Foodborne disease surveillance and outbreak investigations in Western Australia, fourth quarter 2017

**Enhancing foodborne disease surveillance across Australia**



**Communicable Disease Control Directorate**



OzFoodNet, Communicable Disease Control Directorate

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Every endeavour has been made to ensure that the information provided in this document was accurate at the time of writing. However, infectious disease notification data are continuously updated and subject to change.

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# Executive summary

During the fourth quarter of 2017 (4Q17), the Western Australian (WA) OzFoodNet team conducted surveillance of enteric diseases, undertook investigations into outbreaks and was involved with ongoing enteric disease research projects. The most common notifiable enteric infections in WA were campylobacteriosis (n=935), salmonellosis (n=553), rotavirus infection (n=97) and shigellosis (n=68) (Figure 1). Compared to the applicable 5-year fourth quarter means (4QM), there were increases in notifications of campylobacteriosis (20%), salmonellosis (50%), rotavirus infections (10%) and shigellosis (237%). The large increase in salmonellosis was primarily driven by an increase in *S.* Typhimurium MLVA type 03-17-09-12-523 notifications. There were 11 foodborne outbreaks investigated in the fourth quarter, which was 2.75 times the 4QM (n=4). This included seven outbreaks due to *Salmonella* Typhimurium of which six were associated with consumption of egg dishes. Two outbreaks were due to norovirus and two had unknown aetiology. OzFoodNet also conducted surveillance of 59 non-foodborne outbreaks. Of these, the most common mode of transmission was person-to-person (52 outbreaks), with a total of 1274 people ill. Norovirus was the most commonly reported pathogen, being identified in 23 outbreaks.

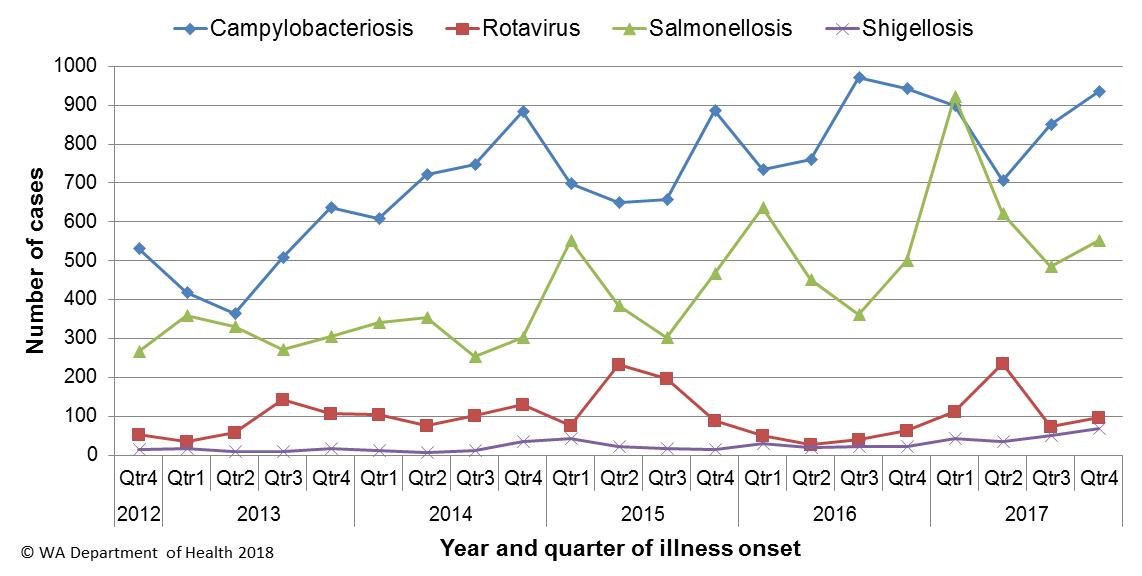


Figure 1: Notifications of the four most common enteric diseases by quarter from 2012 to 2017, WA

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**Notes:**

1. All data in this report are provisional and subject to future revision.
2. To help place the data in this report in perspective, comparisons with other reporting periods are provided. As no formal statistical testing has been conducted, some caution should be taken with interpretation.

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# Introduction

It has been estimated that there are 5.4 million cases of foodborne illness in Australia each year at a cost of $1.2 billion per year1. This is likely to be an underestimate of the total burden of gastrointestinal illness as not all enteric infections are caused by foodborne transmission. Other important modes of transmission include person-to-person, animal-to-person and waterborne transmission. Importantly, most of these infections are potentially preventable through interventions at the level of primary production, commercial food handling, households or institution infection control, as appropriate.

