

Communicable Disease Control Branch,  
Disease Surveillance & Investigation Section

# 2016 Annual Report

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This annual report was prepared by:

Disease Surveillance & Investigation Section  
Communicable Disease Control Branch  
SA Health  
PO Box 6  
Rundle Mall SA 5000

Telephone: 1300 232 272

Web: [www.sahealth.sa.gov.au/SurveillanceNotifiableConditions](http://www.sahealth.sa.gov.au/SurveillanceNotifiableConditions)

### **Disclaimer**

The data presented in this report were correct at the time of publication. Minor discrepancies with previous reports may occur as data adjustments are made retrospectively.

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## Summary

The collection and surveillance of notifiable conditions is conducted under the *South Australian Public Health Act 2011* and associated Regulations. Medical practitioners and laboratories are required to report cases to the Communicable Disease Control Branch (CDCB). On 18 February 2016, variations to the *South Australian Public Health (Notifiable and Controlled Notifiable Conditions) Variation Regulations 2016* were enacted to include five new notifiable conditions and an amendment of poliomyelitis to poliovirus infection. The new notifiable conditions included rheumatic fever, rheumatic heart disease, chancroid, *Vibrio parahaemolyticus* infection and Hendra virus infection.

CDCB conducts state wide surveillance for notifiable diseases enabling analysis of health data. Specified data are provided regularly to the National Notifiable Diseases Surveillance System. Summaries of notifiable diseases in South Australia (SA) are published on the SA Health website. Included are counts of notified infections and information about current cluster and outbreak investigations, in addition to historical data.

CDCB undertakes, frequently in conjunction with partner agencies, public health actions to prevent the further spread of disease. Public health management is in accordance with the Series of National Guidelines and local Disease Surveillance and Investigation Guidelines. See [www.health.gov.au/cdnasongs](http://www.health.gov.au/cdnasongs).

The *South Australian Public Health Act 2011* provides the legislative authority to investigate and control notifiable conditions. Partner agencies may have legislative authority under other Acts in South Australia (SA) such as the *Food Act 2001* (SA).

Additional expertise to investigate and control notifiable conditions may be utilised from other agencies including OzFoodNet Australia, Biosecurity SA Primary Industries and Regions SA, and environmental health officers (EHO) from local government, as well as Food Policy and Programs Branch, Health Protection Programs and Scientific Services Branch, and SA Pathology.

Investigation and control activities included (but were not limited to):

- > 12 possible foodborne outbreaks and 18 cluster investigations
- > 79 non-foodborne clusters of gastrointestinal disease (69 occurring in residential care facilities)
- > 175 cases of Shiga-toxin producing *Escherichia coli* infection
- > 27 cases of invasive meningococcal disease
- > 11 cases of measles
- > 6 cases of *Legionella pneumophila* serogroup 1 infection
- > 7 cases of hepatitis A infection
- > 6 cases of typhoid fever
- > 4 cases of paratyphoid fever
- > 4 cases of *Listeria monocytogenes* infection
- > 28 cases of Q fever.

## Methods

Notification data from laboratories and medical practitioners were entered into and extracted for analysis from the SA Notifiable Infectious Disease Surveillance database (NIDS). Enteric notifiable disease data were extracted by the calculated onset date from 1 January to 31 December 2016 on 31 July 2017. The calculated onset date is the earliest date entered into NIDS; this may be the specimen date, signature date, laboratory confirmed date, notification date, or the current system date. All other notifiable condition data were extracted and reported by notification date which represents the date the case was first reported to CDCB. Data was extracted for cases notified from 1 January to 31 December 2016 on 31 July 2017. Data for varicella was extracted on 15 December 2017.

SA continues to use the surveillance case definitions prepared by the Communicable Diseases Network Australia for the Australian National Notifiable Diseases Surveillance System (NNDSS). All case definitions are used with the exception of varicella infection where clinical diagnoses without laboratory testing are accepted in SA.

Australian Bureau of Statistics estimated residential population counts for June of each year were used in crude rate calculations and are expressed per 100,000 population.

The data reported here is correct as of the time of publishing but is subject to change. Ongoing maintenance of datasets as investigations are finalised, new information is reported or as errors are resolved from data cleaning contributes to this variance.

Data related to mycobacterial diseases, sexually transmitted infections, blood-borne viruses, rheumatic fever and rheumatic heart disease are reported elsewhere.



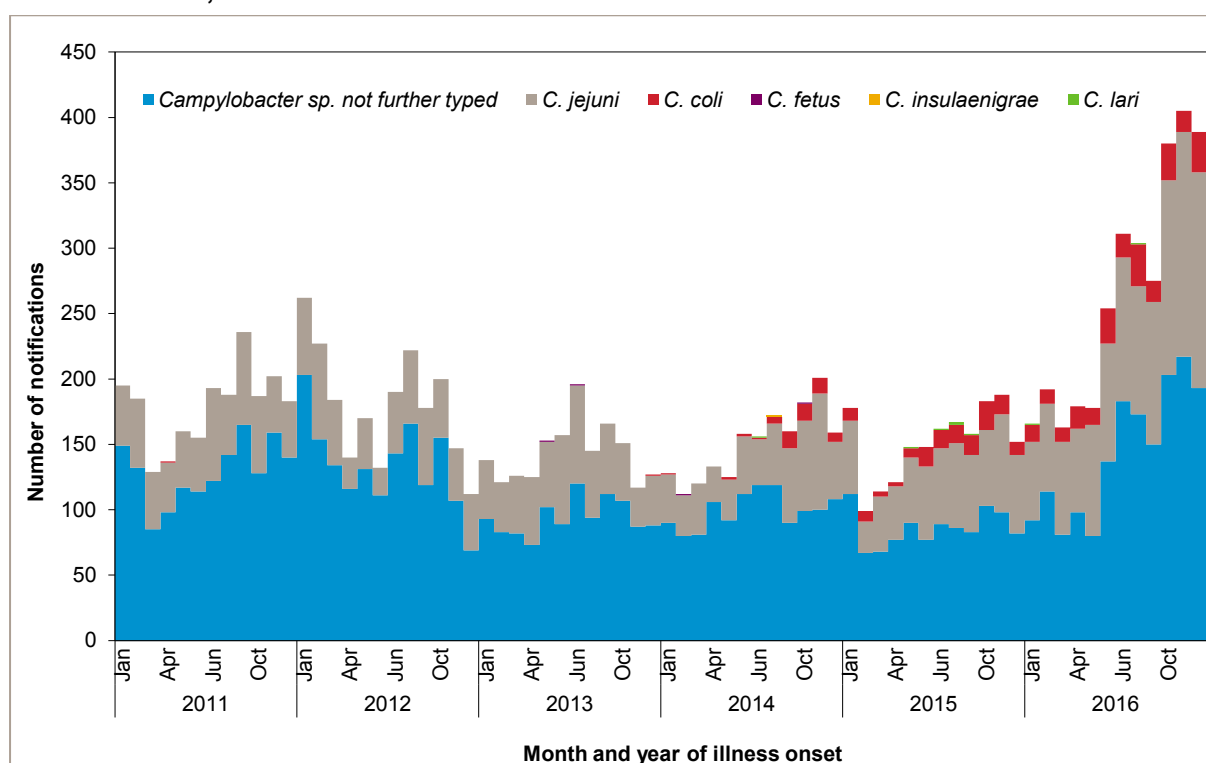
## Enteric diseases

In 2016, there were no cases of botulism, haemolytic uraemic syndrome or thrombotic thrombocytopenic purpura (TTP) reported. Gastrointestinal illnesses accounted for 29% of disease notifications in SA, compared to 15% of notifications in 2015. There were 5,674 cases of notifiable gastrointestinal disease reported in 2016. *Campylobacter* infection was the most commonly reported notifiable gastrointestinal disease in SA and accounted for 56% of these notifiable diseases.

### *Campylobacter* infection

In 2016, there were 3,196 cases of campylobacteriosis reported in SA, compared with 1,818 cases in 2015 and the five year average of 1,932 notifications per annum for the period 2011 to 2015. Notifications this year represented a 76% increase on the number of notifications reported last year.

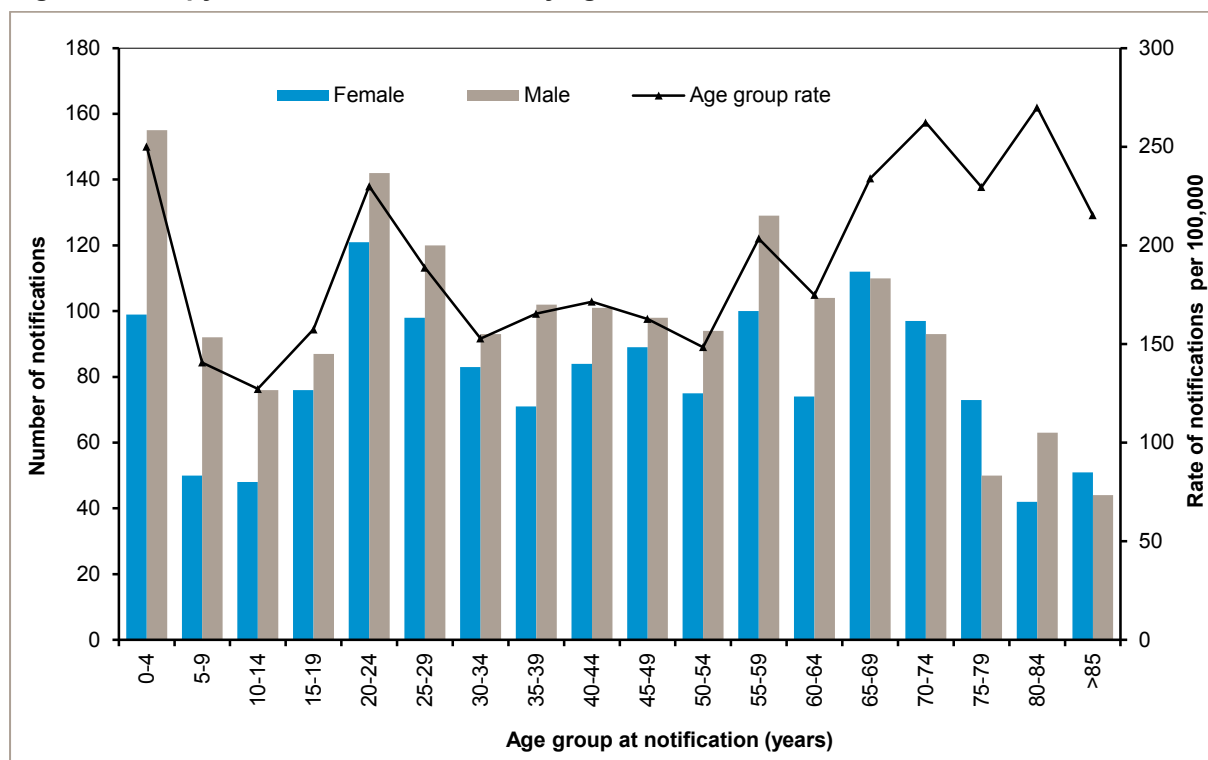
**Figure 1** *Campylobacter* infection notifications by type and month and year of illness onset, South Australia, 2011-2016



In 2016, campylobacter notifications were in 1,753 males and 1,443 females with an age range of less than one year to 103 years, and a median age of 42 years. There were more male cases reported than females in most five year age groups.

The highest number of campylobacteriosis notifications occurred in children aged less than five years of age and accounted for 8% of campylobacteriosis notifications. Persons aged 80 to 84 years accounted for 105 (6%) notifications. Notification rates were highest in persons aged 80 to 84 years with additional peaks in the 70 to 74 year age group and less than one year to four year age group.

**Figure 2 Campylobacter infection cases by age and sex, South Australia, 2016**



Since July 2014, diagnostic laboratories have introduced enteric nucleic acid test (NAT) testing; one laboratory commenced in June 2016. PCR testing is more sensitive than culture methods and a decrease in the proportion of culture positive only results has been observed. There was a sustained increase in cases reported from October to December 2016 and interviews conducted with a subset of cases did not identify any common sources or point source outbreaks. In 2016, 54% of campylobacteriosis cases were not subtyped but reported as *Campylobacter sp.*

In 2016, there was one outbreak of campylobacteriosis investigated following a case who implicated a wedding reception as the source of his illness. ([Appendix 3](#)).

### Cryptosporidiosis

There were 432 cases of cryptosporidiosis reported in 2016, consistent with the 419 notifications reported in 2015 and higher than the a five-year average of 214 cases reported per annum for the period of 2011 to 2015. (Figure 3).

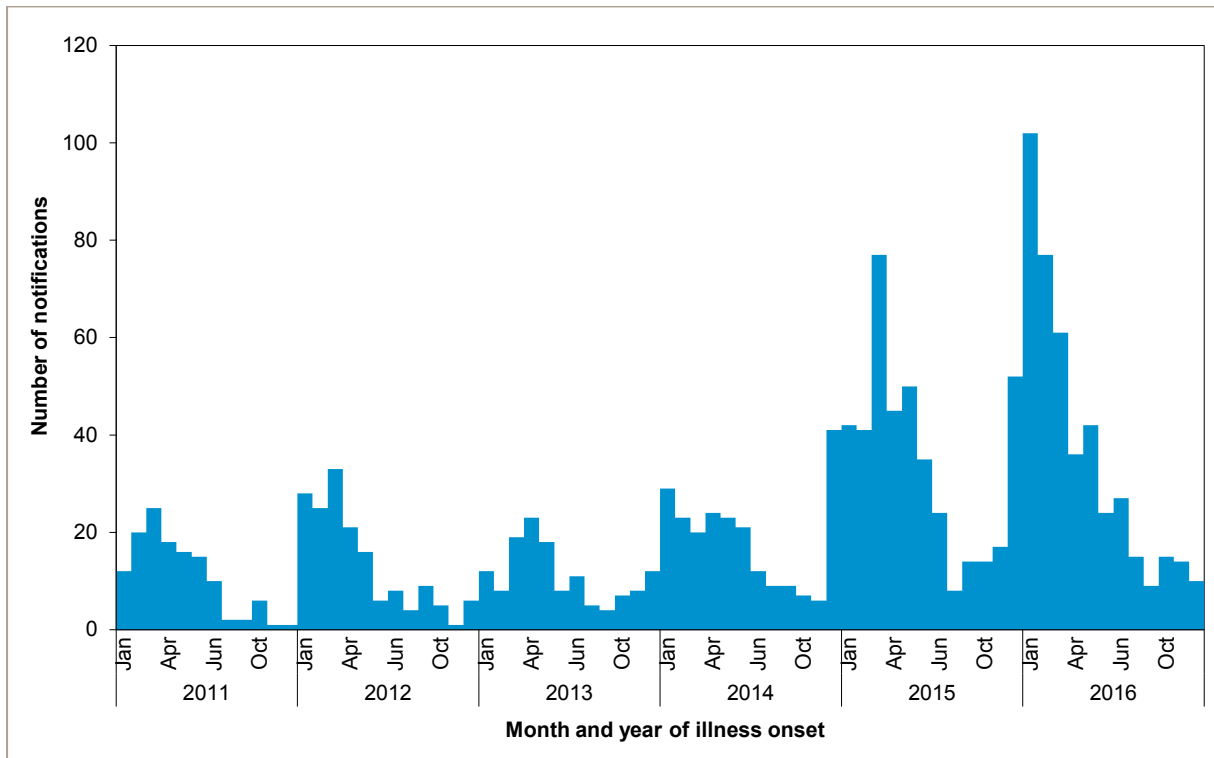
In 2016, cryptosporidiosis notifications were in 208 males and 224 females with an age range of less than one year to 76 years, and a median age of 18 years.

The median age of cryptosporidiosis cases reported this year was older than the five year median age of 16 years for the period 2011 to 2015.

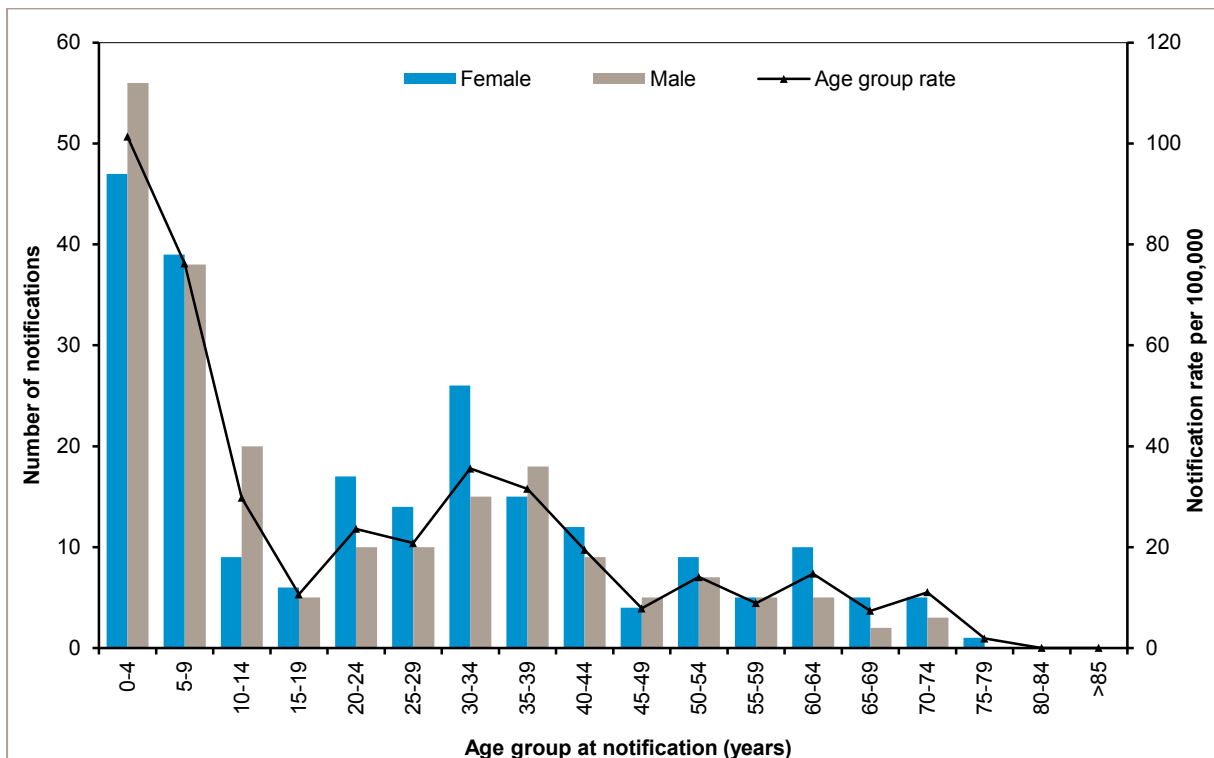
The highest number of cryptosporidiosis notifications occurred in children aged less than 10 years of age and these accounted for 42% of notifications. There were more females reported in the age groups between 20 and 34 years. (Figure 4).

