



Communicable Disease Control Branch,
Disease Surveillance & Investigation Section

2018 Annual Report

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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).

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.

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):

- > 5,929 cases of influenza, including 10 influenza outbreaks in residential care facilities
- > 312 cases of Shiga-toxin producing *Escherichia coli* infection
- > 90 non-foodborne clusters of gastrointestinal disease, including 78 in residential care facilities
- > 55 cases of Ross River virus infection
- > 34 cases of invasive meningococcal disease
- > 30 cases of Q fever
- > 21 cases of hepatitis A infection
- > 14 *Salmonella* outbreak investigations, including 1 in a residential care facility
- > 11 cases of *Legionella pneumophila* serogroup 1 infection
- > 7 cases of paratyphoid fever
- > 6 cases of typhoid fever
- > 5 cases of *Listeria monocytogenes* infection
- > 2 cases of measles.

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 on 06 May 2020 by the calculated onset date from 1 January to 31 December 2018. 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 on 06 May 2020 for cases notified from 1 January to 31 December 2018.

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 2018, gastrointestinal illnesses accounted for 32% of disease notifications in SA, compared to 14% of notifications in 2017. There were 5,488 cases of notifiable gastrointestinal disease reported in 2018.

Campylobacter infection was the most commonly reported notifiable gastrointestinal disease in SA and accounted for 56% of these notifiable diseases.

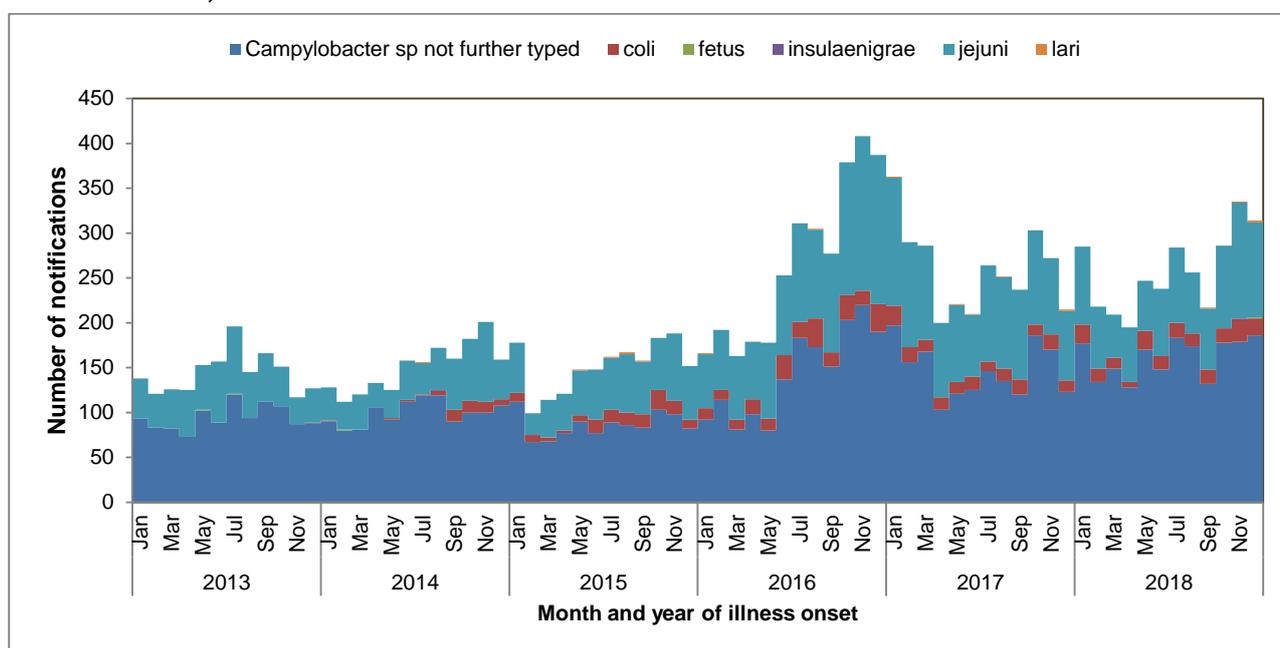
Botulism

There were no cases of botulism notified in 2018, compared to one case notified in 2017.

Campylobacter infection

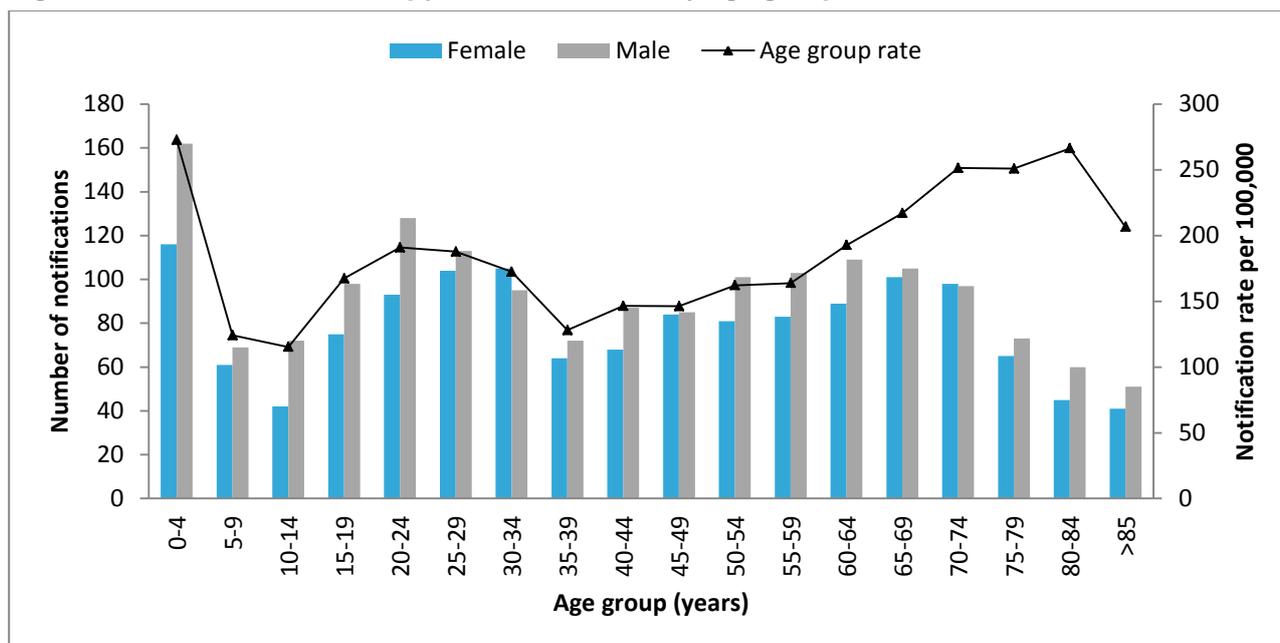
There were 3,084 notifications of *Campylobacter* infection in SA in 2018, consistent with 3,113 in 2017 and higher than the five-year average of 2,331 per annum for the period of 2013 to 2017 (Figure 1).

Figure 1 Notified cases of *Campylobacter* infection by type, and month and year of illness onset, South Australia, 2013-2018



Fifty-four percent of *Campylobacter* notifications in 2018 were in males. There were higher rates of notification amongst males in the majority of five year age groups compared with females. The highest rate of campylobacteriosis notifications occurred in children aged less than five years of age and accounted for nine percent of campylobacteriosis notifications. Notification rates were next highest in persons aged 80 to 84 years and accounted for three percent of campylobacteriosis notifications (Figure 2).

Figure 2 Notified cases of *Campylobacter* infection by age group and sex, South Australia, 2018



Since July 2014, diagnostic laboratories have introduced enteric nucleic acid test (NAT) testing; one laboratory commenced in June 2016. Polymerase chain reaction (PCR) testing is more sensitive than culture methods and a decrease in the proportion of culture positive only results has been observed. In 2018, 1,206 (39%) *Campylobacter* notifications tested positive by PCR only compared to 1,088 notifications (35%) in 2017. The introduction of PCR testing is likely to have contributed to the increase in *Campylobacter* notifications from 2016 onwards.

In 2018, there was one outbreak of campylobacteriosis investigated and linked with an institution that had an on-site dairy (Appendix 3).

Cryptosporidiosis

There were 197 cases of cryptosporidiosis reported in 2018, lower than the 356 notifications reported in 2017 and the five-year average of 313 cases reported per annum for the period of 2013 to 2017 (Figure 3).

In 2018, cryptosporidiosis notifications were in 88 males and 109 females with an age range of less than one year to 80 years, and a median age of 22 years.

The highest number of cryptosporidiosis notifications occurred in children aged less than ten years of age and these accounted for 36% of notifications. There were more males than females reported for cases in children aged less than 14 years, but more females than males reported in cases aged greater than 15 years of age (Figure 4).

Figure 3 Notified cases of cryptosporidiosis by month and year of illness onset, South Australia, 2013-2018

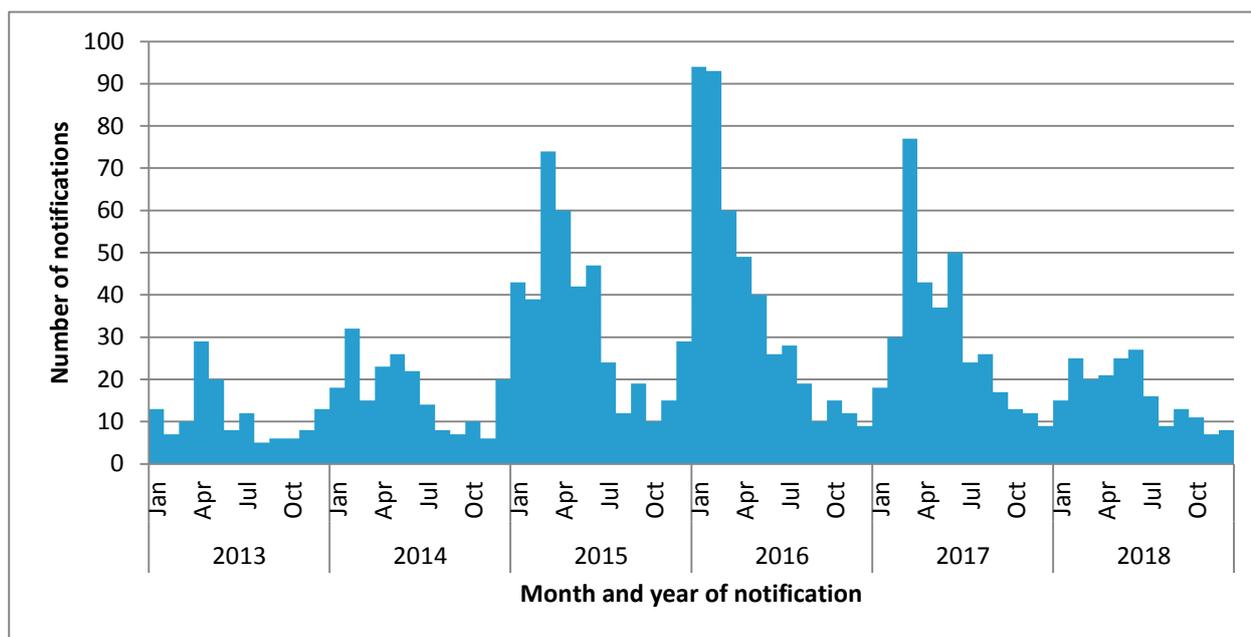
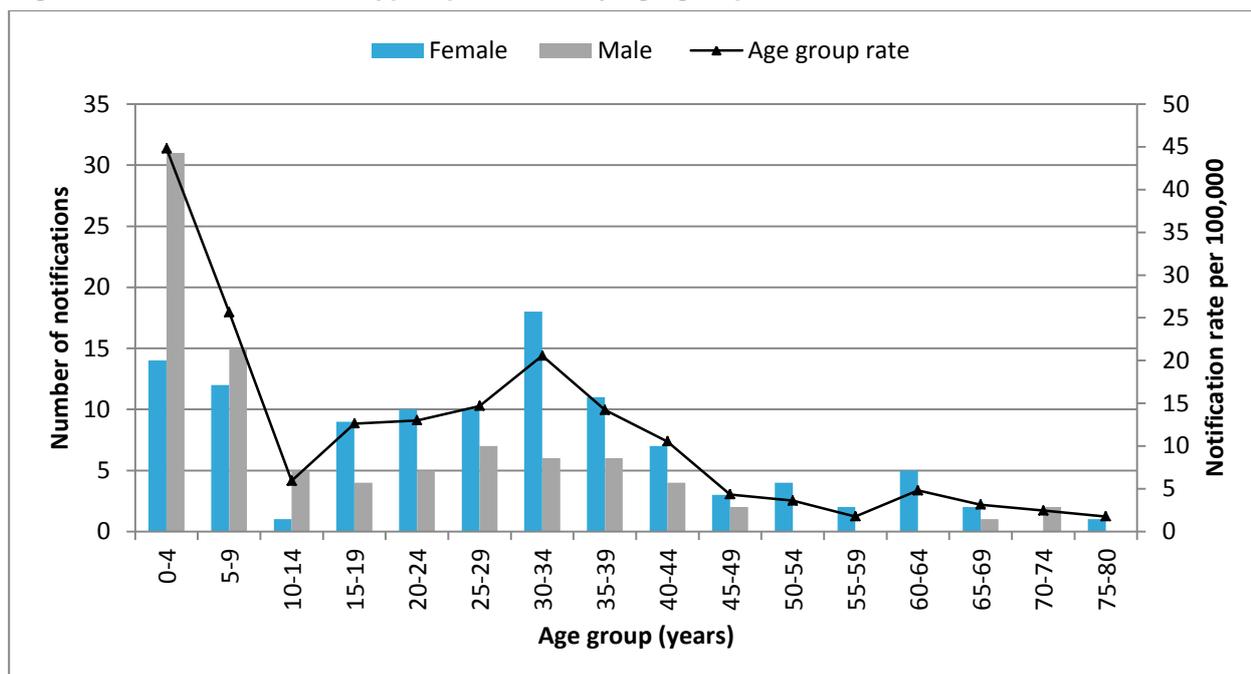


Figure 4 Notified cases of cryptosporidiosis by age group and sex, South Australia, 2018



Hepatitis A

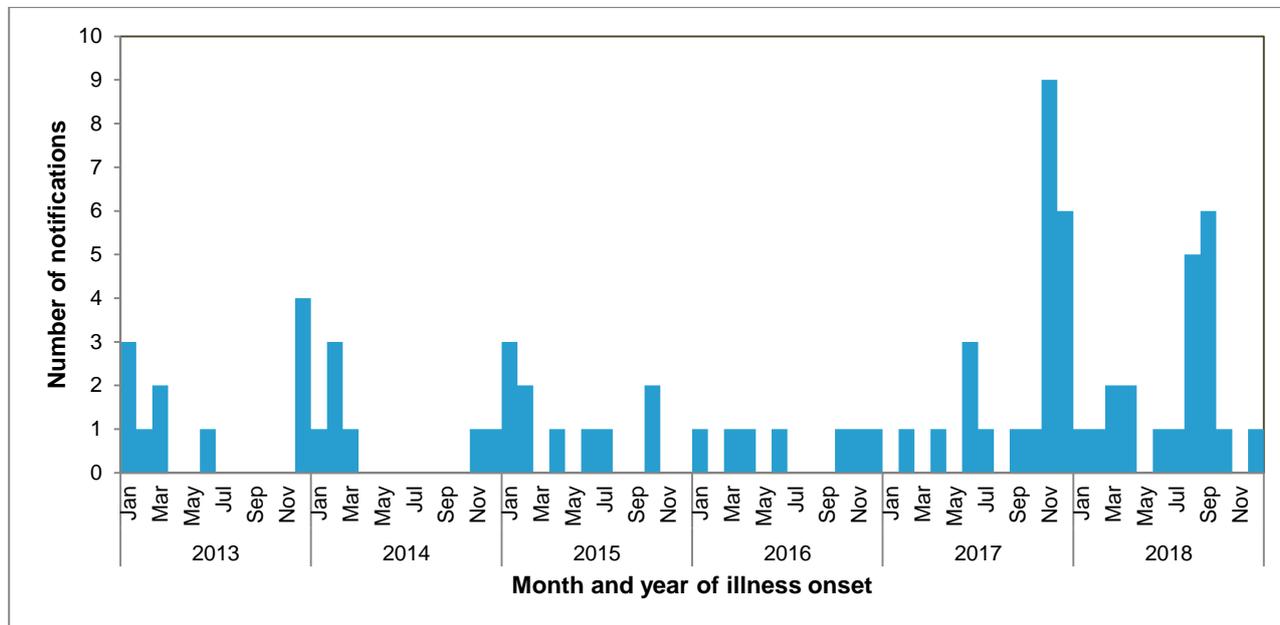
In 2018, there were 21 notifications of hepatitis A in SA, similar to the 23 notifications reported in 2017. The notifications reported in 2018 are higher than the five-year average of 12 notifications per year for the period of 2013 to 2017 (Figure 5). Eleven of the notifications in 2018 were considered to be locally acquired. Countries of acquisition for the ten overseas acquired cases in 2018 were: three from Afghanistan, two from India, and one each from Syria, Fiji, Uganda, Tonga and Pakistan.