This report describes enteric disease surveillance and investigations carried out during the fourth quarter of 2017 by OzFoodNet WA, other WA Health agencies and local governments. Most of the data are derived from reports by doctors and laboratories to WA Health of 16 notifiable enteric diseases. In addition, outbreaks caused by non-notifiable enteric infections are also documented in this report, including norovirus, which causes a large burden of illness in residential (mostly aged) care facilities (RCF) and the general community.

OzFoodNet WA is part of the Communicable Disease Control Directorate (CDCD) within WA Health, and is also part of the National OzFoodNet network funded by the Commonwealth Department of Health2. The mission of OzFoodNet is to enhance surveillance of foodborne illness, including investigating and determining the cause of outbreaks. OzFoodNet also conducts applied research into associated risk factors and develops policies and guidelines related to enteric disease surveillance, investigation and control. The OzFoodNet site based in Perth is responsible for enteric disease surveillance and investigation in WA.

OzFoodNet WA regularly liaises with staff from: Public/Population Health Units (PHUs); the Food Unit in the Environmental Health Directorate of WA Health; and the Food Hygiene, Diagnostic and Molecular Epidemiology laboratories at PathWest Laboratory Medicine WA.

PHUs are responsible for a range of public health activities, including communicable disease control, within their respective administrative regions. The PHUs monitor RCF gastroenteritis outbreaks and provide infection control advice. The PHUs also conduct follow-up of sporadic cases of important enteric diseases including typhoid, paratyphoid and hepatitis A.

The Food Unit liaises with Local Government (LG) Environmental Health Officers (EHO) during the investigation of food businesses. The Food Hygiene, Diagnostic and Molecular Epidemiology laboratories at PathWest Laboratory Medicine WA provide public health laboratory services for the surveillance and investigation of enteric disease.

# Incidence of notifiable enteric infections

## Methods

Enteric disease notifications were extracted from the Western Australian Notifiable Infectious Diseases Database (WANIDD) by optimal date of onset (ODOO) for the time period 1st October 2012 to 31st December 2017. The ODOO is a composite of the ‘true’ date of onset provided by the notifying doctor or obtained during case follow-up, the date of specimen collection for laboratory notified cases, and when neither of these dates is available, the date of notification by the doctor or laboratory, or the date of receipt of notification, whichever is earliest. Rates were calculated using estimated resident population data for WA from Rates Calculator version 9.5.5 (WA Health, Government of Western Australia), which is based on 2011 census data. Rates calculated for this report were annualised (rates for the quarter multiplied by four) and have not been adjusted for age.

## Campylobacteriosis

Campylobacteriosis was the most commonly notified enteric disease in WA during the fourth quarter of 2017 (4Q17), with 935 notifications and a rate of 138 cases per 100 000 population per year (Table 1). There was a 20% increase in campylobacteriosisnotifications in the 4Q17 compared with the 5-year fourth quarter mean (4QM) of 776 notifications. The increase appeared to be due to sporadic disease, as there were no identified *Campylobacter* outbreaks during the 4Q17. At least some of the increase is likely to be due to the introduction by one large private pathology laboratory of polymerase chain reaction (PCR) testing of faecal specimens, which has greater sensitivity than culture techniques.

The place of acquisition of infection was reported for 53% (n=500) of cases, of which 80% (n=402) were locally acquired and 18% (n=92) were acquired overseas.

Table 1: Number of campylobacteriosis notifications, 4th quarter 2017, WA, by region



**\***Percentage change in the number of notifications in the current quarter compared to the historical 5-year mean for the same quarter. Positive values indicate an increase when compared to the historical 5-year mean of the same quarter. Negative values indicate a decrease when compared to the historical 5-year mean of the same quarter. Percentage change should be interpreted with caution when the number of cases is small.

NA: not applicable as there is a 0 value in the calculation for the 4th quarter % change

## Salmonellosis

Salmonellosis was the second most commonly notified enteric disease in WA in the 4Q17, with 553 notifications and a rate of 82 cases per 100 000 population per year (Table 2). The number of salmonellosisnotifications in the 4Q17 was 50% higher than the 4QM (n=369), with substantial increases seen in most PHUs.