Seasonal increases of cryptosporidiosis occur in the warmer months and outbreaks have been associated with recreational water use particularly public swimming pools. From December 2015 to February 2016, 81% of cases interviewed reported recent swimming pool use during either incubation and or infectious periods. Swimming pools identified from case interviews are referred to Health Protection Programs for investigation and action.

**Figure 3 Cryptosporidiosis cases by month and year of illness onset, South Australia, 2011-2016**



**Figure 4 Cryptosporidiosis cases by age and sex, South Australia, 2016**



## Hepatitis A

Seven cases of hepatitis A infection were reported in 2016, lower than the 10 cases reported in 2015 and consistent with a five year average of eight cases per annum for the period 2011 to 2015.

In 2016, hepatitis A notifications were in four males and three females with an age range of five years to 37 years, and a median age of 22 years. Five cases of hepatitis A (71%) were hospitalised due to their infection. All cases were unvaccinated and none were reported to identify as Aboriginal or Torres Strait Islander.

All cases of hepatitis A infection are interviewed and vaccination was recommended for all susceptible household contacts as appropriate.

Overseas travel was identified as the most likely source of infection for all cases in 2016.

**Table 1 Notified cases of hepatitis A infection by reported risk factor, South Australia, 2016**

Risk factor	Hepatitis A infection
<b>Overseas travel</b>	
India	2
Cambodia	1
Indonesia	1
Fiji	1
Zambia	1
China	1
<b>Total</b>	<b>7</b>

## Hepatitis E

There were three cases of hepatitis E infection notified in 2016, compared with one case notified in 2015 and a five year average of less than one case per annum for the period 2011 to 2015.

In 2016, hepatitis E notifications were in three males with an age range of 28 years to 67 years, and a median age of 51 years. Two cases were acquired in India and one immunocompromised case was locally acquired. All cases were interviewed and no common links or sources for infection were identified.

## Listeriosis

Four cases of listeriosis were notified in 2016, consistent with four cases reported in 2015 and the five year average of four cases per annum for the period 2011 to 2015.

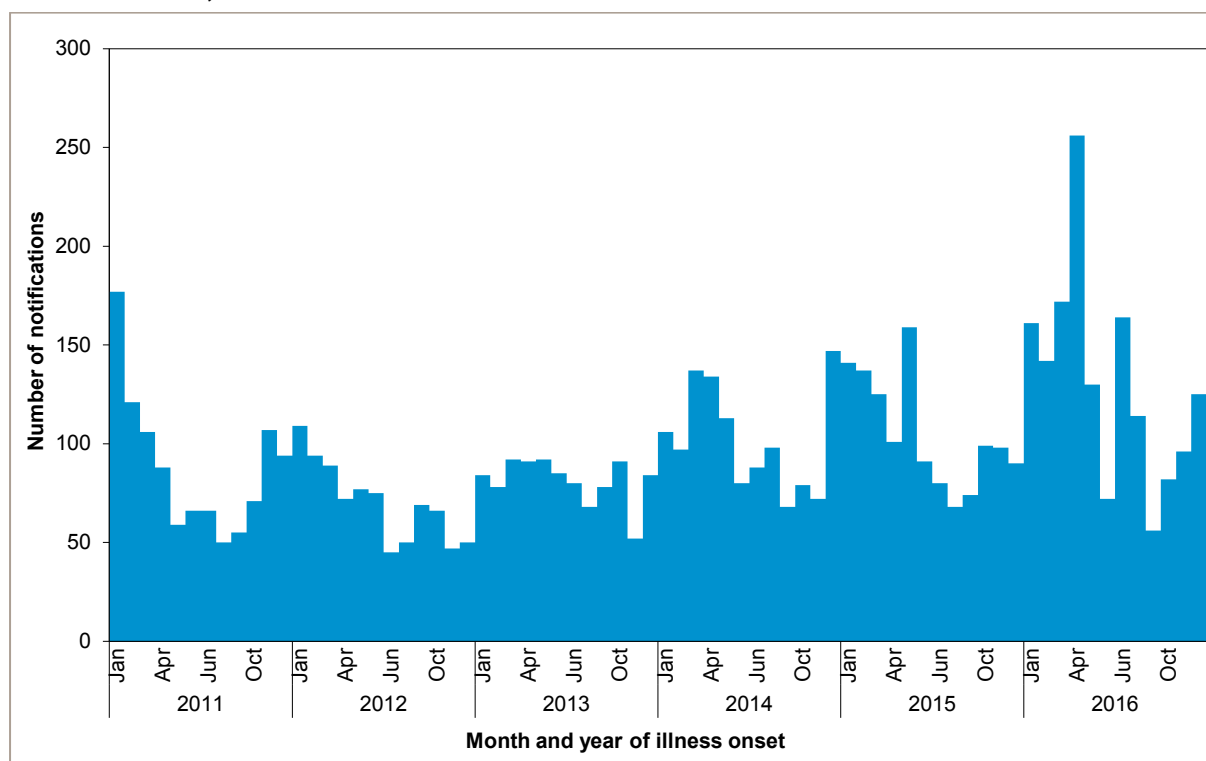
Listeriosis notifications were in two males and two females with an age range of 32 to 95 years, and a median age of 89 years. All cases had pre-existing medical conditions and were hospitalised. One case was deceased at the time of notification. On interview, all cases had consumed multiple high risk foods during their incubation period.

Further laboratory tests attributed all cases to *Listeria monocytogenes* serotype 01. One case was genetically linked to a multi-jurisdictional outbreak investigation.

## Salmonella infection

In 2016, 1,570 notifications of *Salmonella* infection were notified, a 24% increase compared with the 1,263 notifications in 2015 and the five year average of 1,072 notifications for the period 2011 to 2015. Twenty-eight per cent of gastrointestinal notifications this year were due to *Salmonella* infection. An outbreak of *Salmonella* Saintpaul associated with mung bean sprouts contributed to the large increase in notifications in April.

**Figure 5 Notifications of Salmonella infection by month and year of illness onset, South Australia, 2011-2016**



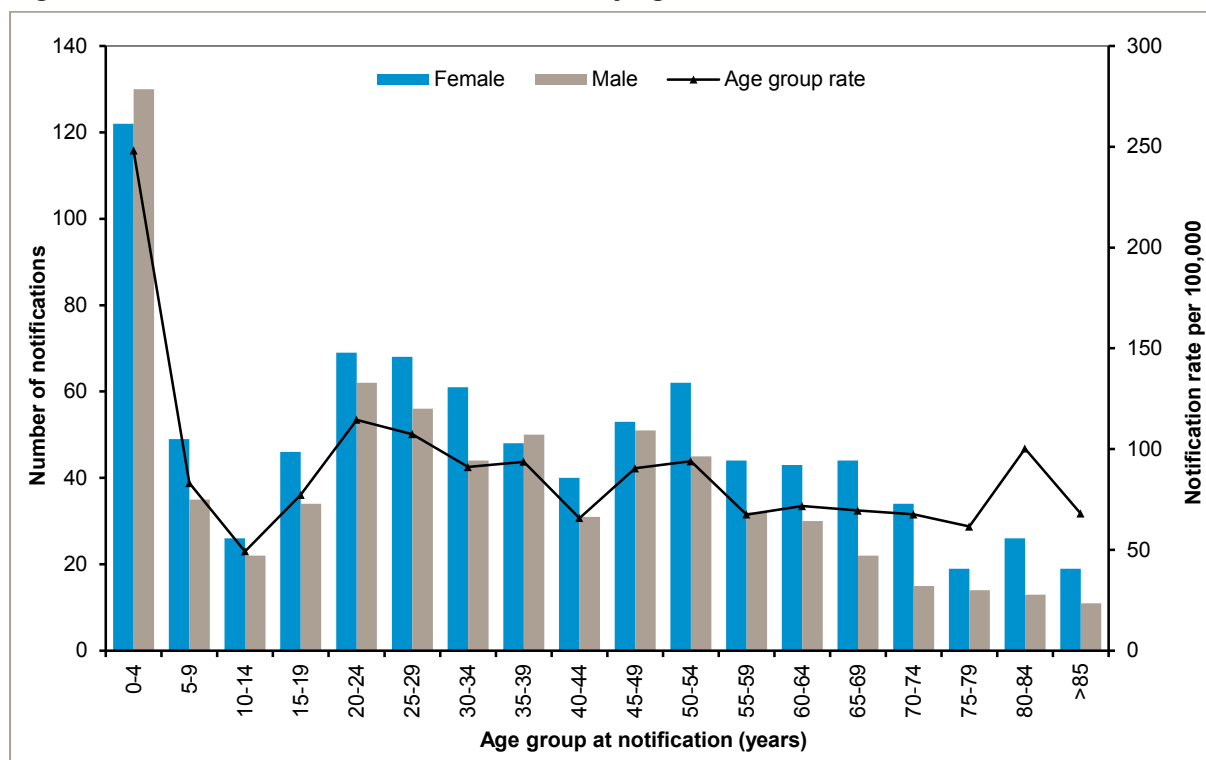
In 2016, *Salmonella* infection notifications were in 697 males and 873 females with an age range of less than one year to 98 years, and a median age of 33 years. Cases reported this year were older than the five year median age of 29 years for the period 2011 to 2015 and consistent with more female cases being reported than males in the last five years. The highest number of salmonellosis notifications occurred in children aged less than five years of age and accounted for 16% of notifications. ([Figure 6](#)).

In 2016, *Salmonella* Typhimurium 9 was the most common serotype or phage-type notified and accounted for 22% of notifications. ([Table 2](#)).

There were 76 notifications of *Salmonella* Enteritidis infection reported in 2016, higher than the 68 notifications reported in the previous year. Among cases, 71 (93%) had travelled during their exposure period; 52 cases had travelled to Indonesia.

In 2016, 11 foodborne outbreaks of *Salmonella* infection were investigated ([Appendix 3](#)).

**Figure 6 Notifications of Salmonella infection by age and sex, South Australia, 2016**



**Table 2: Ten most commonly notified Salmonella serovars or phage types, South Australia, 2016**

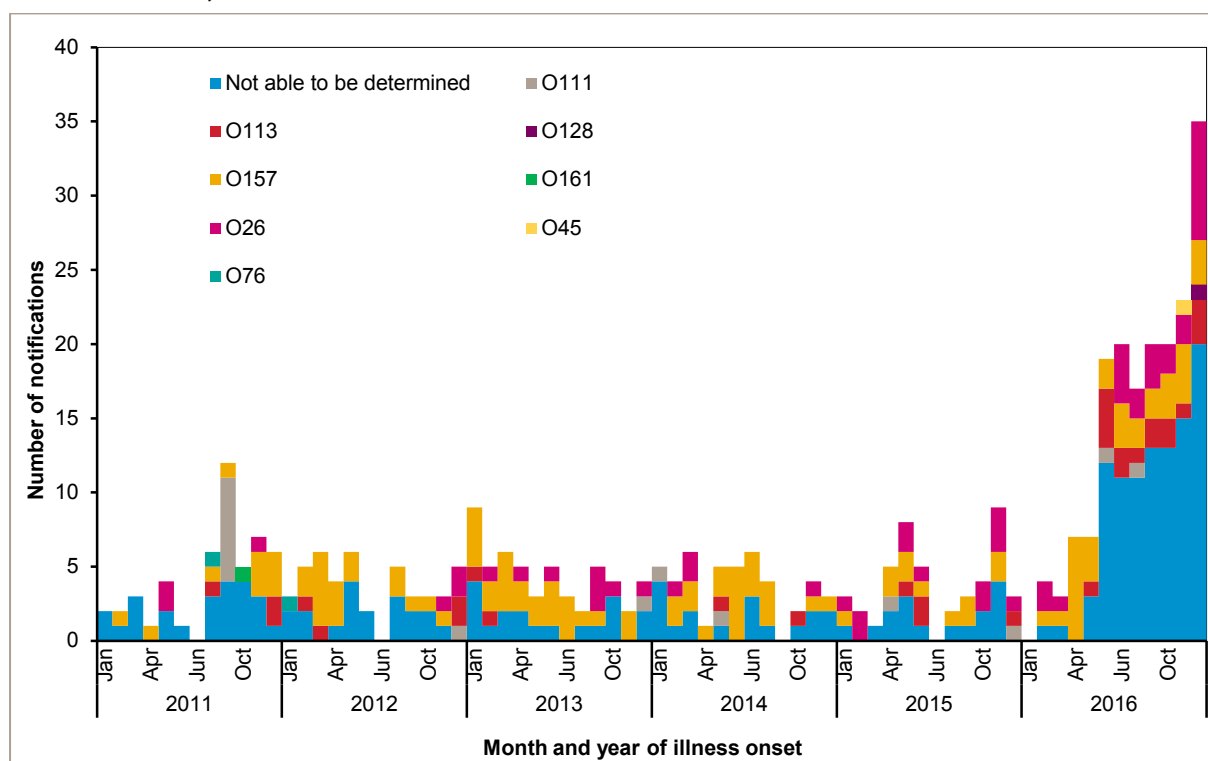
Salmonella serovar or phage type	Cases (%)
S. Typhimurium 9	342
S. Saintpaul	286
S. Typhimurium 135	134
S. Hvittingfoss	36
S. Anatum	34
S. Infantis	30
S. subsp 1 ser 4512:i:-	27
S. Chester	26
S. subsp 1 ser 4 12:i:-	25
S. Typhimurium 44	24
S. Enteritidis 1	24
Other	582
<b>Total</b>	<b>1570</b>

### Shiga toxin-producing *Es. coli* infection (STEC)

During 2016, 175 notifications of STEC infection were reported. This represented a 389% increase on the 45 of notifications reported in 2015 and similarly higher than the five year average of 47 notifications per annum for the period 2011 to 2015.

STEC testing is performed by only one laboratory in SA and in June 2016 this laboratory changed testing practices to test all faeces samples for STEC as a component of a NAT bacterial pathogen panel where previously testing was conducted only if requested or if blood was present in the sample. This change directly affected the number of STEC cases notified to CDCB.

**Figure 7 Serogroup of STEC notifications by month and year of illness onset, and serogroup South Australia, 2011-2016**



Six individuals were co-infected with two different serogroups of STEC, therefore in 2016 cases comprised of 79 males and 90 females with an age range of less than one year to 93 years, and a median age of 46 years.

In 2016, STEC serogroups were determined by a multiplex panel of four serogroups and testing identified 31 STEC O157 detections and 24 STEC O26 detections. Serogroups for 100 (57%) screening positive cases were unable to be determined because the serogroup was not included on the multiplex panel or because there was insufficient DNA in the sample. Cluster detection of STEC serogroups not included in the multiplex panel is difficult.

### Shigella infection

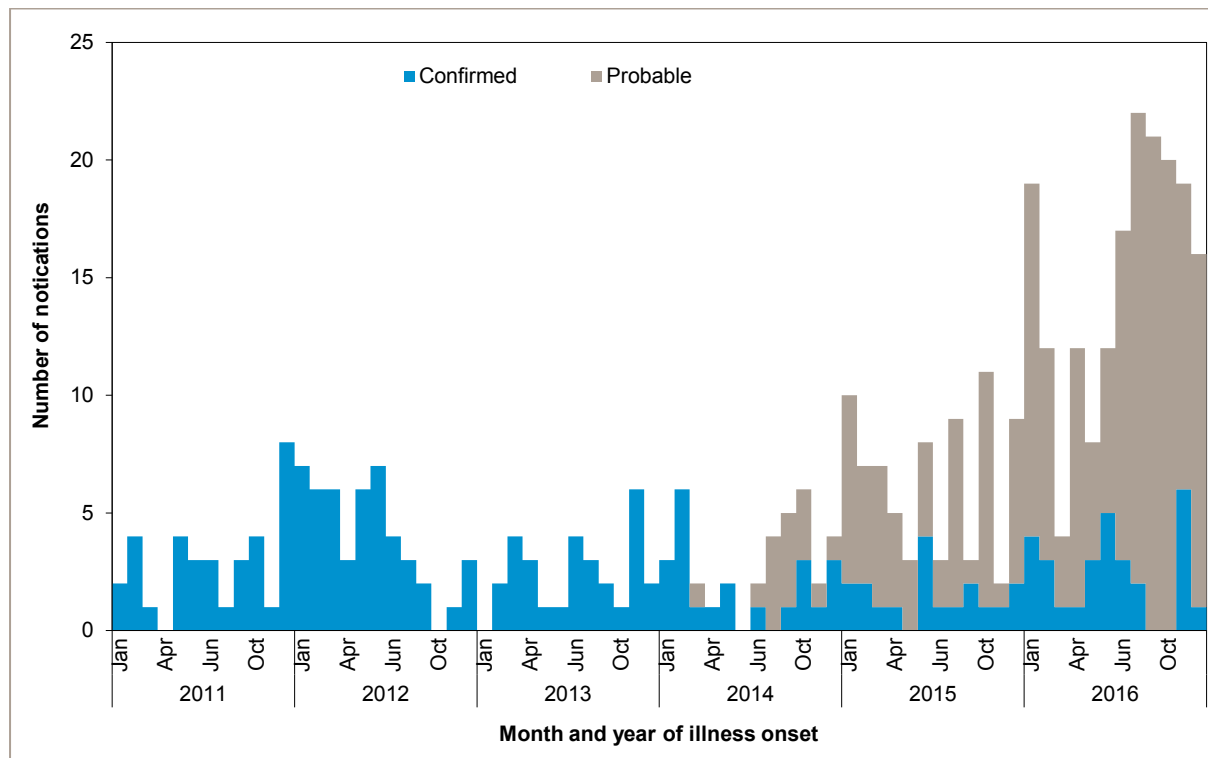
Enteric PCR panel testing includes the detection of *Shigella* and shares the same target genes with enteroinvasive *E. coli*; differentiating between the two organisms is difficult. In SA, a probable case definition has been used for cases reported since 2014 to differentiate confirmed *Shigella* culture notifications from probable *Shigella*/enteroinvasive *E. coli*. In 2016, 182 cases of *Shigella* infection were notified; consisting of 29 confirmed cases and 153 probable cases. This compares with 77 cases notified in 2015 and a five year average of 47 cases per annum for the period 2011 to 2015. (Figure 8).