In 2018, hepatitis A notifications were in nine females and 12 males with an age range of three to 65 years, and a median age of 46 years. Eight cases of hepatitis A were hospitalised (38%) due to their infection. No cases were reported to identify as Aboriginal or Torres Strait Islander peoples. Three cases were reported to

be vaccinated, two which could not be confirmed on the Australian Immunisation Register and one that was given 25 days prior to onset of symptoms.

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

Figure 5 Notified cases of hepatitis A infection by month and year of illness onset, South Australia, 2013-2018



There was one outbreak of locally acquired hepatitis A in SA in 2018 ([Appendix 3](#)). Two cases were linked to a national outbreak with frozen pomegranate arils identified as the source of infection. A second outbreak of hepatitis A was recorded in 2018 with three cases of infection acquired in Afghanistan (family cluster).

An ongoing outbreak of locally acquired hepatitis A that began in November 2017 continued into 2018 up to December ([Appendix 3](#)). There were 22 confirmed outbreak cases with 12 (52%) identifying as men who have sex with men (MSM).

Hepatitis E

There were no cases of hepatitis E infection notified in 2018, compared to one notification in 2017, and the five-year average of one notification per year for the period of 2013 to 2017.

Listeriosis

Five cases of listeriosis were notified in 2018, consistent with five cases notified in 2017 and the five-year average of four cases per annum for the period of 2013 to 2017.

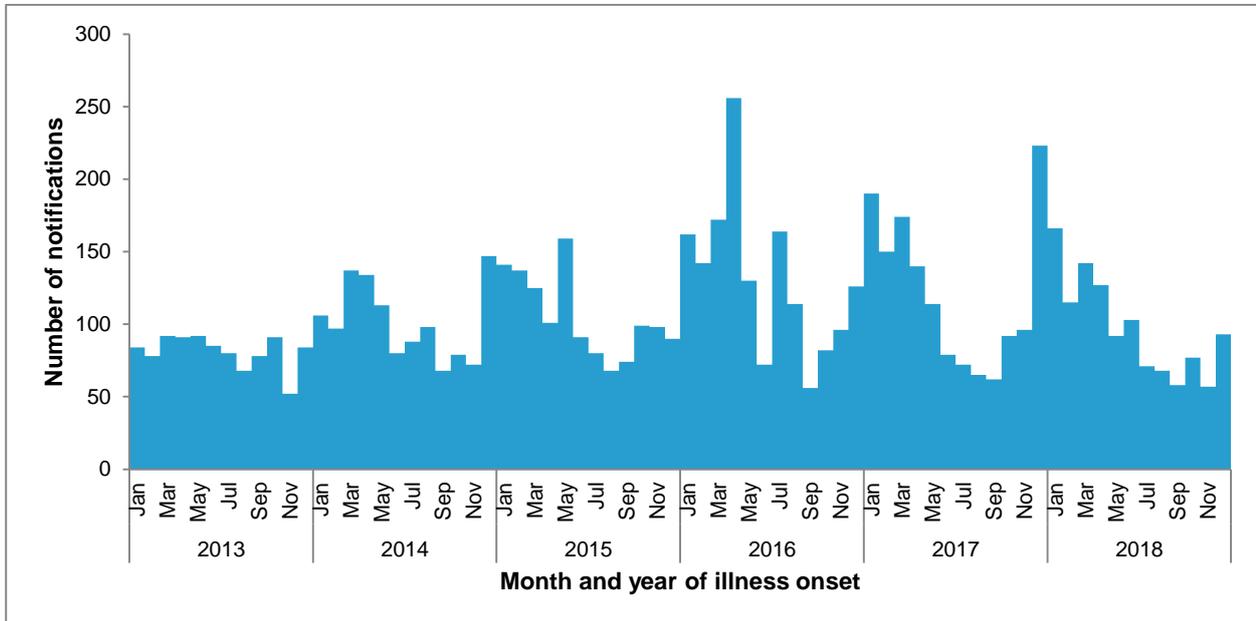
Listeriosis notifications were in three males and two females with an age range of 66 to 91 years, and a median age of 70 years. All cases had pre-existing medical conditions and were hospitalised. There were no deaths reported in cases of listeriosis in 2018.

Further molecular based typing of all listeria isolates from 2018 cases was conducted at the Microbiological Diagnostic Unit (MDU) in Victoria. MDU reported one case from South Australian cases in 2018 that was possibly related to two historical listeria cases in South Australia from 2014 and 2011. An investigation found these cases were linked by a common catering company.

Salmonella infection

In 2018, 1,169 notifications of *Salmonella* infection were notified, consistent with 1,457 notifications in 2017 and below the five-year average of 1,297 notifications per year for the period 2013 to 2017 (Figure 6). Twenty-four per cent of gastrointestinal notifications this year were due to *Salmonella* infection.

Figure 6 Notified cases of *Salmonella* infection by month and year of illness onset, South Australia, 2013-2018



In 2018, *Salmonella* infection notifications were in 540 males and 629 females with an age range of less than one year to 100 years, and a median age of 32 years. Cases reported this year were older than the five-year median age of 30 years for the period 2013 to 2017 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 19% of notifications (Figure 7).

In 2018, *Salmonella* Typhimurium phage types 9, 44 and 135 were the most common serotype or phage-type notified and accounted for 35% of notifications (Table 1).

There were 48 notifications of *Salmonella* Enteritidis infection reported in 2018, lower than the 62 notifications reported in the previous year. Among cases, 40 (83%) had travelled overseas during their exposure period; 24 cases had travelled to Indonesia.

In 2018, 11 outbreaks of *Salmonella* infection were investigated (Appendix 3). Four outbreaks were directly linked to eating at or takeaway from a café or restaurant. Of the remaining seven outbreaks, one was linked to an aged care facility, two to a private residence or private function and two to primary production.

Figure 7 Notified cases of *Salmonella* infection by age group and sex, South Australia, 2018

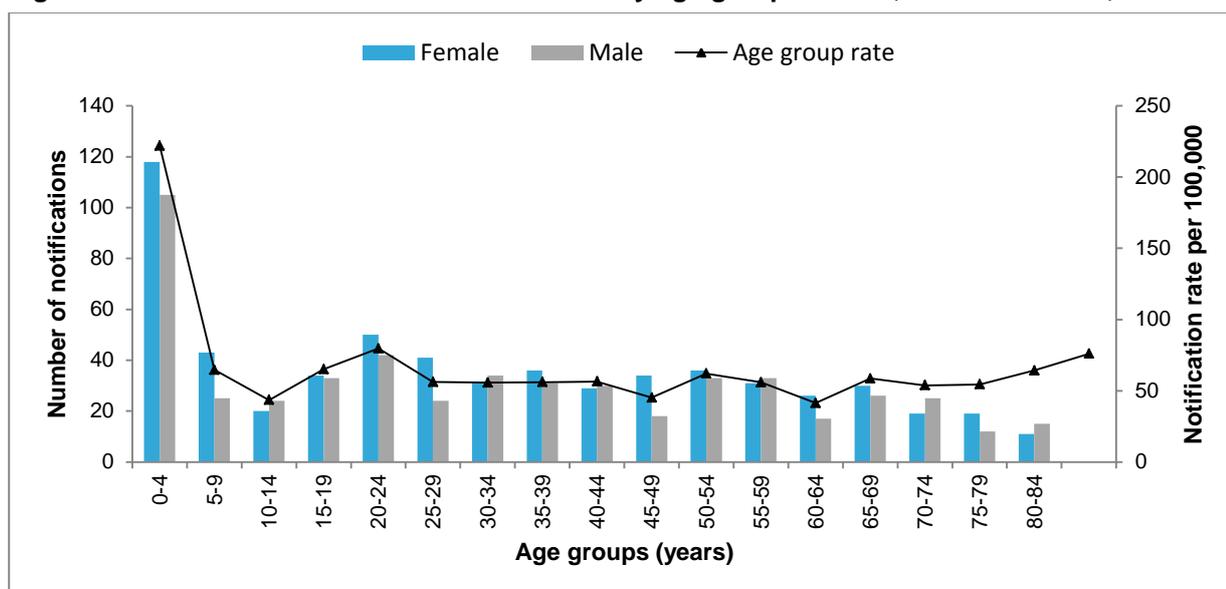


Table 1 Ten most commonly notified *Salmonella* serovars or phage types, South Australia, 2018

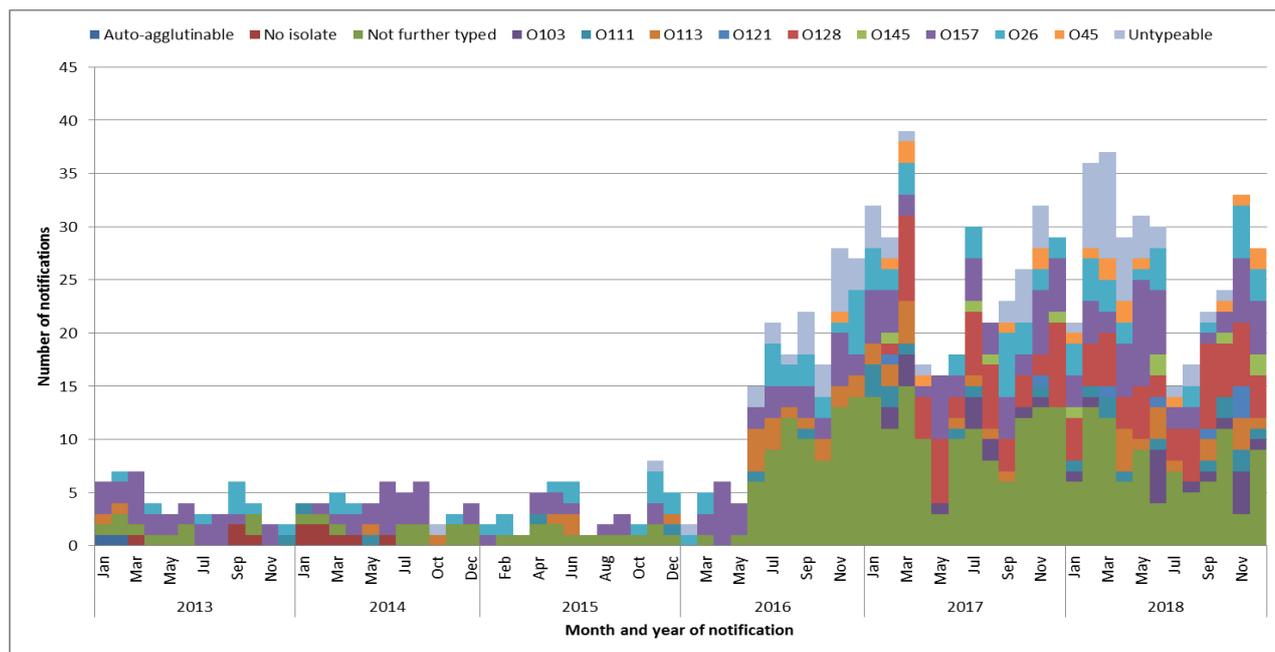
<i>Salmonella</i> serovar or phage type	Cases
S. Typhimurium 9	204
S. Typhimurium 44	106
S. Typhimurium 135	102
S. Typhimurium 108	50
S. Enteritidis	48
S. Havana	42
S. Typhimurium 8	36
S. Oranienburg	30
S. Typhimurium 12a	30
S. subsp 1 ser 4,5,12:i:-	27
Other	494
Total	1,169

Shiga toxin-producing *E. coli* infection (STEC)

In 2018, 312 notifications of STEC infection were reported, similar to the 318 notifications in 2017 and higher than the five-year average of 127 notifications per annum for the period of 2013 to 2017 (Figure 8).

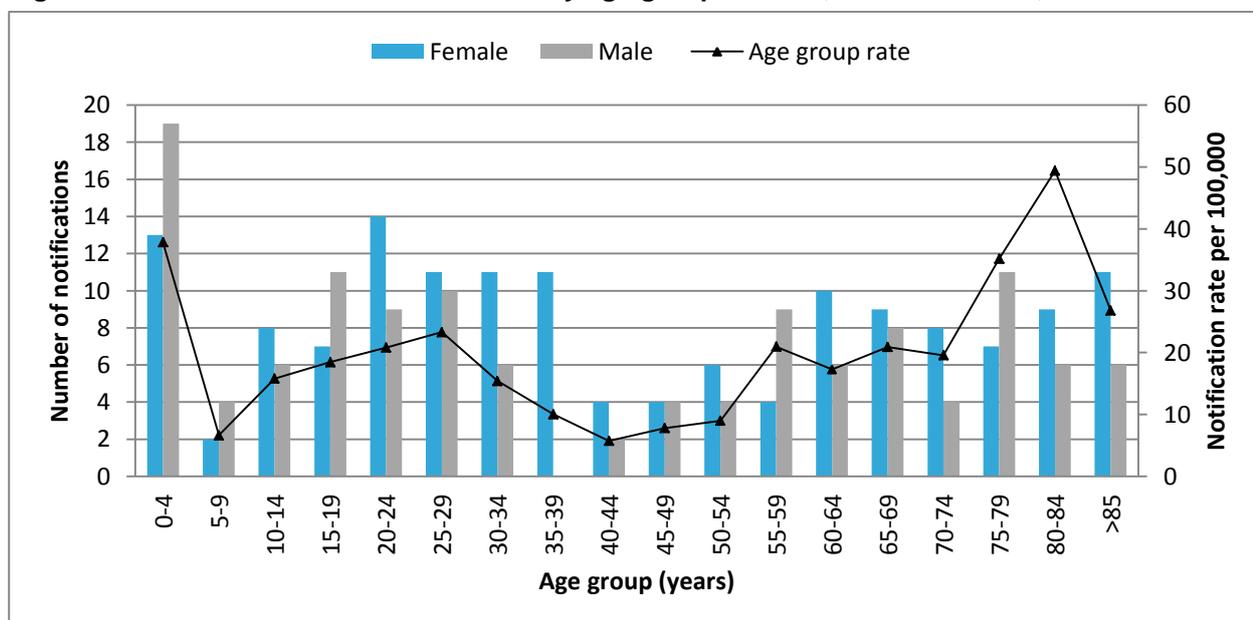
STEC testing is performed by only one laboratory in SA and in June 2016 this laboratory changed testing practices to test all faeces samples for STEC as a component of a NAT bacterial pathogen panel where previously testing was conducted only if STEC testing requested or if blood was present in the sample.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

Figure 8 Notified cases of STEC by month and year of illness onset, and serogroup South Australia, 2013-2018



Thirty one individuals were co-infected with two or more different serogroups of STEC. In 2018 cases comprised of 125 males and 149 females with an age range of less than one year to 101 years, and a median age of 39 years (Figure 9).

Figure 9 Notified cases of STEC infection by age group and sex, South Australia, 2018



In 2018, STEC serogroups were determined by a multiplex panel of nine serogroups and testing identified 49 (16%) STEC O128 detections and 48 (15%) STEC O157 detections. Serogroups for 121 (39%) screening positive cases were unable to be determined because the serogroup was not included on the multiplex panel (86 cases) or because there was insufficient DNA in the sample (35 cases). Cluster detection of STEC serogroups not included in the multiplex panel is difficult.

Haemolytic uraemic syndrome

In 2018, there were no notifications of haemolytic uraemic syndrome (HUS) reported, similar to the two notifications reported in 2017 and the five-year average of two notifications per annum for the period of 2013 to 2017.

Shigella infection

Enteric PCR panel testing includes the detection of *Shigella* and shares the same target genes with enteroinvasive *E. coli*; thus 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 2018, 434 cases of *Shigella* infection were notified, consisting of 119 confirmed cases and 315 probable cases. In 2017, 63 confirmed cases and 237 probable cases were notified. The five-year average of confirmed cases is 32 cases per annum for the period of 2013 to 2017 (Figure 10).

In 2018, *Shigella* infection confirmed and probable notifications were in 240 females and 199 males with an age range of less than one year to 95 years, and a median age of 27 years. Of confirmed *Shigella* cases, there were 67 females and 53 males with an age range of less than one year to 89 years and a median age of 26 years (Figure 11).

Sixty-eight percent of shigellosis cases in 2018 occurred in people who identify as Aboriginal compared with 55% in 2017. The majority of these Aboriginal people were part of an outbreak of shigellosis in remote far-north and far-west regions of South Australia ([Appendix 3](#)).

Shigella flexneri 2b was the most common species and subtype notified; and accounted for 65% of notified cases.

Overseas travel was reported by 111 cases of *Shigella* infection in 2018; including ten confirmed cases and 101 probable cases. Of confirmed cases, only eight percent of *Shigella* cases reported overseas travel, compared to 25% in 2017.

