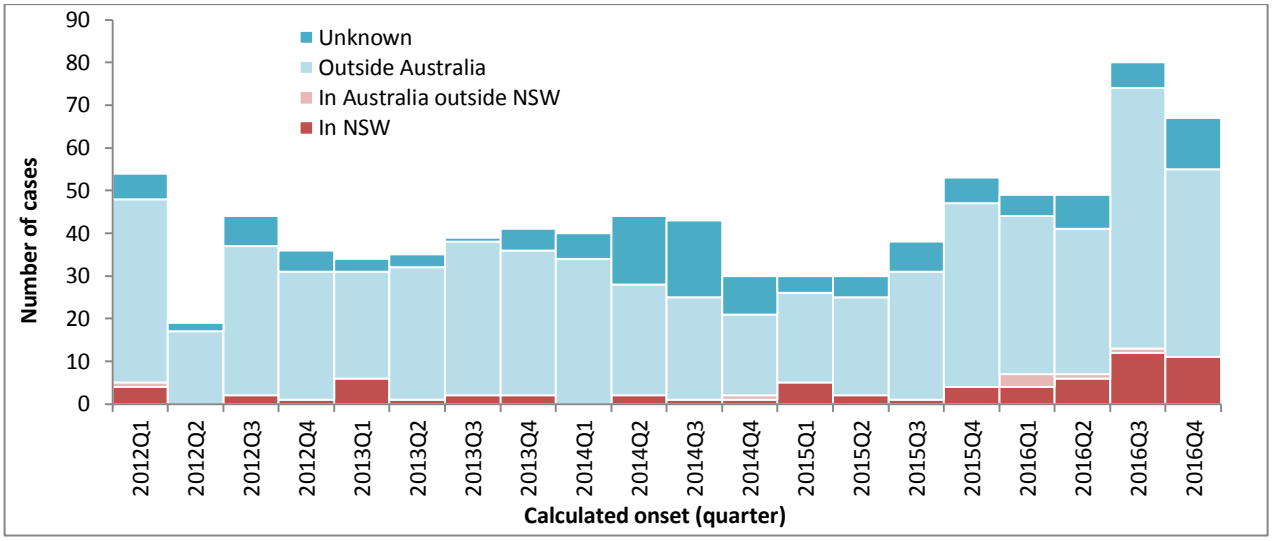
Number of cases and rate of *S.*Enteritidis notifications by place of acquisition and year, 2011-2016, NSW.

Year	Count		Rate (per 100,000)	
	Acquired in NSW	Acquired outside NSW	Acquired in NSW	Acquired outside NSW
2011	23	140	0.3	1.9
2012	7	126	0.1	1.7
2013	11	124	0.2	1.7
2014	4	106	0.1	1.4
2015	12	120	0.2	1.6
2016	33	178	0.4	2.3

*S.*Enteritidis increase in 2016

Salmonella Enteritidis was the second most common *Salmonella* serovar, with 242 cases reported in 2016. While the majority of *S.* Enteritidis notifications in NSW continue to be acquired during overseas travel (79% of those able to be interviewed), an increase in locally acquired infections was observed during 2016 (see figure below). In many areas overseas, *S.* Enteritidis is the most common *Salmonella* serovar. *S.* Enteritidis may infect the ovaries of hens and contaminate the internal contents of eggs before the shells are formed. Infected eggs appear normal and intact, and the bacterium is unaffected by standard industry cleaning and inspection measures that act against external faecal contamination of egg shells. This contributes a risk for human infections if contaminated eggs are eaten raw or undercooked. Strict control programs in Australia have thus far prevented *S.* Enteritidis from establishing itself in commercial poultry flocks. Investigations are ongoing to identify the potential sources of locally acquired *S.* Enteritidis infections. The use of whole genomic sequencing is also being explored to assist in the identification of clusters.

Salmonella Enteritidis notifications by quarter and place of acquisition, NSW, 1 Jan 2012 to 31 Dec 2016



Salmonella Paratyphi B var Java infection

All *S.* 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 *S.* Paratyphi biovar Java organisms).

Summary 2016

- Case count: 125
- Reported hospitalisations: 22
- Reported deaths: 0
- Notification rate per 100,000: 1.6

Overall trend:

- 31% increase in 2016 notification rate compared to 5 year annual mean (1.3 per 100,000)
- The increase is accounted for both by increased locally acquired cases in NSLHD* and overseas acquired cases

Groups with highest notification rate in 2016

- Age: <5 years (27% of cases - 6.7 per 100,000)
- Sex: Female (58% of cases - 1.9 per 100,000)
- LHD: Northern Sydney (43% of cases - 6.0 per 100,000)

Place of acquisition in 2016

- In NSW: 53%
- In Australia & outside NSW: 1%
- Overseas 42%
- Unknown: 4%

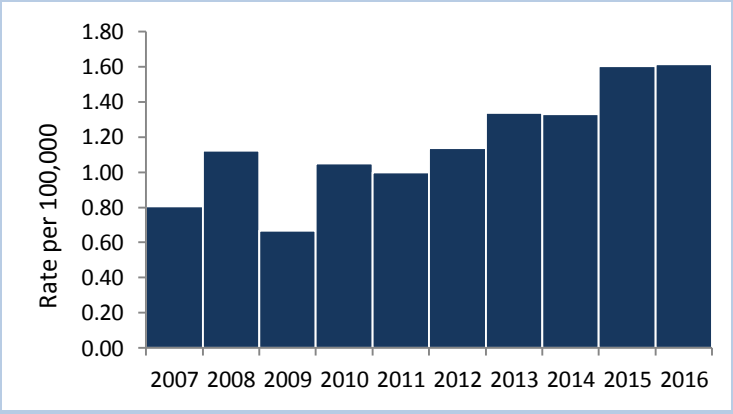
(note: data available on 88% of cases)

Outbreaks

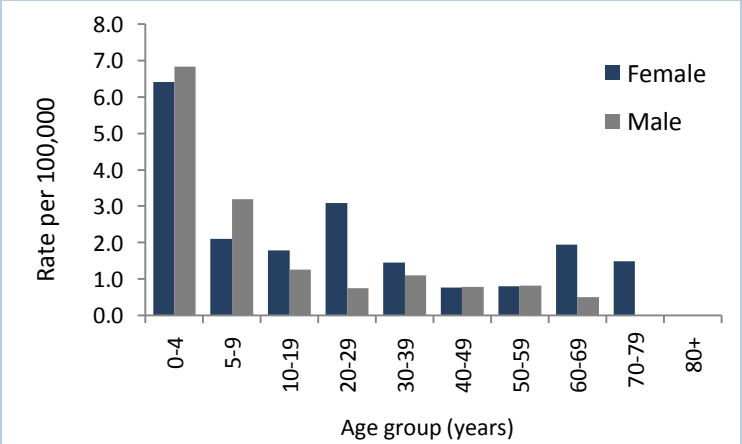
- Cases found to be associated with an outbreak: 0%

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

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	3.6	5	1.1	1.5
FW	0.2	0	0.6	0.0
HNE	7.2	13	0.8	1.4
IS	3.4	6	0.9	1.5
M	0.6	1	0.3	0.4
MNC	1.2	0	0.6	0.0
NBM	5.2	4	1.5	1.1
NNSW	1.6	4	0.5	1.3
NS	41.2	54	4.7	5.9
SES	9.6	14	1.1	1.5
SNSW	1	2	0.5	1.0
SWS	5.6	4	0.6	0.4
SYD	6.6	5	1.1	0.8
WNSW	1.4	1	0.5	0.4
WS	6.8	12	0.8	1.3
NSW	95.2	125	1.3	1.6

* 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 2016

- Case count: 55
- Reported hospitalisations: 44
- Reported deaths: 0
- Notification rate per 100,000: 0.7

Overall trend:

- 24% decrease in 2016 notification rate compared to 5 year annual mean (1.0 per 100,000)

Groups with highest notification rate in 2016

- Age: 20-29 years (29% of cases - 1.6 per 100,000)
- Sex: Male (51% of cases - 0.7 per 100,000)
- LHD: Western Sydney (27% of cases - 1.6 per 100,000)

Seasonality

- Peaks typically in summer months (Jan-Feb)

Place of acquisition in 2016

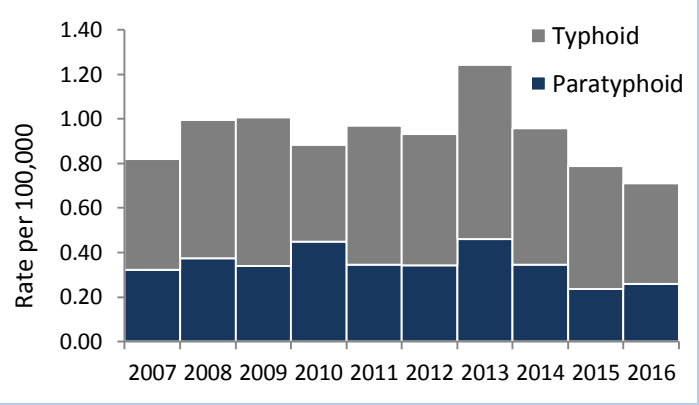
- In NSW: 9%
- In Australia & outside NSW: 0%
- Overseas: 87%
- Unable to be determined: 4%

(note: data available on 100% of cases)

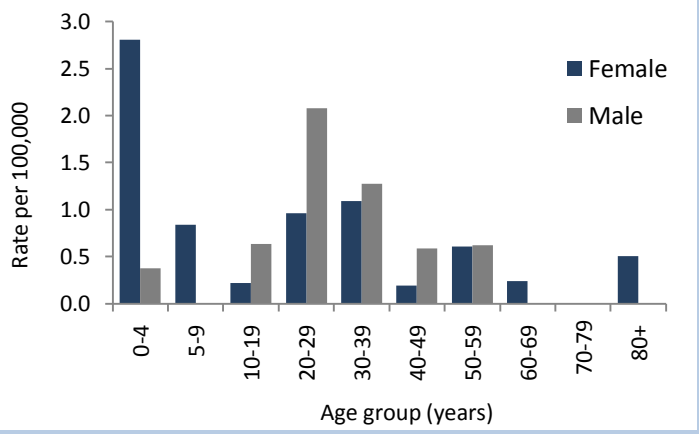
Outbreaks

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

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Typhoid and paratyphoid notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	0.2	1	0.1	0.3
FW	0	0	0.0	0.0
HNE	1.8	1	0.2	0.1
IS	1.4	3	0.4	0.7
M	1	0	0.4	0.0
MNC	0.8	0	0.4	0.0
NBM	0.8	2	0.2	0.5
NNSW	0.8	0	0.3	0.0
NS	8	4	0.9	0.4
SES	12	10	1.4	1.1
SNSW	1	1	0.5	0.5
SWS	10.8	8	1.2	0.8
SYD	9.6	8	1.6	1.3
WNSW	0	2	0.0	0.7
WS	24.2	15	2.7	1.6
NSW	72.4	55	1.0	0.7

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

Typhoid and Paratyphoid continued

Country where infection acquired

Country of acquisition for overseas acquired typhoid and paratyphoid cases, 2016

County of acquisition	Paratyphoid	Typhoid	Total
India	9	17	26
Bangladesh	2	4	6
Indonesia	3	1	4
Pakistan	0	3	3
Samoa	0	2	2
Argentina	1	0	1
Fiji	0	2	2
Myanmar	1	0	1
Nepal	0	1	1
Philippines	0	1	1
Sudan	0	1	1
Unable to be determined	2	0	2
Total	18	32	50

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 2016

- Case count: 305
- Reported hospitalisations: 63
- Reported deaths: 0
- Notification rate per 100,000: 4.0

Overall trend:

- 95% increase in 2016 notification rate compared to 5 year annual mean (2.1 per 100,000)
- Increased use of more sensitive tests may account for some of the increase in notifications (pages 27-28)

Groups with highest notification rate in 2016

- Age: 30-39 years (29% of cases - 8.0 per 100,000)
- Sex: Male (79% of cases - 6.3 per 100,000)
- LHD: Sydney (24% of cases - 11.8 per 100,000) and South Eastern Sydney (31% of cases - 10.4 per 100,000)

Seasonality

- No significant trend (slight peak in Jan)

Place of acquisition in 2016

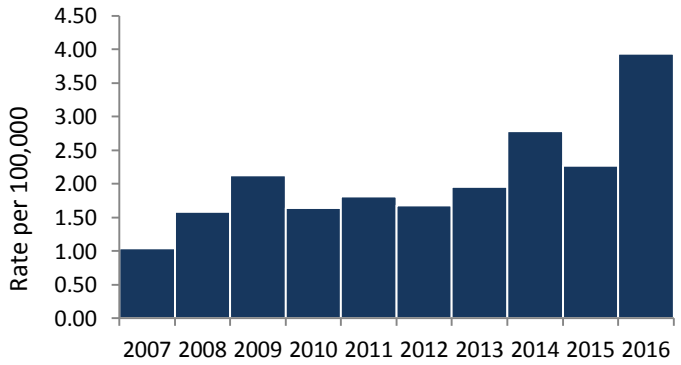
- In NSW: 58%
- In Australia & outside NSW: 2%
- Overseas: 29%
- Unknown: 10%