In 2016, *Shigella* infection confirmed and probable notifications were in 88 males and 94 females with an age range of less than one year to 91 years, and a median age of 29 years. Of confirmed *Shigella* infection cases, there were 16 males and 13 females with an age range of one to 71 years and a median age of 33 years. Five confirmed cases (17%) were reported to identify as Aboriginal or Torres Strait Islander. (Figure 9).

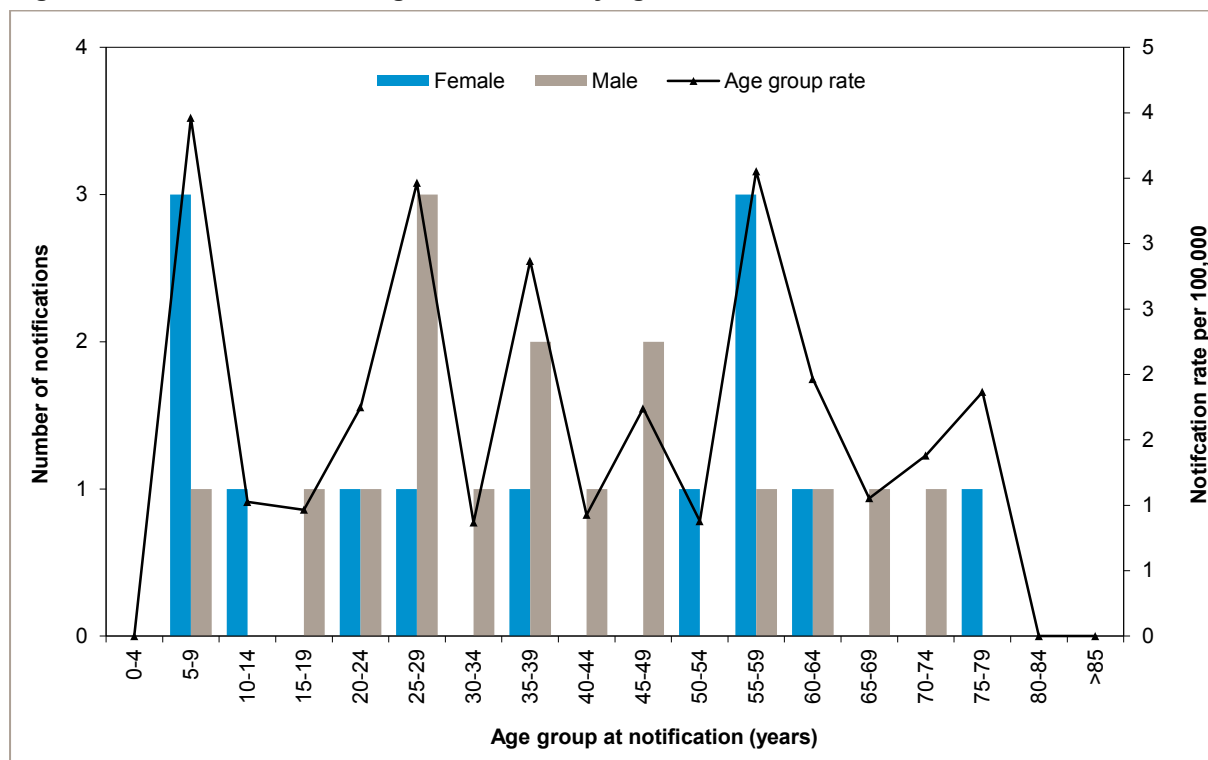
*Shigella sonnei* biotype g was the most common species and subtype notified; and accounted for 66% of notified cases.

Overseas travel was reported by 110 cases of *Shigella* infection in 2016; including 29 confirmed cases and 98 probable cases. Nine confirmed cases and 23 probable cases had travelled to Indonesia.

**Figure 8 Confirmation status of shigellosis notifications by month and year of illness onset, South Australia, 2011-2016**



**Figure 9 Notified cases of Shigella infection by age and sex, South Australia, 2016**





## Typhoid

There were six cases of *Salmonella* Typhi infection notified in 2016 compared to eight cases notified in 2015 and a five year average of seven cases per annum for the period 2011 to 2015.

In 2016, *Salmonella* Typhi infection notifications were in three males and three females with an age range of nine years to 49 years, and a median age of 15 years. All cases were hospitalised. Five cases were acquired overseas; four reported exposure in India and one acquired their illness in the Philippines. One case of typhoid had no recent travel overseas and a source was not identified. (Table 3).

All cases of *Salmonella* Typhi infection are interviewed and close household contacts are screened for carriage or infection. In 2016, no secondary cases were identified.

## Paratyphoid

In 2016, there were four cases of *Salmonella* Paratyphi infection notified, lower than the nine cases notified in 2015 and consistent with the five year average of four notifications per annum for the period 2011 to 2015.

In 2016, *Salmonella* Paratyphi infection notifications were in four females with an age range of 22 years to 49 years, and a median age of 24 years. No cases of paratyphoid were hospitalised. All cases acquired overseas; three cases reported exposure in Indonesia and one case acquired their illness in Cambodia. (Table 3).

Contact tracing of *Salmonella* Paratyphoid cases occurs and no secondary cases were identified from household screening.

**Table 3: Notified cases of typhoid and paratyphoid by reported risk factor, South Australia, 2016**

Risk factor	Typhoid	Paratyphoid
<b>Overseas travel</b>		
India	4	0
Indonesia	0	4
Philippines	1	0
Cambodia	0	1
<b>Other</b>		
Source not identified	1	0
<b>Total</b>	<b>6</b>	<b>1</b>

## *Vibrio parahaemolyticus* infection

*Vibrio parahaemolyticus* infection became notifiable in South Australia on 18 February 2016. In 2016, *Vibrio parahaemolyticus* infection notifications were in six males and two females with an age range of 26 to 62 years and a median age of 55 years.

Six cases (75%) presented as gastroenteritis; five of which reported overseas exposures including three cases who had travelled to Thailand and one each to Vietnam and Indonesia. One case had no recent overseas travel and reported consuming raw oysters during their exposure period.

In two cases (25%), *Vibrio parahaemolyticus* was isolated from wound infections which occurred following contact with seawater in South Australia. These cases were reported 11 months apart.

**Table 4: Notified cases of *Vibrio parahaemolyticus* infection by risk factor, South Australia, 2016**

Risk factor	Cases
<b>Overseas travel</b>	
Thailand	3
Vietnam	1
Indonesia	1
<b>Other</b>	
Contact with seawater	2
Consumption of raw oysters	1
<b>Total</b>	<b>8</b>

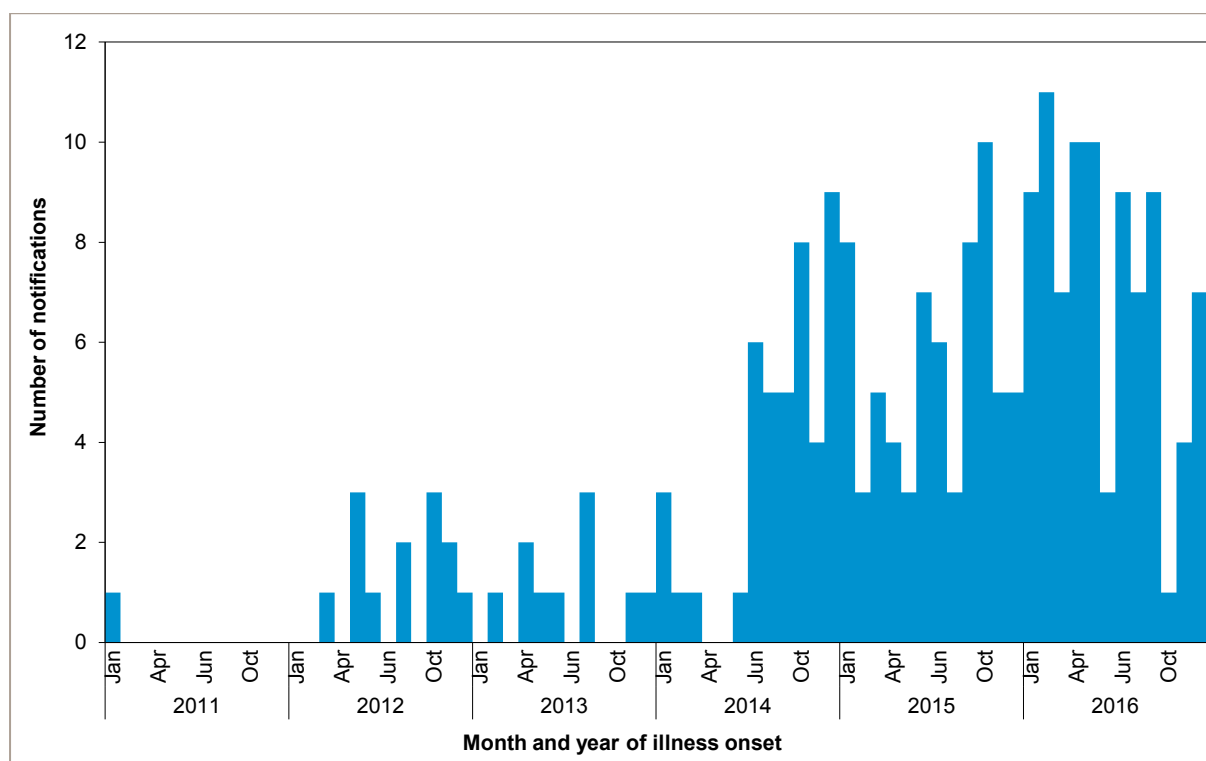
### Yersinosis

In 2016, there were 87 cases of *Yersinia* infection notified, higher than the 67 cases reported in 2015 and markedly higher than the five year average of 22 cases per annum for the period 2011 to 2015. (Figure 10).

The introduction of PCR testing by one laboratory in July 2014 and another laboratory in December 2015 has contributed to the increase in cases over the period. In June 2016 the main public health laboratory commenced using a PCR panel for enteric bacteria which did not include testing for *Yersinia*. All cases in 2016 were reported as *Y. enterocolitica*. Whilst the sensitivity of the surveillance system has increased with the introduction of PCR testing, further laboratory testing to characterise isolates by biotype has ceased which impedes the detection of clusters.

In 2016, *Yersinia* infection notifications were in 36 males and 51 females, with an age range of less than one year to 99 years and a median age of 35 years.

**Figure 10 Notified cases of yersiniosis by month and year of illness onset, South Australia, 2011-2016**



## Quarantinable diseases

There were no cases of cholera, avian influenza in humans, Middle East respiratory syndrome, plague, rabies, severe acute respiratory syndrome (SARS), smallpox, viral haemorrhagic fever including Ebola virus infection or yellow fever reported in 2016.

## Other infectious notifiable diseases

### Leprosy

In 2016, there were no cases of leprosy reported.

### Creutzfeldt-Jakob disease

In 2016, two cases of Creutzfeldt-Jakob disease (CJD) were notified compared to five cases notified in 2015. Notified cases of CJD comprised of a male aged 79 years and a female aged 67 years. There were no links or common exposures identified between cases and both were described as sporadic cases of classical CJD.

### Legionellosis

Twenty-seven cases of legionellosis were reported in 2016 consistent with 28 cases reported in 2015 and lower than the five year average of 42 notifications per annum for the period 2011 to 2015. Laboratory tests attributed six cases to *Legionella pneumophila* serogroup 1, two cases to *L. pneumophila* serogroup 2, 18 cases to *L. longbeachae* and one case to *L. macaechernii*.

The six notified cases of *L. pneumophila* serogroup 1 comprised of one female and five males with an age range of 40 to 86 years and a median age of 73 years. Cases reported this year were older than the five year median age of 60.5 years for the period 2011 to 2015 and consistent with more male cases being reported than females in the last five years. Cases predominantly resided in metropolitan Adelaide and five cases were hospitalised due to their infection.

The *L. pneumophila* serogroup 2 cases were from metropolitan Adelaide and comprised of one female aged 68 years and one male aged 73 years.

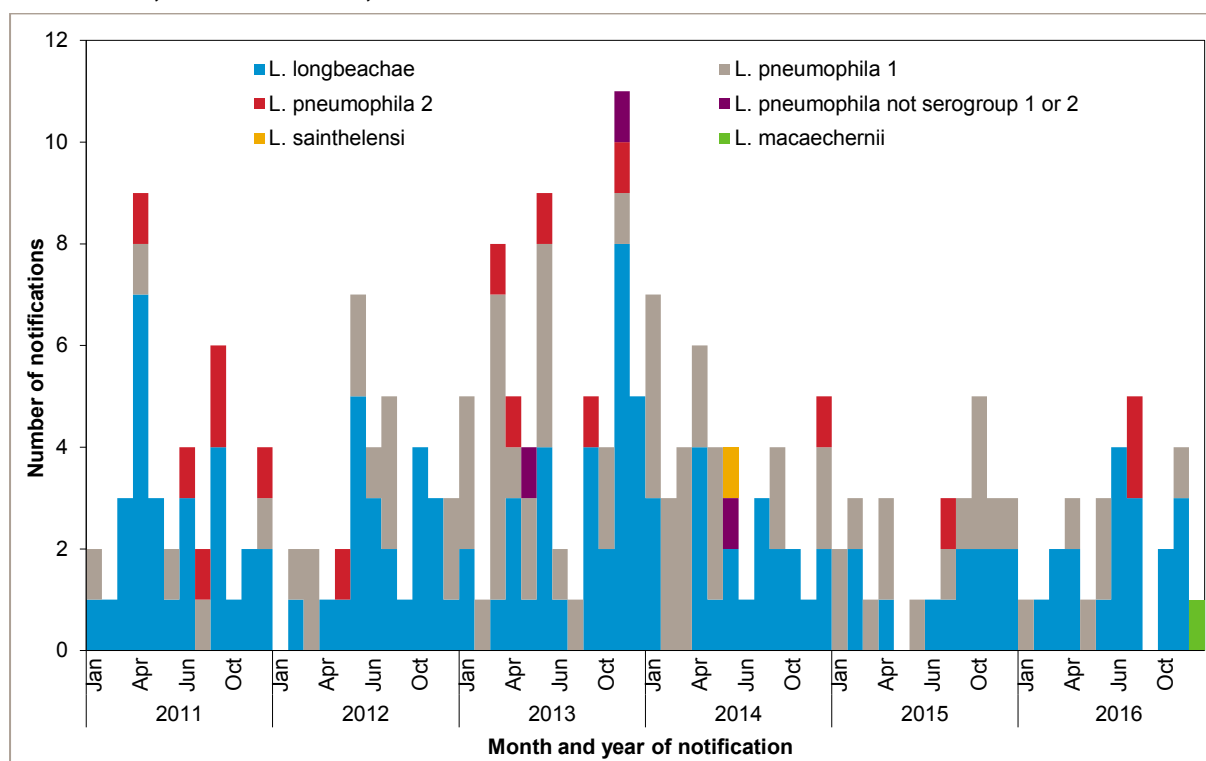
No deaths were attributed to *L. pneumophila* infection in 2016.

All cases of *L. pneumophila* are referred to Health Protection Programs for environmental investigation. No links or common sources were identified.

The 18 notified cases of *L. longbeachae* comprised of 12 males and six females with an age range of 32 to 91 years and a median age of 71 years. Cases resided across metropolitan Adelaide and rural SA. Eighty-nine percent of cases were hospitalised. There was one death, and this was attributed to *L. longbeachae* infection.

One case of *L. macaechernii* was reported in a 53 year-old male from rural SA. This was the first case of this *Legionella* type reported in SA. The case was immunocompromised, had other co-infections and his subsequent death was not attributed to the *L.* infection.

**Figure 11 Species and serogroup of notified cases of legionellosis by month and year of notification, South Australia, 2011-2016**



### Invasive meningococcal disease (IMD)

There were 27 cases of invasive meningococcal disease notified in 2016, slightly less than the 30 cases reported in 2015 and consistent with the five year average of 26 cases reported per annum for the period of 2011 to 2015. (Figure 12).

In 2016, invasive meningococcal disease notifications were in 14 males and 13 females with an age range of one to 94 years and a median age of 21 years. Cases this year were slightly older than the five year median age of 19 years. The highest number of notifications occurred in males aged 15 to 19 years and females aged 20 to 24 years. Notification rates were also highest in the 15 to 24 year age groups. (Figure 13).

Twenty cases (74%) resided in metropolitan Adelaide and seven cases (24%) resided in rural or remote South Australia.

Two cases were reported to identify as Aboriginal or Torres Strait Islander origin; one of which was the first case of a cluster which continued into 2017.