Figure 10 Notified cases of shigellosis by confirmation status, and month and year of illness onset, South Australia, 2013-2018

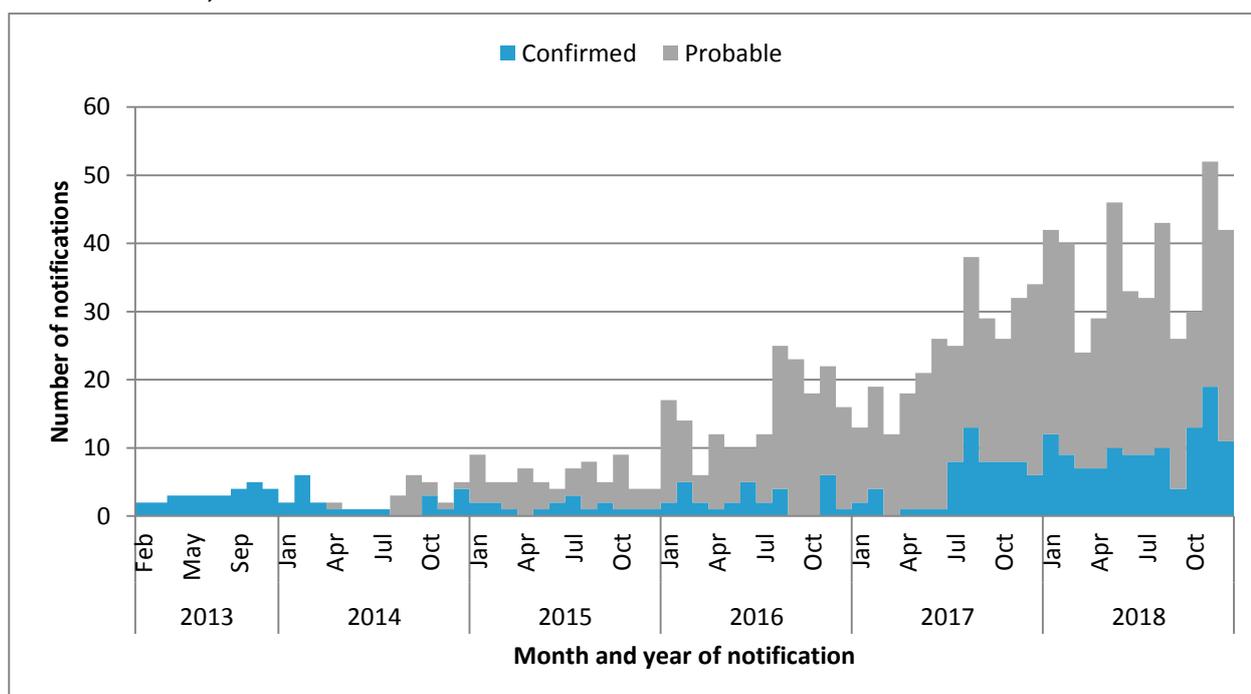
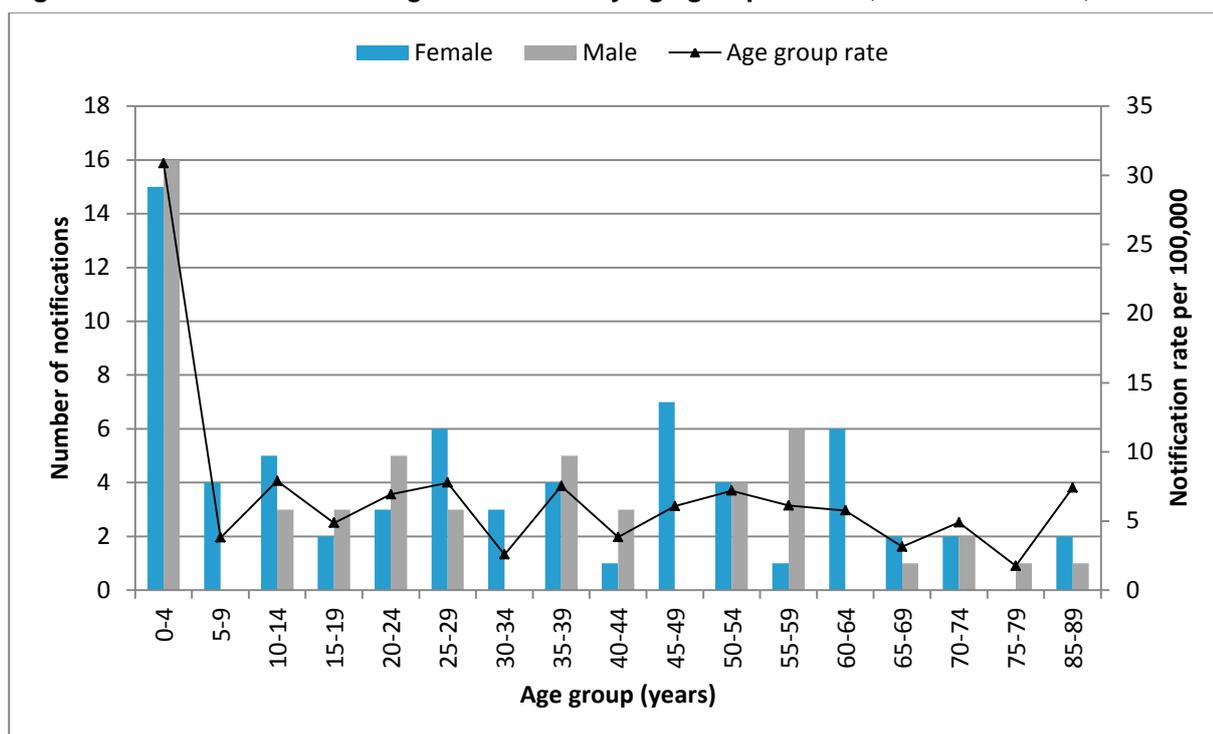


Figure 11 Notified cases of *Shigella* infection by age group and sex, South Australia, 2018



Since July 2014, CDCB has been receiving laboratory notifications for *Shigella* that are PCR positive. Different laboratories have introduced this test at different time points; specifically one laboratory introduced the test in July 2014, one in May 2015 and one in June 2016. In 2017, there were no major changes to laboratory testing, making this the first year over the past four years with no laboratory testing changes relevant to *Shigella*. Most of the cases (73%) reported in 2018 were PCR positive only, 25% were culture and PCR positive, and three percent were culture positive only.

Typhoid

There were six cases of *Salmonella* Typhi infection notified in 2018, compared to five cases notified in 2017 and a five-year average of seven cases per annum for the period 2013 to 2017.

In 2018, *Salmonella* Typhi infection notifications were in five females and one male with an age range of one to 41 years, and a median age of 30 years. All cases were hospitalised and all six cases reported overseas travel during their incubation period (three cases reported travel to India, two cases to Bangladesh and one case to Nepal) (Table 2).

All cases of *Salmonella* Typhi infection were interviewed and close household contacts were screened for carriage or infection. In 2018, no secondary cases were identified.

Paratyphoid

In 2018, there were seven cases of *Salmonella* Paratyphi infection notified, compared to six cases notified in 2017 and the five-year average of five notifications per annum for the period 2013 to 2017.

In 2018, *Salmonella* Paratyphi infection notifications were in three females and four males with an age range of two to 45 years, and a median age of 28 years. Two cases of paratyphoid were hospitalised and six of the seven cases were acquired overseas (Table 2). One case reported no overseas travel and the source of infection could not be identified.

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

Table 2 Notified cases of typhoid and paratyphoid by likely country of acquisition, South Australia, 2018

Likely country of acquisition	Typhoid	Paratyphoid
Locally-acquired	0	1
Bangladesh	2	0
Cambodia	0	1
India	3	2
Indonesia	0	2
Nepal	1	0
Viet Nam	0	1
Total	6	7

Vibrio parahaemolyticus infection

Vibrio parahaemolyticus infection became notifiable in South Australia on 18 February 2016. In 2018, there were eleven cases of *Vibrio parahaemolyticus* infection notified, higher than the five cases notified in 2017. Cases were in six females and five males with an age range of one to 78 years and a median age of 44 years.

Five of the cases acquired *Vibrio parahaemolyticus* infection overseas (all had gastroenteritis), with two cases acquired in Cambodia, two cases in China and one in Indonesia (Table 3). There were six locally acquired cases in 2018, four of which were cases with gastroenteritis and three of these cases reported eating raw oysters during their incubation period. Two locally acquired cases had wound infections following contact with seawater.

Table 3 Notified cases of *Vibrio parahaemolyticus* infection by risk factor, South Australia, 2018

Risk factor	Cases
Overseas travel	
China	2
Cambodia	2
Indonesia	1
Other	
Contact with seawater	2
Consumption of raw oysters	3
Unknown	1
Total	11

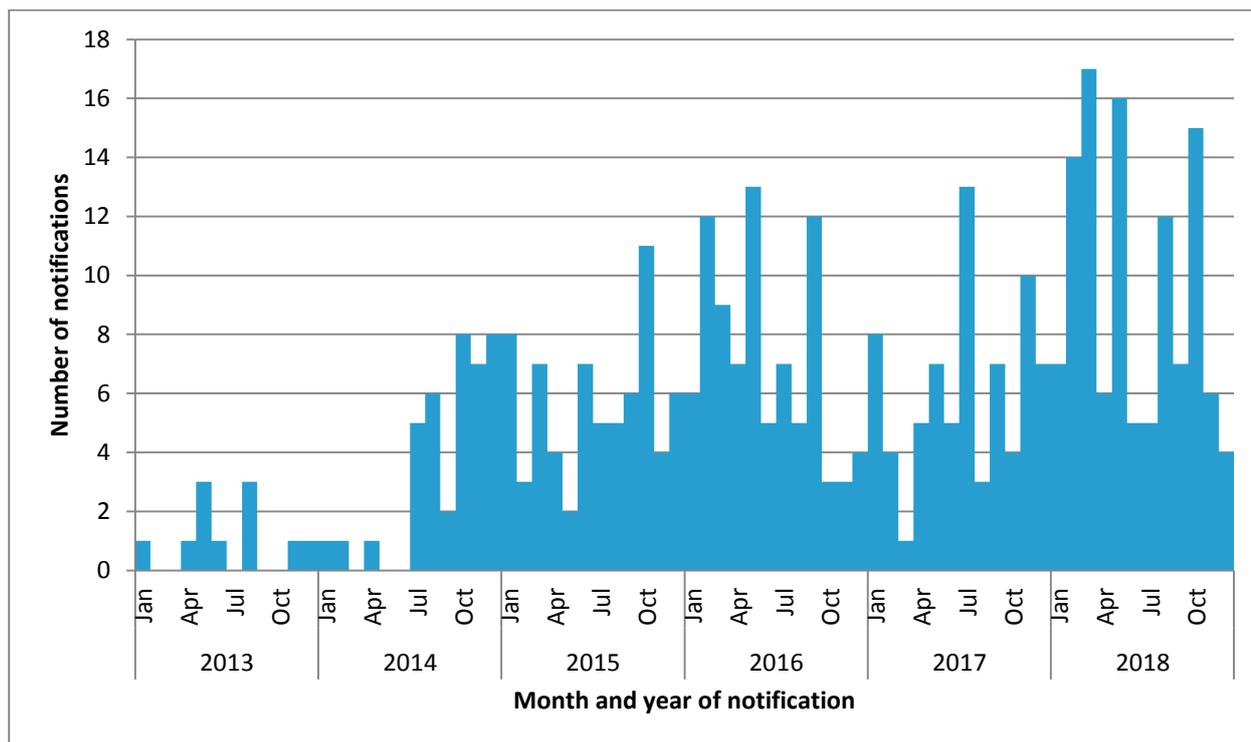
Yersinosis

In 2018, there were 109 notifications of *Yersinia* infection reported, higher than the 76 cases reported in 2017 and higher than the five-year average of 57 cases per annum for the period 2013 to 2017 (Figure 12).

In 2018, *Yersinia* infection notifications were in 46 males and 63 females, with an age range of less than one year to 89 years and a median age of 38 years. Of the 109 cases, all were characterised as *Y. enterocolitica*.

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*. 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.

Figure 12 Notified cases of yersiniosis by month and year of illness onset, South Australia, 2013-2018



Quarantinable diseases

There were no cases of cholera, avian influenza in humans, Middle East respiratory syndrome (MERS), plague, rabies, severe acute respiratory syndrome (SARS), smallpox, viral haemorrhagic fever including Ebola virus infection, or yellow fever reported in 2018.

Other notifiable infectious diseases

Leprosy

There were no cases of leprosy notified in South Australia in 2018, similar to one notification in 2017 and the five-year average of one case per year from 2013 to 2017.

Creutzfeldt-Jakob disease

Six cases of Creutzfeldt-Jakob disease (CJD) were notified in 2018, similar to four cases notified in 2017 and the five-year average of four cases per year from 2013 to 2017. Cases of CJD comprised two females and four males with a median age of 68 years. There were no links or common exposures identified between cases and all were described as sporadic cases of classical CJD.

Legionellosis

Thirty-two cases of legionellosis were notified in 2018, consistent to the 40 cases reported in 2017 and with the five-year average of 40 notifications per annum for the period 2013-2017 (Figure 13).

Laboratory tests attributed 16 cases to *Legionella pneumophila*, with 11 typed as serogroup 1, four typed as serogroup 2 and one case as serogroup 3. Sixteen cases were further typed to be *L. longbeachae*.

The 11 notified cases of *L. pneumophila* serogroup 1 comprised of seven females and four males with an age range of 53 to 90 years and a median age of 73 years. One case was reported to be infected with both *L. pneumophila* serogroup 1 and 2. All cases were hospitalised and one case is reported to have died from the infection.

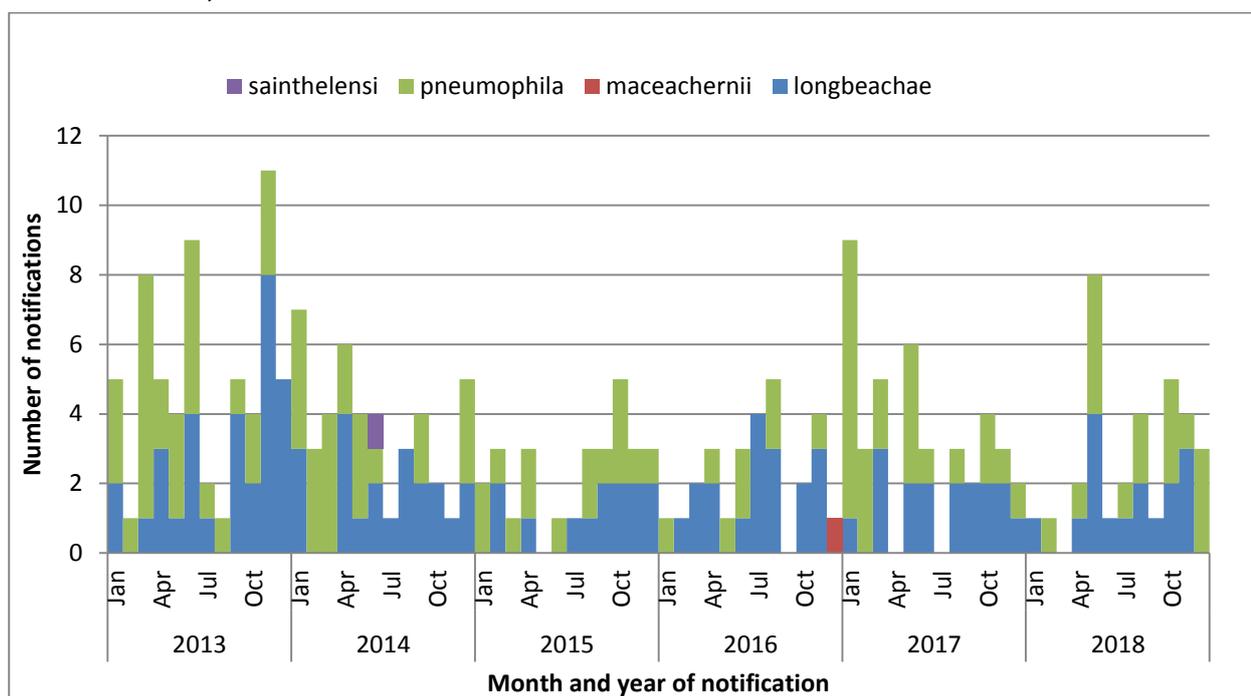
The four notified cases of *L. pneumophila* serogroup 2 comprised of one female and three males with an age range of 58 to 61 years and a median age of 64 years. Three of the four cases were from metropolitan Adelaide and all were hospitalised.

The reported case of *L. pneumophila* serogroup 3 was in an 89-year old male from metropolitan Adelaide. The case was hospitalised.

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

The 11 notified cases of *L. longbeachae* comprised of six females and ten males with an age range of 36 to 90 years and a median age of 69 years. Cases resided across metropolitan Adelaide and rural SA and all cases reported hospitalisation. There was one death, and this was attributed to *L. longbeachae* infection.

Figure 13 Notified cases of legionellosis by serogroup, and month and year of notification, South Australia, 2013-2018



Invasive meningococcal disease (IMD)

There were 34 cases of invasive meningococcal disease notified in 2018, similar to the 36 cases reported in 2017 and the five-year average of 29 cases reported per annum for the period 2013 to 2017 (Figure 14).

In 2018, invasive meningococcal disease notifications were in 18 females and 16 males with an age range of less than one to 93 years. The median age of cases in 2018 was 20 years, similar to the five-year median age of 19 years. The highest number of notifications occurred in males in the age group less than one to four years. Notification rates were also highest in the less than one to four year age group (Figure 15).

Twenty-four cases (71%) resided in metropolitan Adelaide and ten cases (29%) resided in rural or remote SA. Four cases identified as Aboriginal or Torres Strait Islander origin.

Further laboratory testing attributed 27 cases to serogroup B, four cases to serogroup W and three cases to serogroup Y.

Thirty-three cases were hospitalised in 2018, the remaining case died due to the disease (serogroup B). No epidemiological links could be found between any of the cases.