Place of acquisition of infection was reported for 78% (n=434) of cases, of which 78% (n=338) were locally acquired, 22% (n=94) were acquired overseas and <1% (n=2) were acquired interstate.

The most commonly reported *Salmonella* serotype was *S*. Typhimurium (STM) (n=285, 52%), and of those cases with information on place of acquisition (n=251, 88%), 95% of cases (n=239) were locally acquired. Pulsed-field gel electrophoresis (PFGE) was previously used for subtyping of STM in WA, but as of the beginning of 2016, multi locus variable number tandem repeat analysis (MLVA) has replaced PFGE. The most common MLVA types for 4Q17 were 03-17-09-12-523 (n=93, 33%, PFGE type 0043), 03-17-10-12-523 (n=26, 9%, PFGE type 0043), 03-17-07-12-523 (n=24, 8%, PFGE type 0043). The MLVA type 03-17-09-12-523 emerged in the 4Q16 and has been associated with a number of point source outbreaks (Sections 3 and 4).

Table 2: Number of salmonellosis notifications, 4th quarter 2017, WA, by region



**\***Percentage change in the number of notifications in the current quarter compared to the historical 5-year mean for the same quarter. Positive values indicate an increase when compared to the historical 5-year mean of the same quarter. Negative values indicate a decrease when compared to the historical 5-year mean of the same quarter. Percentage change should be interpreted with caution when the number of cases is small.

*S*. Enteritidis was the second most common *Salmonella* serotype (n=40, 7%), with most (n=37, 93%) cases acquired overseas, primarily after travel to Indonesia (n=26, 70%), and almost exclusively to Bali.

*Salmonella* Stanleywas the third most common serotype (n=22), and of those cases with known place of acquisition, 31% of cases were acquired in WA and 69% acquired overseas. There were also 17 notifications of *Salmonella* Paratyphi B bv Java and most (64%) of these notifications were acquired overseas.

There were 26 notifications of *Salmonella* that had no serotype. Most (50%) of these notifications were from one laboratory that first uses PCR screening for enteric pathogens. Specimens that are subsequently culture negative remain as a “PCR only” notification.

## Rotavirus infection

In the 4Q17 there were 97 notifications of rotavirus infection (145 cases per 100 000 population per year), a 10% increase compared with the 4QM (Table 3). The increase occurred in metropolitan regions and rural regions had 0 or 1 cases notified. On a statewide basis, of the cases with known Aboriginality status, 96% were non-Aboriginal and 4% were Aboriginal people. The median age was 2 years (range <1 years to 82 years).

Table 3: Number of rotavirus notifications, 4th quarter 2017, WA, by region



\*Percentage change in the number of notifications in the current quarter compared to the historical 5-year mean for the same quarter. Positive values indicate an increase when compared to the historical 5-year mean of the same quarter. Negative values indicate a decrease when compared to the historical 5-year mean of the same quarter. Percentage change should be interpreted with caution when the number of cases is small.

NA: not applicable as there is a 0 value in the calculation for the 4th quarter % change

## Shigellosis

In the 4Q17 there were 68 culture confirmed shigellosis notifications (10 cases per 100 000 population per year), a 237% increase compared to the 4QM (Table 4). The largest increases were in the remote rural regions of the Goldfields, Pilbara and Kimberley.

Most (65%) of the cases were diagnosed with *Shigella flexneri* 2b. On a statewide basis, of the cases with known Aboriginality status, 69% were Aboriginal and 31% were non-Aboriginal people. The median age was 17 years (range 1 years to 76 years). Increases in S. *flexneri* 2b were also reported in South Australia (SA) and the Northern Territory (NT). Public health actions and treatment protocols conducted in SA and NT were circulated to affected WA public health units for their information.

Table 4: Number of shigellosis notifications, 4th quarter 2017, WA, by region



**\***Percentage change in the number of notifications in the current quarter compared to the historical 5-year mean for the same quarter. Positive values indicate an increase when compared to the historical 5-year mean of the same quarter. Negative values indicate a decrease when compared to the historical 5-year mean of the same quarter. Percentage change should be interpreted with caution when the number of cases is small.