(note: data available on 86% of cases)

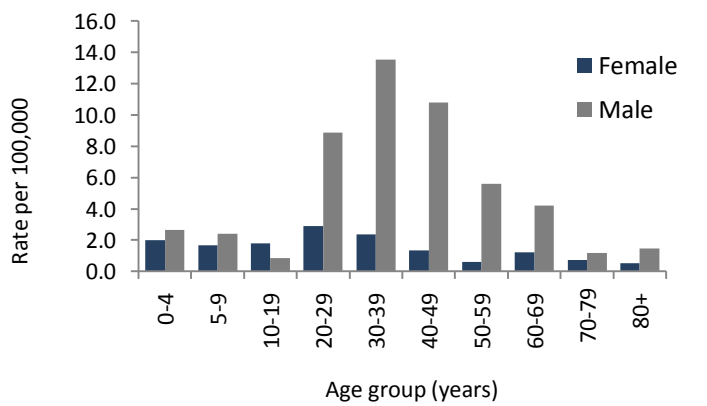
Possible risk exposures (locally acquired only)

- Men who have sex with men (MSM): 84%
- Household contact: 5%
- Associated with foodborne outbreak: 1%
- Unknown: 10%

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	5.2	19	1.6	5.6
FW	0.4	0	1.3	0.0
HNE	5.4	15	0.6	1.6
IS	4.8	8	1.2	2.0
M	1.6	4	0.7	1.7
MNC	2.6	3	1.2	1.4
NBM	4.4	5	1.2	1.3
NNSW	6.6	8	2.3	2.7
NS	19.8	31	2.2	3.4
SES	44.6	94	5.1	10.3
SNSW	1.6	1	0.8	0.5
SWS	10.8	16	1.2	1.7
SYD	33	74	5.4	11.6
WNSW	2.4	3	0.9	1.1
WS	13	24	1.5	2.5
NSW	156.2	305	2.1	3.9

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

Shigellosis continued

Place were infection acquired

Place of acquisition for shigellosis 2012-2016, NSW

Place of acquisition	2012	2013	2014	2015	2016
Acquired in NSW	25	53	112	65	177
Acquired in Australia outside NSW	2	2	4	9	6
Acquired overseas	70	64	49	84	88
Unknown	26	26	44	15	52
Total	123	145	209	173	305

Reported risk exposures for those infections acquired in Australia

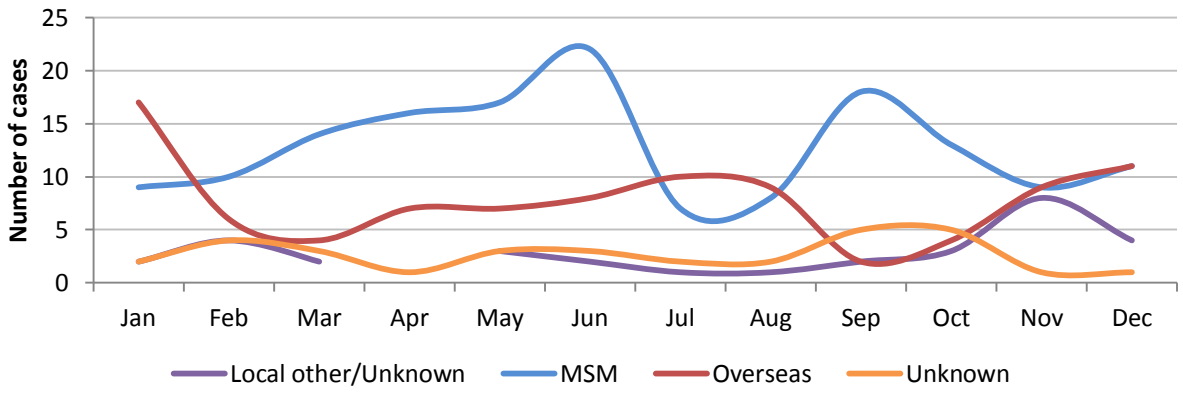
Reported risk exposure for shigellosis cases with no travel history, 2012-2016, NSW

Reported risk exposure	2012	2013	2014	2015	2016
Men who have sex with men (MSM)	9	29	68	36	154
Household contact	6	0	1	2	11
Unknown	15	33	37	36	18
Total	30	62	106	74	183

Shigellosis increase during 2016

During 2016, notifications of shigellosis increased by 95% compared to the five year average. This increase in notifications was largely due to locally acquired *Shigella* infection. Locally acquired cases increased by 137% compared to 40% increase in overseas acquired cases. An analysis of exposure information revealed that the majority of locally acquired cases were in men who have sex with men (MSM). For 2016, MSM accounted for 84% of locally acquired cases when in the previous 4-years MSM only accounted for 52% of cases. The figure below illustrates that *Shigella* infections with MSM exposure began to increase in March. There was no shift in the serotype of the cases; with the majority (63%) of shigellosis cases from all sources typed as *Shigella* sonnei G. Although some common sex on premises venues were identified between MSM cases there was no clustering to suggest point source outbreaks, this instead appeared to be a community wide increase. Health Protection NSW met with local public health units and NSW sexual health organisations at the beginning of July to discuss the increase in those with MSM risk factors. A program of awareness raising was initiated which included social media releases, clinician alerts, gay media print ads and poster information distributed to sex on premises venues. This resulted in a decrease in notifications reporting MSM exposure as the likely source of acquisition.

Reported risk exposure for shigellosis cases by month, 2016, NSW



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 foetuses, the elderly and people with weakened immune systems are most vulnerable to infection. All notified cases of listeriosis are investigated in NSW.

Summary 2016

- Case count: 34
- Reported hospitalisations: 33
- Reported deaths: 6
- Notification rate per 100,000: 0.4
- Perinatal cases: 1 pair (mother and baby)

Overall trend:

- 21% increase in 2016 notification rate compared to 5 year annual mean (0.4 per 100,000)

Groups with highest notification rate in 2016

- Age: 80+ years (32% of cases - 3.3 per 100,000)
- Sex: Male (59% of cases - 0.5 per 100,000)
- LHD: Illawarra Shoalhaven (12% of cases - 1.0 per 100,000)

Seasonality

- Peak in summer (Dec-Jan)

Place of acquisition in 2016

- In NSW: 80%
- In Australia & outside NSW: 0%
- Overseas: 3%
- Unknown: 17%

(note: data available on 88% of cases)

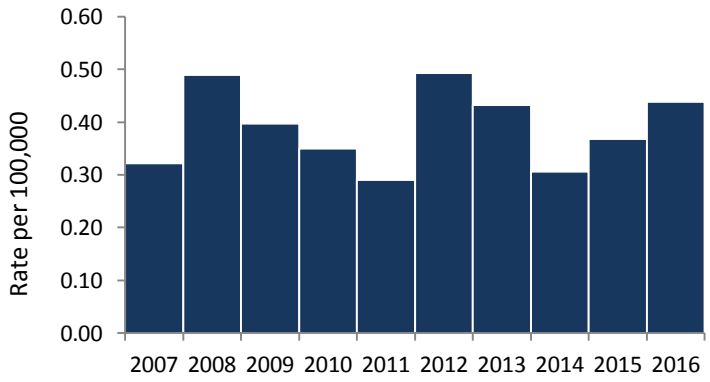
Most common comorbidities reported

- Heart Disease: 11
- Cancer: 12

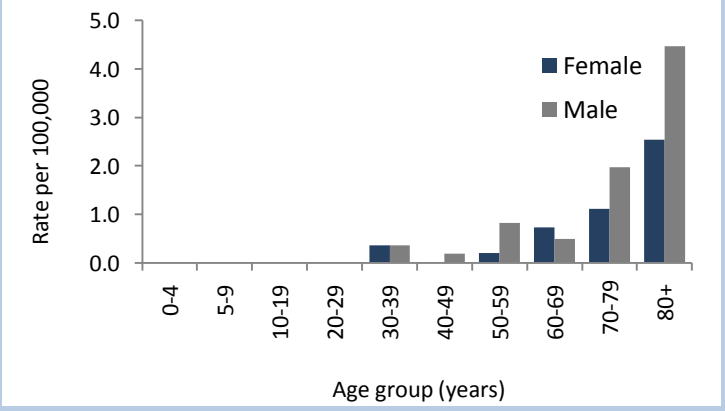
Perinatal

- One maternal-infant pair

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

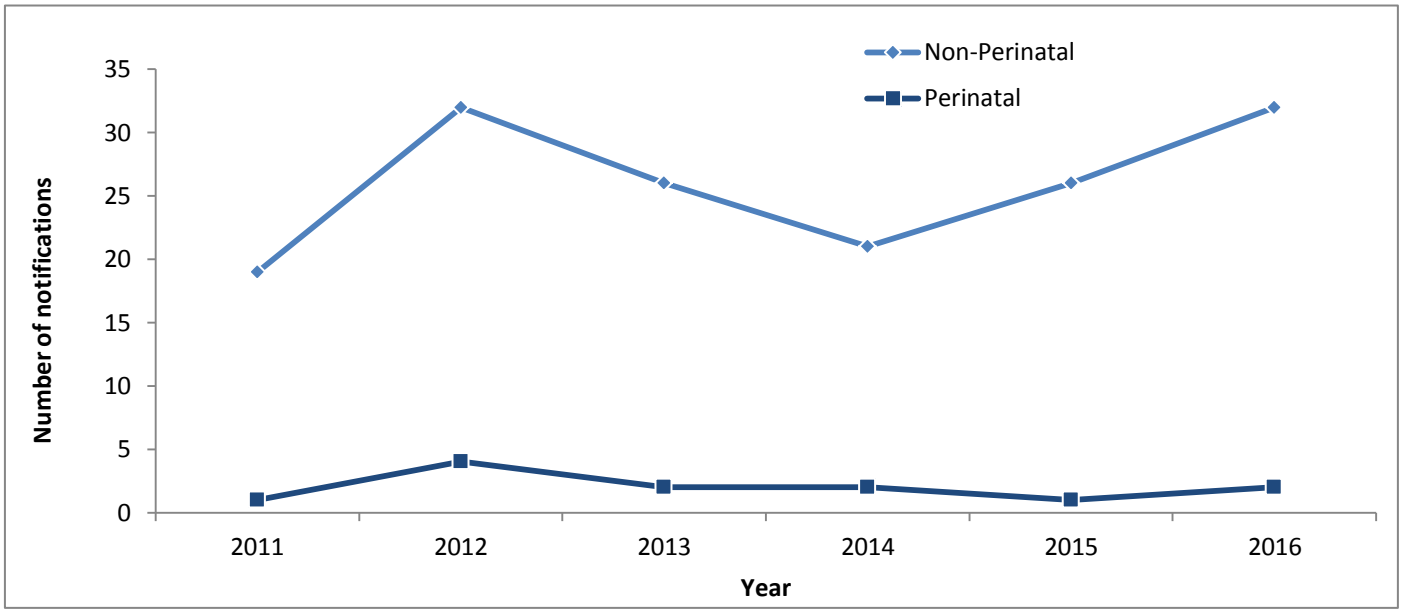
	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	1	2	0.3	0.6
FW	0	0	0.0	0.0
HNE	2.2	1	0.2	0.1
IS	2.2	4	0.6	1.0
M	0.8	0	0.3	0.0
MNC	0.4	0	0.2	0.0
NBM	1	1	0.3	0.3
NNSW	0.4	1	0.1	0.3
NS	4.2	5	0.5	0.5
SES	5	5	0.6	0.5
SNSW	1	1	0.5	0.5
SWS	4.4	6	0.5	0.6
SYD	2	4	0.3	0.6
WNSW	0.4	1	0.1	0.4
WS	2.8	3	0.3	0.3
NSW	28	34	0.4	0.4