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

Figure 14 Notified cases of invasive meningococcal disease by serotype, and month and year of notification, South Australia, 2013-2018

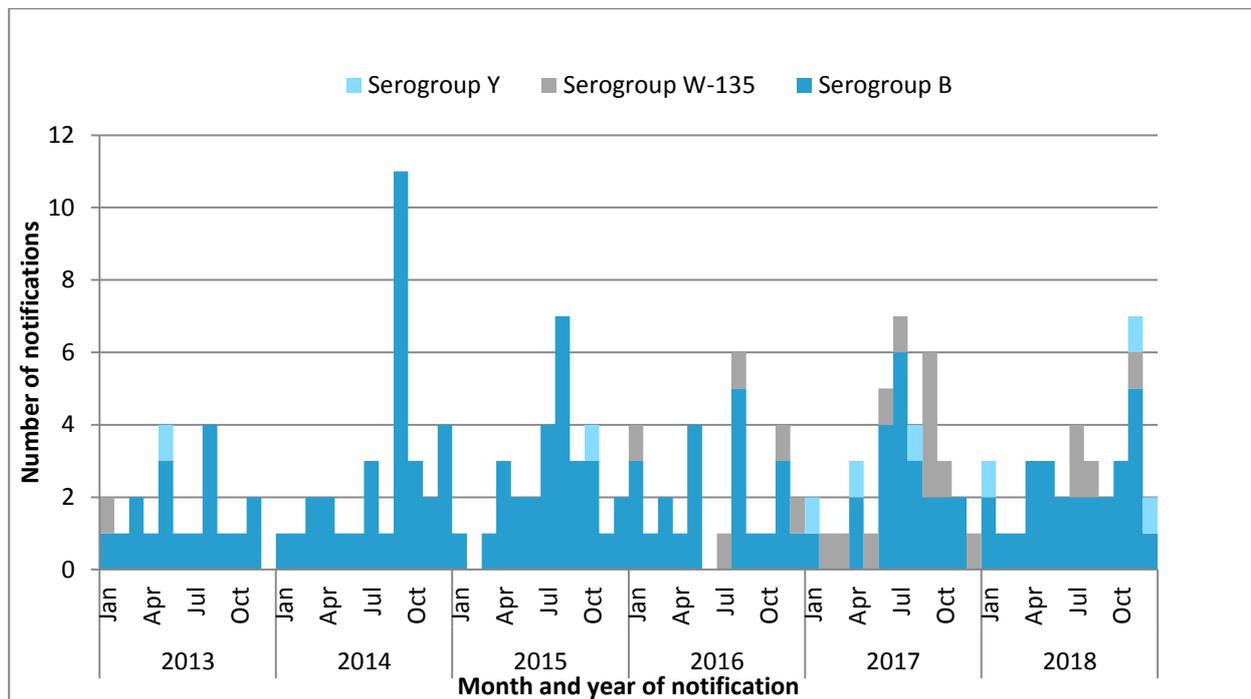
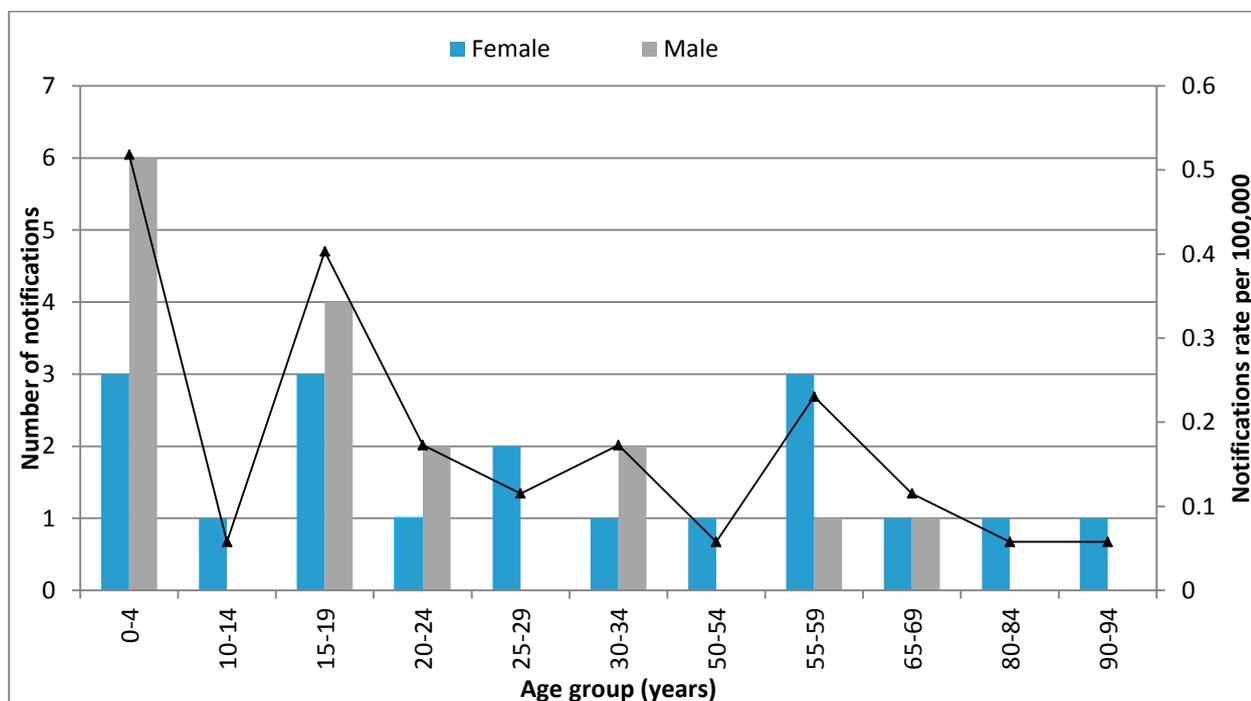


Figure 15 Notified cases of invasive meningococcal disease by age group and sex, South Australia, 2018



Vaccine preventable diseases

Diphtheria

There was one case of cutaneous diphtheria infection notified in 2018, compared to no notifications in 2017, and the five-year average of less than one notification per year for the period of 2013 to 2017. The last reported case of cutaneous diphtheria in South Australia was in 2013. The case was a 46 year old male who acquired his infection in Papua New Guinea. The case reported he had been previously vaccinated. In accordance with national guidelines, contact tracing of all close contacts occurred, they were tested, advised to isolate and received vaccination (if necessary).

Haemophilus influenzae infection (invasive)

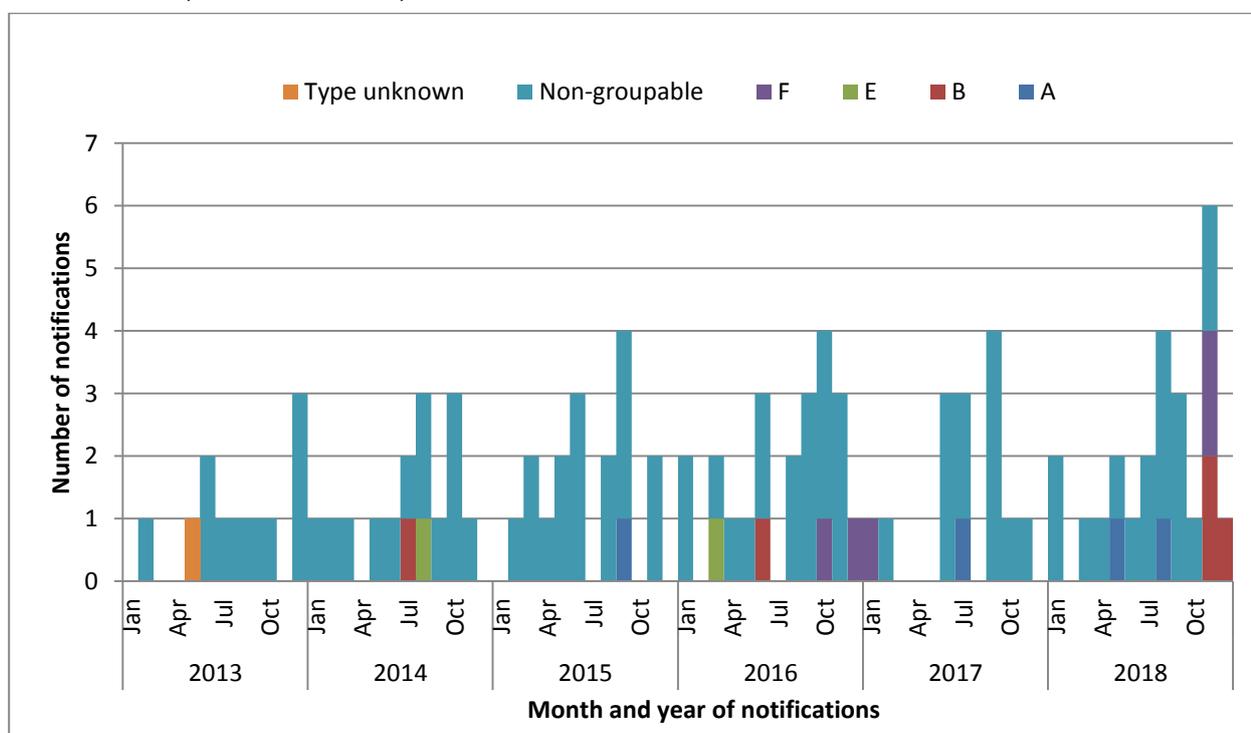
In 2018, there were 24 cases of invasive *H. influenzae* infection notified, higher than the 14 cases reported in 2017 and the five-year average of 15 cases reported per annum for the period 2013 to 2017 (Figure 16).

In 2018, *H. influenzae* infection notifications comprised 12 females and 12 males with an age range of less than one to 90 years and a median age of 58 years. There was one death due to *H. influenzae* infection. Four cases reported to identify as Aboriginal in 2018 (one case unknown), compared to two cases reported to identify as Aboriginal in 2017.

Further laboratory tests attributed the cases to the following groups: two cases to type A, three cases to type B (HiB), two cases to type F and the remainder were non-groupable.

All cases in 2018 were female, with an age range of less than one to 33 years and a median age of one year. One case resided in metropolitan Adelaide, one in rural South Australia and one in the Anangu Pitjantjatjara Yankunytja (APY) Lands. Two cases reported as identifying as Aboriginal. The vaccine status for one case was unknown, and the two other cases were vaccinated to age. In accordance with national guidelines, contact tracing of all close contacts occurred and clearance antibiotics were given.

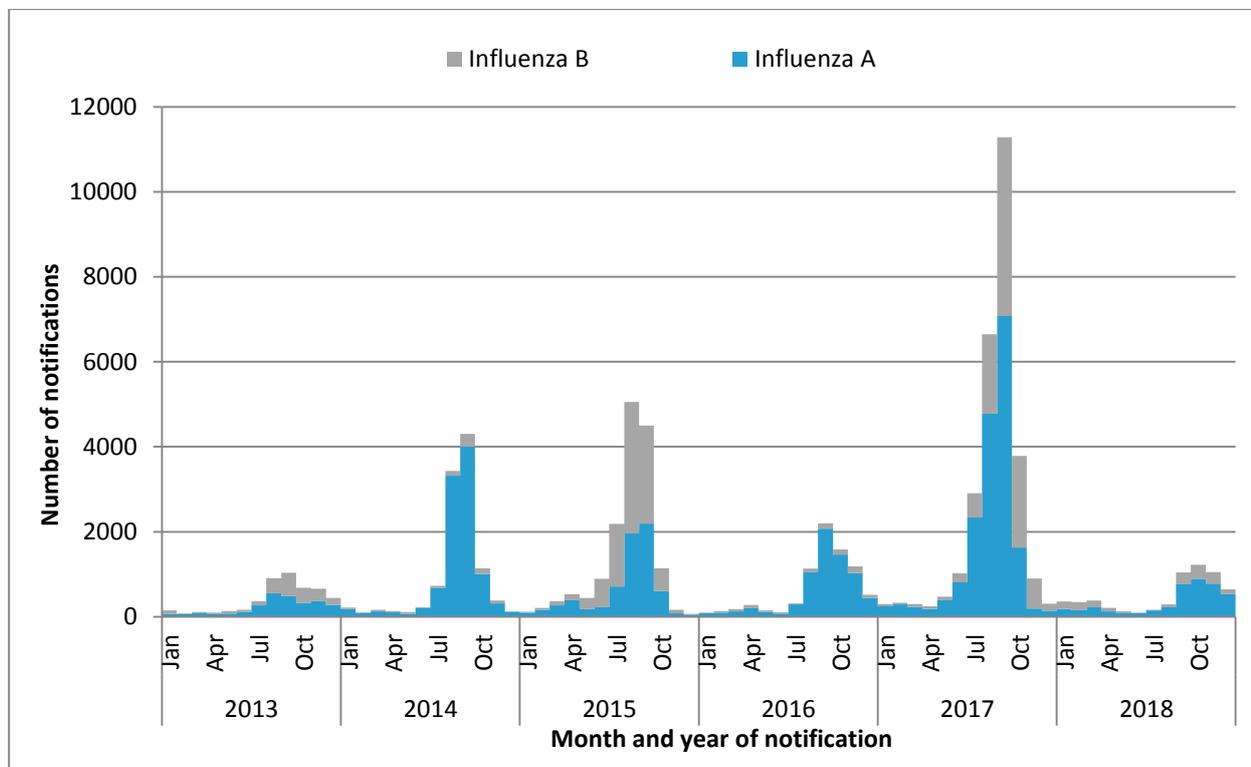
Figure 16 Notified cases of invasive *Haemophilus influenzae* infection by type, and month and year of notification, South Australia, 2013-2018



Influenza

There were 5,929 notifications of laboratory confirmed influenza in 2018, significantly less than the previous year with 28,484 notifications for 2017 and less than the five-year average of 13,573 notifications per annum for 2013 to 2017 (Figure 17).

Figure 17 Notified cases of influenza virus by type, and month and year of notification, South Australia, 2013-2018



In 2018, notifications of influenza were in 3,116 females and 2,813 males. Cases ranged in age from less than one to 101 years with a median age of 35 years.

The highest number of influenza notifications occurred in children aged less than ten years of age and accounted for 28% of notifications (higher than in 2017 when 22% of notifications were in children aged less than ten years). Notification rates in 2018 were also highest in this age group. This is in contrast to 2017 when notification rates were highest in the over 85 year age group. Persons aged 85 or older accounted for three percent of all notifications in 2018, lower than five percent in 2017 (Figure 18).

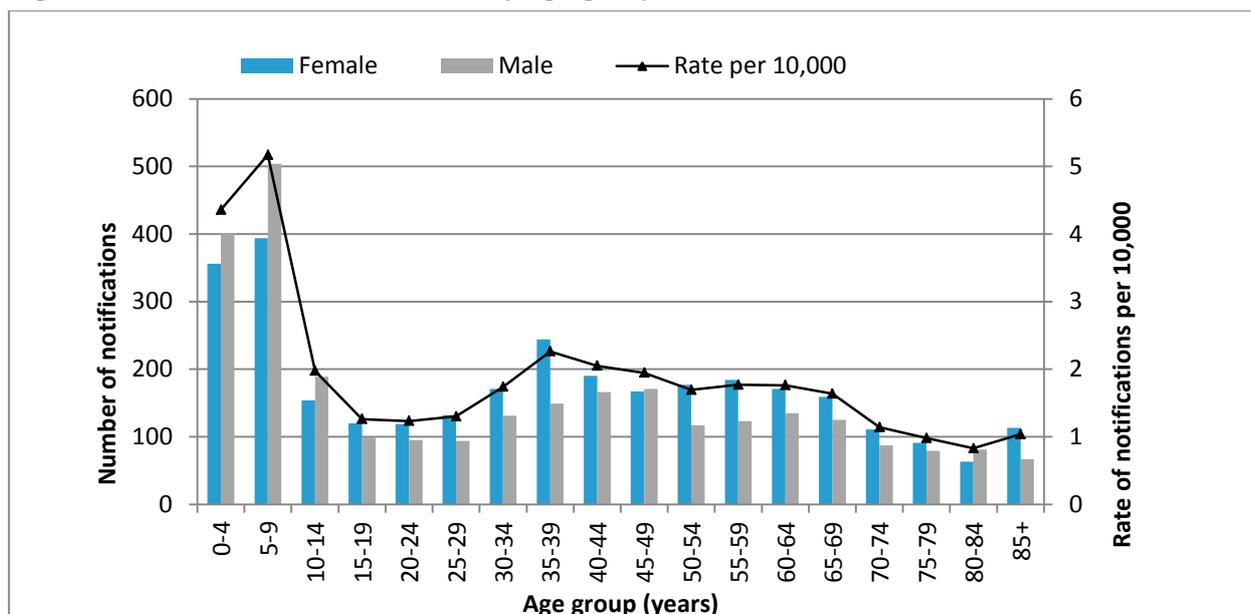
Among influenza notifications in 2018, 70% (4,181) were reported as influenza virus type A and 30% (1,748) were reported as influenza virus type B, compared to 64% type A and 36% type B for 2017.

In 2018 there were 49 cases reported to identify as Aboriginal or Torres Strait Islander and this represented 0.8% of all influenza notifications. The completeness of indigenous status data was 67%, similar to previous years.

In 2018, there were 15 deaths reported due to influenza virus infection, compared to 124 deaths in 2017 and 44 deaths in 2016.

In 2018 there were ten outbreaks of influenza reported to CDCB, all in residential care facilities ([Appendix 3](#)). Influenza outbreaks in 2018 were markedly reduced compared to 2017, during which 98 outbreaks were reported, 95 of these were in residential care facilities.