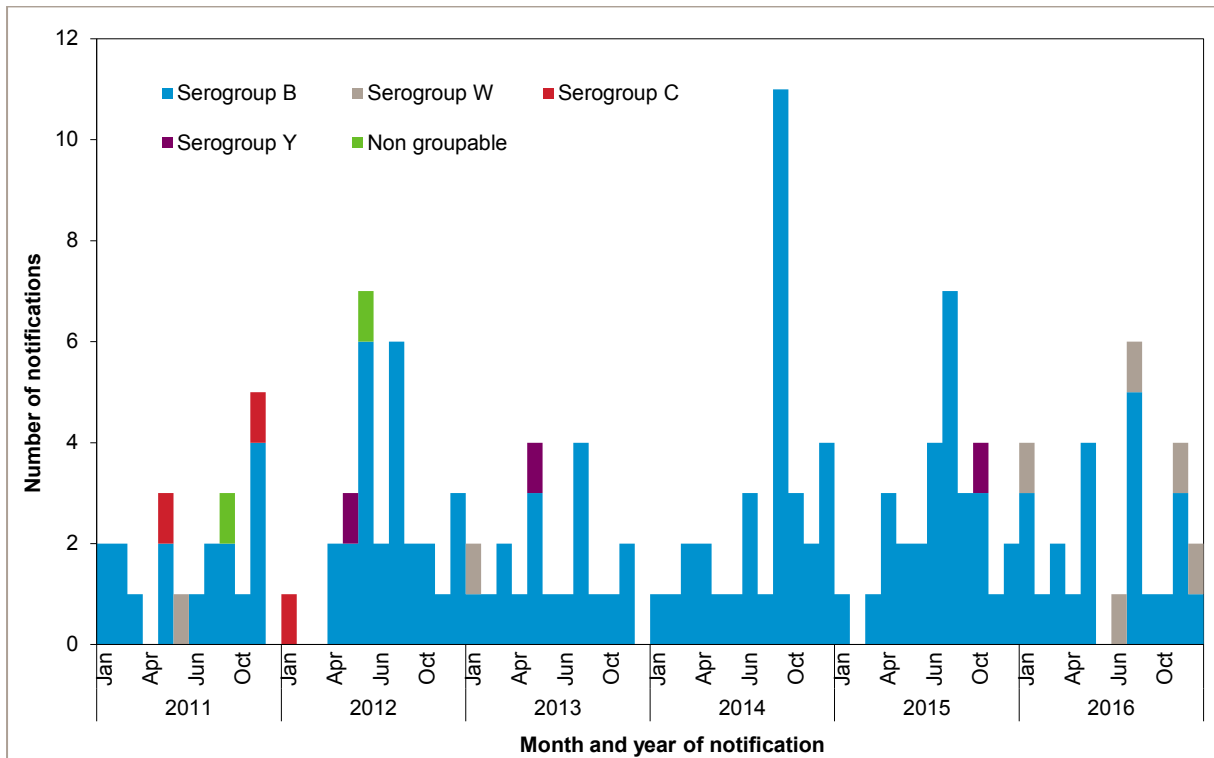
Further laboratory testing attributed 22 cases to serogroup B and the remaining seven cases to serogroup W.

Twenty-six cases (96%) were hospitalised and in 2016, there was one death due to serogroup B; a case fatality rate of 4%.

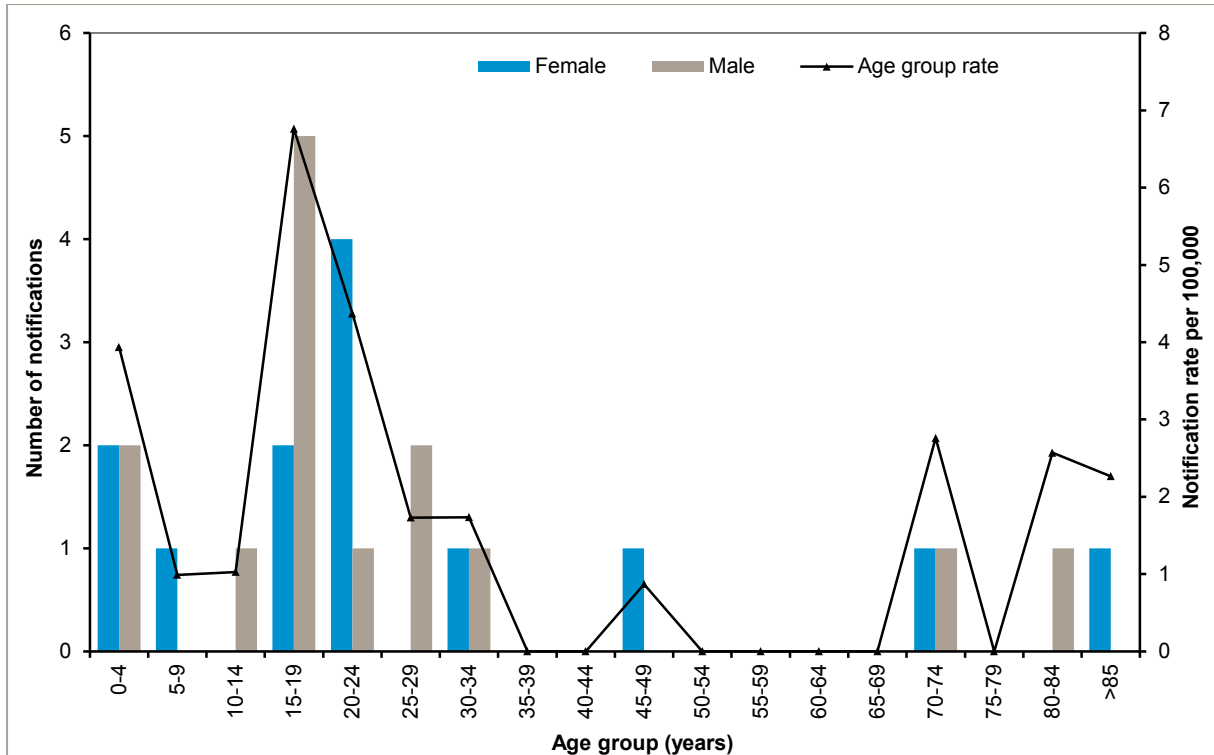
One cluster of two cases of meningococcal disease serogroup B was identified in metropolitan Adelaide ([Appendix 3](#)).

In accordance with national guidelines, contact tracing occurs with all cases; clearance antibiotics are provided for close contacts as well as vaccination, where appropriate.

**Figure 12 Serotypes of notified cases of invasive meningococcal disease by month and year of notification, South Australia, 2011-2016**



**Figure 13 Notified cases of invasive meningococcal disease by age and sex, South Australia, 2016**



## Vaccine preventable diseases

There were no cases of diphtheria, poliovirus infection, rubella or tetanus reported in 2016. There were 13,601 cases of vaccine preventable diseases were notified in 2016. Influenza virus infection was the most commonly reported vaccine preventable disease in SA and accounted for 58% of these diseases.

### *Haemophilus influenzae* infection (invasive)

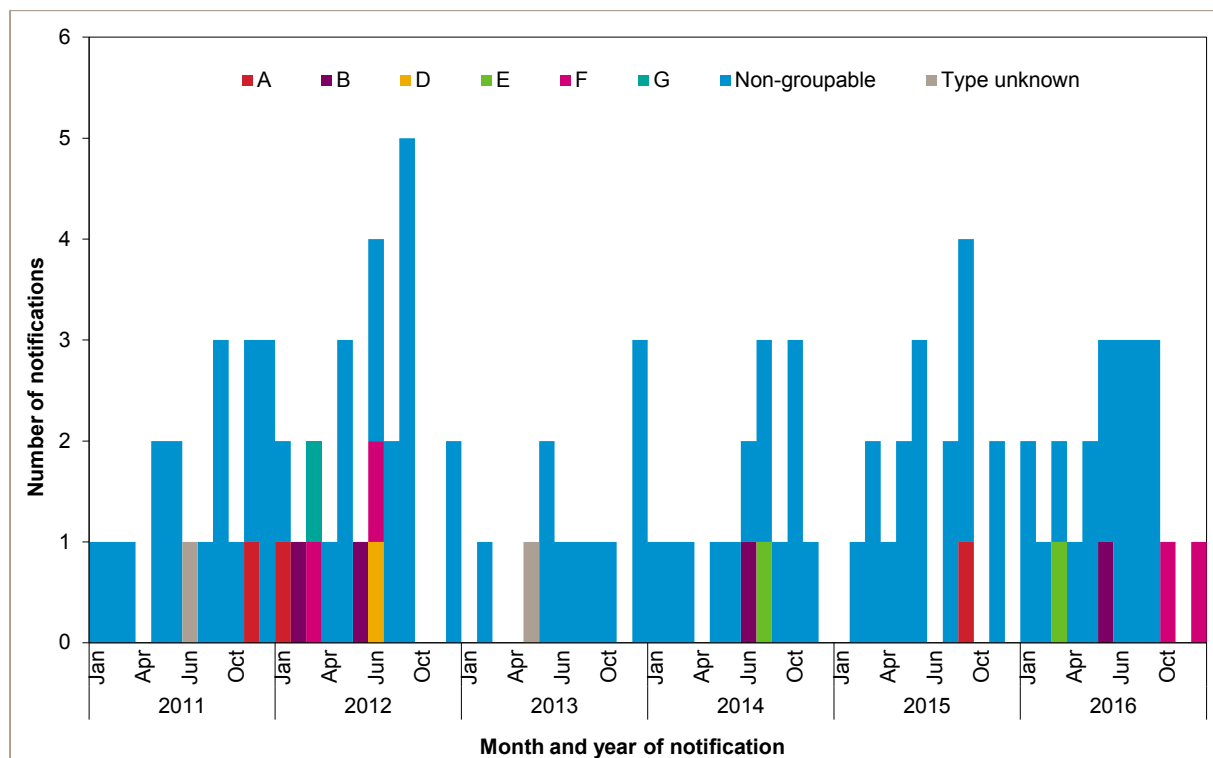
In 2016, there were 22 cases of invasive *H. influenzae* infection notified, higher than the 17 cases reported in 2015 and the five-year average of 17 cases reported per annum for the period of 2011 to 2015.

In 2016, *H. influenzae* infection notifications comprised of eight males and 14 females with an age range of one year to 96 years and a median age of 73 years. There was one death due to *H. influenzae* infection. Aboriginal status was known for 20 cases (91%), with two cases were reported to identify as Aboriginal in 2016 and is consistent with two cases were reported to identify as Aboriginal in 2015.

Further laboratory tests attributed one case to *H. influenzae* type B, two cases to type F, one case to type E and the remainder were non-groupable.

The National Immunisation Program includes vaccination against *H. influenzae* type B (HiB) for children aged from six weeks of age. The one year-old female with HiB infection had attended a metropolitan childcare centre prior to becoming unwell; further investigation ascertained all contacts in the same room as the case were fully vaccinated.

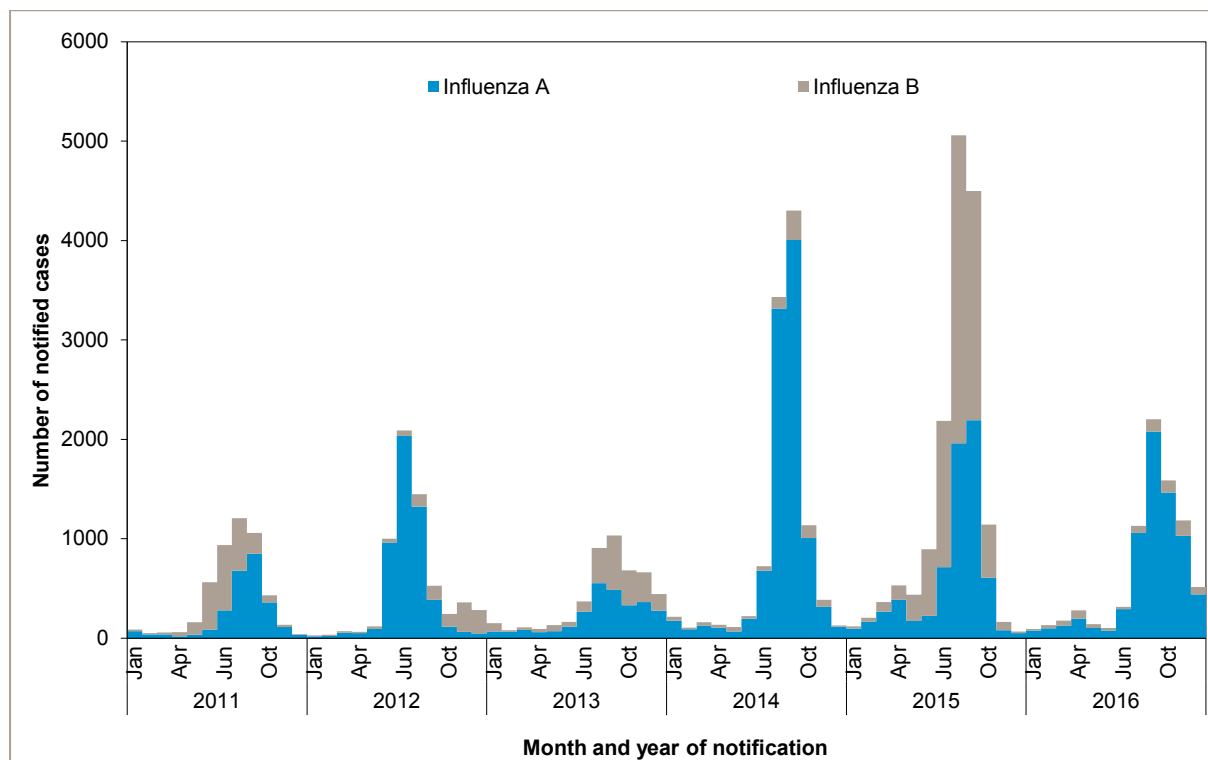
**Figure 14 Types of invasive *Haemophilus influenzae* infection cases by month and year of notification, South Australia, 2011-2016**



## Influenza

There were 7,851 notifications of laboratory confirmed influenza notified in 2016. Notifications this year represented a 49.9% decrease on the number of notifications reported in 2015 (15,659 cases), however, it was only slightly lower than the five year average of 8,517 notifications per annum for the period 2011 to 2015.

**Figure 15 Notified cases of influenza virus types by month and year of notification, South Australia, 2011-2016**



In 2016, notifications of influenza virus were in 3,540 males and 4,311 females aged less than one year to 105 years with a median age of 41 years.

The highest number of influenza notifications occurred in children aged less than 10 years of age and accounted for 17% of notifications. Persons aged 85 or older accounted for 504 (6%) notifications. Notification rates were highest in the over 85 year age-group, less than one to four year age group and in the 80-84 year age-group. Age distributions may in part reflect higher testing rates in vulnerable age group populations. (Figure 16).

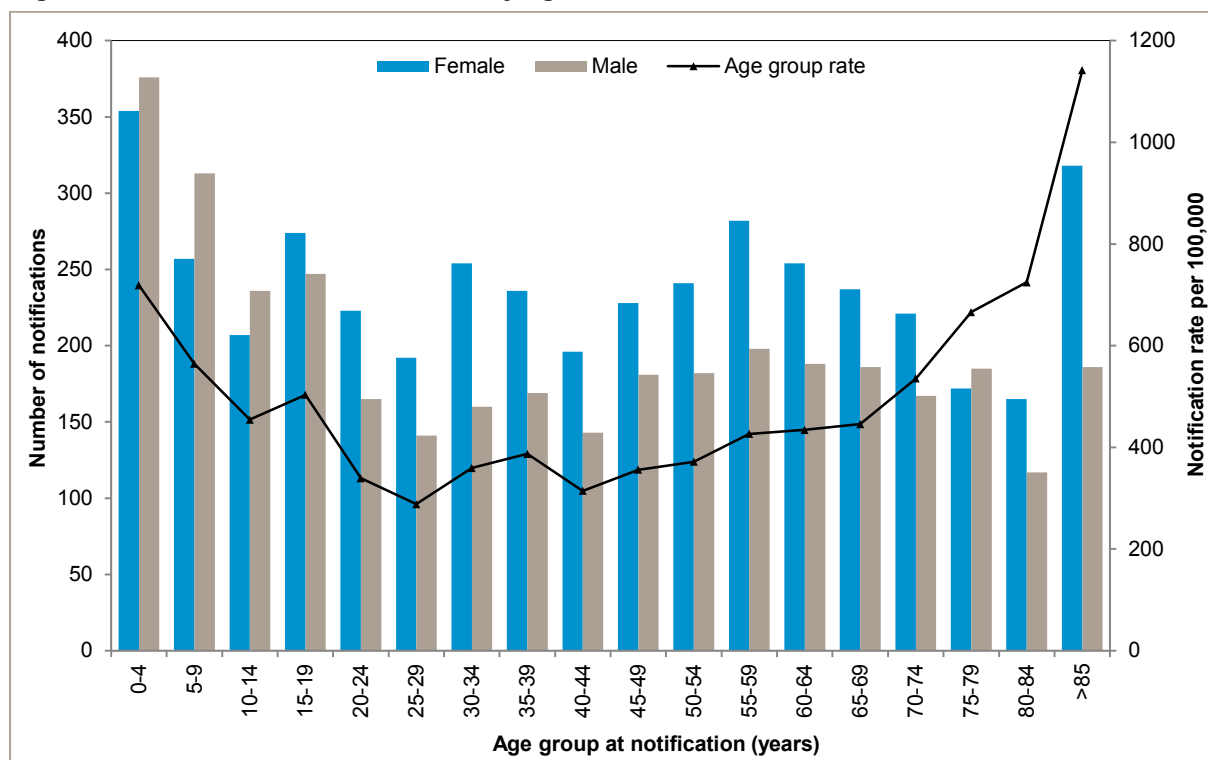
Among influenza notifications, 90% (7,030) were reported as influenza virus type A and 10% (821) of notifications were reported as influenza virus type B.

In 2016, there were 104 cases were reported to identify as Aboriginal or Torres Strait Islander and this represented 1.3% of all notifications. The completeness of indigenous status data was 83%.

In 2016, there were 44 deaths reportedly due to influenza virus infection compared to 71 deaths in 2015.

There were 30 outbreaks of influenza in residential care facilities reported to CDCB in 2016 ([Appendix 3](#)).

**Figure 16 Notified cases of influenza by age and sex, South Australia, 2016**



## Measles

There were 11 notified cases of measles in 2016, higher than the four cases notified in 2015 and a five-year average of nine cases notified per annum for the period of 2011 to 2015. Cases comprised of six males and five females with an age range of one to 45 years and a median age of 21 years. None of the cases were reported to identify as Aboriginal or Torres Strait Islander. (Figure 17).