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

Listeriosis continued

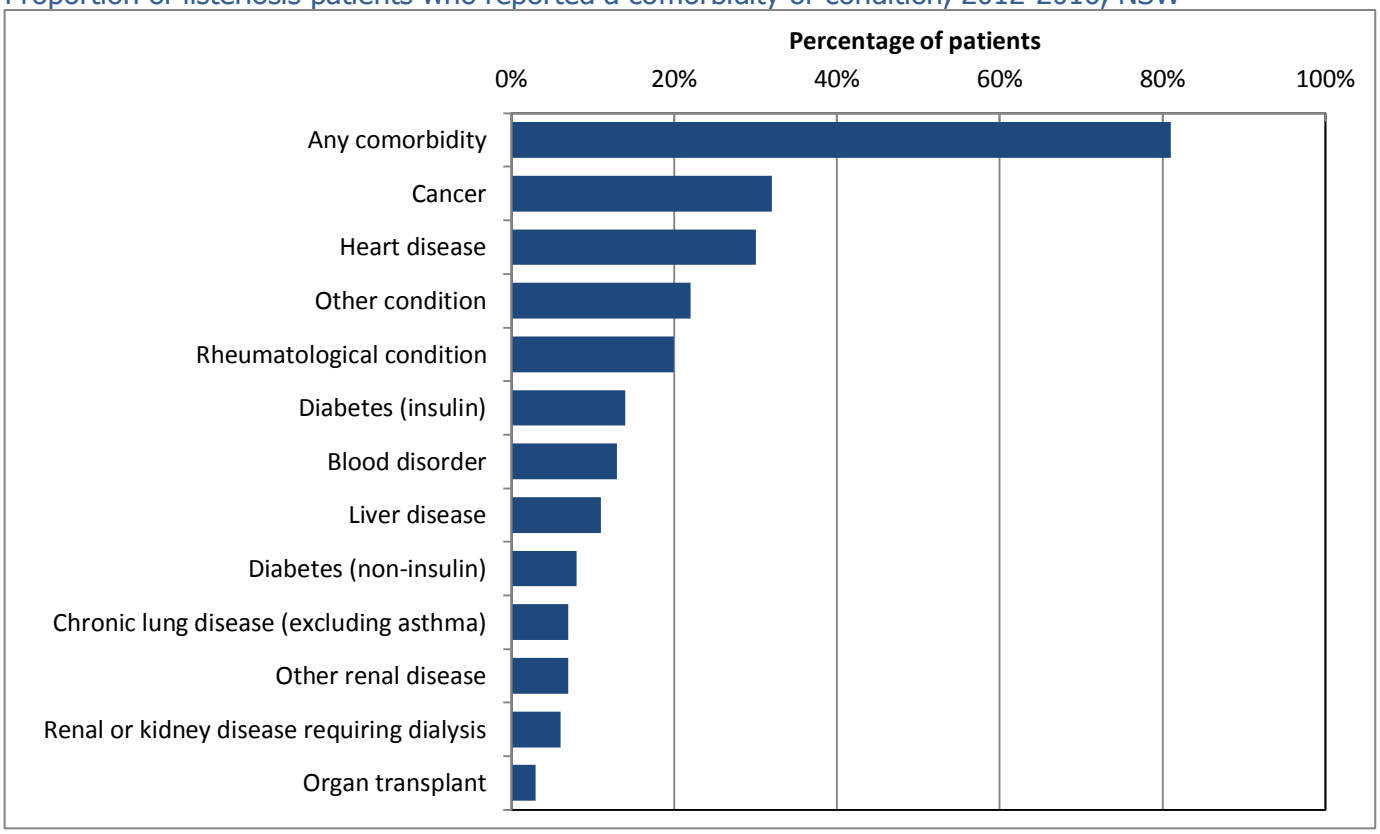
Perinatal cases

Perinatal and non-perinatal reported listeriosis, 2011-2016, NSW



Reported comorbidities

Proportion of listeriosis patients who reported a comorbidity or condition, 2012-2016, NSW



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

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 2016

- Case count: 69
- Reported hospitalisations: 36
- Reported deaths: 1
- Notification rate per 100,000: 0.9

Overall trend:

- 219% increase in 2016 notification rate compared to 5 year annual mean (0.29 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 2016

- Age: 50-59 years (17% of cases - 1.2 per 100,000)
- Sex: Female (57% of cases - 0.8 per 100,000)
- LHD: Western Sydney (20% of cases- 1.5 per 100,000)

Seasonality

- Peaks from October to January

Place of acquisition in 2016

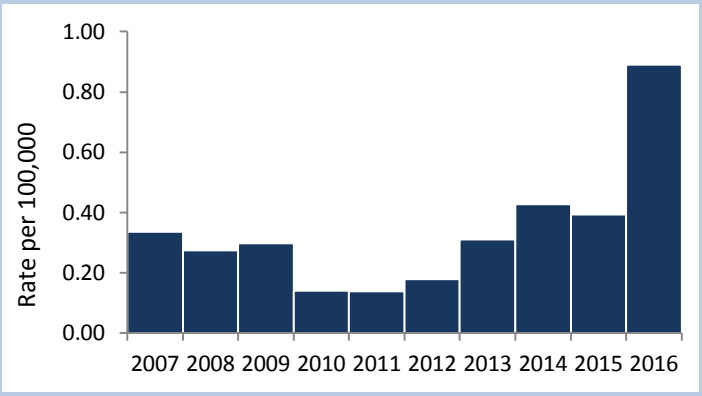
- In NSW: 77%
- In Australia & outside NSW: 3%
- Overseas: 5%
- Unknown: 15%

(note: data available on 90% of cases)

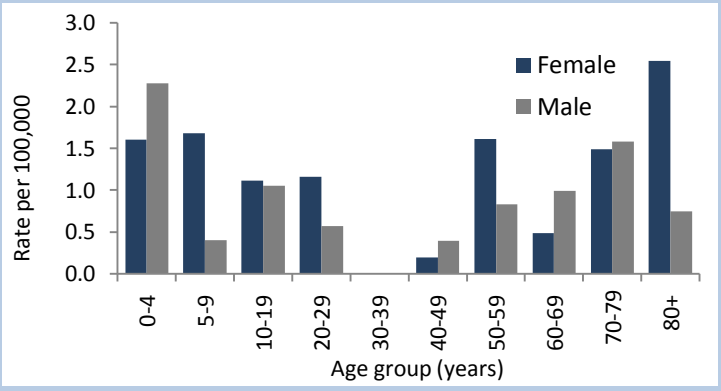
Possible Risk exposures (locally acquired only)

- Restaurant during incubation: 50%
- Ate beef during incubation: 82%
- Animal contact: 31%
- Farm exposure: 31%

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	0.2	3	0.1	0.9
FW	0.2	1	0.6	3.3
HNE	6.6	9	0.7	1.0
IS	1.6	1	0.4	0.2
M	1.4	11	0.6	4.6
MNC	0.4	0	0.2	0.0
NBM	0.4	0	0.1	0.0
NNSW	1.4	1	0.5	0.3
NS	0.6	1	0.1	0.1
SES	3	6	0.3	0.7
SNSW	1.8	12	0.9	5.7
SWS	1.4	1	0.2	0.1
SYD	1	0	0.2	0.0
WNSW	1	8	0.4	2.9
WS	0.6	14	0.1	1.5
NSW	21.6	69	0.3	0.9

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

HAEMOLYTIC UREMIC 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 2016

- Case count: 4
- Reported hospitalisations: 4
- Reported deaths: 0
- Notification rate per 100,000: 0.05

Overall trend:

- 50% decrease in 2016 notification rate compared to 5 year annual mean (0.1 per 100,000)

Groups with highest notification rate in 2016

- Sex: Female (75% of cases - 0.08 per 100,000)

Seasonality

- Peaks in summer months (Dec-Jan)

Place of acquisition in 2016

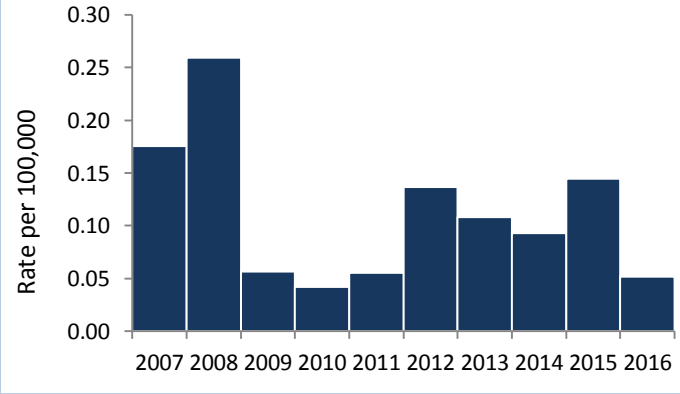
- In NSW: 67%
- In Australia & outside NSW: 0%
- Overseas: 0%
- Unknown: 33%

(note: data available on 75% of cases)

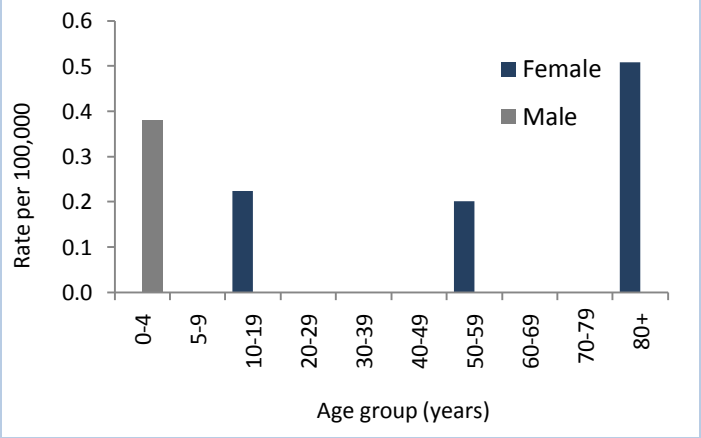
Bacterial infection

- In 1 case, STEC infection was identified (serogroup 0111)

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	0	0	0.0	0.0
FW	0.2	0	0.6	0.0
HNE	0.8	2	0.1	0.2
IS	0.4	1	0.1	0.2
M	0.4	0	0.2	0.0
MNC	0.2	0	0.1	0.0
NBM	0.4	0	0.1	0.0
NNSW	0.2	0	0.1	0.0
NS	1.2	1	0.1	0.1
SES	1	0	0.1	0.0
SNSW	0.4	0	0.2	0.0
SWS	1.2	0	0.1	0.0
SYD	0.4	0	0.1	0.0
WNSW	0.8	0	0.3	0.0
WS	0.4	0	0.0	0.0
NSW	8	4	0.1	0.1

* 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 2016

- Case count: 1194
- Reported hospitalisations: 66
- Reported deaths: 0
- Notification rate per 100,000: 15.5

Overall trend:

- 64% increase in 2016 notification rate compared to 5 year annual mean (9.8 per 100,000)
- Increased use of a more sensitive tests may account for some of the increase in notifications (page 26)

Groups with highest notification rate in 2016

- Age: <5 years (30% of cases - 71.3 per 100,000)
- Sex: Male (50% of cases - 15.6 per 100,000)
- LHD: Northern NSW (8% of cases - 30.6 per 100,000)

Seasonality

- Peaks in summer months (Feb-Mar)

Place of acquisition in 2016

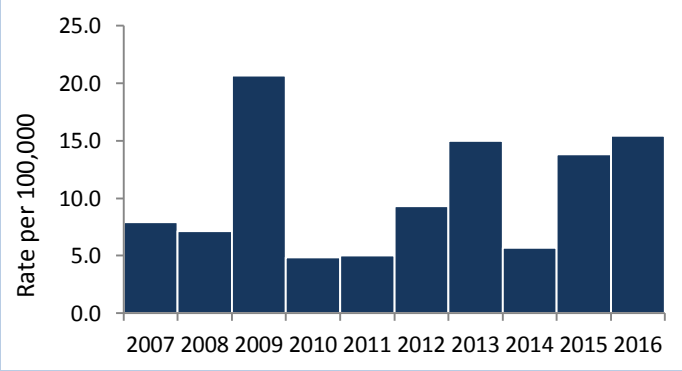
- In NSW: 74%
- In Australia & outside NSW: 3%
- Overseas: 15%
- Unknown: 8%

(note: data available on 75% of cases)

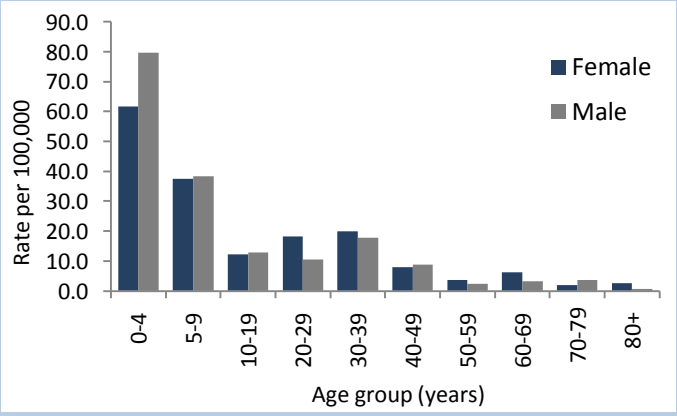
Possible Exposures (locally acquired only)