Figure 18 Notified cases of influenza by age group and sex, South Australia, 2018

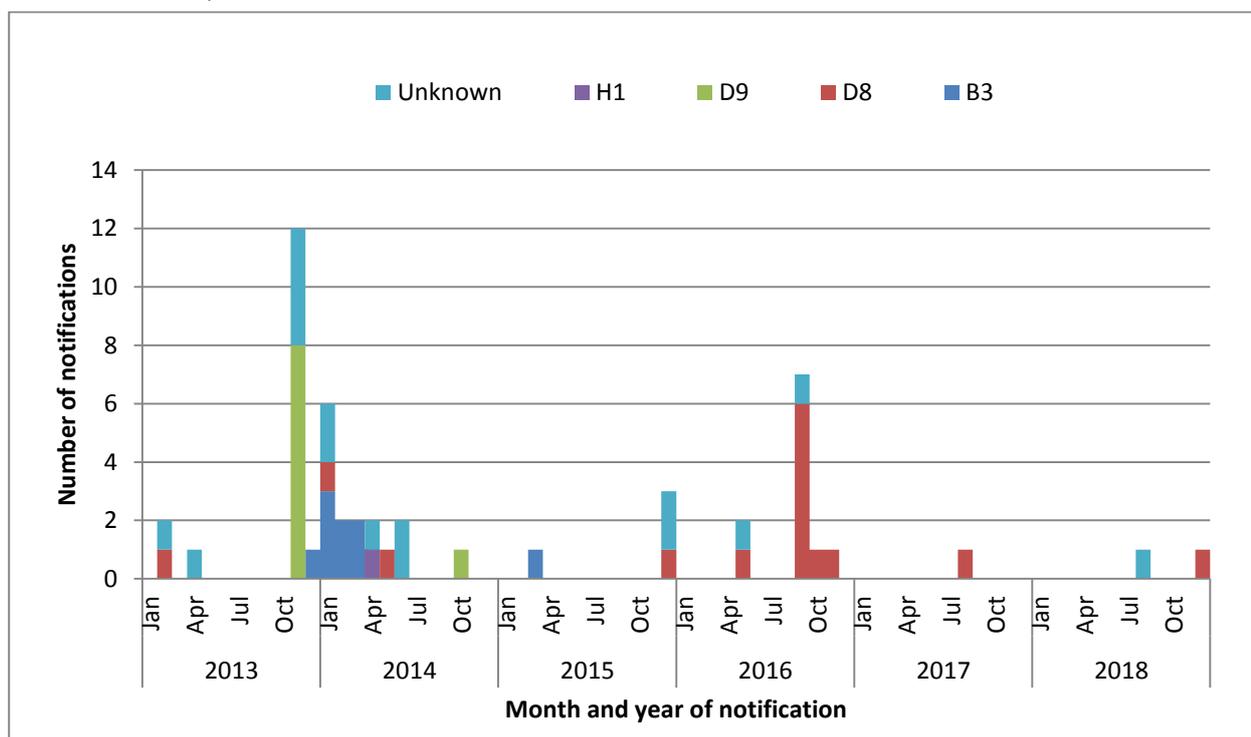


Measles

There were two notified cases of measles in 2018, similar to the one case notified in 2017 and lower than the five-year average of ten cases notified per annum for the period of 2013 to 2017. One case was a 15 year old female who acquired the infection after travel to Myanmar. This case was subsequently identified as genotype D8. The second case was a seven year old male who acquired the infection after travel to Thailand. This case was not able to be further typed. Both cases were unvaccinated (Figure 19).

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

Figure 19 Notified cases of measles by genotype, and month and year of notification, South Australia, 2013-2018



Mumps

Eleven cases of mumps were notified in 2018, six times lower than the 63 cases reported in 2017 and three times lower than the five-year average of 28 cases reported per annum for the period of 2013 to 2017 (Figure 20). In 2017, an outbreak of mumps occurred in the APY Lands which largely accounted for the increase in cases seen.

In 2018, mumps notifications were in six females and five males with an age range of 12 to 84 years and a median age of 30 years.

In 2018, one case had documented evidence of receiving two mumps containing vaccines.

PCR testing to diagnose mumps in SA was introduced in 2015. PCR testing increases the accuracy of diagnoses and is a less invasive test. In 2018, two cases were diagnosed by PCR, compared to 49 cases in 2017 and four cases in 2016. The proportion of diagnosis confirmation by PCR testing is expected to increase (Figure 21).

Figure 20 Notified cases of mumps by month and year of notification, South Australia, 2013-2018

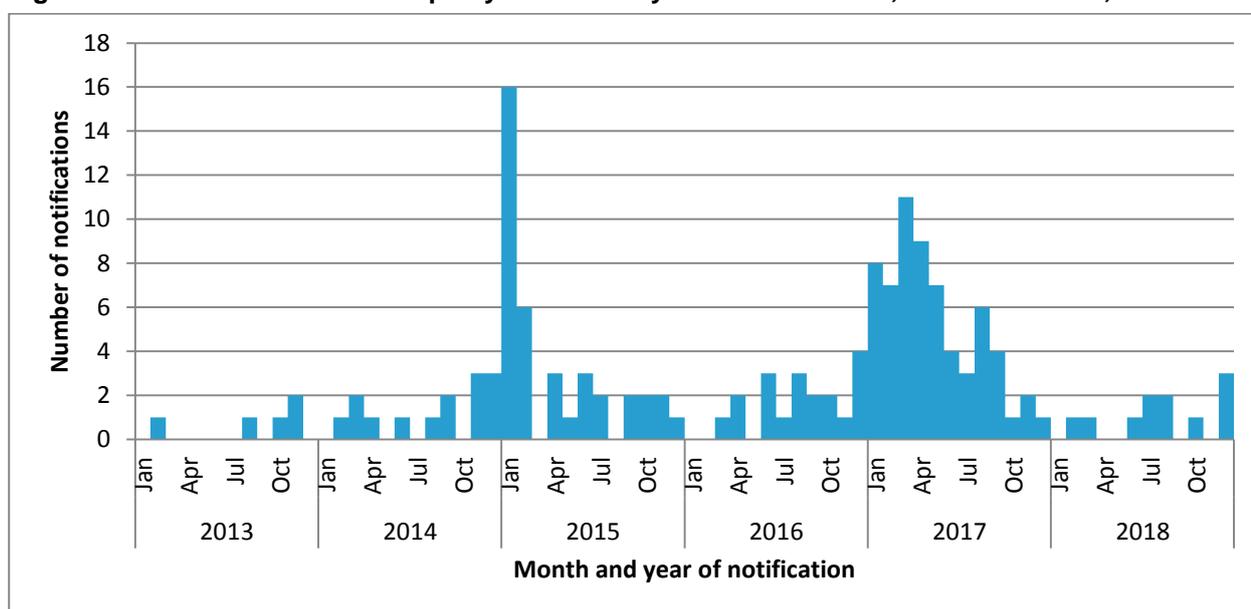
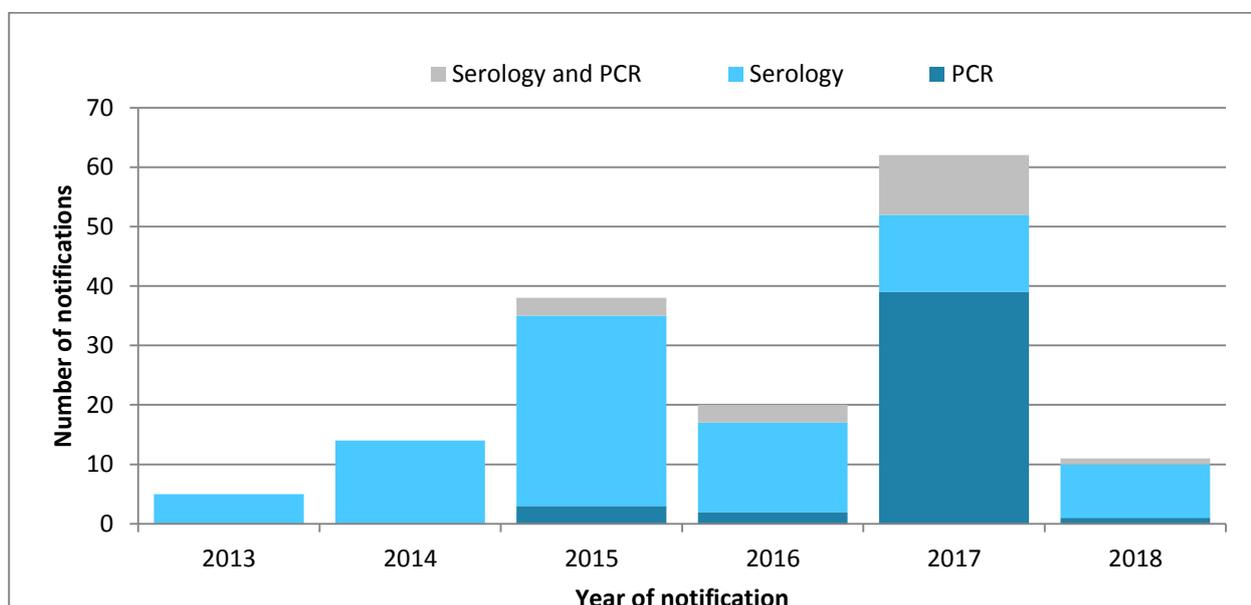


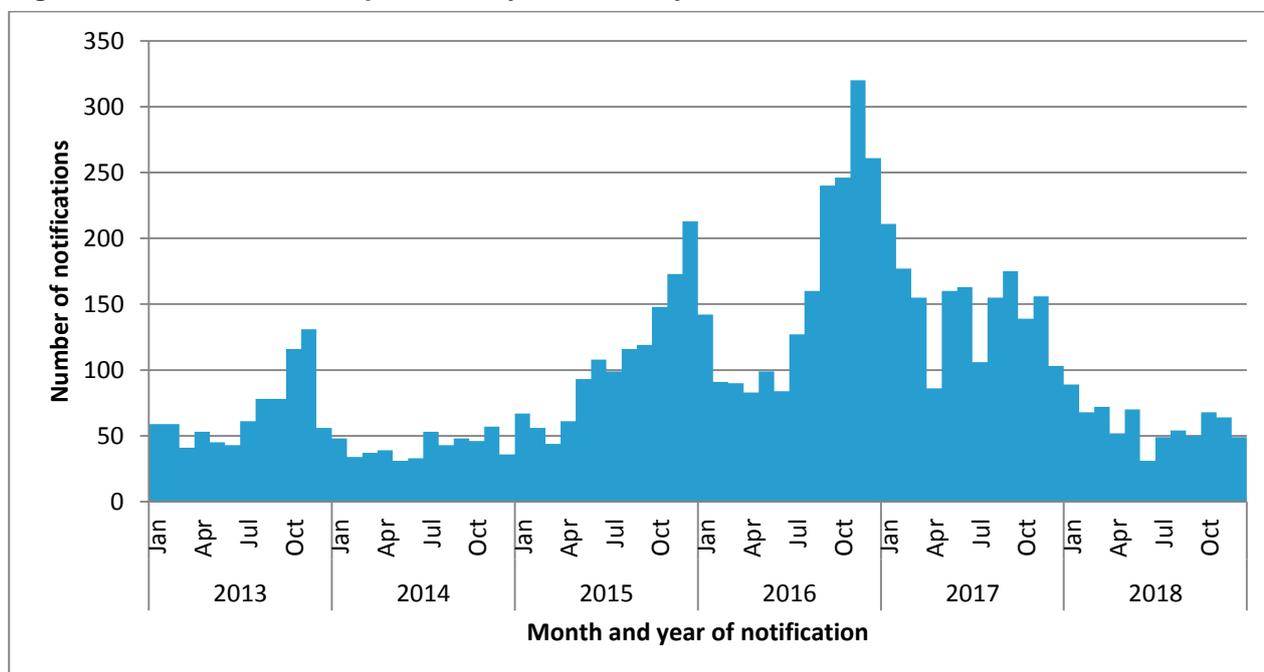
Figure 21 Notified cases of mumps by laboratory testing method and year, South Australia, 2013-2018



Pertussis (whooping cough)

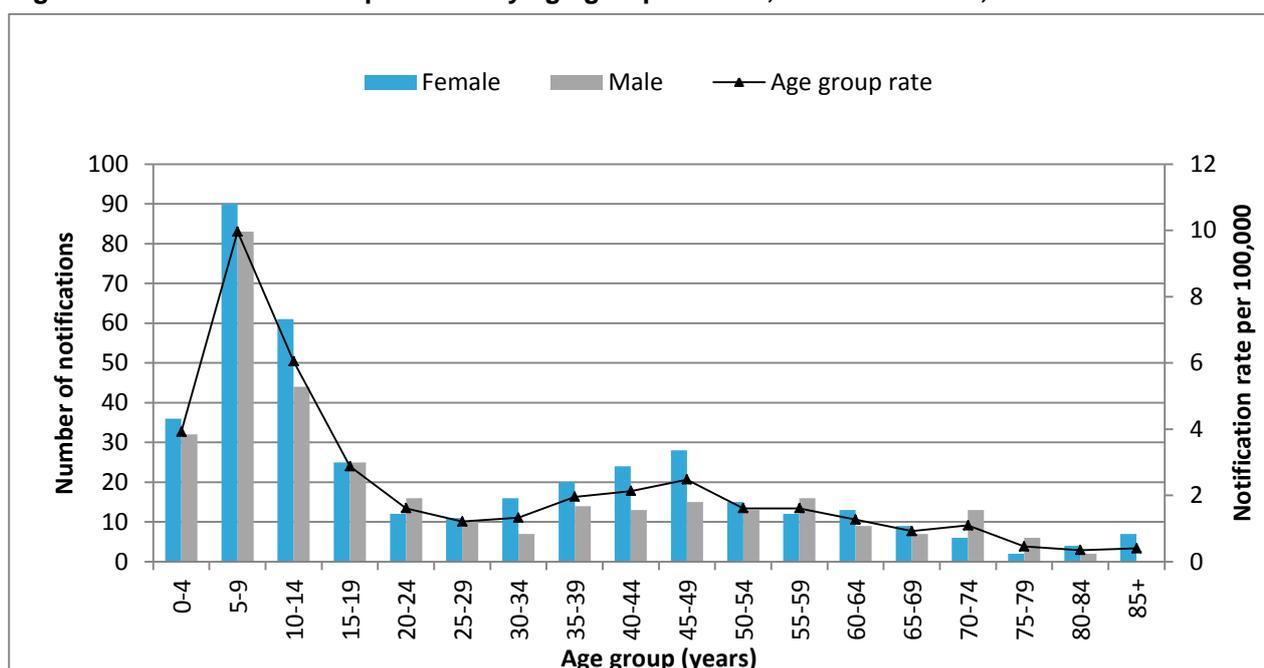
In 2018, 716 cases of pertussis were notified, 2.5 times lower than the 1,786 cases reported in 2017 and 1.8 times lower than the five-year average of 1,270 cases reported per annum for the period 2013 to 2017 (Figure 22).

Figure 22 Notified cases of pertussis by month and year of notification, South Australia, 2013-2018



In 2018, notifications of pertussis comprised 391 females and 325 males. Higher numbers of notifications in females has been seen in previous years. The age range of notifications in 2018 was less than one year to 95 years. The median age for 2018 was 16 years, similar to the median age of 15 years for 2013 to 2017. The pertussis notifications and notification rate were highest in children aged five to nine years (Figure 23).

Figure 23 Notified cases of pertussis by age group and sex, South Australia, 2018

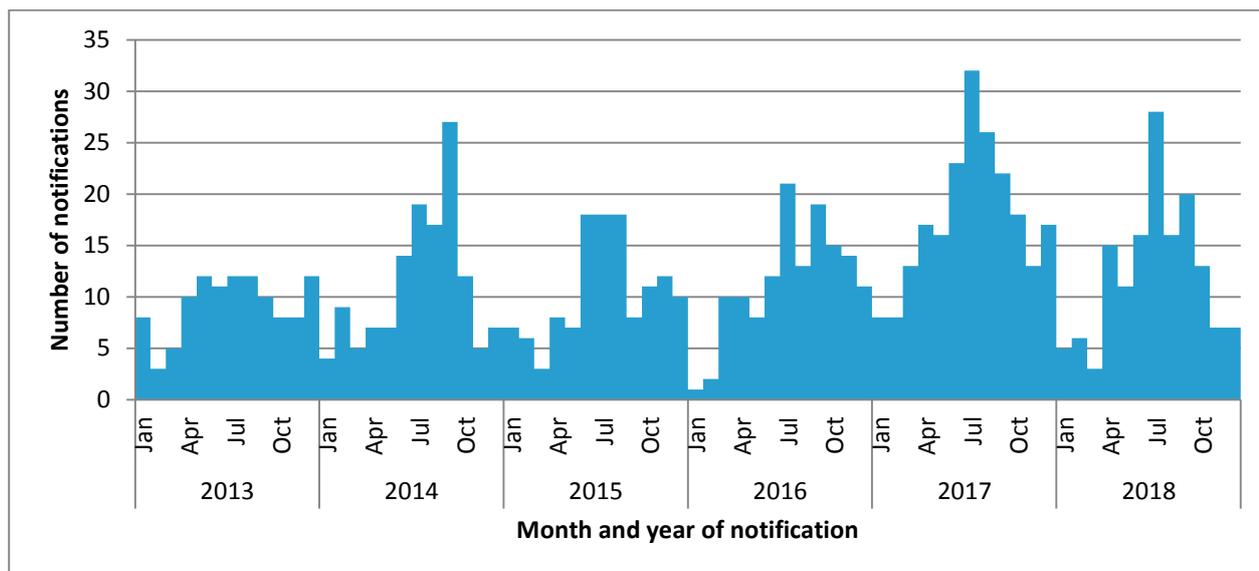


Pertussis vaccination is recommended for pregnant women. Of the five cases aged less than six months, three (60%) cases had documented evidence of maternal vaccination during pregnancy. Three of these cases were vaccinated to age at time of infection, one case had no recorded vaccination at time of infection and one case was too young to be vaccinated at time of infection.