NA: not applicable as there is a 0 value in the calculation for the 4th quarter % change

## Other enteric diseases and foodborne illness

During the 4Q17, other enteric disease notifications included:

* **Cryptosporidiosis:** In the 4Q17 there were 28 cryptosporidiosis notifications (4 cases per 100 000 population per year), a 52% decrease compared to the 4QM (Table 4). Most cases resided in metropolitan Perth. On a statewide basis, of the cases with known Aboriginality status, 89% were non-Aboriginal and 11% were Aboriginal people. The median age was 24 years (range 1 years to 69 years).
* **Hepatitis A infection:** One hepatitis A case was notified in 4Q17, who acquired their illness in Iraq.
* **Yersiniosis:** There were three cases of culture-positive yersiniosis notified in 4Q17 and all cases acquired their illness in Western Australia.
* **Shiga toxin producing *E. coli* (STEC):** There were 22 cases notified in 4Q17 compared to 3.2 cases for the 4QM. Prior to 2016, STEC was only diagnosed at one laboratory by culture and <1 to 2 cases were notified each year. The increase in cases in the 4Q17 was likely due to the introduction in 2016 by one laboratory of PCR testing for STEC on stool samples with bloody diarrhoea (macroscopic or history) and PCR testing of any stool sample by Dr’s request from another laboratory. The 22 cases included seven (27%) females and 15 (73%) males, ranging in age from <1-91 years (median 48 years). Three cases could not be contacted. Of the remaining 19 cases, 17 cases had an acute illness with a specific onset date and eight cases with bloody diarrhoea. Two cases had no acute illness, but had ongoing or intermittent diarrhoea for many months. Four cases with acute illness had travelled to Bali during their incubation period, while the remaining 13 cases were locally acquired.
* **Typhoid fever:** There were 11 cases of typhoid fever notified in the 4Q17with six cases travelling to India prior to illness, two to Pakistan, and one each to Indonesia, Iraq and Nepal.
* ***Vibrio parahaemolyticus*:** There were seven notifications of *Vibrio parahaemolyticus* in 4Q17. Five cases acquired their infection in Western Australia and the pathogen was isolated from wound infections in three of these cases. The remaining tlyticus wo locally acquired cases had gastroenteritis and reported eating oysters during their incubation period; there was no common venue or origin of the oysters for the two cases. One case each acquired their infection overseas in Indonesia and Ecuador.

There were no notifications for paratyphoid fever, listeriosis, hepatitis E, HUS orbotulism in the 4Q17.

Table 5: Summary of number of notified cases of enteric notifiable diseases in WA in the fourth quarter 2017 compared to historical means



Percentage change in the number of notifications in the current quarter compared to the historical 5-year mean for the same quarter. Positive values indicate an increase when compared to the historical 5-year mean of the same quarter. Negative values indicate a decrease when compared to the historical 5-year mean of the same quarter. Percentage change should be interpreted with caution when the number of cases is small.

NA: not applicable as there is a 0 value in the calculation for the 4th quarter % change

# Foodborne and probable foodborne disease outbreaks

There were 11 foodborne or probable foodborne outbreaks identified and investigated in this quarter. The number of foodborne outbreaks in the 4Q17 was 2.75 fold higher than the 4QM (n=4).

## Private residence Outbreak, *Salmonella* Typhimurium (outbreak code 042-2017-035)

A family of four were ill, with three diagnosed with *S*. Typhimurium 03-10-16-11-496 and one diagnosed with *S*. Typhimurium 03-10-15-11-496. The family included a 17 yo who was hospitalised, a 9 yo, and two parents, all with onsets on 25/9/2017. Median diarrhoea duration was 14 days. This family had eaten home prepared chocolate mousse containing raw eggs. The eggs were a WA free range brand and stored at room temperature at the supermarket where they were purchased. The eggs were clean with no visible cracks. The mousse was made with six eggs taken from the refrigerator at 5pm on 24/9/2017 and it took 15 minutes to make the chocolate mousse which was then put back into the fridge. Immediately prior to eating at 8pm, the mousse was removed from the refrigerator and served. Median incubation period was 12.5 hours. There were no eggs or chocolate mousse left for sampling. The transmission was recorded as probable foodborne.

## Café Outbreak, *Salmonella* Typhimurium (outbreak code 042-2017-036)

There were 10 people ill from five groups who had eaten at a café in common. Of the 10 cases, six were diagnosed with *S*. Typhimurium MLVA 03-26-16-12-523. Three cases visited the café on the 15/10/2017 and seven cases visited the café on the 20/10/2017. The median incubation period was 30 hours and one person was hospitalised. The food eaten in common was eggs in breakfast dishes, including poached, fried and scrambled eggs. The environmental investigation did not identify any deficiencies that may have contributed to the consumption of unsafe food. Eggs used at the food business were from a WA egg producer. The transmission was recorded as probable foodborne.