- Swimming pool: 49%
- Farm animal exposure: 16%
- Tank water: 12%

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	23.4	68	7.1	20.0
FW	1.2	1	3.9	3.3
HNE	105.8	167	11.8	18.1
IS	37	61	9.4	15.1
M	28.6	47	11.9	19.4
MNC	18	44	8.6	20.2
NBM	34.2	34	9.6	9.0
NNSW	38.8	92	13.3	30.5
NS	109.6	202	12.5	22.2
SES	111.8	170	12.8	18.7
SNSW	14.2	20	7.1	9.6
SWS	36.8	78	4.0	8.1
SYD	62.6	75	10.3	11.7
WNSW	40	58	14.4	20.8
WS	64	80	7.2	8.4
NSW	726	1197	9.8	15.4

* 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 2016

- Case count: 3455
- Reported hospitalisations: 10
- Reported deaths: 0
- Notification rate per 100,000: 44.8

Overall trend:

- 33% increase in 2016 notification rate compared to 5 year average (35.1 per 100,000)
- Increased use of more sensitive tests may account for some of the increase in notifications (page 26)

Groups with highest notification rate in 2016

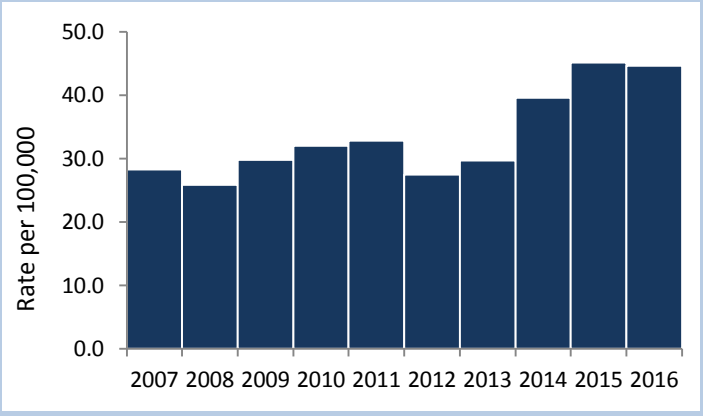
- Age: <5 years (22% of cases - 152.1 per 100,000)
- Sex: Male (52% of cases - 46.8 per 100,000)
- LHD: South Eastern Sydney (17% of cases - 64.8 per 100,000)

Seasonality

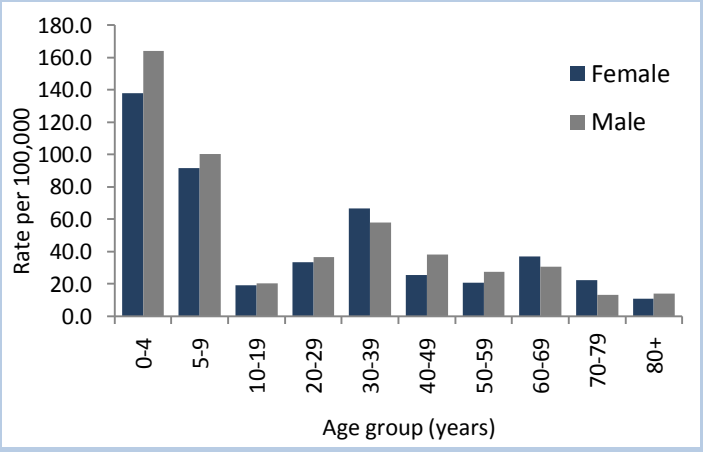
- Peaks in summer months (Feb-Mar)

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

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	95.6	151	29.1	44.5
FW	6	3	19.3	9.8
HNE	325.6	439	36.3	47.7
IS	158.6	198	40.3	48.9
M	83.6	148	34.9	61.2
MNC	53.2	100	25.2	45.8
NBM	131.4	147	36.8	39.1
NNSW	58.4	118	19.9	39.1
NS	448.4	566	50.9	62.2
SES	465.8	586	53.4	64.3
SNSW	56.2	64	28.1	30.7
SWS	156.2	249	17.2	25.8
SYD	229	331	37.9	51.7
WNSW	120	105	43.5	37.6
WS	209	249	23.5	26.3
NSW	2597.8	3455	34.9	44.6

* 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 2016

- Case count: 40
- Reported hospitalisations: 18
- Reported deaths: 0
- Notification rate per 100,000: 0.5

Overall trend:

- 36% decrease in 2016 notification rate compared to 5 year average (0.9 per 100,000)

Groups with highest notification rate in 2016

- Age: 20-29 years (33% of cases - 1.3 per 100,000)
- Sex: Male (53% of cases - 0.6 per 100,000)
- LHD: Western Sydney (28% of cases - 1.2 per 100,000)

Seasonality

- Peaks in summer months (Jan-Feb)

Place of acquisition in 2016

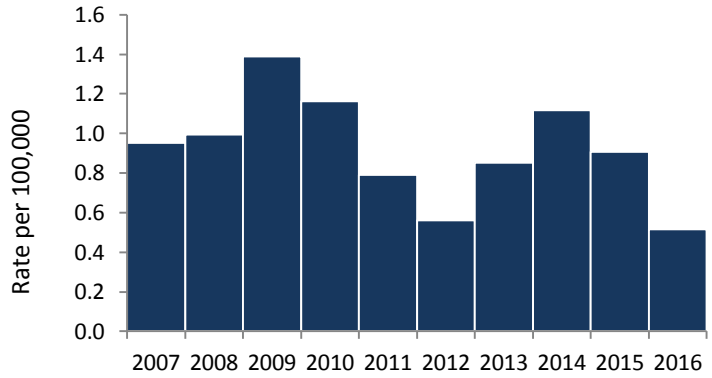
- In NSW: 5%
- In Australia & outside NSW: 0%
- Overseas: 90%
- Unknown: 5%

(note: data available on 100% of cases)

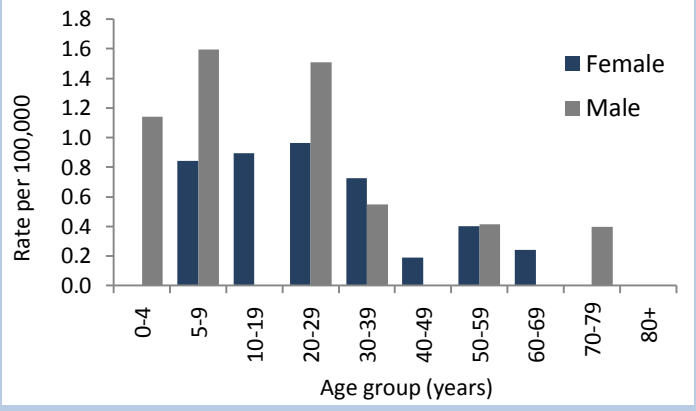
Outbreaks

- No foodborne outbreaks of hepatitis A in 2016

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	1.4	0	0.4	0.0
FW	0	0	0.0	0.0
HNE	2	0	0.2	0.0
IS	1.2	3	0.3	0.7
M	0.6	0	0.3	0.0
MNC	0.8	0	0.4	0.0
NBM	1.6	1	0.4	0.3
NNSW	2	0	0.7	0.0
NS	5.2	5	0.6	0.5
SES	9.4	8	1.1	0.9
SNSW	0.8	0	0.4	0.0
SWS	9.8	7	1.1	0.7
SYD	6.8	5	1.1	0.8
WNSW	1.8	0	0.7	0.0
WS	19.4	11	2.2	1.2
NSW	62.8	40	0.8	0.5

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

Hepatitis A continued

Place infection was acquired

Hepatitis A notifications by place of acquisition, 2016 compared to the previous 5 year annual mean, NSW

Place of acquisition	5 year annual mean		2016	
	Count	%	Count	%
Acquired in Australia outside NSW	0.4	1%	0	0%
Acquired in NSW	13.6	22%	2	5%
Acquired outside Australia	47.6	76%	36	90%
Unknown	1.2	2%	2	5%
Total	62.8	100%	40	100%

Country infection was acquired

Hepatitis A notifications by country of acquisition, 2016 compared to the previous 5 year annual mean, NSW

Country of acquisition	5 year annual mean		2016	
	Count	%	Count	%
Australia	14.0	22%	2	5%
Pakistan	4.2	7%	6	15%
Iraq	0.6	1%	5	13%
India	9.2	15%	4	10%
Lebanon	2.8	4%	3	8%
Vanuatu	1.0	2%	3	8%
Cambodia	0.4	1%	2	5%
Philippines	4.8	8%	2	5%
Western Europe	0.0	0%	2	5%
Bangladesh	2.2	4%	1	3%
Unknown	1.6	3%	2	5%
Other	22.0	35%	8	20%
Total	62.8	100%	40	100%

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 2016

- Case count: 14
- Reported hospitalisations: 13
- Reported deaths: 0
- Notification rate per 100,000: 0.2

Overall trend:

- 35% decrease in 2016 notification rate compared to 5 year average (0.3 per 100,000)

Groups with highest notification rate in 2016

- Age: 20-29 years (36% of cases - 0.5 per 100,000)
- Sex: Male (71% of cases - 0.3 per 100,000)
- LHD: Western Sydney (57% of cases - 0.8 per 100,000)

Place of acquisition in 2016

- In NSW: 14%
- In Australia & outside NSW: 0%
- Overseas: 86%
- Unknown: 0%

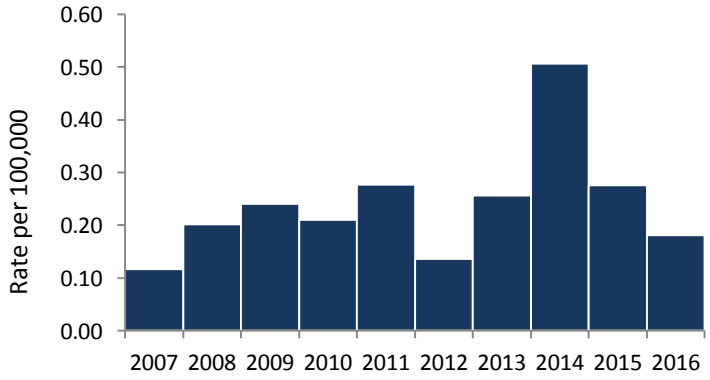
(note: data available on 93% of cases)

Possible risk exposures (locally acquired)*

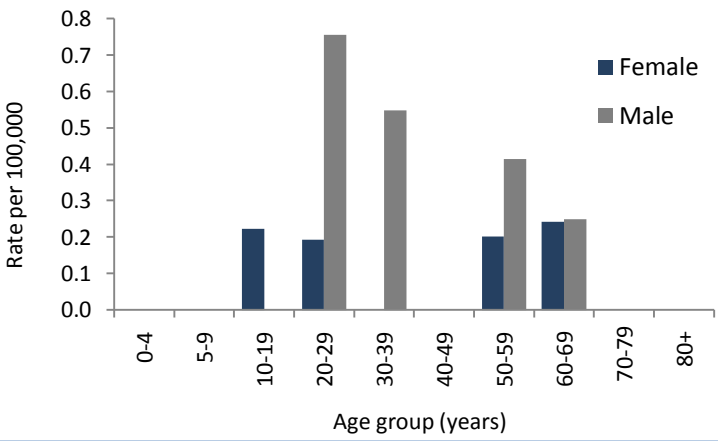
- Pork consumption: 50%
- Shellfish consumption: 100%

*only 2 locally acquired cases were reported in 2016.

Notification rate per 100,000 population by year, 2007 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	0.4	0	0.1	0.0
FW	0	0	0.0	0.0
HNE	0.6	0	0.1	0.0
IS	0	0	0.0	0.0
M	0.2	0	0.1	0.0
MNC	0.2	0	0.1	0.0
NBM	0	1	0.0	0.3
NNSW	0	0	0.0	0.0
NS	4	2	0.5	0.2
SES	4	2	0.5	0.2
SNSW	0	0	0.0	0.0
SWS	3.2	0	0.3	0.0
SYD	2.6	1	0.4	0.2
WNSW	0	0	0.0	0.0
WS	6.4	8	0.7	0.8
NSW	21.6	14	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 2016

- Case count: 754
- Reported hospitalisations: 86
- Reported deaths: 0
- Notification rate per 100,000: 9.8

Overall trend:

- 26% decrease in 2016 notification rate compared to 5 year average (13.7 per 100,000)

Groups with highest notification rate in 2016

- Age: <5 years (47% of cases - 69.1 per 100,000)
- Sex: Male (51% of cases - 10.1 per 100,000)
- LHD: North Sydney (20% of cases - 16.3 per 100,000)

Seasonality

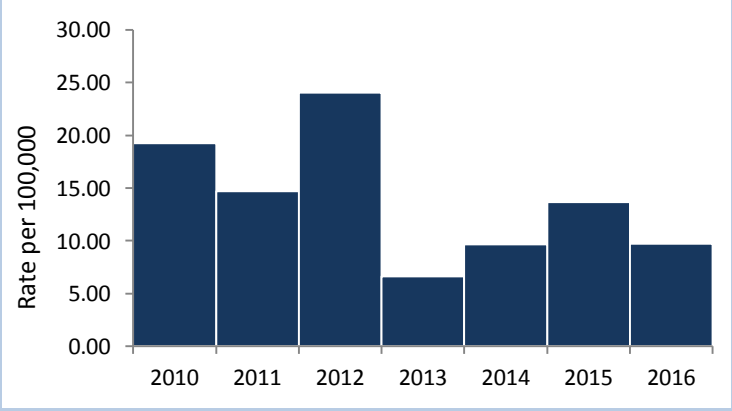
- Peaks in spring (Sep-Oct)

Outbreaks

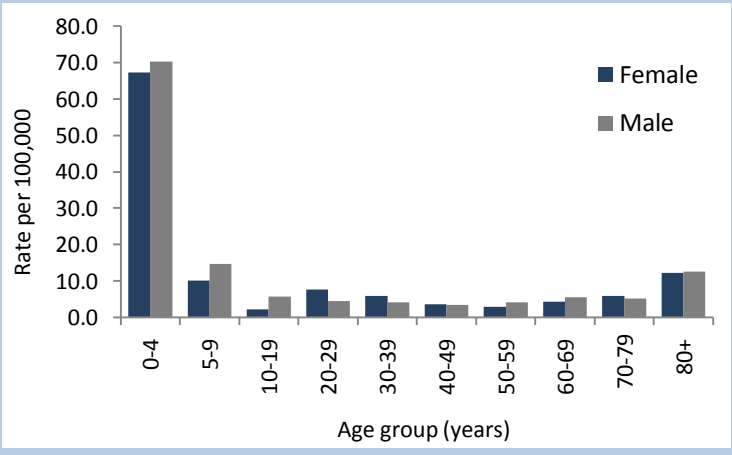
- Cases found to be associated with an outbreak: 4%

Note: Rotavirus was made notifiable in 2010.