Invasive pneumococcal disease

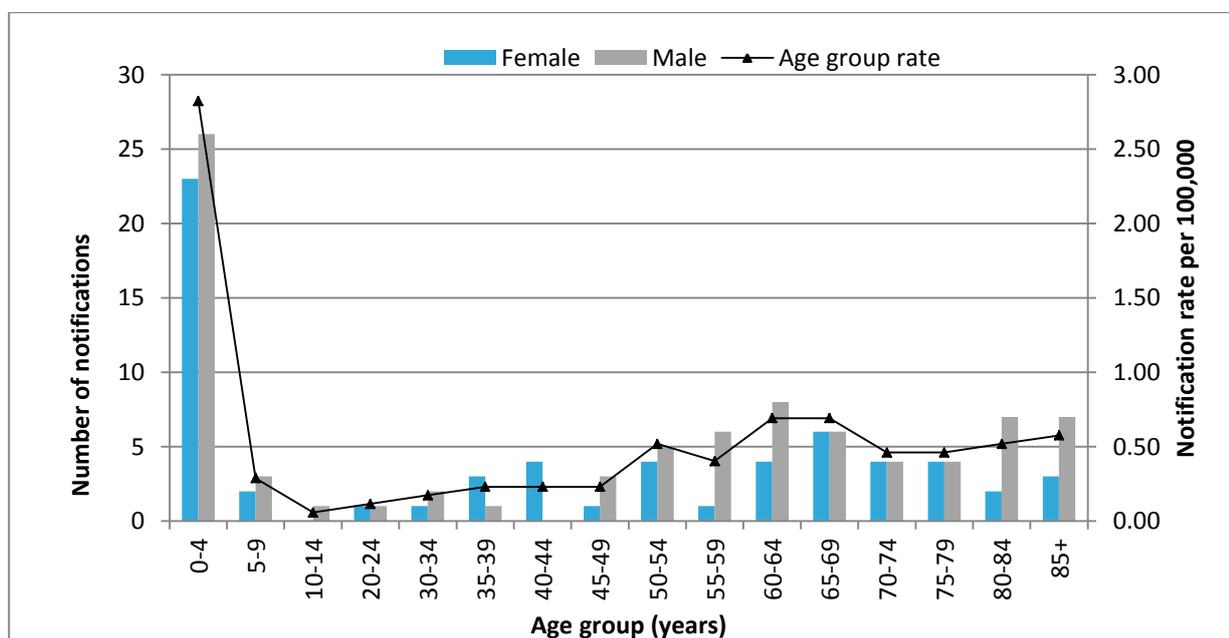
There were 147 notifications of invasive pneumococcal disease notified in 2018, lower than the 213 notifications in 2017, but similar to the five-year average of 144 notifications per annum for the period 2013 to 2017 (Figure 24).

Figure 24 Notifications of invasive pneumococcal disease by month and year, South Australia, 2013-2018



Cases comprised of 63 females and 84 males with an age range of less than one year to 95 years and a median age of 50 years. The 2018 female to male ratio and median age in 2018 were similar to the five year average figures (2013-2017). Notifications were highest in the less than one to four year age group, as were notification rates (Figure 25).

Figure 25 Notified cases of invasive pneumococcal disease by age group and sex, South Australia, 2018



In 2018, 25 cases of invasive pneumococcal disease reported to identify as Aboriginal or Torres Strait Islander.

Two deaths (one percent) were attributed to invasive pneumococcal disease in 2018, compared to thirteen deaths (six percent) attributed to invasive pneumococcal disease in 2017.

Further laboratory testing identified the pneumococcal serotype for 83 (56%) cases. Of the 64 cases not serotyped, 43 were diagnosed by PCR only, two were not typeable and the remaining 19 were either unviable or insufficient for typing. In 2018, serogroup 3 was the most common serotype identified and accounted for seven percent of all notifications or 13% of isolates serotyped (Table 4).

Table 4 Five most commonly identified serotypes of invasive pneumococcal disease, South Australia, 2018

Pneumococcal serotype	Notifications (%)
Not serotyped	64 (44)
Serotype 3	11 (7)
Serotype 22F	9 (6)
Serotype 19A	7 (5)
Serotype 11A	6 (4)
Serotype 9N	5 (3)
Other serotypes	45 (31)
Total	147

In 2018, 60 cases (41%) were attributed to serotypes included in the National Immunisation Program. This is similar to 2017, when 46% of cases were attributed to serotypes included in the National Immunisation Program.

In 2018 there were 49 cases aged less than five years. Of these, 41 were reported as appropriately vaccinated for age, five were partially vaccinated, one was not vaccinated and two were too young for vaccination.

Of the 47 cases aged 65 years and over, two were reported to identify as Aboriginal or Torres Strait Islander origin and both had received two doses of Pneumovax[®]23. Of the remaining 45 cases, 19 cases had received at least one pneumococcal vaccination, 17 cases were not vaccinated against pneumococcal disease, and the vaccination status was unknown for nine cases.

In 2018, five cases were recorded as vaccine failures as they tested positive for pneumococcal serotypes for which they were vaccinated. In 2017, 13 vaccine failures were reported.

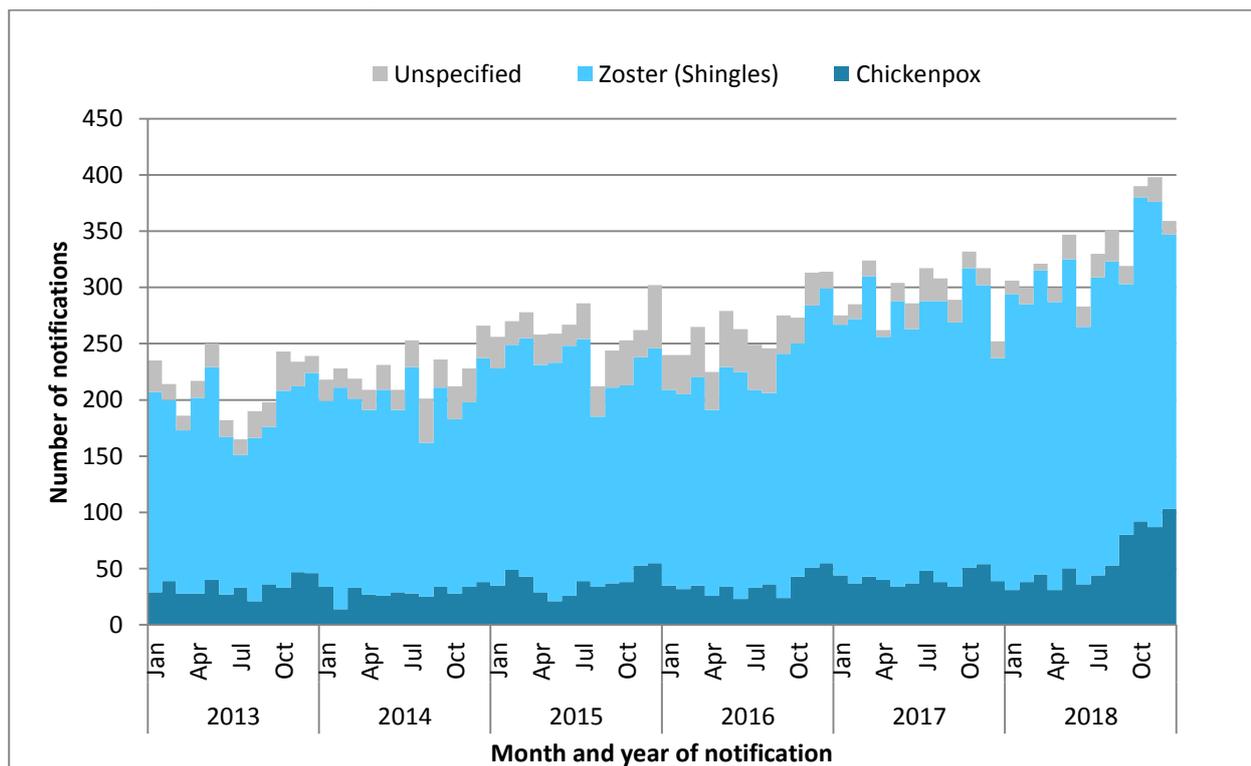
Enhanced data for invasive pneumococcal disease notifications is collected and reported nationally elsewhere and informs vaccine development.

Rotavirus infection

There were 496 cases of rotavirus infection notified in 2018, lower than the 1,362 notifications received in 2017 and lower than the five-year average of 903 notifications per annum for the period 2013 to 2017 (Figure 26).

In July 2018, the case definition for rotavirus changed to assist with differentiating cases of laboratory positive rotavirus that may be due to recent vaccination (if the laboratory test cannot differentiate wild-type and vaccine derived rotavirus). If a case is less than eight months of age and had been vaccinated less than four weeks prior to being tested, this case is now classed as probable. Ten percent of total cases in 2018 were classed as probable (Figure 26).

Figure 27 Notified cases of varicella zoster virus infection by infection type, and month and year of notification, South Australia, 2013-2018



Among cases of varicella zoster notified there were 2,211 females and 1,792 males with an age range of less than one to 102 years. Medical notifications characterised 690 infections as chickenpox (17%) and 3,119 as shingles (78%) and the clinical manifestation for 194 cases (5%) remained unspecified. The median age of chickenpox cases was nine years and the median age of shingles cases was 57 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

Four cases of Barmah Forest virus infection were notified in 2018, similar to the three cases notified in 2017 and lower than the five-year average of 17 cases per annum for the period 2013 to 2017. From December 2013 to November 2016, changes in laboratory testing procedures affected the number of notifications compared with previous years. Cases comprised two males and two females with an age range of 39 to 58 years. One case resided in metropolitan Adelaide and the remaining three cases lived in rural South Australia.

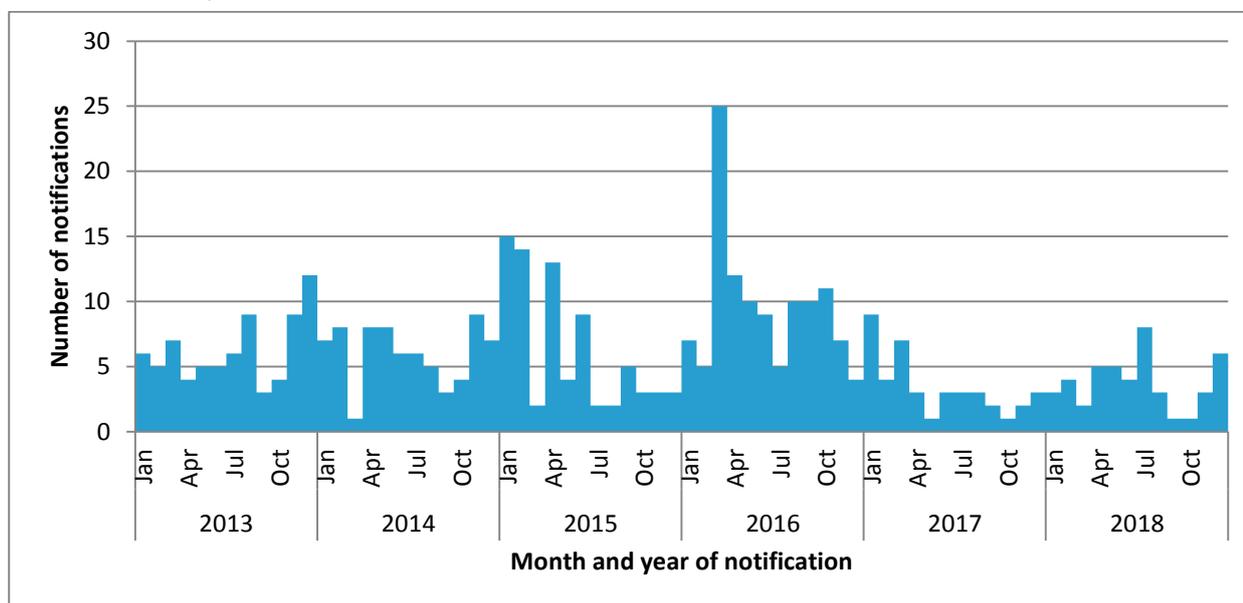
Chikungunya virus infection

In 2018, two cases of chikungunya virus infection were notified in South Australia, similar to the one case notified in 2017 and lower than the five-year average of five cases reported per annum for the period 2013 to 2017. The cases were two females aged 53 and 69 years and both reported overseas travel (India and Sudan) prior to illness onset.

Dengue virus infection

There were 45 cases of dengue virus infection notified in 2018, similar to the 41 cases in 2017, and lower than the five-year average of 76 notifications per annum for the period 2013 to 2017 (Figure 28).

Figure 28 Notified cases of dengue virus infection by month and year of notification, South Australia, 2013-2018



In 2018, notifications of dengue virus infection were in 17 females and 28 males with an age range of 22 to 75 years and a median age of 43 years.

All cases were acquired overseas. South East Asia was the most commonly reported region of exposure (60%), followed by the Indian subcontinent (22%) and the Western Pacific (16%) (Table 5).

Table 5 Notified cases of dengue virus infection by country of acquisition, South Australia, 2018

Country of acquisition	Cases
Indonesia	13
Thailand	6
Sri Lanka	4
India	3
Bangladesh	3
Philippines	3
Cambodia	2
Kiribati	2
Tonga	2
Fiji	1
Polynesia (excludes Hawaii, not further defined)	1
Viet Nam	1
Samoa	1
Singapore	1
South-east Asia, not further defined	1
South Africa	1
Total	45

Malaria

Thirty-four cases of malaria were notified in 2018, a substantial increase compared to the eight cases reported in 2017 and the five-year average of seven cases reported per annum for the period 2013 to 2017.

In 2018, malaria infections were in 17 males and 17 females with an age range of one to 71 years and a median age of 26 years.

All cases were acquired overseas. Twenty-eight cases (82%) were reported to have been acquired in Africa, with 12 cases (35%) reported as acquired in Tanzania (Table 6).

Twenty-six cases were caused by *Plasmodium falciparum*, 25 of these cases were acquired in Africa, with the remaining case acquired in Malaysia. Six cases were caused by *P. vivax*, two cases each acquired in Africa and Papua New Guinea, and one each in India and Indonesia. One case was caused by *P. ovale*, this case was acquired in India. One case was not further typed (Table 6).

Table 6 Notified cases of malaria infection by region and country of acquisition, South Australia, 2018

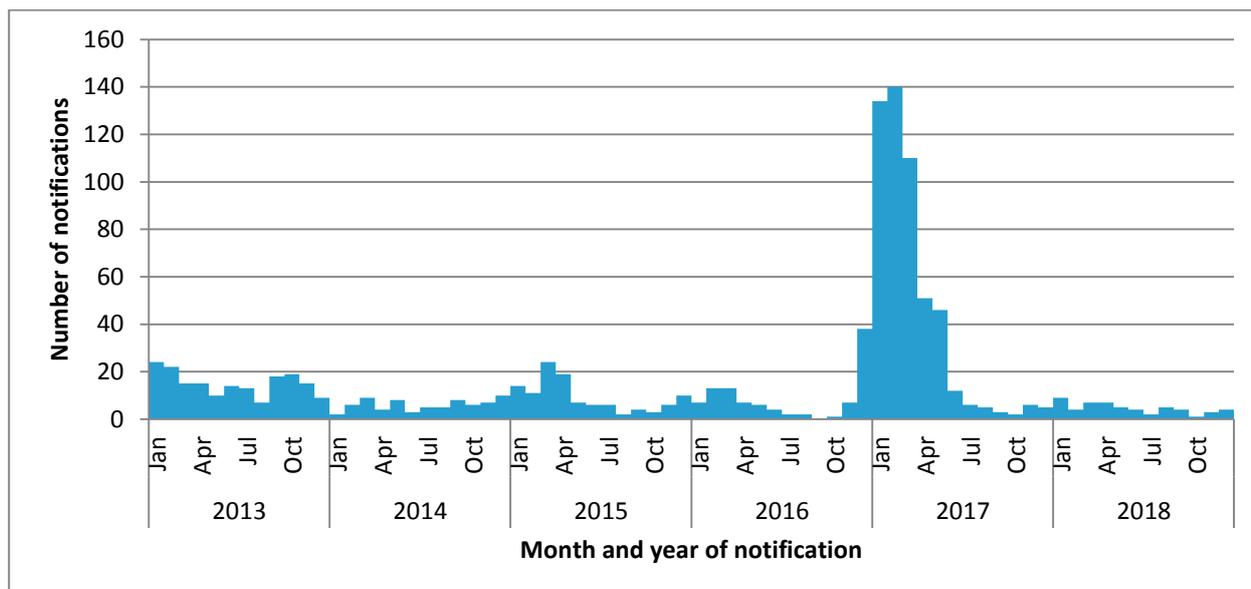
Region and Country of acquisition	<i>P. falciparum</i>	<i>P. ovale</i>	<i>P. vivax</i>	Not further typed	Total
Africa	25	0	2	1	28
Congo	1	0	1	0	2
Equatorial Guinea	1	0	0	0	1
Ghana	1	0	0	0	1
Guinea	2	0	0	0	2
Nigeria	1	0	0	1	2
Kenya	1	0	0	0	1
Malawi	1	0	0	0	1
Sierra Leone	1	0	0	0	1
Sudan	3	0	0	0	3
Tanzania	11	0	1	0	12
Uganda	1	0	0	0	1
Zambia	1	0	0	0	1
South East Asia	1	0	1	0	2
Indonesia	0	0	1	0	1
Malaysia	1	0	0	0	1
Indian subcontinent	0	1	1	0	2
India	0	1	1	0	2
Western Pacific	0	0	2	0	2
Papua New Guinea	0	0	2	0	2
Total	26	1	6	1	34

Ross River virus

There were 55 cases of Ross River virus infection (RRV) notified in 2018, much lower than the 520 cases reported in 2017 and the five-year average of 197 notifications per annum for the period 2013 to 2016 (Figure 29).