Eight of the 11 notified cases of measles were not vaccinated for measles, two cases had documented evidence of two doses of measles-containing vaccines in childhood and the vaccination status for one case was unknown. Seven cases were hospitalised due to their illnesses.

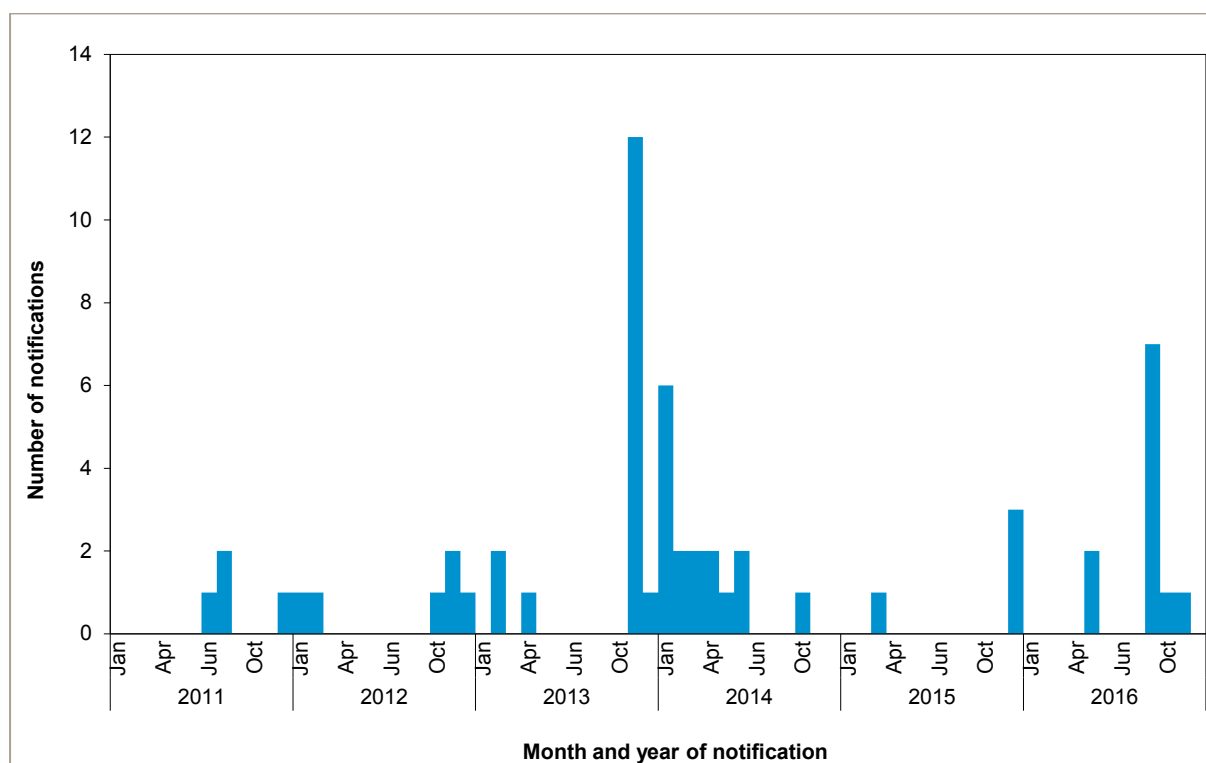
Five cases in 2016 were imported from overseas; four cases had travelled to Indonesia and one to Thailand. A further five cases were import-related following an exposure in South Australia to an infectious imported case. One case was reported during the outbreak of cases linked to the return traveller from Thailand, however, direct epidemiological links were unable to be established ([Appendix 3](#)).

In accordance with national guidelines, immediate contact tracing occurs with all cases; vaccination or immunoglobulin is provided as appropriate for identified susceptible contacts. Where appropriate, isolation of some susceptible contacts is required.

Further laboratory testing attributed nine cases to measles genotype D8 and the remaining two cases were not tested.



**Figure 17 Notified cases of measles by month and year of notification, South Australia, 2011-2016**



## Mumps

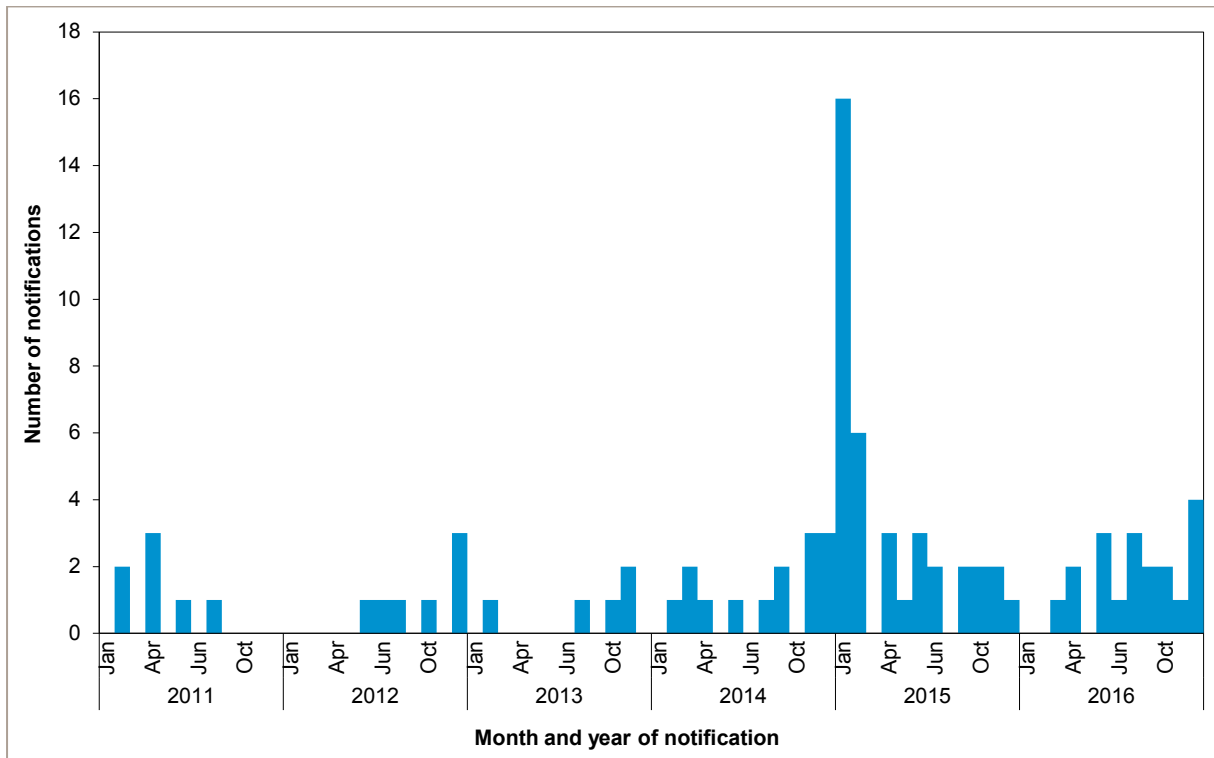
Nineteen cases of mumps were notified in 2016, half the number of cases reported in 2015 and slightly higher than the five-year average of 14 cases reported per annum for the period of 2011 to 2015. ([Figure 18](#)).

In 2016, mumps notifications were in 11 males and eight females with an age range of one year to 81 years, and a median age of 34 years, consistent with the five year average age of 34 years. Cases predominantly resided in metropolitan Adelaide. In December, three indigenous cases were reported from remote South Australia, which marked the commencement of an outbreak which has continued into 2017.

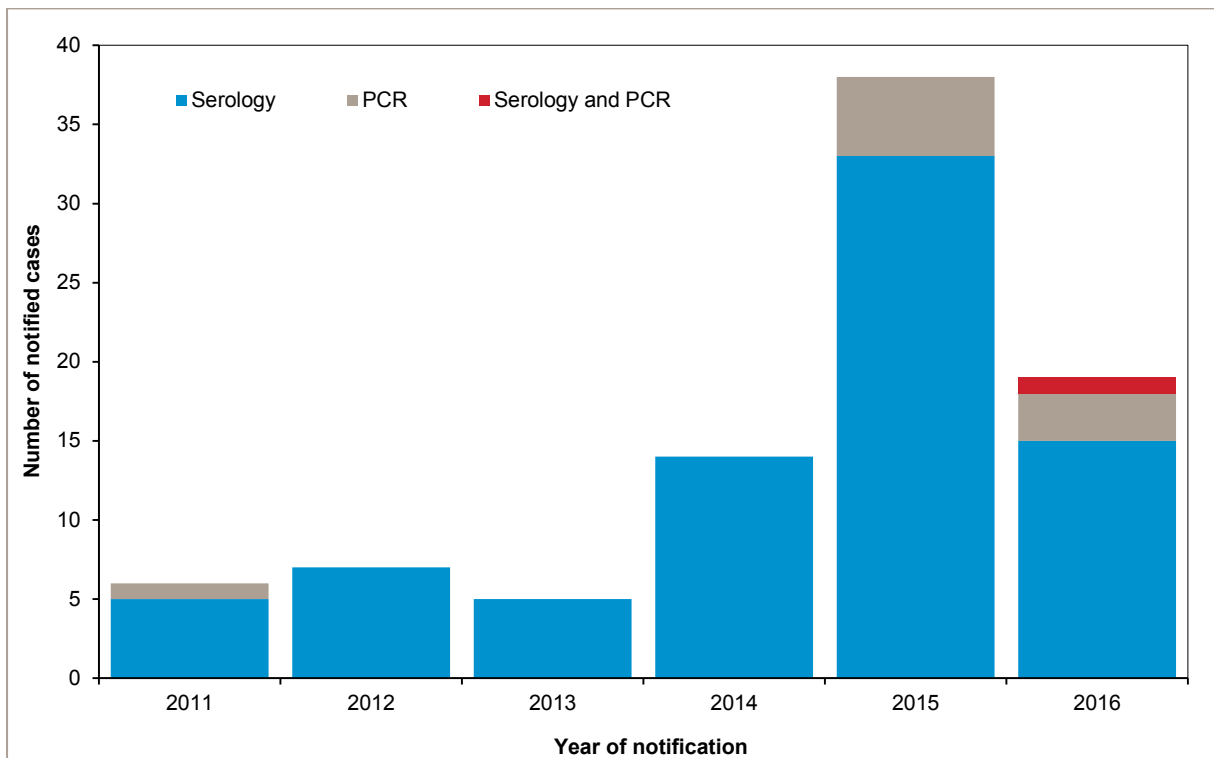
In 2016, four cases (36%) had documented evidence of receiving two mumps containing vaccines.

In 2015, PCR testing became an emerging test method to diagnose mumps in SA. In 2016, three cases were diagnosed by PCR, 15 by serological methods and one case was diagnosed by both PCR and serological tests. The proportion of cases diagnosed by serology only decreased from 87% in 2015 to 79% in 2016. PCR testing increases the accuracy of diagnoses and is a less invasive test. The proportion of diagnosis confirmation by PCR testing is expected to increase. ([Figure 19](#)).

**Figure 18 Notified cases of mumps by month and year of notification, South Australia, 2011-2016**



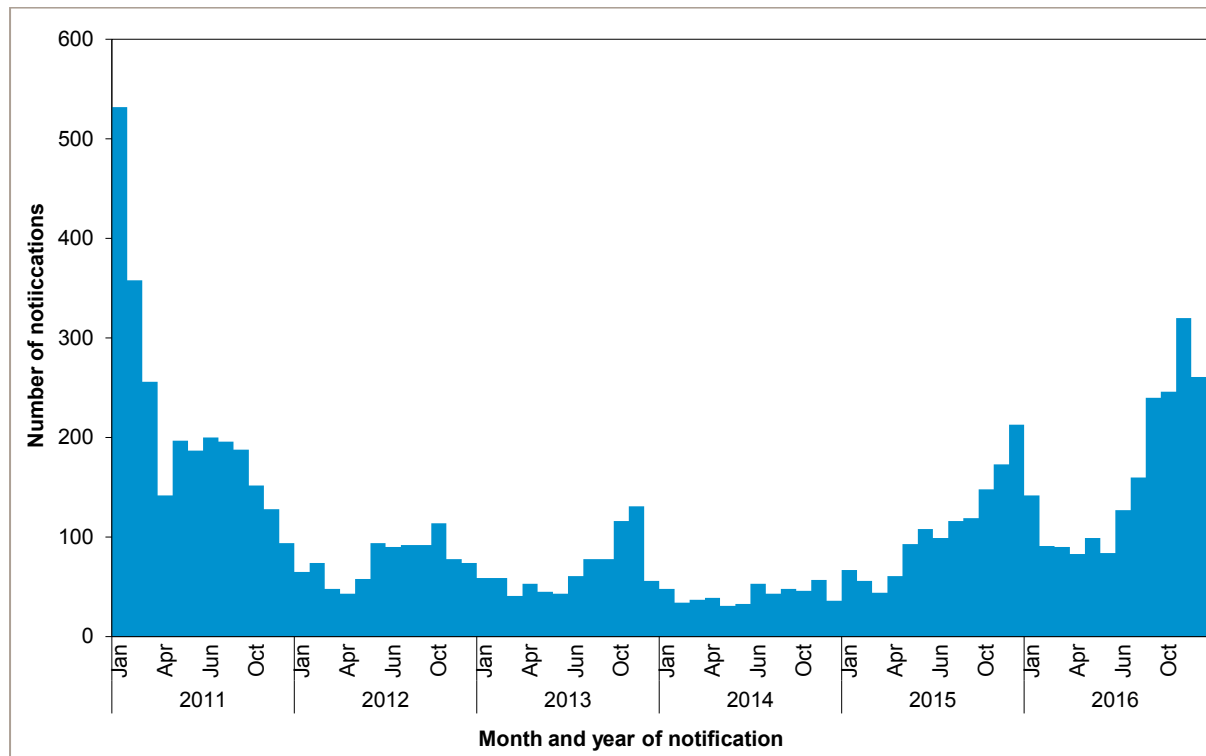
**Figure 19 Notified cases of mumps by laboratory testing method, South Australia, 2011-2016**



## Pertussis

In 2016, 1,943 cases of pertussis were notified, higher than the 1,297 reported in 2015 and the five-year average of 1,235 cases reported per annum for the period of 2011 to 2015.

**Figure 20 Notified cases of pertussis by month and year of notification, South Australia, 2011-2016**



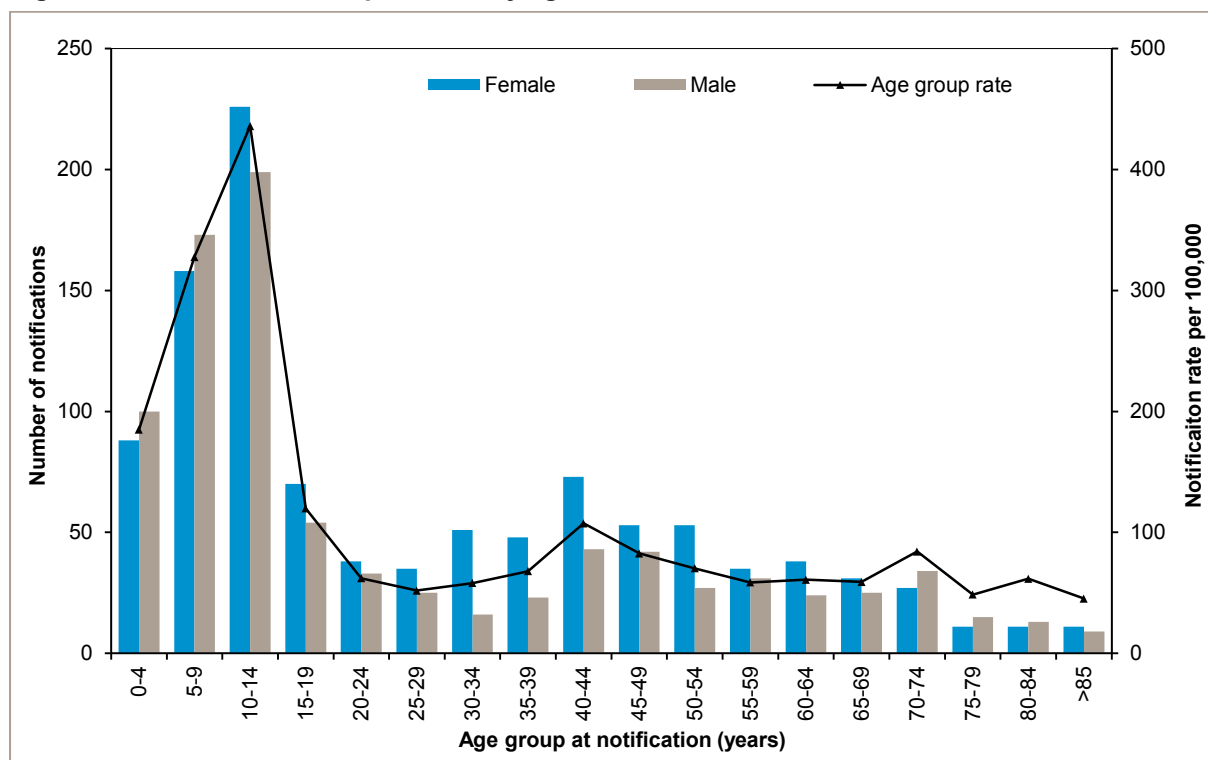
In 2016, notifications of pertussis comprised of 886 males and 1,057 females with an age range of less than 1 year to 90 years and a median age of 15 years. The median age of notified cases this year was younger than the five year median age of 34 years for the period 2011 to 2015 and consistent with more female cases being reported than males in the last five years. (Figure 21).

The pertussis notifications peaked in children aged 10 to 14 years and this age group accounted for 425 (22%) of notifications. Children aged five to nine years accounted for 331 (10%) notifications. The notification rate was highest in the 10 to 14 year age group.

Four cases aged less than six weeks were too young to be vaccinated, three of these were hospitalised. Of the eight cases aged six weeks to three months inclusive, six cases (75%) had received one dose of pertussis containing vaccine, one case was not vaccinated (12.5%) and the vaccination status of one case was unknown. Of the nine cases aged four months to less than six months inclusive, four cases (44.4%) had received two doses of vaccine, three cases (33.3%) had received one dose of vaccine, one case was not vaccinated (11.1%) and the vaccination status of one further case (11.1%) was unknown.