Notification rate per 100,000 population by year, 2010 – 2016, NSW



Notification rate per 100,000 population by age category and sex, 2016, NSW



Number of cases and rates (per 100,000) by Local Health District, 2016, NSW

	Count		Rate	
LHD	5Yr annual mean	2016	5Yr annual mean	2016
CC	28.2	14	8.6	4.1
FW	5.4	2	17.4	6.5
HNE	137.2	74	15.4	8.0
IS	33.6	17	8.6	4.2
M	27.4	16	11.5	6.6
MNC	9.6	7	4.6	3.2
NBM	57.6	39	16.2	10.4
NNSW	55	24	18.9	8.0
NS	150	148	17.2	16.3
SES	126	111	14.5	12.2
SNSW	13	5	6.5	2.4
SWS	86.8	103	9.6	10.7
SYD	78	75	13.0	11.7
WNSW	72.6	19	26.4	6.8
WS	134.4	100	15.2	10.6
NSW	1015.4	754	13.7	9.7

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

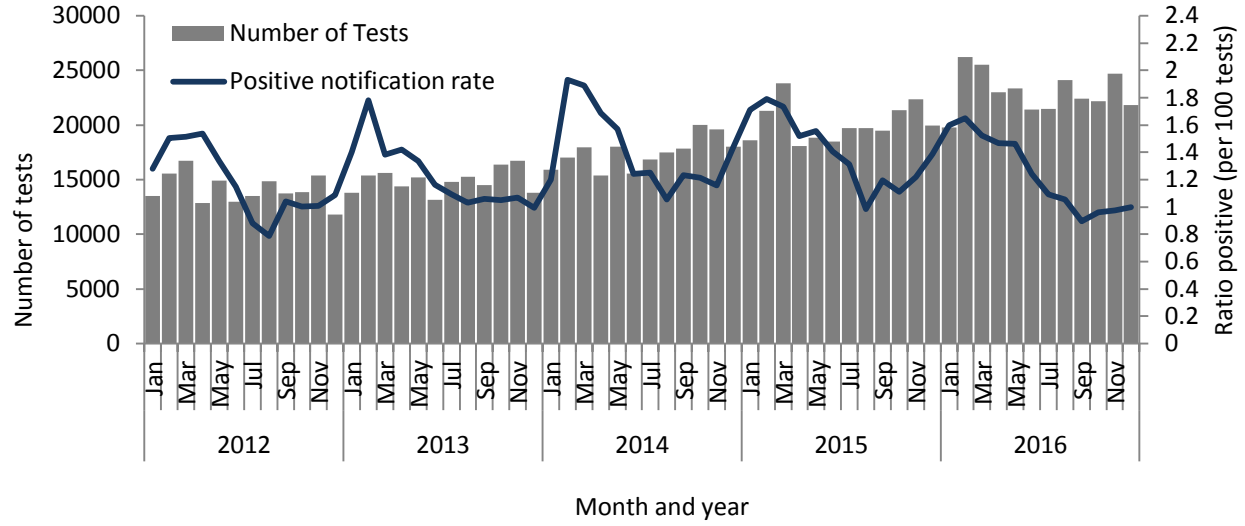
Denominator data

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 2016:

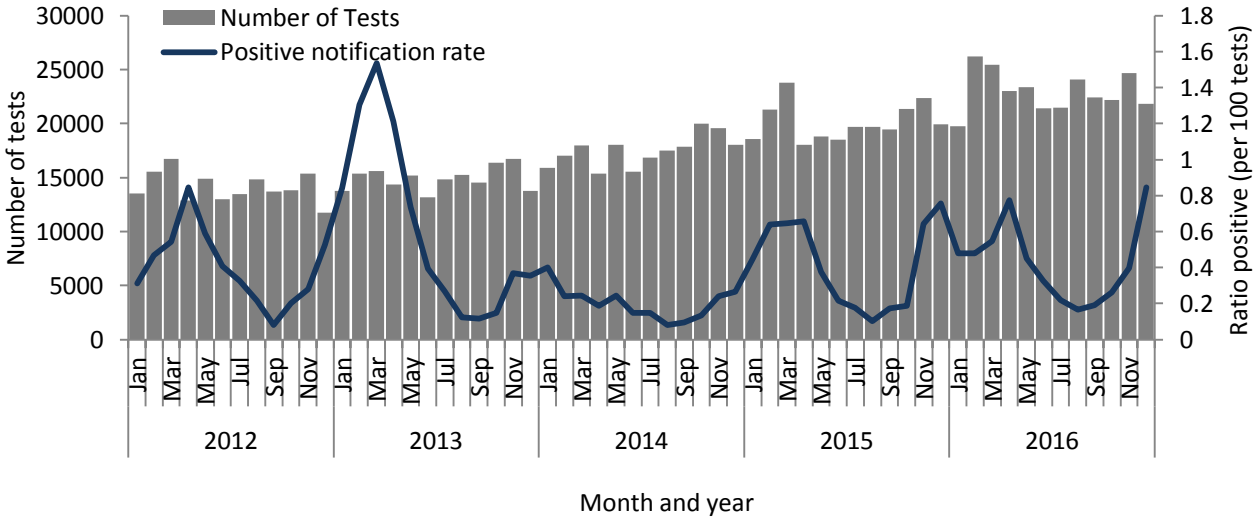
- *Giardia* positive notification rates peaked during late-summer at 1.65 (per 100 tests performed)
- There were two peaks in the *Cryptosporidium* positive notification rate; the first in April (0.77 per 100 tests performed) followed by a second higher peak 8 months later in December (0.84 per 100 tests performed)
- *Salmonella* positive notification rates followed the seasonal pattern, peaking in January at 3.36 (per 100 tests performed)
- *Shigella* positive notification rate was highest in June at 0.15 (per 100 tests performed)

Number of *Giardia* tests performed by 15 laboratories and rate positive by month and year, NSW, 2012–2016*



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

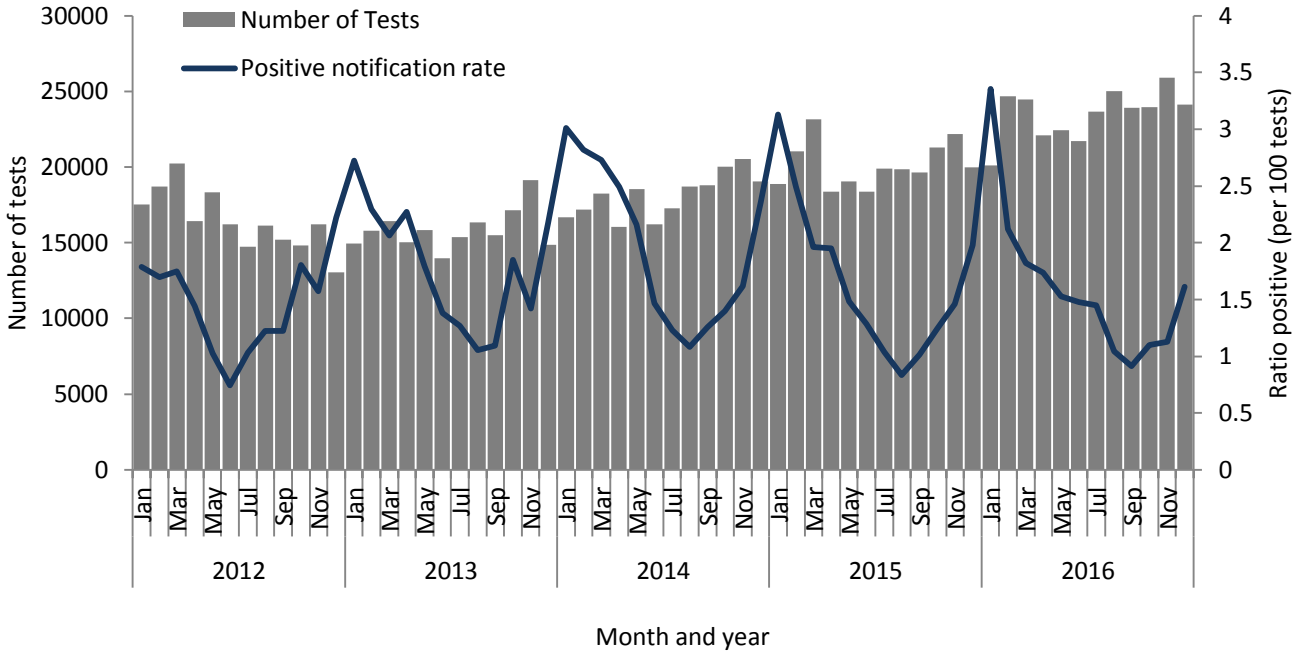
Number of *Cryptosporidium* tests performed by 15 laboratories and rate positive by month, NSW, 2012–2016*



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

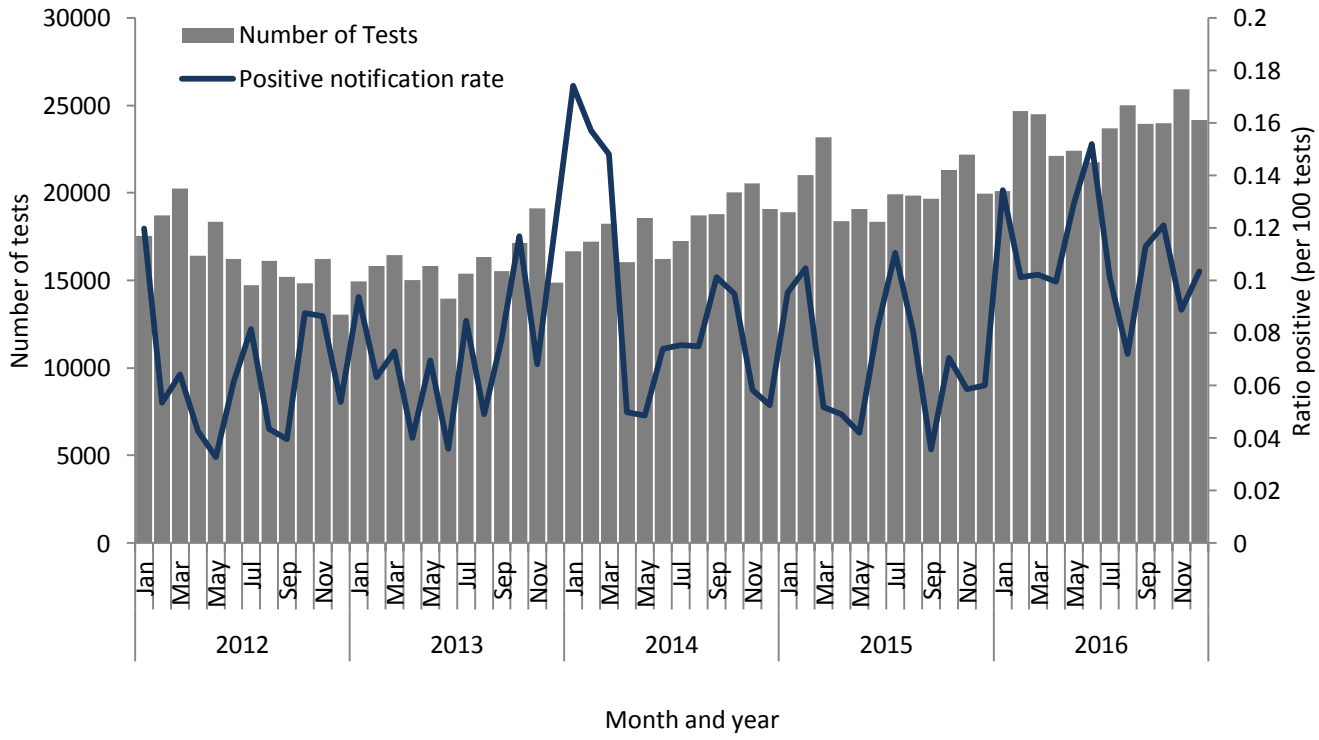
Denominator data continued

Number of *Salmonella* tests performed by 15 laboratories and rate positive by month, NSW, 2012–2016*