In 2018, notifications of RRV infection were in 30 females and 25 males with an age range of 12 to 90 years and a median age of 30 years. Medical notification may elicit the suspected location of exposure and in 2018 medical notifications were received for 93% of cases. Exposure during interstate travel was reported for nine cases (16%). Notifications for 14 (33%) cases either reported travel to, or were residents of, locations along the Murray River.

Figure 29 Notified cases of Ross River virus infection by month and year of notification, South Australia, 2013-2018



Zika virus infection

There were no cases of Zika virus infection notified in South Australia in 2018, similar to no notifications in 2017 and the five-year average of one case per year from 2013 to 2017.

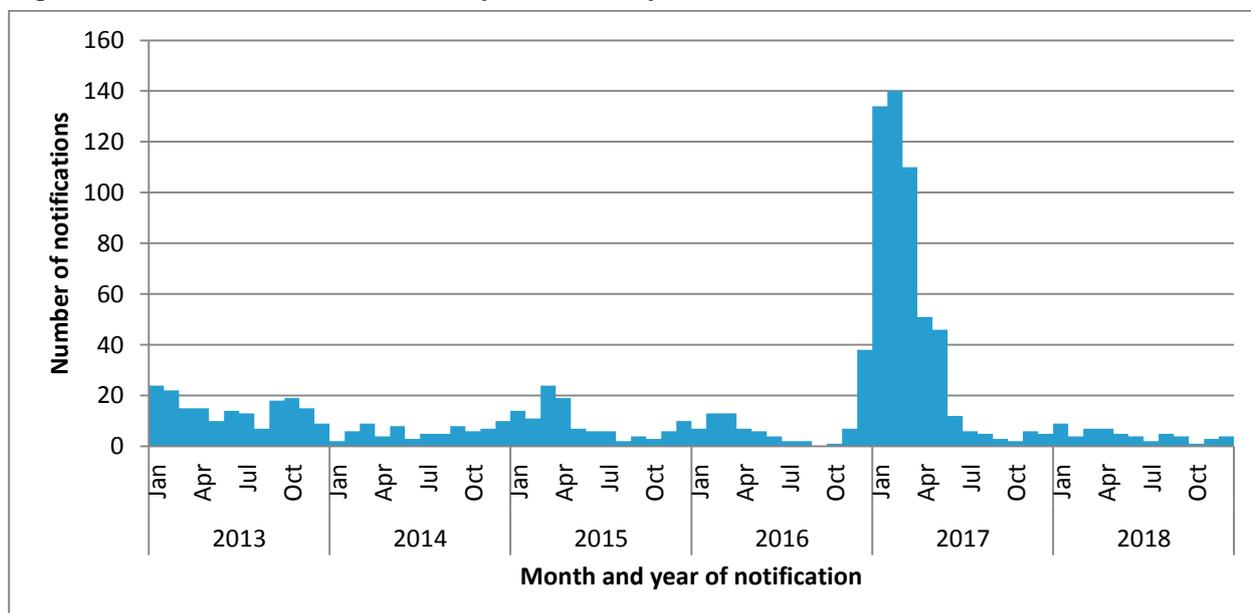
Zoonoses

No cases of anthrax, brucellosis, leptospirosis, lyssavirus, Hendra virus infection, psittacosis/ornithosis or tularaemia, were reported in 2018.

Q fever

There were 30 cases of Q fever notified in 2018, higher than the 22 cases notified in 2017 and the five-year average of 18 cases per annum for the period 2013 to 2017 (Figure 30). Cases comprise of four females and 26 males with an age range of 17 to 85 years and a median age of 45 years. Eleven cases were hospitalised.

Figure 30 Notified cases of Q fever by month and year of notification, South Australia, 2013-2018



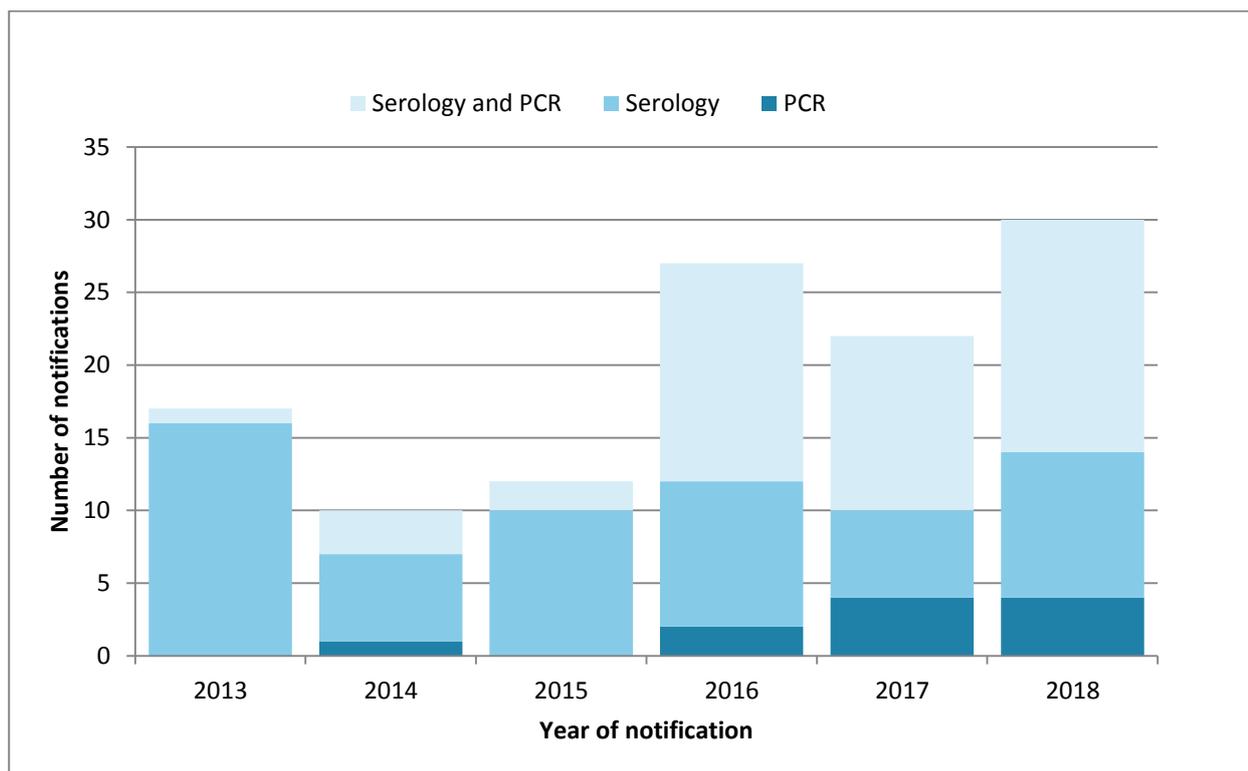
Nineteen cases of Q fever (64%) reported residing or working on a farm, three cases reported employment transporting livestock, three cases reported working at an abattoir and one case reported an indirect exposure to an abattoir. Five cases had no risk factors identified for acquiring Q fever (Table 7). Two cases reported being vaccinated for Q fever, 16 years and two weeks respectively, prior to illness.

Table 7 Notified cases of Q fever by risk factor, South Australia, 2018

Risk factor	Cases (%)
Residing/working on farm	19 (64)
Livestock transport	3 (10)
Working at an abattoir	3 (10)
Indirect exposure to an abattoir	1 (3)
No risk factor identified	4 (13%)
Total	30

There has been an increase in the use of PCR testing for Q fever. Of the 30 cases notified, 16 cases were diagnosed by PCR and serological testing (53%), ten were diagnosed by serological testing only (33%) and four were diagnosed by PCR testing only (14%). The introduction of PCR testing is likely to be responsible for part of the increase in Q fever notifications since 2016 (Figure 31).

Figure 31 Notified cases of Q fever by laboratory testing method and year of notification, South Australia, 2013-2018



Appendices

Appendix 1: Notifiable conditions by count, South Australia, 2013 to 2018

Notifiable condition	2013	2014	2015	2016	2017	5 year mean	2018
Enteric Diseases							
Botulism	0	0	0	0	1	0	0
<i>Campylobacter</i> infection	1,722	1,806	1,818	3,199	3,113	2,331	3,084
Cryptosporidiosis	135	224	419	432	356	313	197
Hepatitis A	11	7	10	7	23	12	21
Hepatitis E	0	0	1	3	1	1	0
Listeriosis	2	6	4	4	5	4	5
Paratyphoid	6	2	9	4	6	5	7
<i>Salmonella</i> infection	975	1,219	1,263	1,572	1,457	1,297	1,169
Shiga toxin-producing <i>E. coli</i> infection (STEC)	53	45	45	176	318	127	312
HUS/TTP infection	1	4	0	1	2	2	0
<i>Shigella</i> infection	29	37	77	182	300	125	434
Typhoid	8	9	8	6	5	7	6
<i>Vibrio parahaemolyticus</i> infection	NN	NN	NN	8	5	NA	11
Yersinosis	10	43	67	88	76	57	109
Quarantinable diseases							
Cholera	0	0	1	0	0	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
Other infectious notifiable diseases							
Creutzfeldt-Jakob disease	4	3	5	2	4	4	6
Legionellosis	60	44	28	27	40	40	32
Leprosy	1	1	0	0	1	1	0
Meningococcal disease (invasive)	20	32	30	27	36	29	34
Vaccine preventable diseases							
Diphtheria	1	0	0	0	0	0	1
<i>Haemophilus influenzae</i> (invasive)	11	13	16	22	14	15	24
<i>Haemophilus influenzae</i> type b (invasive)	0	2	1	2	0	1	3
Influenza A	2,641	9,962	6,915	7,030	18,295	8,969	4,181
Influenza B	2,179	1,088	8,744	821	10,189	4,604	1,748
Measles	16	16	4	11	1	10	2
Mumps	5	14	38	19	63	28	11

Notifiable condition	2013	2014	2015	2016	2017	5 year mean	2018
Pertussis	820	505	1,297	1,943	1786	1,270	716
Pneumococcal disease (invasive)	111	133	126	136	213	144	147
Polio virus infection	0	0	0	0	0	0	0
Rotavirus	782	808	1,127	435	1362	903	496
Rubella	2	2	2	0	0	1	0
Rubella - congenital	1	0	0	0	0	0	0
Tetanus	1	0	0	0	2	1	0
Varicella zoster (unspecified)	239	288	365	415	148	291	194
Varicella zoster (chickenpox)	407	350	459	427	499	428	690
Varicella zoster (shingles)	1,908	2,072	2,332	2,340	2,858	2,302	3,119
Vectorborne diseases							
Barmah Forest virus infection	77	0	1	5	3	17	4
Chikungunya virus infection	9	7	2	7	1	5	2
Dengue virus infection	75	72	75	115	41	76	45
Japanese encephalitis virus infection	1	0	0	0	0	0	0
Kunjin virus infection	0	0	0	0	0	0	0
Malaria	8	6	2	10	8	7	34
Murray Valley encephalitis infection	0	0	0	0	0	0	0
Ross River virus infection	181	73	112	100	520	197	55
Zika virus infection	0	0	1	2	0	1	0
Zoonoses							
Anthrax	0	0	0	0	0	0	0
Australian bat lyssavirus infection	0	0	0	0	0	0	0
Brucellosis	0	0	0	0	1	0	0
Hendra virus infection	NN	NN	NN	0	0	NA	0
Hydatid disease	NN	NN	NN	NN	NN	NA	0
Leptospirosis	2	1	0	2	1	1	0
Lyssavirus (NEC)	0	0	0	0	0	0	0
Psittacosis/Ornithosis	0	0	1	0	1	0	0
Q Fever	17	9	12	28	22	18	30
Tularaemia	0	0	0	0	0	0	0
Grand Total	12,531	18,903	25,417	19,608	41,777	23,644	16,929

NN = not notifiable; NEC = not elsewhere classified

HUS/TTP = haemolytic uraemic syndrome / thrombotic thrombocytopenic purpura

Appendix 2: Notifiable conditions by rate per 100,000 population, South Australia, 2013 to 2018

Notifiable condition	2013	2014	2015	2016	2017	5 year mean	2018
Enteric Diseases							
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Campylobacter</i> infection	103.1	107.1	107.0	187.1	180.7	137.0	177.6
Cryptosporidiosis	8.1	13.3	24.7	25.3	20.7	18.4	11.3
Hepatitis A	0.7	0.4	0.6	0.4	1.3	0.7	1.2
Hepatitis E	0.0	0.0	0.1	0.2	0.1	0.1	0.0
Listeriosis	0.1	0.4	0.2	0.2	0.3	0.2	0.3
Paratyphoid	0.4	0.1	0.5	0.2	0.3	0.3	0.4
<i>Salmonella</i> infection	58.4	72.3	74.4	91.9	84.5	76.3	74.7
Shiga toxin-producing <i>E. coli</i> infection (STEC)	3.2	2.7	2.6	10.2	18.2	7.4	18.0
HUS/TTP infection	0.0	0.2	0.1	0.0	0.1	0.1	0.0
<i>Shigella</i> infection	1.7	2.2	4.5	10.7	17.3	7.3	25.3
Typhoid	0.5	0.5	0.5	0.4	0.3	0.4	0.3
<i>Vibrio parahaemolyticus</i> infection	NN	NN	NN	0.5	0.3	0.2	0.6
Yersinosis	0.6	2.6	3.9	5.1	4.3	3.3	6.3
Quarantinable diseases							
Cholera	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Influenza (avian in humans)	0.0	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	0.0
Plague	0.0	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	0.0
Severe acute respiratory syndrome (SARS)	0.0	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	0.0
Viral haemorrhagic fever	0.0	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	0.0
Other infectious notifiable diseases							
Creutzfeldt-Jakob disease	0.2	0.2	0.3	0.1	0.2	0.2	0.3
Legionellosis	3.6	2.6	1.6	1.6	2.3	2.3	1.8
Leprosy	0.1	0.1	0.0	0.0	0.1	0.1	0.0
Meningococcal disease (invasive)	1.2	1.9	1.8	1.6	2.1	1.7	2.0
Vaccine preventable diseases							
Diphtheria	0.1	0.0	0.0	0.0	0.0	0.0	0.1
<i>Haemophilus influenzae</i> (invasive)	0.7	0.8	0.9	1.2	0.8	0.9	1.4
<i>Haemophilus influenzae</i> type b (invasive)	0.0	0.1	0.1	0.1	0.0	0.1	0.2
Influenza A	158.1	591.0	407.1	411.5	1061.5	525.8	240.8
Influenza B	130.4	64.5	514.8	48.1	591.2	269.8	100.7
Measles	1.0	0.9	0.2	0.6	0.1	0.6	0.1
Mumps	0.0	0.8	2.2	1.1	3.7	1.6	0.6
Pertussis	49.1	30.0	76.4	113.7	103.6	74.6	41.2

Notifiable condition	2013	2014	2015	2016	2017	5 year mean	2018
Pneumococcal disease (invasive)	6.6	7.9	7.4	8.0	12.4	8.5	8.5
Polio virus infection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rotavirus	46.8	47.9	66.3	25.5	79.0	53.1	28.6
Rubella	0.1	0.1	0.1	0.0	0.0	0.1	0.0
Rubella - congenital	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Varicella zoster (unspecified)	14.3	17.1	21.5	24.3	8.6	17.2	11.2
Varicella zoster (chickenpox)	24.4	20.8	27.0	25.0	29.0	25.2	39.7
Varicella zoster (shingles)	114.2	122.9	137.3	137.0	165.8	135.4	179.6
Vectorborne diseases							
Barmah Forest virus infection	4.6	0.0	0.1	0.3	0.2	1.0	0.2
Chikungunya virus infection	0.5	0.4	0.1	0.4	0.1	0.3	0.1
Dengue virus infection	4.5	4.3	4.4	6.7	2.4	4.5	2.6
Japanese encephalitis virus infection	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Kunjin virus infection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaria	0.5	0.4	0.1	0.6	0.5	0.4	2.0
Murray Valley encephalitis infection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ross River virus infection	10.8	4.3	6.6	5.9	30.2	11.6	3.2
Zika virus infection	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Zoonoses							
Anthrax	0.0	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	0.0
Brucellosis	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Hendra virus infection	NN	NN	NN	0.0	0.0	0.0	0.0
Hydatid disease	NN	NN	NN	NN	NN	NA	NA
Leptospirosis	0.1	0.1	0.0	0.1	0.1	0.1	0.0
Lyssavirus (NEC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Psittacosis/Ornithosis	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Q Fever	1.0	0.5	0.7	1.6	1.3	1.0	1.7
Tularaemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NN = Not notifiable; NEC = not otherwise classified

HUS/TTP = haemolytic uraemic syndrome / thrombotic thrombocytopenic purpura

Appendix 3: Summary of outbreaks reported in 2018

2018 Outbreak Investigations by disease type.

Campylobacter – Institution – February

Five people from the same institution were notified with *Campylobacter* (two cases had cultures isolated that were further typed as *C. jejuni*, and three were PCR positive only). Routine environmental health officer (EHO) inspections of the main kitchen facility have not identified any issues and areas where individuals were able to prepare food were inspected and no issues identified. The institution had an on-site dairy where several residents worked and it was reported that unpasteurised cream was unaccounted for; it was suspected that residents were consuming unpasteurised milk and/or cream. Advice on the risks of consuming unpasteurised milk products were provided to the facility by an EHO.