Pertussis vaccination is recommended for pregnant women in the third trimester of pregnancy. Of the 21 cases aged less than six months, six (28.6%) cases had documented evidence of maternal vaccination during pregnancy.

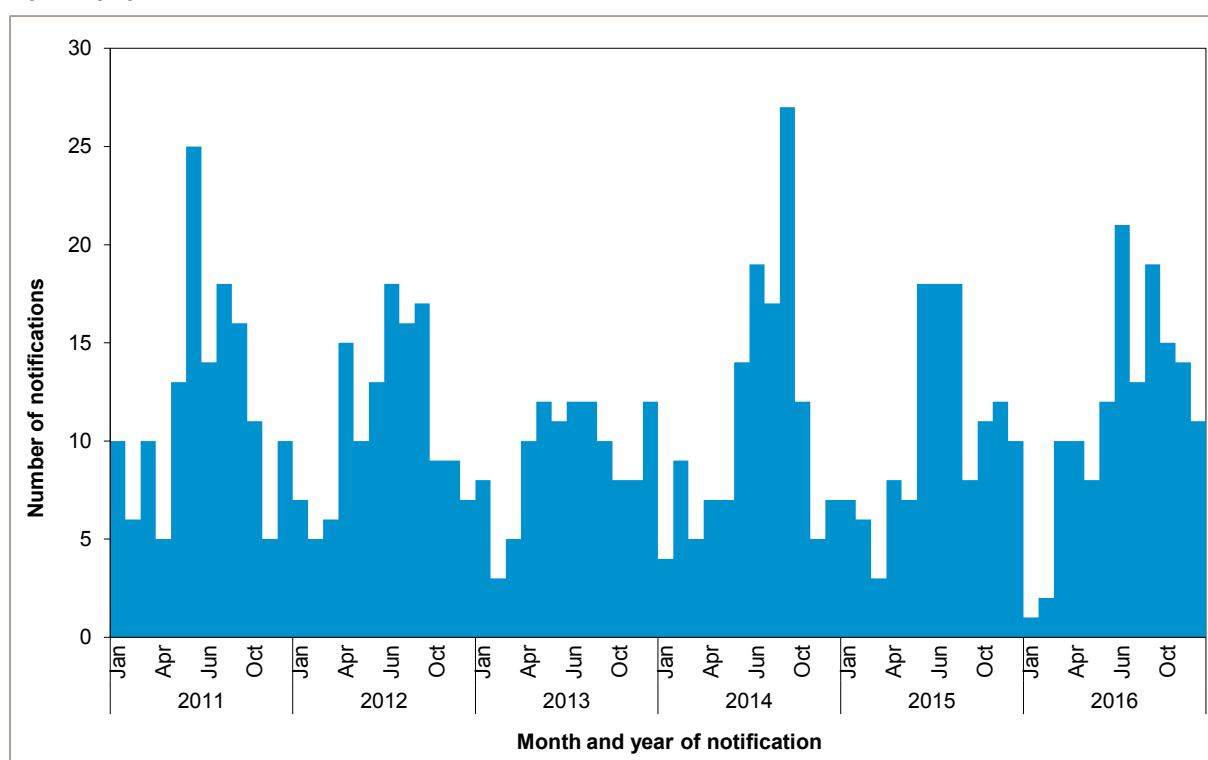
**Figure 21 Notified cases of pertussis by age and sex, South Australia, 2016**



### Invasive pneumococcal disease

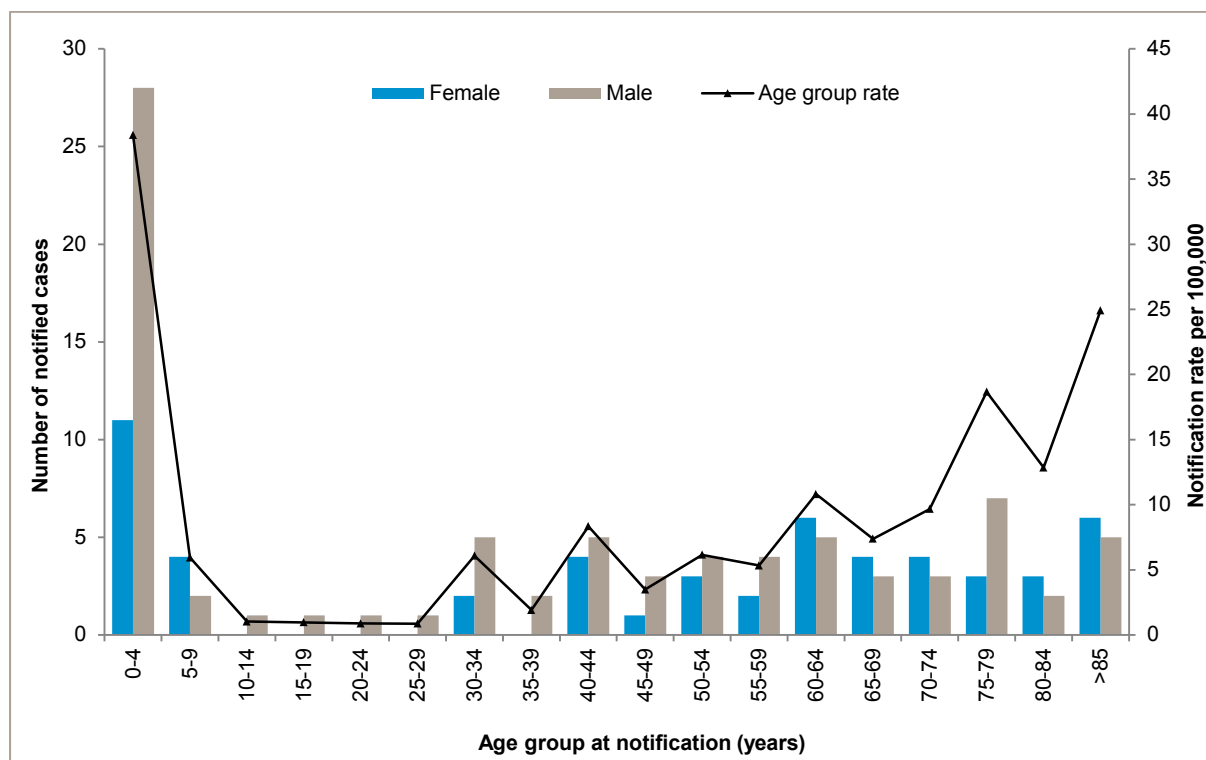
There were 136 notifications of invasive pneumococcal disease (IPD) compared with 126 notifications in 2015 and consistent with the five-year average of 129 notifications per annum for the period of 2011 to 2015.

**Figure 22 Notifications of invasive pneumococcal disease by age and sex, South Australia, 2011-2016**



One male aged four years was co-infected with two pneumococcal serotypes and this case is recorded as two notifications. Therefore cases comprised of 82 males and 53 females with an age range of less than one year to 93 years and a median age of 46 years. In 2016 the median age of cases was younger than the five-year median age of 55 years.

**Figure 23 Notified cases of invasive pneumococcal disease by age and sex, South Australia, 2016**



In 2016, there were 10 cases who were reported to identify as Aboriginal or Torres Strait Islander; the completeness of indigenous status data was 100%.

Four deaths (3%) were attributed to invasive pneumococcal disease in 2016 compared with 10 deaths (13%) attributed to invasive pneumococcal disease in 2015.

Further laboratory testing identified the pneumococcal serotype for 100 cases (74%). Thirty-six cases were not serotyped; 26 were not serotyped because they were diagnosed by PCR and serotyping was not conducted for a further 10 cases. In 2016, serogroup 3 was the most common serotype notified and accounted for 8% of notifications.

**Table 5: Five most commonly identified serotypes of invasive pneumococcal disease, South Australia, 2016**

Pneumococcal serotype	Notifications (%)
Not serotyped	36
Serotype 3	11
Serotype 9N	10
Serotype 22F	7
Serotype 19A	6
Serotype 33F	6
Other	60
<b>Total</b>	<b>136</b>

In 2016, 60 cases (60%) were attributed to serotypes included in registered pneumococcal vaccines. Of the 12 cases aged less than five years, eight cases were appropriately vaccinated for age, one case was partially vaccinated for age and the vaccination of three cases was unknown.

Of the 21 cases aged over 65 years and the three cases aged over 50 years were reported to identify as Aboriginal or Torres Strait Islander, five cases had received at least one pneumococcal vaccination, nine cases were not vaccinated and the vaccination status was unknown for 15 cases.

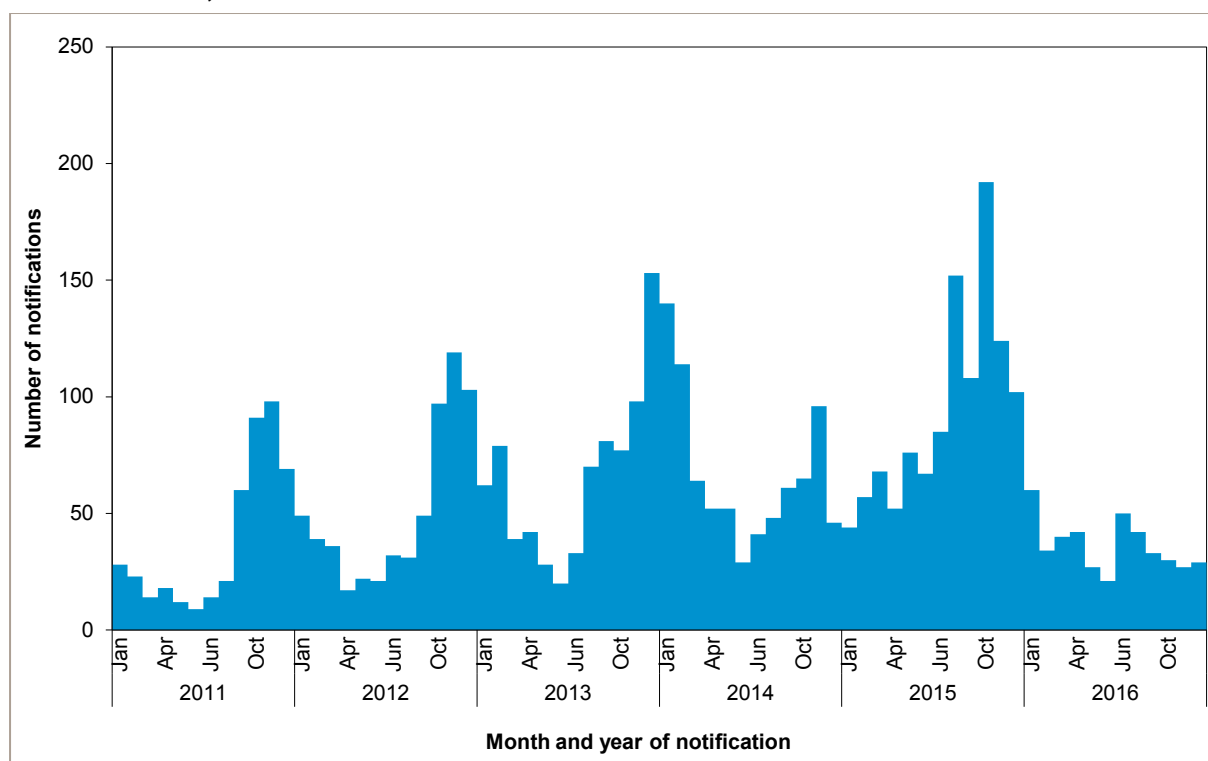
In 2016, eight cases were identified as due to a serotype which is included in the vaccine and were recorded as a vaccine failure. In 2015 four vaccine failures were reported.

Enhanced data for IPD notifications is collected and reported nationally elsewhere and informs vaccine development.

### Rotavirus infection

There were 435 cases of rotavirus infection reported in 2016. Notifications this year represented a 61.4% decrease on the number of notifications reported in 2015 (1,127) and lower than the five year average of 758 notifications per annum for the period 2011 to 2015.

**Figure 24 Notified cases of rotavirus infection by month and year of notification, South Australia, 2011-2016**



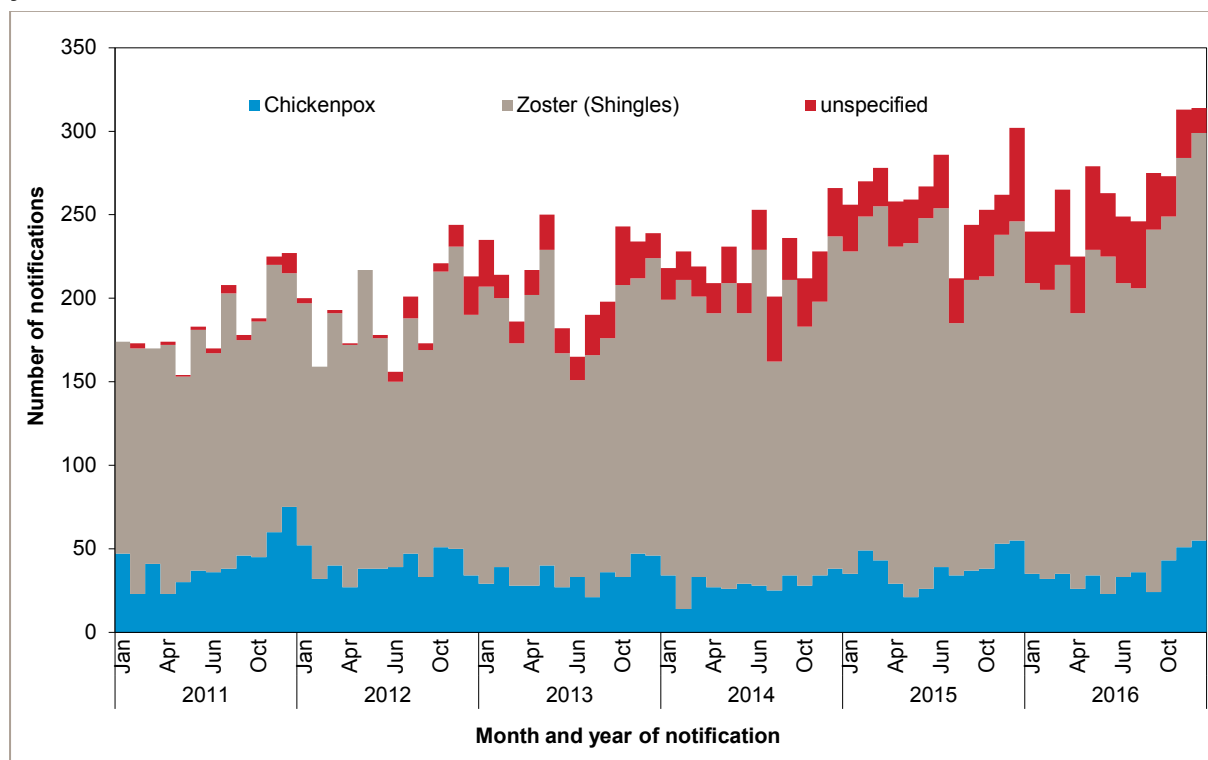
Notified cases of rotavirus comprised of 224 males and 223 females with an age range of less than one year to 96 years with 274 (62%) cases were aged less than two years. Vaccination data was available for 226 (82%) cases aged less than two years and 192 (85%) were vaccinated for age.

There were three outbreaks of rotavirus in residential care facilities reported to CDCB in 2016 ([Appendix 3](#)).

## Varicella zoster virus

In 2016, 3,182 cases of varicella zoster virus infection were notified, consistent with the 3,156 cases notified in 2015. In 2017, technical issues were identified with the reporting systems of two laboratories in SA and have resulted in an under reporting of cases to the CDCB.

**Figure 25 Characterisation of notified cases of varicella zoster virus infection by month and year of notification, South Australia 2011-2016**



Among cases of varicella-zoster notified there were 1,437 males and 1,745 females with an age range of less than one to 100 years. Medical notification characterised 427 infections as chickenpox and 2,340 as shingles and the clinical manifestation for 415 remained unspecified. The median age of chickenpox cases was 11 years and the median age of shingles cases was 59 years.

In November 2016, a National Shingles Vaccination Program was commenced as an ongoing program for 70 year olds, with a five year catch up program for persons aged 71 to 79 years. Previously shingles vaccine was only available on the private market.

## Vector borne diseases

### Barmah Forest virus infection

Five cases of Barmah Forest virus (BFV) infection were reported in 2016, a marked increase from the one case reported in 2015. From December 2013 to November 2016, changes in laboratory testing procedures affected the number of notifications compared with previous years.

In 2016, Barmah Forest virus infection notifications were in three males and two females with an age range of 28 to 70 years and a median age of 65 years.

Three cases resided in rural South Australia and two cases resided in metropolitan Adelaide; one metropolitan case had travelled to the Northern Territory immediately prior to illness.