** 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, 2012–2016*



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

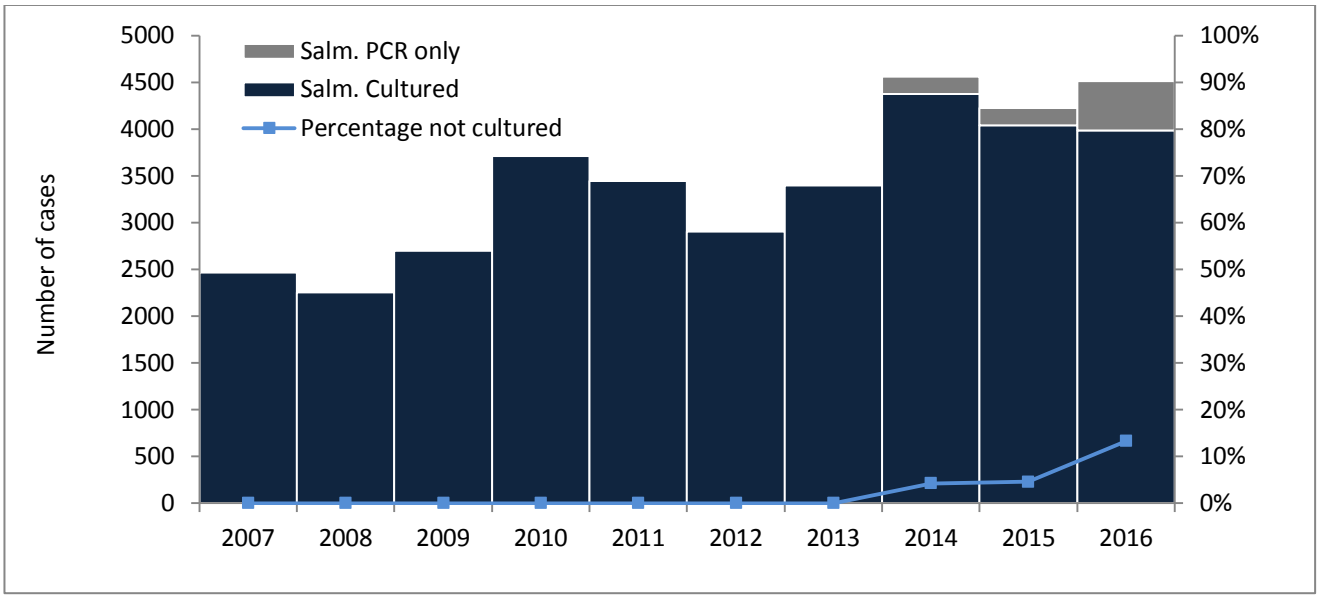
Culture Independent Testing

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.

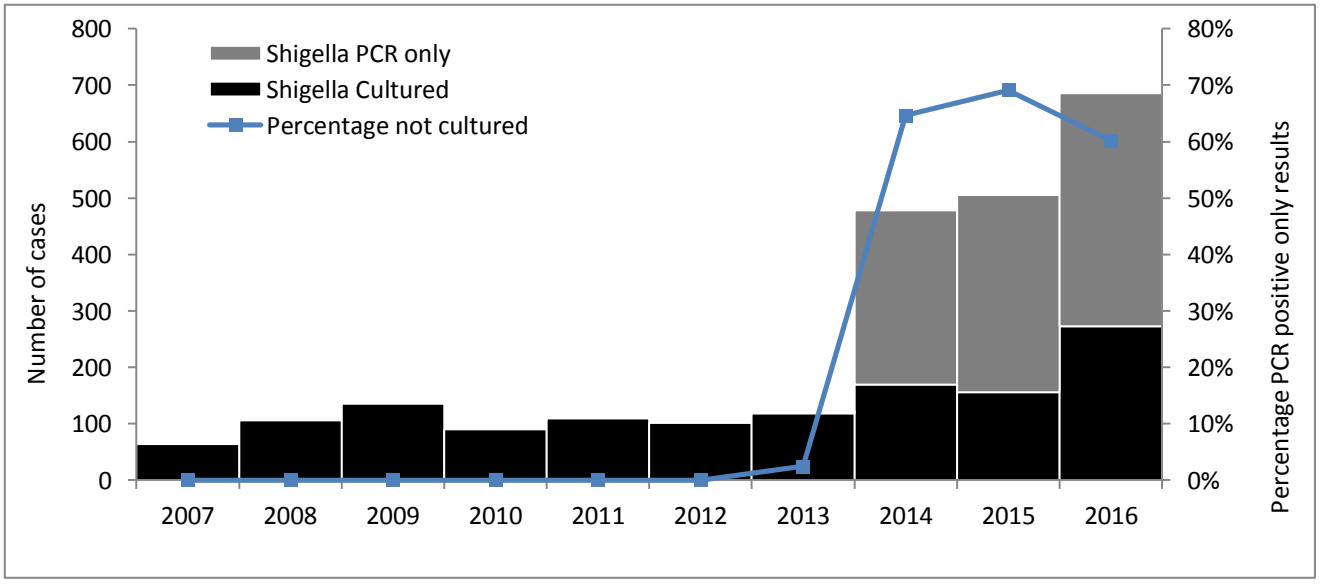
Summary:

- 13% of *Salmonella* notifications in 2016 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.
- 60% of *Shigella* notifications in 2016 could not be cultured or were not cultured.
  - PCR positive *Shigella* are 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 also 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, 2007 - 2016



The number of *Shigella* notifications, by test type, and the percentage with only PCR* positive result in NSW, 2007 - 2016



* PCR only notifications will be underestimated as data is not complete for this group.

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 direct to public health units.

Summary 2016

- Foodborne outbreaks investigated: 70
- Outbreak related cases: 1,625

Overall trend:

- 40% increase in the number outbreaks compared to 5 year annual mean (50 outbreaks)
- 174% increase in the number of outbreak related cases compared to 5 year annual mean (593.6 people ill)

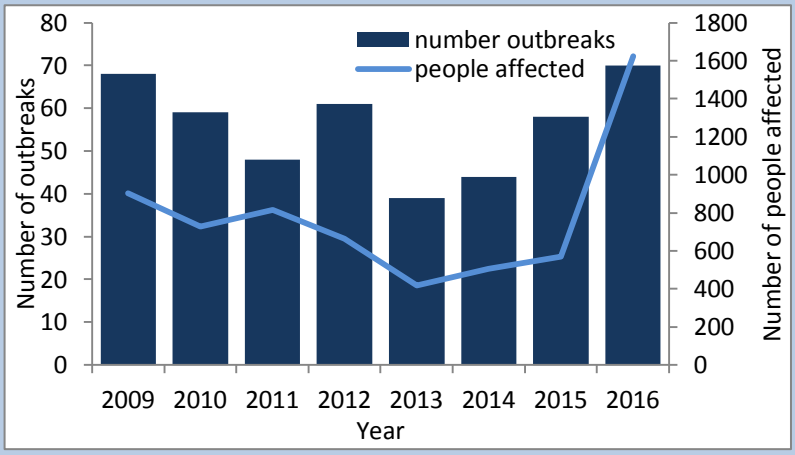
Causative agent in 2016

- Unknown: 49%
- *Salmonella*: 29%
- *Salmonella* Typhimurium: 20%
- Norovirus: 10%

Contributing factors in 2016

- Unknown 57%
- Cross contamination: 11%
- Food handler contamination: 11%
- Contaminated primary produce: 7%
- Undercooked or raw eggs: 6%

Number of foodborne or suspected foodborne outbreaks and number people affected by year, 2009-2016, NSW



Foodborne outbreak by causative agent and year, 2011-2016, NSW

Causative agent	2011	2012	2013	2014	2015	2016
Unknown	25	28	19	8	25	34
Salmonella (all serotypes)	16	27	12	26	23	20
Salmonella Typhimurium	13	23	9	26	19	14
Norovirus	3	1	6	1	2	7
Campylobacter	2	0	1	0	2	2
Clostridium perfringens	1	2	0	0	1	0
Fish poisoning	1	1	0	4	4	4
Listeria	0	0	1	1	0	1
Hepatitis E	0	0	0	1	0	0
STEC	0	0	0	1	0	0
Hepatitis A	0	0	0	0	1	0
Shigella	0	0	0	1	0	2
Total outbreaks	48	61	39	44	58	70

Number of foodborne outbreaks and number of people affected by Local Health District, 2016, NSW

LHD	2016	n ill
CC	2	10
FW	0	0
HNE	10	72
IS	5	51
M	0	0
MNC	0	0
NBM	0	0
NNSW	1	26
NS	8	66
SES	17	450
SNSW	0	0
SWS	5	125
SYD	6	91
WNSW	0	0
WS	6	158
NSW*	4	203
National*	3	191

*NSW cases only

Foodborne outbreaks continued

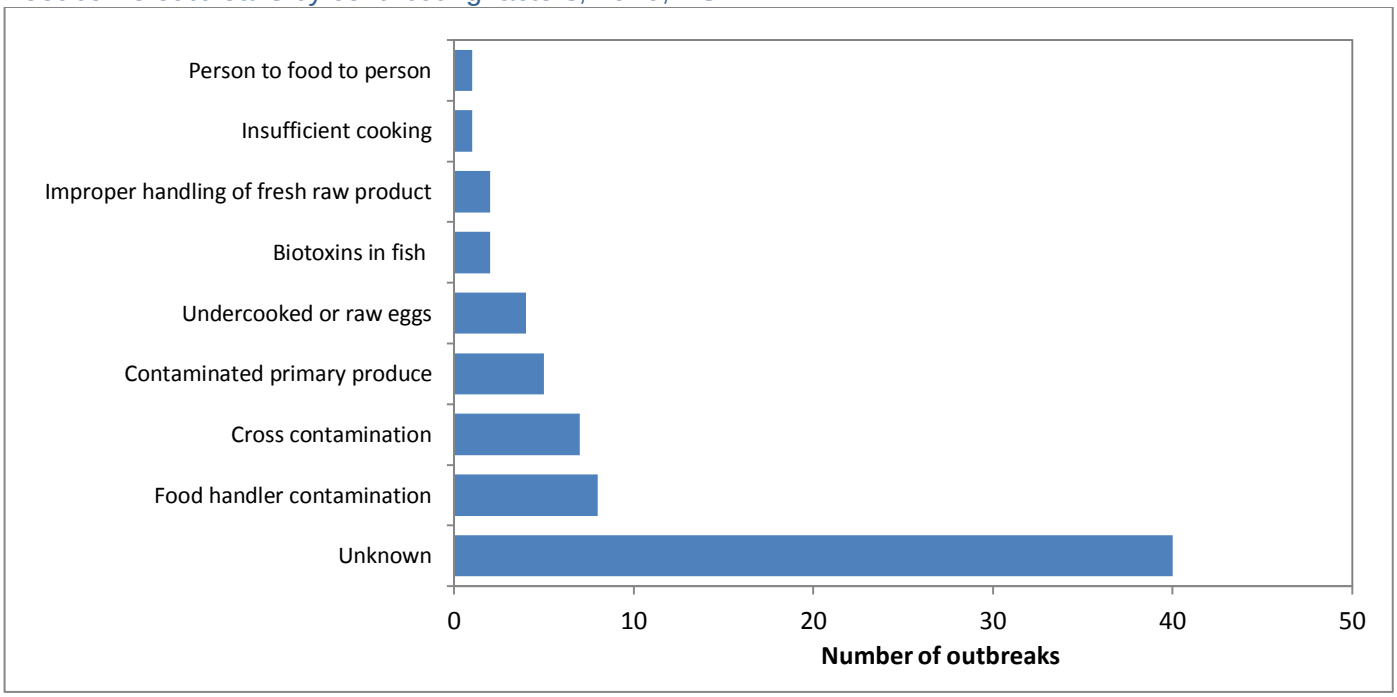
Description of outbreaks by causative agent

Number of outbreaks, number ill and number hospitalised by causative agent, 2016, NSW

Causative agent	Number of outbreaks	Number ill	Ratio ill per outbreak	Number hospitalised	Ratio hospitalised per outbreak
Unknown	34	605	17.8	5	0.1
Salmonella Typhimurium	14	406	29.0	34	2.4
Other *Salmonella*	6	226	37.7	23	3.8
Norovirus	7	353	50.4	1	0.1
Fish Poisoning	4	14	3.5	5	1.3
Shigella	2	10	5.0	0	0.0
Campylobacter	2	8	4.0	0	0.0
Listeria	1	3	3.0	3	3.0
Total	70	1625	23.2	71	1.0

Summary foodborne outbreaks by contributing factors

Foodborne outbreaks by contributing factors, 2016, NSW.