Hepatitis A – National outbreak pomegranate arils – April

An increase in notifications of locally acquired hepatitis A genotype IB was observed in New South Wales (NSW) in early 2018, with several other jurisdictions also reporting cases. Based on the NSW evidence a national recall was issued on 7 April 2018. A multijurisdictional outbreak investigation (MJOI) was launched. A total of 31 cases were reported nationally between 1 January 2018 and 9 January 2019. SA had two cases of HAV that met the MJOI case definition based on sequencing results. One of the SA cases died and the cause of death is yet to be determined. A national prospective matched case-control study was conducted using *Salmonella* or *Campylobacter* controls. Thirteen cases and 21 controls were enrolled in the study which found an adjusted odds ratio of 43.4 (95% CI 4.2-449; p=0.002) for frozen pomegranate arils.

Hepatitis A – Community – September

Three children in the same family group acquired hepatitis A after travelling to Afghanistan. Interviews identified 82 contacts in a kindergarten that required vaccination. A vaccination clinic was set up at the kindergarten with 48 contacts (children and staff) immunised at the clinic. An additional 20 contacts had either been previously vaccinated or were vaccinated at their GP, and 14 contacts were lost to follow up and given information only.

Listeria monocytogenes MLST 3 – Commercial caterer – June

National *Listeria monocytogenes* genomic analysis received in June 2018 reported that the most recent South Australian case from May 2018 was sequence type 3 and potentially related to two other South Australian case isolates from outside the previous six month period; one in 2011 and one in 2014. There were no interstate human isolates related to this group. All three cases had consumed food from the same catering service. In 2011, a food isolate and three environmental isolates from the food service detected *L. monocytogenes* sequence type 3. The food and environmental isolates underwent whole genome sequencing (WGS) and phylogenetic analysis in July 2018 and were also reported as potentially related to the three human isolates. An inspection of the food service was conducted and increased frequency of inspections has been implemented. The investigation remains open with ongoing follow up at the premises.

Norovirus – Restaurant – January

Nineteen people out of a group of approximately 60 people attending a work function at a hotel for two days were reported unwell with gastroenteritis. Additionally, one hotel staff member was also unwell with an onset of illness on the same date as function attendees. The staff member consumed food that was left over and prepared for the function. Other interviews did not identify a common food source. There were no reports of illness amongst staff or attendees before the event. One specimen was submitted and norovirus was identified. The mode of transmission was unable to be determined.

Norovirus/Rotavirus – Restaurant – October

Eight out of approximately 200 attendees at a wedding reception reported gastrointestinal symptoms, with one specimen submitted that was positive for both norovirus and rotavirus. The majority of ill attendees were seated together at the reception.

Norovirus – Restaurant – November

A report of gastroenteritis among eight of 68 people attending a conference function over two days was received. Two specimens were submitted and were both confirmed to be norovirus.

Pertussis – Childcare Centre – October

Four cases of pertussis were notified linked to a childcare centre between 29 October and 5 November 2018. Information was provided to staff and parents at the centre. There were no children aged less than six months at the centre. One child was incompletely vaccinated. This child was excluded from the centre, and given prophylactic antibiotics and catch up vaccination. Ten staff members were overdue vaccinations and were given prophylactic antibiotics and received their booster vaccinations.

Pertussis – Childcare Centre – December

Eight cases of pertussis were notified between 18 December 2018 and 7 January 2019 linked to a childcare centre. Information was provided to all staff and parents at the centre. There were no children aged less than six months at the centre. No further public health action was taken since all staff and children were vaccinated and the centre was closed for two weeks over the Christmas and New Year period with no additional cases (the case notified in January had not attended the childcare centre since December 2018).

Salmonella Typhimurium (STm) phage type 9 – Restaurant – January

Six cases of STm 9 (MLVA 03-24-11-10-523) reported consumption of food prepared or purchased from the same restaurant over a two week period in January 2018. One household member of a case was considered a secondary case of illness, and therefore also linked to this outbreak. Three of the six cases consumed meals containing eggs from the premises. An EHO inspected the premises and an improvement notice was issued to address cleaning and sanitising issues.

Salmonella Typhimurium phage type 135 – Cluster – January

A cluster of ten cases of STm 135 were notified in cases that did not report eating at either of two STm 135 outbreak venues in the same local area in January or February 2018. One case was hospitalised. Two cases ate at a common food venue which was referred to Food Standards Surveillance. No other food businesses were common between the cases. Seven cases had purchased raw chicken to be cooked at home and six cases had consumed eggs. A range of MLVA patterns were in this cluster so unlikely to have come from the same source.

Salmonella Typhimurium phage type 135 – Restaurant – February

Eight cases of *Salmonella* (seven typed as STm 135 with MLVA 03-14-10-08-523 and one as *Salmonella* not further typed with no culture isolated for the case) reported consumption of food from the same restaurant over a one week period in January 2018. Cases consumed a variety of foods including seafood, steak, pork, chicken, vegetables and salads. Four cases (50%) were hospitalised. An EHO inspected the premises and identified cleaning and temperature control issues. Cross contamination issues with raw eggs were also identified. Food and environmental samples were submitted with no *Salmonella* detected.

Salmonella Saintpaul – Cluster - January

A cluster of six cases of *Salmonella* Saintpaul were notified in January (three cases were hospitalised). All cases were interviewed. Multiple foods were common to cases, but no common high risk foods or eating out venues were identified. Numbers returned to expected levels in February.

Salmonella Typhimurium phage type 12a – Private residence – February

A probable foodborne outbreak was identified at a private residence with five people reporting gastroenteritis after a meal with common foods served on two consecutive nights. Three attendees (extended family members, all in different residences) were confirmed with STm 12a (MLVA 05-15-17-09-490). Foods served at both meals included vegetarian lasagne, salad and lemon parfait made with raw eggs.

Salmonella Typhimurium phage type 44 – Takeaway/Caterer – February

Twenty-seven cases of STm 44 (MLVA 03-10-08-09-523) reported consumption of food purchased from the same takeaway venue or attended events catered by the food business. Foods eaten by cases included sandwiches, wraps, salads and dipping sauces, all of which included raw egg mayonnaise as an ingredient. An EHO inspected the premises and identified issues with cleaning and sanitising. Several food and environmental samples were positive for STm 44. A prohibition order was served and the venue was closed between 5 March 2018 and 13 March 2018. The business also reported that they would cease production of raw egg mayonnaise and use a commercial product instead.

Salmonella Typhimurium phage type 44 – Community cluster – March

Sixty cases of STm phage type 44 with MLVA 03-10-08-09-523 that were not linked to the takeaway/caterer outbreak in February were notified between 22 February and 16 May 2018 and an investigation initiated. From this cluster 21 cases were hospitalised and one person died due to the disease. Cases were widespread and not clustered to any particular local government area or setting. A total of 48 cases were interviewed, with no definitive source identified. Eggs were one of the most common consumed foods reported by cases (60%) although no particular brand was identified as a source of infection. Safe egg handling messaging was distributed in the community on various media platforms.

Salmonella Typhimurium phage type 135a – Aged Care Facility – April

There were six cases of *Salmonella* in an aged care facility (of 86 residents), all typed as STm phage type 135a. Two confirmed cases had co-infections, one with STm 193 and one with STm 135. All seven STm isolates were the same MLVA pattern of 03-12-07-11-523. Onset dates ranged from 2 to 11 April 2018. A site visit was conducted by an epidemiologist and only one additional case of gastroenteritis was identified in the facility that did not have a specimen submitted at the time of their illness. Unwell cases were all on a normal diet and had some social links. Multiple food items were in common to the unwell cases as they ate from a common menu at the facility. Cases were spread in three of the four sections of the facility. Multiple environmental inspections were conducted that identified some potential issues in the kitchen with cross contamination, egg handling and hand washing. Multiple food and environmental samples were taken and *Salmonella* was not detected.

Salmonella Havana – Primary production – June

Thirty-one cases of *Salmonella* Havana were notified in South Australian residents between 1 June and 16 July 2018. Thirteen cases reported eating at the same hotel; a variety of different hot meals and food from the salad bar were consumed by cases. An environmental inspection of the hotel identified alfalfa sprouts were served as a garnish on all hot meals, along with snow pea shoots and mesclun lettuce. A further eight cases of *S. Havana* reported alfalfa sprouts as a common food item consumed prior to illness. A case-control study was conducted on 20 June 2018 (prior to a media release), including a total of 18 cases and 54

controls. Analysis of the case-control data identified an odds ratio of 26 (95% confidence intervals 2.62 – 1217.6, $p=0.001$) for exposure to alfalfa sprouts. Trace back identified two South Australian producers of alfalfa sprouts. Food and environmental sampling was conducted including samples from retail venues and at the sprout producer. Several alfalfa sprout samples from one sprout producer were positive for *S. Havana* and *S. Oranienburg*. A consumer level recall of one brand of alfalfa sprouts occurred on 20 June 2018; a media release and public health alert was issued.

***Salmonella* Oranienburg – Primary production – August**

An increase in cases of *Salmonella* Oranienburg was identified in August 2018. Of the 27 cases, 25 were interviewed and 12 reported consumption of alfalfa sprouts in their incubation period and one case is a likely secondary case of a sibling that consumed alfalfa sprouts and was unwell with gastroenteritis but not tested. A case control study was conducted (including ten cases and 36 controls). On a univariate analysis, alfalfa sprouts had the highest odds ratio out of all the food exposures. However, there were three other food exposures that also had elevated odds ratios. There was insufficient statistical power to enable a stratified or multivariate analysis to control for confounding in the study. Traceback led to the identification of a common supplier of alfalfa sprouts. Sampling of alfalfa sprouts from retail was conducted and *S. Oranienburg* was identified. A product recall and media release was undertaken on 9 September 2018.

***Salmonella* Newport – Community – October**

Three cases of *Salmonella* Newport were notified during a two week period in cases aged less than two years old. Interviews were completed and all three cases had consumed a particular brand of formula as well as some common foods (chicken, yoghurt, fruit and vegetables). No national increase in *S. Newport* was identified, but four cases aged less than two years of age were interviewed in Vic and had not consumed the same brand of formula. Cases in other states were not interviewed. WGS was performed and two cases from SA and three cases from Vic were determined to be part of the same cluster. However, no common food source was identified in these cases and the investigation was closed with no additional cases in children aged less than two years.

***Salmonella* Typhimurium phage type 108 – Private function – November**

Five cases of STm phage type 108, MLVA pattern 04-11-15-00-517 were reported in November, and all had attended the same wedding. The wedding was privately catered by multiple people and held over several days. The investigation was limited, as further information was not able to be obtained about attendees or food supplied for the event.

***Salmonella* Stanley – Community – December**

Three cases of *Salmonella* Stanley were notified in a one week period in December. One additional case was also linked to this cluster in person-to-person transmission. All cases were interviewed and two cases likely acquired *S. Stanley* at a private party with a home cooked spit. The other case was not linked to the private party. No further cases were notified and the investigation closed.

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

Five people were diagnosed with STm phage type 9, MLVA 03-23-12/13-10-523, that all consumed food from the same café. A variety of foods were consumed, several included aioli and eggs. All cases ate at the venue over a three day period. Samples of aioli made with raw eggs from the premises did not detect *Salmonella*.

Unknown pathogen/Suspected Food Poisoning – Restaurant – January

Thirty-one people from two different groups that attended the same function in December 2017 reported gastroenteritis. The function catered for approximately 3,000 people. Only one person submitted a specimen and no bacterial pathogens were detected and viral testing was not undertaken. The transmission mode was unable to be determined.

Shigella – Community – August

Six cases of *Shigella* were linked via common risk factors. Three cases were typed as *Shigella sonnei* biotype g and three cases were PCR positive only with no cultures identified. The mode of transmission was person-to-person with four cases reporting male to male sex, one case identified as bi-sexual and two cases reported injecting drugs.

Shigella sonnei biotype g – Community – December

There was an increase in multi-drug resistant *Shigella sonnei* biotype g cases in SA. There were five culture confirmed cases of multi-drug resistant *Shigella sonnei* biotype g notified with onsets from October 2018 onwards and one PCR only case with an epidemiological link to two culture confirmed cases. All cases were men, and five identified as MSM. One MSM case was acquired in New Zealand. A Public Health Alert was issued on 20 December 2018.

Varicella virus (Chickenpox) – School – February

An outbreak of chickenpox was identified in eight children attending the same school, with one case confirmed by laboratory testing. All cases had been previously vaccinated. Information was provided to the school. There were no immunocompromised staff/students or pregnant staff at the school that required further public health action. Immunisation records were checked and no clustering was identified.

Ongoing *Shigella flexneri* 2b – Community

From April 2017 onwards there has been an increase in shigellosis in the remote far north and far west regions of SA, with concurrent ongoing increases in neighbouring remote areas of the Northern Territory and Western Australia. In 2018, there were 226 *Shigella* notifications from the outbreak regions, 70 typed as *S. flexneri* 2b, six typed as *S. flexneri* 2a, two as *S. flexneri* type x and 148 as PCR only (*Shigella* not further typed). The majority of cases identified as Aboriginal or Aboriginal and Torres Strait Islander (211/226; 93%). A project officer worked in the far north region for three months to improve contact tracing, improve specimen collection from symptomatic cases, monitor and administer treatment as directly observed therapy, and conduct health promotion and awareness of the situation among communities and relevant organisation in the region. Online media tools were developed, including advertisements on social media and radio announcements. Regional EHOs continued to promote good hand hygiene at schools and childcare centres, and inspected food premises. Housing SA undertook a housing audit in several communities to address any issues of malfunctioning house hardware and general maintenance. Cases in the regions were noted to increase at times of temporary camps where access to water and sanitation was limited.

Ongoing Hepatitis A

There was a protracted outbreak of locally acquired hepatitis A virus in SA. From November 2017 to 31 December 2018, there were 22 confirmed outbreak cases with genotype IA infection with one of the three outbreak sequences. One case had the cluster 3 sequence (V16-25801), nine cases had the cluster 2 sequence (RIVM-HAV16-090) and 12 cases had the cluster 1 sequence (UK_VRD_521_2016). There was one probable outbreak case who was epidemiologically linked to a confirmed case. Of the 23 cases, 20

(87%) were male and three were female. Two cases identified as Aboriginal. The median age was 48 years, ranging from 20 to 65 years. Twelve out of 23 cases (52%) were hospitalised. No fatalities were recorded. Four cases were secondary cases, acquiring their infection either through household and/or sexual contact.

Twelve cases (52%) identified as MSM, with seven reporting attendance at sex on premises venues during their exposure period. Twelve of the primary cases had travelled interstate (seven of these cases identified as MSM), with nine cases travelling to Victoria and one each to Queensland and NSW. One case had travelled to multiple locations within SA and interstate during his exposure period. A hepatitis A vaccination campaign ran from 1 January 2018 to 22 October 2018 targeting gay men and other MSM who use sexual health clinics, those who are part of the pre-exposure prophylaxis-expanded South Australia (PrEPX-SA) trial for HIV prevention and there was also a vaccination clinic run at the main sex on premises venue in SA. A targeted health promotion and social marketing campaign was run to inform community members about the outbreak and how to prevent the spread of the infection, including accessing vaccination.

Outbreaks Reported by Aged Care Facilities in 2018

Month reported	Agent identified	Number of facilities affected
January	Gastroenteritis, organism not detected	5
	Norovirus	4
	Influenza	1
February	Gastroenteritis, organism not detected	2
	Norovirus	1
March	Gastroenteritis, organism not detected	3
	Influenza	1
April	Gastroenteritis, organism not detected	1
	Norovirus	2
	Salmonella	1
May	Gastroenteritis, organism not detected	3
June	Gastroenteritis, organism not detected	2
	Norovirus	2
July	Norovirus	2
	Rotavirus	1
	Influenza	2
August	Gastroenteritis, organism not detected	2
	Norovirus	3
September	Gastroenteritis, organism not detected	2
	Norovirus	11
	Influenza	1
October	Gastroenteritis, organism not detected	4
	Norovirus	15
	Influenza	1
November	Gastroenteritis, organism not detected	1
	Norovirus	6
	Influenza	1
December	Gastroenteritis, organism not detected	1
	Norovirus	5
	Influenza	3

For more information

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