### Chikungunya virus infection

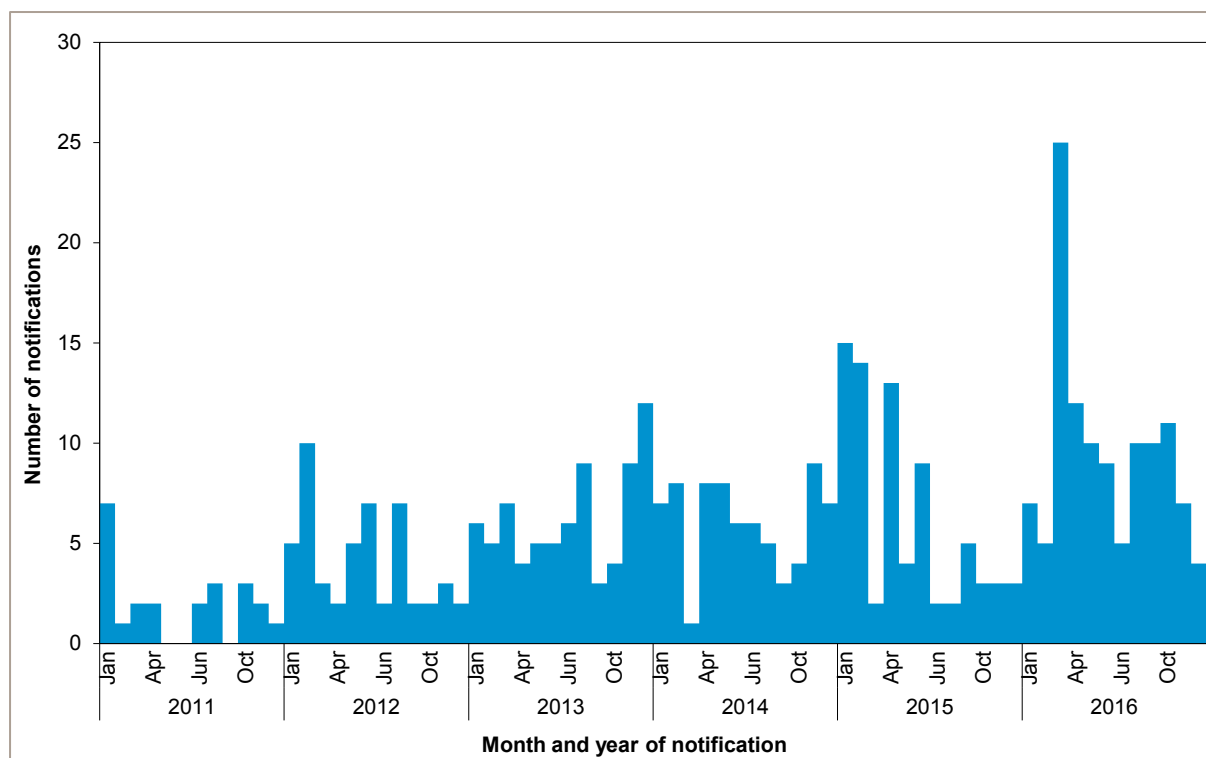
In 2016, seven cases of chikungunya virus infection were notified compared with two cases notified in 2015 and higher than the five year average of four cases reported per annum for the period of 2011 to 2015.

In 2016 chikungunya virus infection notifications were in three males and four females with an age range of 24 to 57 years and a median age of 35 years. All cases reported acquiring their infection overseas. Three cases (43%) had travelled to India, two cases (29%) to Indonesia, one case (14%) to East Timor and one case (14%) to Fiji.

### Dengue virus infection

In 2016, 115 cases of dengue virus infection were notified. Notifications this year represented a 53% increase on the 75 notifications reported in 2015 and nearly double the five year average of 59 notifications per annum for the period 2011 to 2015.

**Figure 26 Notified cases of dengue virus infection by month and year of notification, South Australia 2011-2016**





In 2016, notifications of dengue virus infection were in 61 males and 54 females with an age range of seven to 82 years and a median age of 42 years.

All cases were acquired overseas. Indonesia was the most commonly reported country of exposure (83%) followed by Thailand (6%) and the Philippines (5%).

**Table 6 Notified cases of dengue virus infection by country of acquisition, South Australia, 2016**

Country of acquisition	Cases (%)
Indonesia	83 (72)
Thailand	7 (6)
Philippines	6 (5)
South-east Asia, not further defined	3 (3)
Sri Lanka	2 (2)
East Timor	2 (2)
India	2 (2)
Cambodia	2 (2)
Pakistan	1 (<1)
Mexico	1 (<1)
Maldives	1 (<1)
Papua New Guinea	1 (<1)
Vietnam	1 (<1)
Laos	1 (<1)
Solomon Islands	1 (<1)
New Caledonia	1 (<1)
<b>Total</b>	<b>115</b>

### Zika virus infection

Two cases of Zika virus infection were reported in 2016; compared with one case reported in 2015.

Cases comprised of one male aged 25 years who travelled to Tonga and one female also aged 25 years who travelled to Brazil.

### Malaria

Ten cases of malaria were reported in 2016; a marked increase from the two cases reported in 2015 and slightly higher than the five year average of six cases reported per annum for the period of 2011 to 2015.

In 2016, malaria notifications were in six males and four females with an age range of 14 to 48 years with a median age of 34 years. All cases were acquired overseas.

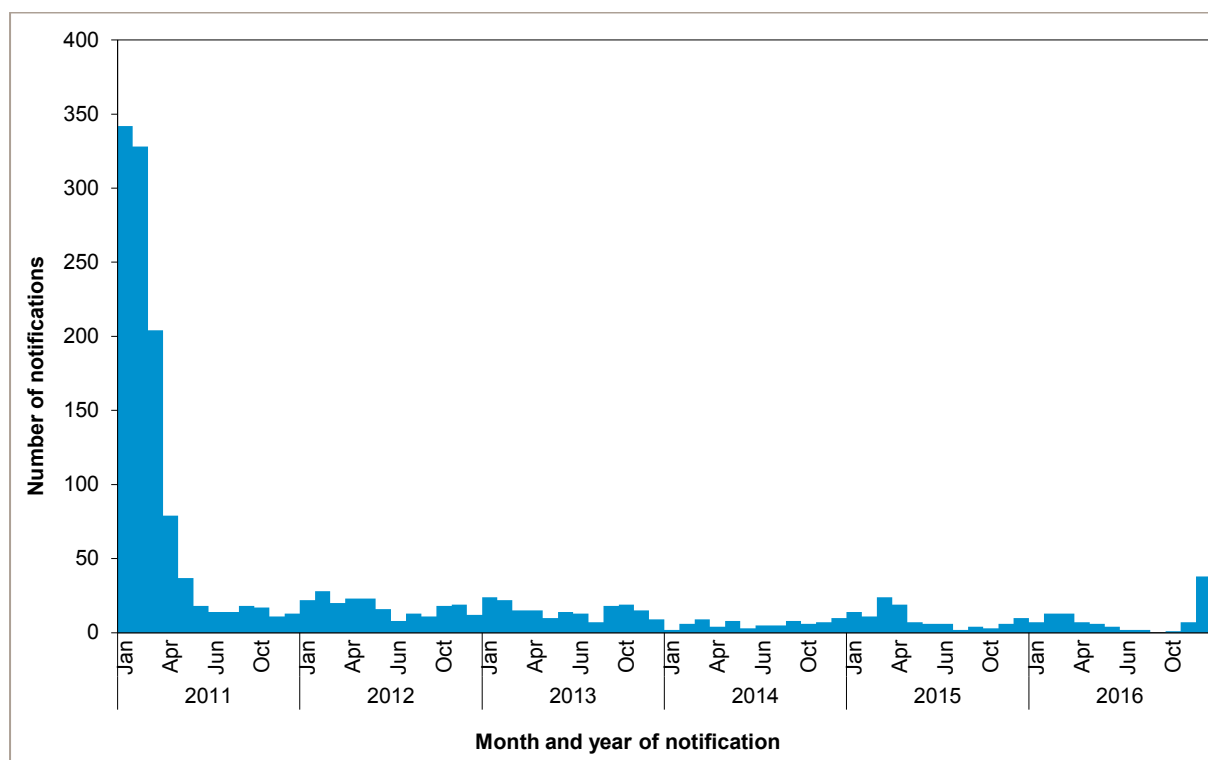
Six cases were caused by *Plasmodium vivax* and reported local of exposure included Indonesia, India and Papua New Guinea. Three cases were caused by *P. falciparum* and one case was a mixed infection of both *P. vivax* and *P. falciparum*; all with reported exposures in Africa.

## Ross River virus

There were 100 cases of Ross River virus infection (RRv) reported in 2016 slightly less than the 112 reported in 2015. Similar to BFV, changes in laboratory testing procedures affected the number of notifications of RRv between December 2013 and November 2016. An increase in notifications was observed from late November onwards corresponding with the reintroduction of serological testing of single specimens by one laboratory. (Figure 27).

In 2016, notifications of RRv infection were in 51 males and 49 females with an age range of 17 to 77 years and a median age of 48 years. Medical notification may elicit suspected location of exposure and in 2016, medical notifications were received for 92% of cases. Exposure during interstate travel was reported for 11 cases, one case reported travel to Indonesia. Notifications for 35 cases either reported travel to or were residents of locations along the River Murray.

**Figure 27 Notified cases of RRv infection by month and year of notification, South Australia, 2011-2016**



## Zoonoses

No cases of anthrax, lyssavirus, brucellosis, Hendra virus infection, psittacosis/ornithosis, rabies, or tularaemia were reported in 2016.

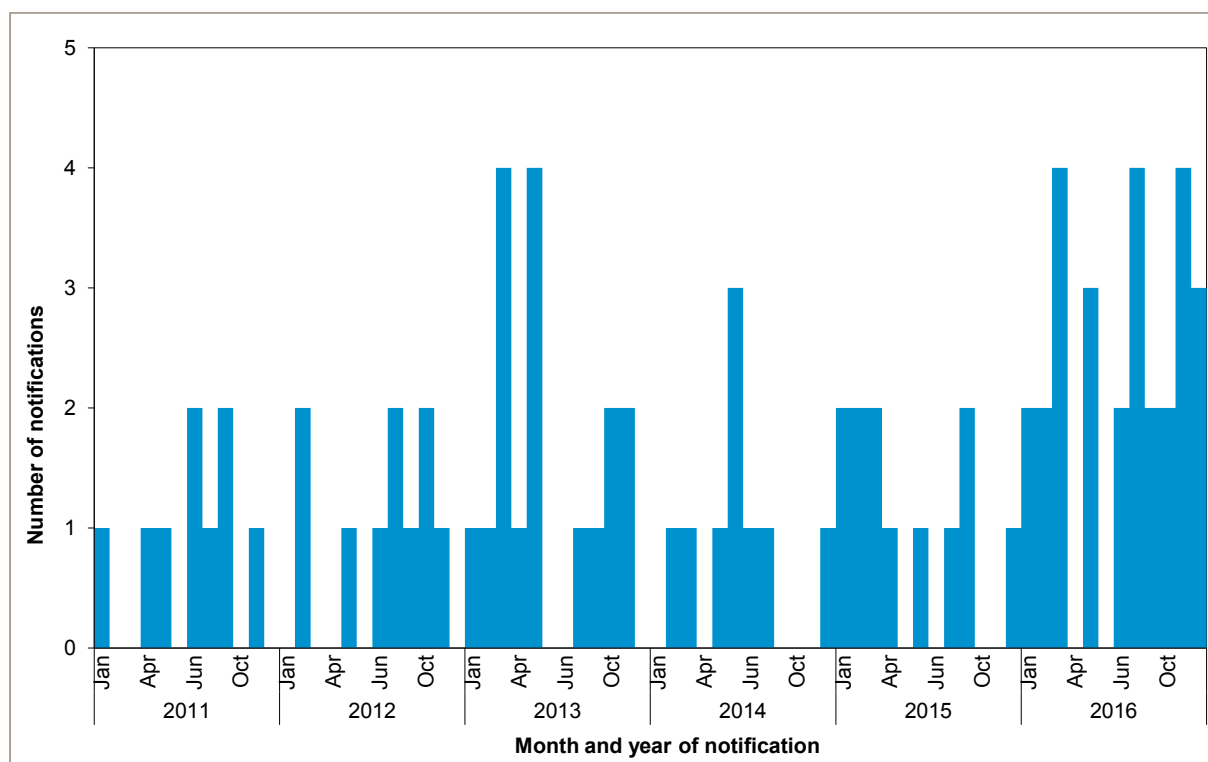
### Leptospirosis

Two cases of leptospirosis were reported in 2016 and there were no cases reported in 2015. Cases comprised of two females aged 24 and 59 years with travel during their incubation period to different locations within south-east Asia. Further laboratory testing identified one infection as due to *Leptospira copenhageni* and the other was attributed to *L. canicola*. Both cases were hospitalised.

### Q fever

There were 28 cases of Q fever notified in 2016, which is higher than both the 12 cases reported in 2015 and the five year average of 11 cases per annum for the period 2011 to 2015.

**Figure 28 Notified cases of Q fever by month and year of notification, South Australia, 2011-2016**



Twenty-two cases of Q fever (79%) reported residing on a farm and/or working in occupations involving contact with animals. No risk factors for acquiring Q fever were identified from interviews conducted for four cases. One case reportedly was vaccinated 10 years prior to illness.

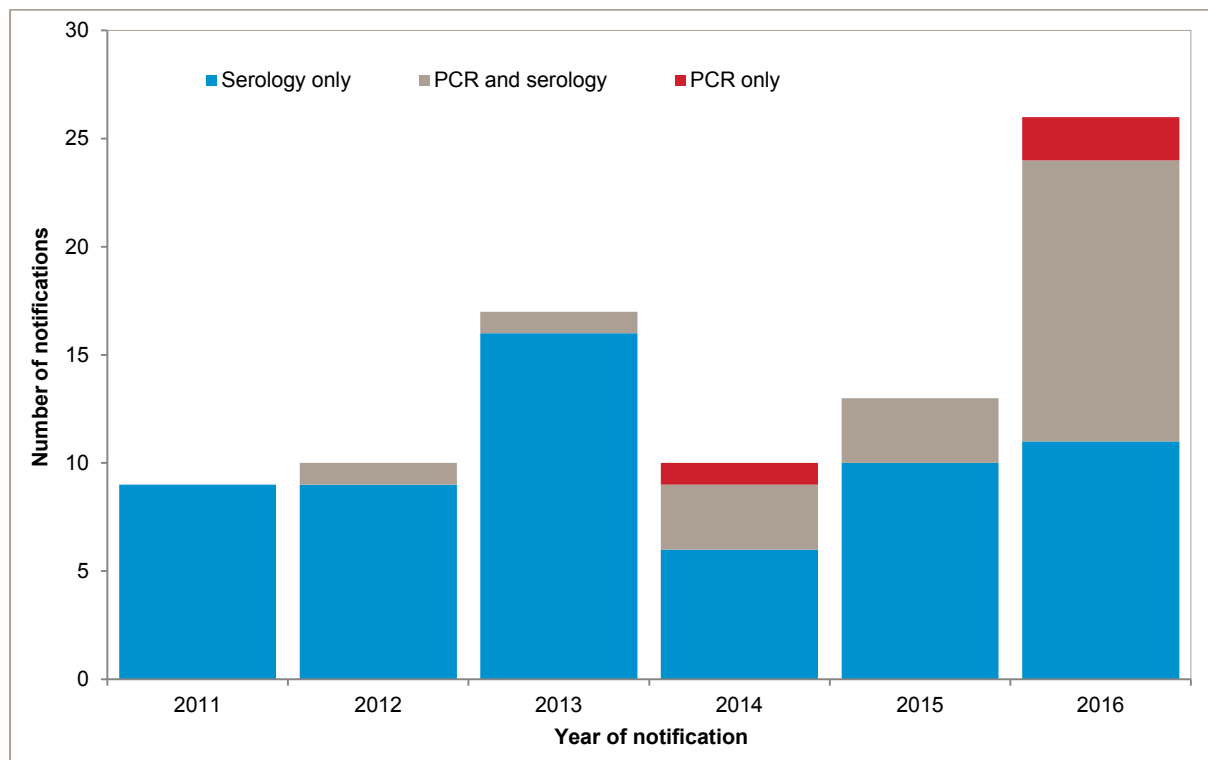
**Table 7 Notified cases of Q fever by risk factor, South Australia, 2016**

Risk factor	Cases (%)
Residential and/or occupational	22 (79)
No risk factor identified	4 (14)
Recreational	1 (3.5)
Unknown	1 (3.5)
<b>Total</b>	<b>28</b>

There was a large increase in the use of PCR testing for Q fever in 2016. Of the 28 cases notified, 14 cases were diagnosed by PCR and serological testing (50%), 11 were diagnosed by serological testing only (39%) and two were diagnosed by PCR testing only (7%). One further case was reported based on follow-up serological testing following a 2015 PCR diagnosis which had not previously been notified to CDCB (4%).

Seven of the 14 cases diagnosed by PCR and serological testing (50%) had positive PCR samples collected before any serologically positive samples were collected. The introduction of PCR testing is likely to be responsible for part of the increase in Q fever notifications in 2016.