OUTBREAK SUMMARY 2016

Foodborne and potentially foodborne disease outbreaks investigated in NSW, 2016

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
NS201601	Nov	Restaurant	*Campylobacter*	3	1	0	D	N	Chicken liver pate	Undercooking
SES49817	Apr	Restaurant	*Campylobacter*	5	1	0	D	N	Unknown	Unknown
HUN0502	Apr	Private Residence	Ciguatera toxin	4	0	0	M	D	Spanish Mackerel	n/a
SES201604	Apr	Private Residence	Ciguatera toxin	5	0	2	D	D	Spanish Mackerel	n/a
NSW201605	Feb	Community	*Listeria* Monocytogenes	3	3	3	M	D	Ham	Contamination from environment
LIV51720	Aug	Restaurant	Norovirus	80	1	1	D	D	Contaminated cakes	Food handler contamination
SYD50761	Jun	Restaurant	Norovirus	26	1	0	D	0	Unknown	Food handler contamination
GS201602	Nov	Restaurant	Norovirus	171	2	0	D	N	Unknown	Unknown
NS48659	Jan	Restaurant	Norovirus	4	0	0	D	N	Oysters	Contaminated raw product

* 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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
SYD201601	Mar	Take-away	Norovirus	13	2	0	D	N	Rice paper rolls	Unknown
SYD48685	Jan	Private residence	Norovirus	7	0	0	M	N	Oysters	Contaminated raw product
SES201605	Oct	Commercial caterer	Norovirus	52	2	0	D	D	Unknown	Unknown
NSW201607*	Jan	Community	*Salmonella* Anatum	23	23	3	AM	CC	Lettuce leaves	Contaminated raw product
NS48764	Jan	Take-away	*Salmonella* Bareilly	28	18		M	D	Korean sushi	Cross contamination
HUN0501	Apr	Child Care Centre	*Salmonella* Bovismorbificans	3	3	1	D	D	Unknown	Unknown
NSW201602	Jul-Aug	National	*Salmonella* Hvittingfoss	69	69	10	AM	CC	Rockmelon	Inadequate sanitation of RTE product
LIV201603	Mar	Aged Care	*Salmonella* Infantis	4	3	2	D	D	Unknown	Unknown
NSW201606*	Jan-Mar	Community	*Salmonella* Saintpaul	99	99	7	AM	CC	Mung bean sprouts	Contaminated raw product
GS201601	Oct	Restaurant	*Salmonella* Typhimurium MLVA 3-9-7-12-	8	6	0	D	D	Raw egg sauce Multiple menu	Cross contamination

* 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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
			523						items	
SES201602	Jan	Take-away	*Salmonella* Typhimurium MLVA 3-26-13-8-523	202	91	20	M	D	Numerous bakery items	Cross contamination
WS48874	Jan	Bakery	*Salmonella* Typhimurium MLVA 3-26-19-8-523	33	4	1	M	N	Cream and custard profiterole cake	Cross contamination
IS100497493	Feb	Aged Care	*Salmonella* Typhimurium 3-12-12-11-523	13	7	2	D	N	Unknown	Unknown
IS201601	Feb	Community	*Salmonella* Typhimurium 4-18-12-0-490	11	11	3	D	D	Contaminated deli items	Food handler contamination
LIV201604	May	Restaurant	*Salmonella* Typhimurium 5-17-15-10-490	16	12	0	M	D	Unknown	Cross contamination
CC201601	Oct	Restaurant	*Salmonella* Typhimurium MLVA 3-10-8-11-496	4	4	0	D	D	Items containing undercooked eggs	Use of raw eggs

* 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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
HUN0504	Jul	Restaurant	*Salmonella* Typhimurium MLVA 3-11-15-10-523	5	5	1	D	D	Raw egg products	Sale of raw egg products
NSW201603	Oct	Restaurant	*Salmonella* Typhimurium MLVA 3-12-11-15-523	6	6	0	D	D	Unknown	Cross contamination
NS100587429	Sep	Aged Care	*Salmonella* Typhimurium MLVA 3-14-9-13-523	13	3	0	D	D	Unknown	Unknown
CC201602	Dec	Restaurant	*Salmonella* Typhimurium MLVA 3-18-9-11-523	6	1	0	D	N	Raw egg sauce	Use of raw eggs
NSW201604	Dec	Commercial caterer	*Salmonella* Typhimurium MLVA 3-25-18-12-523	78	28	5	D	C	Duck pancakes	Cross contamination
LIV201602	Jan	Aged Care	*Salmonella* Typhimurium MLVA 3-26-13-8-523	8	2	1	D	D	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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
HUN0496	Feb	Restaurant	*Salmonella* Typhimurium MLVA 3-9-8-12-523	3	3	1	D	D	Unknown	Unknown
NS48603	Jan	Private residence	Scrombroid	3	0	1	D	N	Tilapia fish	Improper handling of fresh raw product
SES201601	Jan	Restaurant	Scrombroid	2	0	2	D	D	Tuna sashimi	Improper handling of fresh raw product
HUN0499	Feb	Restaurant	*Shigella* sonnei	7	2	0	D	D	Multiple foods prepared by caterer	Food handler contamination
SES50920	Jun	Restaurant	*Shigella* sonnei	3	2	0	D	N	Cherry Strudel	Food handler contamination
NS48617	Jan	Restaurant	Unknown	3	0	0	D	N	Unknown	Unknown
SES53083	Dec	Restaurant	Unknown	4	0	0	D	N	Unknown	Unknown
SES53176	Dec	Restaurant	Unknown	6	0	0	D	N	Unknown	Food handler contamination likely

* 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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
SES53224	Dec	Restaurant	Unknown	44	0	3	D	N	Unknown	Unknown
HUN0495	Jan	Restaurant	Unknown	4	0	0	NA	N	Unknown	Unknown
HUN0497	Feb	Take-away	Unknown	10	0	0	NA	N	Unknown	Unknown
HUN0500	Apr	Take Away	Unknown	5	0	0	D	D	Unknown	Unknown
IS49818	Apr	Restaurant	Unknown	3	0	0	D	N	Unknown	Unknown
IS50331	May	Restaurant	Unknown	5	0	0	D	N	Unknown	Unknown
NNSW201601	Jun	Restaurant	Unknown	26	0	0	D	N	Unknown	Unknown
SES49948	Apr	Restaurant	Unknown	2	0	0	D	N	Unknown	Unknown
SES50408	May	Take Away	Unknown	13	0	0	D	N	Unknown	Unknown
SYD201602	Feb	Restaurant	Unknown	3	0	0	D	N	Unknown	Unknown
WS49837	Apr	Restaurant	Unknown	7	0	0	D	N	Unknown	Unknown
WS50596	Jun	Restaurant	Unknown	23	0	0	D	N	Unknown	Unknown
GS52152	Sep	Commercial caterer	Unknown	3	0	0	D	N	Contaminated wraps	Food handler contamination
HUN0506	Sep	Restaurant	Unknown	19	0	0	D	D	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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
HUN0507	Sep	Restaurant	Unknown	12	0	1	D	N	Unknown	Unknown
IS51433	Aug	Commercial caterer	Unknown	19	0	0	D	N	Unknown	Food handler contamination
LIV201601	Jan	Restaurant	Unknown	17	0	0	D	D	Unknown	Unknown
NS48899	Jan	Restaurant	Unknown	8	0	0	D	N	Unknown	Unknown
NS49546	Mar	Restaurant	Unknown	4	0	0	NA	N	Unknown	Unknown
NSW201601	Jul	Camp	Unknown	116	0	0	D	N	Unknown	Person to food to person
SES201603	Feb	Restaurant	Unknown	22	0	0	D	D	Unknown	Unknown
SES48681	Jan	Restaurant	Unknown	4	0	0	NA	N	Unknown	Unknown
SES51787	Aug	Restaurant	Unknown	7	0	0	D	N	Unknown	Unknown
SES52304	Oct	Restaurant	Unknown	9	0	0	D	N	Unknown	Unknown
SES52328	Oct	Restaurant	Unknown	8	0	0	D	N	Unknown	Unknown
SES52362	Oct	Restaurant	Unknown	62	0	0	D	C	Unknown	Unknown
SYD48990	Feb	Restaurant	Unknown	12	0	0	NA	N	Unknown	Unknown
SYD52140	Sep	Restaurant	Unknown	30	0	0	D	D	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

PHU ID number	Month of onset	Setting	Pathogen	No. ill	Lab confirmed	No. hospitalised	Evidence*	Epi. Study**	Suspected / Responsible vehicle	Contributing factors
WS48839	Jan	Restaurant	Unknown	22	0	1	D	C	Unknown	Unknown
WS51181	Jul	Restaurant	Unknown	3	0	0	D	N	Unknown	Unknown
WS52757	Nov	Restaurant	Unknown	70	0	0	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

Significant enteric outbreaks during 2016

Salmonella Anatum

During quarter 1, 24 cases of *Salmonella* Anatum were notified in NSW, compared to 3 notifications on average for the previous five years for the same quarter. Concurrent increases were also observed in other jurisdictions and a multi-jurisdictional outbreak investigation (MJOI) commenced on 8 February 2016.

Interstate, two different types of bagged lettuce had tested positive for *S*. Anatum. On 4 February, 2016, trade and consumer level recalls were issued. Whole genome sequencing (WGS) of the food and human isolates confirmed the pre-packaged mixed salad as the source of the outbreak.

In NSW, 23 cases were linked through WGS to the multi-state outbreak; 70% of NSW cases indicated eating bagged lettuce of any kind.

The investigation was the first multijurisdictional foodborne disease outbreak in Australia to use WGS to support the investigation. WGS played an important role in defining confirmed cases and implicating pre-packaged salad mix as the source of the outbreak. Given a relatively high baseline for *S.* Anatum in Australia (3 year historical mean of 72 cases per year), WGS was helpful in differentiating outbreak cases from background cases.

Salmonella Saintpaul

In January 2016, an increase in *Salmonella* Saintpaul infections was identified through routine surveillance. Sixty two cases of *S*. Saintpaul with a specimen collection date between 1 December 2015 and 12 January 2016 were notified in NSW. Historically (2010-2015), NSW received on average 2 notifications of *S.* Saintpaul per week. Health Protection NSW (HPNSW) in conjunction with public health units (PHUs) and the NSW Food Authority (NSWFA) commenced an investigation on 13 January 2016.

During this time period, increases were also identified in two other Australian jurisdictions with a MJOI commencing on 11 February 2016. Investigators conducted extensive hypothesis generating interviews later followed by a case control study. Due to the moderate background levels of *S*. Saintpaul, WGS was incorporated to facilitate the identification of outbreak associated cases.

In NSW, 99 confirmed and 17 probable cases were linked to the outbreak with specimen collection dates between December 2015 and April 2016.

Initial descriptive analysis pointed towards a produce item as the food vehicle of interest. Following a surge of cases in another jurisdiction towards the end of March 2016, mung bean sprouts were identified as a likely source through a case-control investigation. Subsequent testing of mung-bean sprouts identified *S.* Saintpaul (later matched by WGS). Health advisories and product recalls occurred in jurisdictions where the implicated product was distributed.

Mung bean sprout consumption was reported by less than 30% of cases, with initial interviews in NSW reporting consumption frequencies of less than 20%. This highlights the challenge of so-called 'stealth' foods: foods that are poorly recalled during interviews since they generally used as a garnish. A similar situation occurred in Europe with the *E. coli* O104:H4 outbreak that ultimately implicated raw fenugreek sprouts as the food vehicle. During exploratory interviews, only 25% of German cases reported sprout consumption resulting in it being excluded from further analytic studies.

Salmonella Typhimurium Bakery Outbreak

On Sunday 24 January 2016, the South Eastern Sydney Local Health District (SESLHD) PHU was notified by a hospital emergency department of people presenting with gastrointestinal illness who had eaten food purchased at a common bakery. An investigation was initiated by the PHU and the NSWFA.

The epidemiological investigation identified 203 people who had become ill after eating food purchased from this same bakery. Of the 203 cases, 91 were confirmed with *Salmonella* and of these, 83 were *Salmonella* Typhimurium, of which 81 had the same MLVA profile (3-26-13-8-523).

Illness onset dates ranged from 18 – 26 January, 2016, with foods purchased over a 7 day period from 17 – 24 January, 2016. Of the 91 confirmed cases, 58 (73%) presented to a hospital emergency department

and 32 (35%) were admitted to hospital (mean length of stay was 5 days, range 1-19 days).

Foods commonly consumed included bread rolls (75%), mayonnaise (41%), mayo/margarine mix (40%) and salad fillings (lettuce (62%) tomato (49%), carrot (47%).

The environmental investigation concluded the food handling practices of the bakery were unsatisfactory and *S.* Typhimurium was detected in ready-to-eat foods sampled from the premises. An order prohibiting the sale of food was issued on the food business until they corrected the issues identified.

Multijurisdictional outbreak of listeriosis

A cluster of listeriosis was detected when epidemiological, environmental and laboratory investigations linked multiple cases in NSW and interstate residents to one another, and to supermarket deli products. Whole genome sequencing subsequently confirmed the cases were highly-related; prompting a multijurisdictional outbreak investigation.

Overall, between February and June 2016, a total of eight cases from four jurisdictions, including three NSW residents, were linked to the outbreak by molecular typing (binary type 83, MLVA 04-20-19-04-03-11-10-04-00 or similar) and/or WGS.

Traceback investigations completed by the NSWFA isolated *Listeria monocytogenes* sharing a similar genetic profile from food samples and environmental swabs from three supermarket delis, as well as from a ham production facility in NSW that distributed their products to various supermarkets implicated by cases. The production facility was closed for unrelated reasons prior to this outbreak being detected. The three NSW cases had consumed cold meats, cheeses and/or salads from various deli counters within the four weeks prior to onset.

Based on epidemiological, environmental and laboratory investigations, it was concluded that the outbreak was likely caused by consumption of contaminated deli products – arising from a common ham supplier, with subsequent cross-contamination of other deli products at the point of retail. Over the course of the investigation the NSW Food Authority worked with the affected supermarkets and the ham supplier to implement cleaning and equipment replacement to prevent further cases and minimise risks of recurrence.

Two clusters of Ciguatera Fish Poisoning

In March, 2016, Hunter New England LHD was notified of three suspected ciguatera poisonings linked to the consumption of Spanish mackerel. The 40 Kg Spanish mackerel was caught off the coast of Crowdy Head (near Taree). All cases consumed the fish at the same time and all reported onset of illness three hours later. Symptoms included reverse temperature sensation, tingling/numbness in hands and feet, chest tightness, diarrhoea and nausea. Portions of the Spanish mackerel (frozen) were collected by the NSW Food Authority and tested positive for Pacific ciguatoxin 1B (P-CTX-1B), with a concentration of 0.926 µg/Kg. The US Food and Drug Administration (FDA) have published guidance suggesting that levels should not exceed 0.01 µg/Kg for Pacific CTX.

In April, 2016, Hunter New England LHD was notified of suspected ciguatera poisoning in a 35 year-old female. The case consumed part of a 20 Kg Spanish mackerel caught off the coast of Crescent Head (≈100km north of Crowdy Head). Symptoms included reverse temperature sensation, numbness/tingling around mouth and hands, diarrhoea, aching teeth (no chest tightness or cardiac problems were noted). The Spanish mackerel was shared between several individuals. Three other cases were subsequently identified. Two samples were provided to the NSW Food Authority for testing. P-CTX-1B was detected in both samples at concentrations of 0.108 µg/Kg and 0.366 µg/Kg, respectively.

Salmonella Hvittingfoss

In July 2016, an increase in *Salmonella* Hvittingfoss infections was identified through routine surveillance. 32 cases of *S.* Hvittingfoss with a specimen collection date between 1 July and 14 July 2016 were notified in NSW. Usually NSW receives an average of 1.3 notifications of *S.* Hvittingfoss per month. HPNSW in conjunction with PHUs and the NSWFA commenced an investigation on 8 July 2016.

During this time period, increases were also identified in two other Australian jurisdictions with MJOI commencing on 18 July 2016. Investigators conducted extensive hypothesis generating interviews later followed by a case control study. WGS was incorporated to facilitate the identification of outbreak associated cases. In NSW, 47 confirmed cases and 22 suspected cases were linked to the outbreak with specimen collection date between 14 June and 24

August. The majority of cases (61%) were aged under 5 years of age.

Initial descriptive analysis identified rockmelon and watermelon as potential sources. A multijurisdictional case-case study was conducted to test the hypothesis that melons were the source of the outbreak. On 2 August 2016 rockmelons from an implicated grower were recalled following a positive result from a food sample in another jurisdiction.

Cryptosporidium linked to a petting zoo

In late 2016, Nepean Blue Mountains Public Health Unit was notified of four cases of cryptosporidiosis in children under 5 years old within a fortnight of each other. The four cases had symptom onsets between 11 and 20 September 2016. There were multiple risk exposures for all four cases, including attending swimming class and attending child care. However a particular petting zoo at a country club was the only exposure associated with all cases.

Two cases had direct contact with the petting zoo at the country club with a plausible incubation period before illness. A third case also had direct contact, but the time from contact to illness onset was slightly outside the typical 12 day incubation period for cryptosporidiosis, and therefore may have also been a secondary case (acquired from their sibling). The fourth case had contact with the petting zoo but there were several weeks between contact and illness onset. The petting zoo owner was interviewed and an inspection conducted at the country club. The petting zoo was licenced with the Department of Primary Industry, had no new staff, had a copy of South Australian Health Guidelines for contact with animals, immediately removed faeces from the display area, and ran numerous events each weekend.

The country club had recently built the animal enclosure, allowed only 10 children at time to enter enclosure, had signage at the exit of the animal enclosure, zoo staff constantly supervise in enclosure and country club staff hose down the enclosure after animals were removed at the end of the day. The staff provided hand gel but this would not be sufficient to kill the *Cryptosporidium* protozoa. The country club also had a hand wash trough with soap, but this was located about 20 metres from the exit of the enclosure. Advice was given to the country club to relocate their hand washing station closer to the exit from the enclosure to reduce the risk of children putting their hands in their mouth before washing their hands.

Multiple point source outbreaks of *Salmonella* Typhimurium 3-25-18-12-523

In early December 2016, four separate complaints of foodborne illness were received by the NSWFA and PHUs. Initial investigations by the NSWFA identified one common food item which was served at all events, a duck pancake supplied by a commercial catering company.

Specimens collected as part of the initial investigations were positive for *Salmonella* Typhimurium MLVA 3-25-18-12-523. A review of all *Salmonella* specimens with collection dates from 27 November to 17 December 2016 found a total of 54 cases with the same MLVA. A total of 36 cases were interviewed, of which 31 identified attending 12 catered events during the exposure period (including the initial four complainants). Eight of the 12 events were found to have been supplied by the identified caterer; however, a supplier could not be confirmed for the other four events. A survey sent to guests and staff from one of the events showed a significant risk of illness associated with consumption of duck pancakes (RR 9.2; 95% CI 2.5-33.5) and sushi (RR 3.0; 95% CI 1.1-8.2); both supplied by the one caterer.

Based on epidemiological, environmental and laboratory investigations, it was concluded that the outbreak was likely caused by consumption of contaminated duck pancakes distributed by the one commercial caterer. The NSWFA took immediate action prohibiting the sale and distribution of food products from this company.

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 2016

- Number of outbreaks: 788
- Number of people affected: 11,605
- Number of outbreaks with at least one stool sample collected: 272 (34%)

Groups with highest frequency in 2016

- Facility type: child care centres, 493 (63%) of outbreaks
- Attack rate in staff: child care centres at 19%
- Attack rate in non-staff: school children at 42%
- Average duration of outbreaks: child care centres at 10 days

Overall trend (compared to 5 year average):

- 28% increase in the number of outbreaks
- 23% increase in the number of people affected

Causative agent

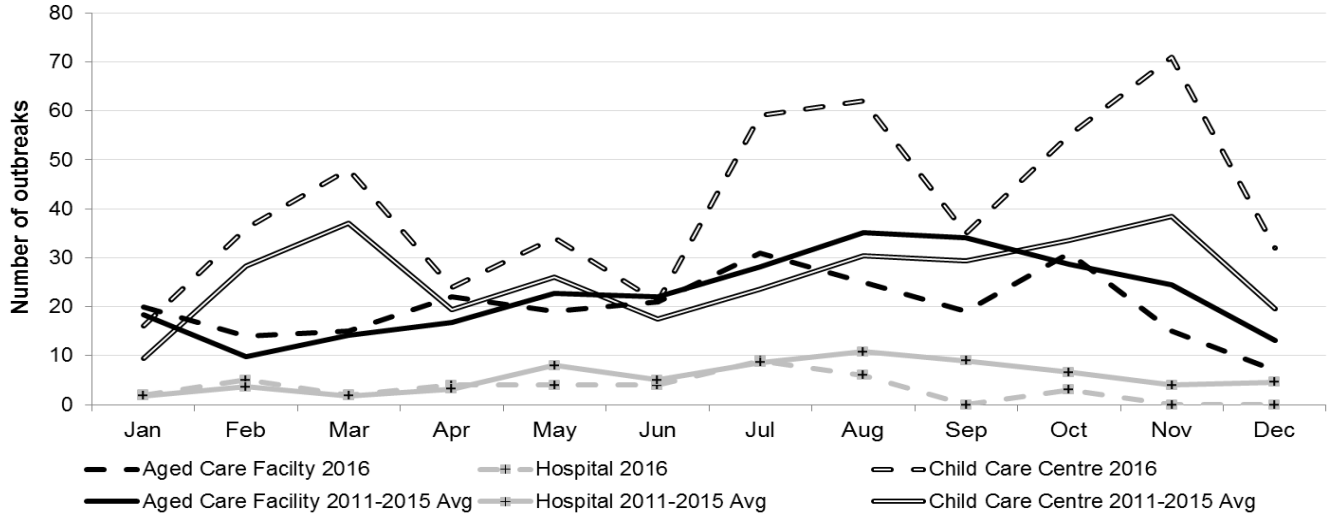
- Norovirus (laboratory confirmed) - 14% of outbreaks (40% of outbreaks with a stool sample collected)

(*Note: only 35% of outbreaks had one or more stool samples collected*)

Seasonality

- Child care centres: Peaked in November
- Aged care and hospitals: Peaked in July

Number of reported outbreaks of gastrointestinal illness in institutions in 2016 and average of the previous 5 years by month and facility type



Characteristics of outbreaks of gastrointestinal illness in institutions reported to NSW in 2016

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	239	995: 7%	3432: 19%	7	184: 77%	88: norovirus 6: rotavirus
Child care	493	1302: 19%	5089: 14%	10	56: 11%	5: norovirus 6: rotavirus
Hospital	39	173: 11%	265: 24%	5	28: 72%	16: norovirus
School	8	24: 26%	219: 42%	8	1: 13%	-
Other*	9	15: 14%	91: 29%	7	3: 33%	-
TOTAL	788	2509: 15%	9096: 16%	9	272: 35%	109: norovirus 12: 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: 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 *Campylobacter* and norovirus infection are not notifiable in NSW.

NSW laboratories report cases of notifiable enteric diseases to public health units (PHUs). Outbreaks of foodborne or suspected foodborne illness and institutional gastroenteritis are reportable by doctors, hospitals, child care centres and aged care facilities. Notifiable disease data are routinely entered by public health unit staff into the NSW Notifiable Conditions Information Management System (NCIMS).

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 continued

Methods

We analysed data for the following notifiable enteric pathogens; *Salmonella*[i], *Salmonella* Paratyphi *Salmonella* Typhi, *Listeria monocytogenes*, *Shigella*, HUS and STEC, *Cryptosporidium*, *Giardia*, rotavirus and hepatitis A & E viruses. On 23 March 2016, 2015 data was extracted from NCIMS using Secure Analytics for Population Health Research and Intelligence (SAPHaRI)[ii] using the date of onset of disease. The counts of each notifiable enteric disease[iii] for 2016 were compared with the average annual count for the years 2011 to 2015. The NSW estimated resident population for 30 June of each year from 2011-2016 was used to calculate crude incidence rates for each disease.[iv]

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.

Notification data for *Cryptosporidium*, *Giardia, Salmonella* and *Shigella* were analysed for the period between 1 January 2012 and 31 December 2016, 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. Data were reported as received by Communicable Diseases Branch up to 1 May 2017.

[ii] We define *Salmonella* as all *Salmonella* serovars, excluding *S.* Typhi ans 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.

[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

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

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The NSW OzFoodNet Annual Report 2016 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
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- Hunter New England OzFoodNet team and Dr Tony Merritt, Dr Craig Dalton and Dr David Durrheim, Hunter New England Local Health District
- Dr Vicky Sheppeard, Director, Communicable Diseases Branch
- Dr Jeremy McAnulty, 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 with Health Protection, NSW
- All OzFoodNet epidemiologists and collaborators
- Partners in Department of Primary Industries and associated stakeholders