**Figure 29 Notified cases of Q fever by laboratory testing method, South Australia 2011-2016**



## Appendices

### Appendix 1: Notifiable conditions by count, South Australia 2011 to 2016

Notifiable condition	Number of notified cases					5 year mean	2016
	2011	2012	2013	2014	2015		
<b>Enteric Diseases</b>							
Botulism	0	0	0	0	0	0	0
<i>Campylobacter</i> infection	2,150	2,164	1,722	1,806	1,818	1,932	3,196
Cryptosporidiosis	128	162	135	224	419	214	432
Hepatitis A	6	7	11	7	10	8	7
Hepatitis E	0	0	0	0	1	0	3
Listeriosis	6	4	2	6	4	4	4
Paratyphoid	1	3	6	2	9	4	4
<i>Salmonella</i> infection	1,060	843	975	1,219	1,263	1,072	1,570
Shiga toxin-producing <i>E. coli</i> infection (STEC)	49	45	53	45	45	47	175
HUS/TTP infection	2	1	0	4	1	2	0
<i>Shigella</i> infection	34	48	29	37	77	45	182
Typhoid	9	3	8	9	8	7	6
<i>Vibrio parahaemolyticus</i> infection	NN	NN	NN	NN	NN	NN	8
Yersinosis	1	13	10	43	67	22	87
<b>Quarantinable diseases</b>							
Cholera	0	2	0	0	1	0	0
Influenza (avian in humans)	0	0	0	0	0	0	0
Middle East respiratory syndrome coronavirus (MERS-CoV)	0	0	0	0	0	0	0
Plague	0	0	0	0	0	0	0
Rabies	0	0	0	0	0	0	0
Severe acute respiratory syndrome (SARS)	0	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0	0
Viral haemorrhagic fever	0	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	0
<b>Other infectious notifiable diseases</b>							
Creutzfeldt-Jakob disease	5	1	4	3	5	4	2
Legionellosis	39	37	60	44	28	42	27
Leprosy	1	0	1	1	0	1	0
Meningococcal disease (invasive)	21	29	20	32	30	2	27
<b>Vaccine preventable diseases</b>							
Diphtheria	0	0	1	0	0	0	0
<i>Haemophilus influenzae</i> (invasive)	18	19	11	13	17	17	22
<i>Haemophilus influenzae</i> type b (invasive)	1	4	0	2	1	2	2
Influenza A	3,598	1,132	2,179	1,088	8,744	3,348	821
Influenza B	1,192	5,135	2,641	9,962	6,915	5,169	7,030
Measles	4	6	16	16	4	9	11
Mumps	7	7	5	14	38	14	19
Pertussis	2,630	922	820	505	1,297	1,235	1,943

Notifiable condition	Number of notified cases					5 year mean	2016
	2011	2012	2013	2014	2015		
Pneumococcal disease (invasive)	143	132	111	133	126	129	136
Polio virus infection	0	0	0	0	0	0	0
Rotavirus	457	615	782	808	1,127	758	435
Rubella	3	2	2	2	2	2	0
Rubella - congenital	0	0	1	0	0	0	0
Tetanus	0	1	1	0	0	0	0
Varicella zoster (unspecified)	38	72	239	288	365	200	415
Varicella zoster (chickenpox)	501	481	407	350	459	439	427
Varicella zoster (shingles)	1,685	1,775	1,908	2,072	2,332	1,954	2,340
<b>Vectorborne diseases</b>							
Barmah Forest virus infection	141	50	77	0	1	54	5
Chikungunya virus infection	4	0	9	7	2	4	7
Dengue virus infection	23	50	75	72	75	59	115
Japanese encephalitis virus infection	0	0	1	0	0	0	0
Kunjin virus infection	0	0	0	0	0	0	0
Malaria	4	8	8	6	2	6	10
Murray Valley encephalitis infection	2	0	0	0	0	0	0
Ross River virus infection	1,095	213	181	73	112	335	100
Zika virus infection	0	1	0	0	1	0	2
<b>Zoonoses</b>							
Anthrax	0	0	0	0	0	0	0
Australian bat lyssavirus infection	0	0	0	0	0	0	0
Brucellosis	0	1	0	0	0	0	0
Hendra virus infection	NN	NN	NN	NN	NN	NN	0
Hydatid Disease	4	NN	NN	NN	NN	NN	0
Leptospirosis	3	2	2	1	0	2	2
Lyssavirus (NEC)	0	0	0	0	0	0	0
Psittacosis/Ornithosis	0	1	0	0	1	0	0
Q Fever	9	10	17	9	12	11	28
Tularaemia	0	0	0	0	0	0	0
<b>Grand Total</b>	<b>15,074</b>	<b>14,001</b>	<b>12,530</b>	<b>18,903</b>	<b>25,418</b>	<b>17,153</b>	<b>19,600</b>

NN = not notifiable; NEC = not elsewhere classified

## Appendix 2: Notifiable conditions by rate, South Australia 2011 to 2016

Notifiable condition	Notification rate per 100,000					
	2011	2012	2013	2014	2015	2016
<b>Enteric diseases</b>						
Botulism	0	0	0	0	0	0
<i>Campylobacter</i> infection	129.8	130.8	103.1	107.1	107.0	187.1
Cryptosporidiosis	7.7	9.8	8.1	13.3	24.7	25.3
Hepatitis A	0.4	0.4	0.7	0.4	0.6	0.4
Hepatitis E	0.0	0.0	0.0	0.0	0.1	0.2
Listeriosis	0.4	0.2	0.1	0.4	0.2	0.2
Paratyphoid	0.1	0.2	0.4	0.1	0.5	0.2
<i>Salmonella</i> infection	64.0	50.9	58.4	72.3	74.4	91.9
Shiga toxin-producing <i>E. coli</i> infection (STEC)	3.0	2.7	3.2	2.7	2.6	10.2
HUS/TTP infection	0.1	0.1	0.0	0.2	0.1	0.0
<i>Shigella</i> infection	2.1	2.9	1.7	2.2	4.5	10.7
Typhoid	0.5	0.2	0.5	0.5	0.5	0.4
<i>Vibrio parahaemolyticus</i> infection	NN	NN	NN	NN	NN	0.5
Yersinosis	0.1	0.8	0.6	2.6	3.9	5.1
<b>Quarantinable diseases</b>						
Cholera	0.0	0.1	0.0	0.0	0.1	0.0
Influenza (avian in humans)	0.0	0.0	0.0	0.0	0.0	0.0
Middle East respiratory syndrome coronavirus (MERS-CoV)	0.0	0.0	0.0	0.0	0.0	0.0
Plague	0.0	0.0	0.0	0.0	0.0	0.0
Rabies	0.0	0.0	0.0	0.0	0.0	0.0
Severe acute respiratory syndrome (SARS)	0.0	0.0	0.0	0.0	0.0	0.0
Smallpox	0.0	0.0	0.0	0.0	0.0	0.0
Viral Haemorrhagic Fever	0.0	0.0	0.0	0.0	0.0	0.0
Yellow Fever	0.0	0.0	0.0	0.0	0.0	0.0
<b>Other infectious notifiable diseases</b>						
Creutzfeldt-Jakob disease	0.3	0.1	0.2	0.2	0.3	0.1
Legionellosis	2.4	2.2	3.6	2.6	1.6	1.6
Leprosy	0.1	0.0	0.1	0.1	0.0	0.0
Meningococcal disease (invasive)	1.3	1.8	1.2	1.9	1.8	1.6
<b>Vaccine preventable diseases</b>						
Diphtheria	0.0	0.0	0.1	0.0	0.0	0.0
<i>Haemophilus influenzae</i> (invasive)	1.1	1.1	0.7	0.8	0.9	1.2
<i>Haemophilus influenzae</i> type b (invasive)	0.1	0.2	0.0	0.1	0.1	0.1
Influenza A	217.1	68.4	130.4	64.5	514.8	48.1
Influenza B	71.9	310.3	158.1	591.0	407.1	411.5
Measles	0.2	0.4	1.0	0.9	0.2	0.6
Mumps	0.4	0.4	0.0	0.8	2.2	1.1
Pertussis	158.7	55.7	49.1	30.0	76.4	113.7
Pneumococcal disease (invasive)	8.6	8.0	6.6	7.9	7.4	8.0
Polio virus infection	0.0	0.0	0.0	0.0	0.0	0.0
Rotavirus	27.6	37.2	46.8	47.9	66.3	25.5
Rubella	0.2	0.1	0.1	0.1	0.1	0.0

Notifiable condition	Notification rate per 100,000					
	2011	2012	2013	2014	2015	2016
Rubella - congenital	0.0	0.0	0.1	0.0	0.0	0.0
Tetanus	0.0	0.1	0.1	0.0	0.0	0.0
Varicella zoster (unspecified)	2.3	4.4	14.3	17.1	21.5	24.3
Varicella zoster (chickenpox)	30.2	29.1	24.4	20.8	27.0	25.0
Varicella zoster (shingles)	101.7	107.3	114.2	122.9	137.3	137.0
<b>Vectorborne diseases</b>						
Barmah Forest virus infection	8.5	3.0	4.6	0.0	0.1	0.3
Chikungunya virus infection	0.2	0.0	0.5	0.4	0.1	0.4
Dengue virus infection	1.4	3.0	4.5	4.3	4.4	6.7
Japanese encephalitis virus infection	0.0	0.0	0.1	0.0	0.0	0.0
Kunjin virus infection	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	0.2	0.5	0.5	0.4	0.1	0.6
Murray Valley encephalitis infection	0.1	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	66.1	12.9	10.8	4.3	6.6	5.9
Zikavirus infection	0.0	0.1	0.0	0.0	0.1	0.1
<b>Zoonoses</b>						
Anthrax	0.0	0.0	0.0	0.0	0.0	0.0
Australian bat lyssavirus infection	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis	0.0	0.1	0.0	0.0	0.0	0.0
Hendra virus infection	NN	NN	NN	NN	NN	0.0
Hydatid Disease	0.2	NN	NN	NN	NN	0
Leptospirosis	0.2	0.1	0.1	0.1	0.0	0.1
Lyssavirus (NEC)	0.0		0.0	0.0	0.0	0.0
Psittacosis/Ornithosis	0.0	0.1	0.0	0.0	0.1	0.0
Q Fever	0.5	0.6	1.0	0.5	0.7	1.6
Tularaemia	0.0	0.0	0.0	0.0	0.0	0.0

NN = Not notifiable; NEC = not otherwise classified



## Appendix 3: Summary of outbreaks reported in 2016

### Foodborne Disease Investigations 2016

A foodborne outbreak is defined as an event where two or more people experience a similar illness after eating a common meal or food and epidemiological evidence indicates the meal or food as the source of the illness.

#### *Salmonella* Typhimurium phage type 135a – Restaurant – January

On the 28<sup>th</sup> January, a medical notification for a *Salmonella* case was received which indicated that four out of five people in a family were unwell with gastroenteritis after consuming milk shakes from a café. On the 29<sup>th</sup> January, a call was received from a Victorian resident indicating that three out of four people were unwell with gastroenteritis after eating food from the same café while attending a national sport event. An investigation was launched. A total of 31 people with gastroenteritis who consumed food from the café were identified across three jurisdictions, with 26 positive for *Salmonella*. Twenty-three cases were residents of South Australia, with 19 confirmed as *Salmonella* Typhimurium phage type 135a with an MLVA profile 03-14-10-10-523. Other cases were interstate residents. An environmental investigation at the premise identified that the ice-cream was made with raw eggs. The ice-cream was served in milk shakes, and as a topping for various desserts.

#### *Salmonella* Anatum – Community – February

On 1<sup>st</sup> February, an increase in notifications for *Salmonella* Anatum was detected through routine surveillance. Interviews were conducted with five cases and no common links were found. On the 4<sup>th</sup> February the Victorian Department of Health and Human Services announced they had an increased number of notifications for *Salmonella* Anatum and had initiated a product recall for pre-packed salad greens. Twenty-eight cases tested using whole genome sequencing had the outbreak sequence in SA. Thirteen of the cases reported eating pre-packed salad greens.

#### *Salmonella* Typhimurium phage type 9 – Restaurant – February

An increase in notifications for *Salmonella* Typhimurium phage type 9 was noted on 10<sup>th</sup> February 2016. All cases with dates of onset since 25<sup>th</sup> January were interviewed and three cases with onset dates between 25<sup>th</sup> and 30<sup>th</sup> January were linked to a café in metropolitan Adelaide, one of whom (onset date 30<sup>th</sup> January) worked as a food-handler at the café. One of the cases was hospitalised. The three cases consumed a range of egg based dishes at the café. All three cases had the same MLVA profile: 03-15-07-12-550. The outbreak information was referred to local council environmental health officers for investigation.

#### *Salmonella* Typhimurium phage type 9 – Takeaway – February

An increase in notifications for *Salmonella* Typhimurium phage type 9 was noted on 10<sup>th</sup> February 2016. All cases with dates of onset since 25<sup>th</sup> January were interviewed and ten cases with onset dates between 1<sup>st</sup> and 10<sup>th</sup> February were linked to a takeaway outlet in metropolitan Adelaide. One of the cases was hospitalised. The ten cases consumed a variety of Vietnamese rolls which were made with raw egg butter. All ten cases had the same MLVA profile: 03-25-12-11-523. The outbreak information was referred to local environmental health officers for investigation. Two samples of egg butter from this outlet were submitted to the laboratory; no *Salmonella* was detected in either sample.

### ***Salmonella* subsp 1 ser 4, 12:i:- – Restaurant – February**

There was an increase in *Salmonella* subsp 1 ser 4, 12:i:- with nine notifications received within a four week period. Seven cases were interviewed and, from the interviews, three cases were linked to a takeaway outlet in metropolitan Adelaide. All three cases had consumed Vietnamese rolls or salad which included a number of common ingredients. The premise was inspected by the local council environmental health officer, a number of food samples were submitted to the laboratory, but no *Salmonella* was detected in the food samples. Two of the three cases were reported as the same MLVA profile; 04-14-10-00-490 one with the MLVA profile 04-15-12-00-490. The source of the infection was not determined.

### ***Salmonella* Typhimurium phage type 44 – Restaurant – February**

On the 23rd February, a *Salmonella* medical notification was received, which mentioned the person ate at a particular café. The following day two suspected food poisoning cases were notified who had consumed food from the same café. An investigation was commenced and, in total, 13 cases of *S. Typhimurium* phage type 44 MLVA 03-10-09-10-523 and two cases of suspected food poisoning were linked to the café. Ten of the cases identified eating eggs on toast, three cases identified eating pancakes and one case each identified eating a breakfast donut and a chicken salad. Three environmental inspections were conducted at the café. Poor food handling and practices were identified. No *Salmonella* was detected on samples taken at the café.

### ***Salmonella* Typhimurium phage type 108 – Institution – April**

Three cases of *Salmonella* Typhimurium phage-type 108, MLVA 03-09-09-14-523, occurred in residents at an institution. All three cases shared a house within the facility and prepared their own food, including raw egg milkshakes. An inspection of the facility was conducted by the local government environmental health officer. No further cases were reported from the facility.

### ***Salmonella* Typhimurium phage type 9 – Restaurant – April**

Three persons with *Salmonella* Typhimurium phage-type 9 infection were identified as eating at the same restaurant. The restaurant was inspected by the local government environmental health officer. Environmental samples from the restaurant were collected and no *Salmonella* was detected. Two of the cases had an MLVA of 03-24-13-10-523 with the results of the other case pending.

### ***Salmonella* Typhimurium phage type 135 – Takeaway – May**

On 11th May, CDCB received notifications for four confirmed cases of *Salmonella* who all identified eating Vietnamese rolls from the same takeaway shop in metropolitan Adelaide. A total of thirty-four *Salmonella* Typhimurium 135 cases were linked to food prepared by the takeaway shop with 31 cases reporting that they had consumed various Vietnamese rolls. Of those cases (34) with a MLVA profile, all were identical (03-12-09-11-523). An environmental investigation of the premise identified that raw egg was being used in the butter spread for the rolls. However, food samples were *Salmonella* not detected.

### ***Salmonella* Typhimurium phage type 9 – Restaurant – August**

Multiple reports of suspected food poisoning were made to CDCB and the local government following consumption of food at the same hotel in August 2016. A case-control study was conducted. Of 219 people interviewed, 84 were confirmed with *Salmonella* and 59 reported experiencing gastrointestinal illness. The majority of confirmed cases were infected with *Salmonella* Typhimurium phage type 9 (81 cases), with other types of *Salmonella* also reported. The predominant MLVA type of cases was 03-24-11-10-523 (83 cases). The results from the case-control study indicate that the odds of cases eating scrambled eggs were 41 times higher than the odds of controls eating scrambled eggs. Environmental swabs of the kitchen were *Salmonella* not detected.

### **Salmonella Typhimurium phage type 135 – Bakery – October**

Eight people with *Salmonella* Typhimurium phage type 135 consumed sandwiches or wraps from the same bakery. All cases had the same MLVA profile, 03-14-10-10-523. An environmental health inspection of the premises was conducted and no major issues were identified.

### **Salmonella Typhimurium phage type 9 – Restaurant – December**

Fourteen people with *Salmonella* Typhimurium phage type 9 were associated with the same restaurant; 11 had consumed food from the restaurant and three were staff members. Food samples, including aioli, hummus and dukkha, and environmental swabs from the restaurant were positive for *Salmonella* Typhimurium phage type 9. A prohibition order was placed on the venue and it was closed until clearance was given by SA Health.

### **Campylobacter – Commercial caterer – December**

Six cases of campylobacteriosis and five cases of gastroenteritis were reported among 90 attendees at a wedding. Food was supplied by a catering company and served on boards to be shared amongst a group of people. The local council inspected the catering company and the preparation of chicken liver parfait was inadequate; cases also reported inadequate and dirty toilet facilities at the venue.

**Note:** MLVA (Multi-locus variable number tandem repeat analysis) is a laboratory technique used to determine if bacteria are genetically similar.

## **Vaccine Preventable Disease Investigations 2016**

An outbreak is defined as the occurrence of cases of disease above what is normally expected within a specific place or group of people over a given period of time.

### **Measles**

South Australia experienced an outbreak of measles in September, consisting of four cases. The source of the outbreak was a traveller returning from Thailand. SA Health urges anyone planning to travel overseas to ensure they are fully vaccinated before leaving Australia.

### **Meningococcal infection**

There was one invasive meningococcal infection cluster identified in August/September caused by *Neisseria meningitidis* serogroup B. The cluster comprised of two males, both in their late teens. CDCB identified 11 people with social connections to both cases and these people were directed to receive clearance antibiotics.

## Outbreaks Reported by Aged Care Facilities in 2016

Month reported	Agent identified	Number of facilities affected
<b>January</b>	Gastroenteritis, organism not detected	4
	Norovirus	1
	Rotavirus	1
<b>February</b>	Gastroenteritis, organism not detected	1
	Norovirus	1
	Influenza	1
<b>March</b>	Norovirus	2
<b>April</b>	Gastroenteritis, organism not detected	1
	Norovirus	1
	Rotavirus	1
<b>May</b>	Gastroenteritis, organism not detected	4
	Norovirus	2
<b>June</b>	Gastroenteritis, organism not detected	2
	Norovirus	3
	Rotavirus	1
	Influenza	1
<b>July</b>	Gastroenteritis, organism not detected	7
	Norovirus	3
	Influenza	1
<b>August</b>	Gastroenteritis, organism not detected	1
	Norovirus	10
	Influenza	2
<b>September</b>	Gastroenteritis, organism not detected	1
	Norovirus	4
	Influenza	5
<b>October</b>	Gastroenteritis, organism not detected	1
	Norovirus	1
	Influenza	8
<b>November</b>	Gastroenteritis, organism not detected	5
	Norovirus	3
	Influenza	8
<b>December</b>	Gastroenteritis, organism not detected	3
	Norovirus	4
	Influenza	5

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## For more information

**Communicable Disease Control Branch**  
**Public Health and Clinical Systems**  
**PO Box 6**  
**Rundle Mall SA 5000**  
**Telephone: 1300 232 272**  
[www.sahealth.sa.gov.au](http://www.sahealth.sa.gov.au)

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