## Private function, *Salmonella* Typhimurium (outbreak code 042-2017-037)

An extended family of nine people from four households shared a meal on 17/10/2017 at 6.30 pm and six people became ill, with three diagnosed with *S*. Typhimurium 03-12-10-11-523. Median incubation period was one day. A ten month old infant became ill two days after the parents became ill. The infant did not attend the dinner and is thought to have acquired their illness by person to person transmission. The median diarrhoea duration was five days. There were no reports of hospitalisation among the dinner attendees. The food was prepared in a private residence and included meat cannelloni, fried squid, pickled octopus and salad. The cannelloni contained fried beef, chicken and pork mince fried, which was combined using spices and raw egg. This mixture was used to fill the cannelloni tubes and added to a baking tray and covered with tomato sauce and cheese. The dish was then heated to melt the cheese but not cooked. The egg brand was unknown. There was no left over food for testing. The transmission was recorded as probable foodborne.

## Restaurant, *Salmonella* Typhimurium (outbreak code 042-2017-038)

Eight people, including five diagnosed with STM 03-12-11-10-523 from five independent groups, became ill with diarrhoea between 30/10/17 and 4/11/17 after eating food from the same restaurant during their incubation period. Three cases were female and five were male and the median age of cases was 43 years. The median incubation period was 2 days (range 1-4 days). The median duration of diarrhoea was 4 days. One person was hospitalised as a result of their illness. Seven of the cases had dined at the restaurant for lunch or dinner and all had consumed either the semifreddo dessert (n=3) or the chocolate ganache dessert (n=5) as part of their meal. A variety of other main dishes were eaten for lunch or dinner but it was not apparent whether a high risk ingredient was common to these meals. Local government inspected the food business and multiple non-compliances were identified. The food business reported that raw eggs were not used in the chocolate ganache but were used in the semifreddo dessert and the passionfruit curd that accompanied the chocolate ganache. Raw eggs were also used to make aioli sauce which was used over 2-3 days, and scrambled egg mixture was pre-prepared. Eggs were cracked and separated by hand. Eggs used at the food business were from a WA egg producer. Samples of implicated foods were collected and were negative for *Salmonella*. The vehicle for this outbreak was recorded as an egg dish. The mode of transmission was probable foodborne.

## Restaurant, unknown aetiology (outbreak code 11/17/UCW)

A group of 70-90 people attended a dinner at a function centre on 16/10/17 and at least 13 developed gastroenteritis. Two people sought medical advice but no clinical samples were tested. Of the 13 ill people, 23% were female and 77% were male, and the median age was 35. Symptoms included diarrhoea (13/13), abdominal pain (6/13) and vomiting (3/13). No cases reported bloody diarrhoea. Median duration of diarrhoea was 2 days and the median incubation period was 9 hours. Foods included a range of Indian dishes. Survey responses from 31 people (13 ill and 18 not ill) identified multiple dishes statistically associated with illness including rice (OR 22, P value=0.002), chicken curry (OR 21, P value=0.002), bread (OR undefined, P value=0.004), salad (OR 10, P value=0.011), goat curry (OR 9, P value=0.022), chicken drumsticks (OR 8, P value=0.026), chicken tikka (OR 7, P value=0.032), and dahl (OR 7, P value=0.032). An environmental health investigation (after the 11/17/WWR outbreak) identified that cooked food stored in large containers in the cool room would not have cooled in sufficient time to prevent the growth of potential pathogens. Samples of dahl, rice dessert, garlic paste and chicken tikka were tested and *Clostridium perfringens* was detected at >15000 CFU/g in the dahl. The illness characteristics and incubation period was similar to *C. perfringens* food poisoning and the dahl was positive for *C. perfringens*. Mode of transmission was foodborne.

## Restaurant, unknown aetiology (outbreak code 11/17/WWR)

Approximately 180-200 people attended a wedding reception on 22/10/17 at a function centre (same as outbreak 11/17/UCW) and at least 17 developed gastroenteritis. No stool samples were tested. Of the 17 ill people, 47% were female and 53% were male, and the median age was 31. Symptoms included diarrhoea (16/17), abdominal pain (16/17) and vomiting (6/17). The median incubation period to onset of diarrhoea was 10.5 hours and median duration was 2 days. No cases reported bloody diarrhoea. The median incubation period for vomiting was 3.5 hours. Foods consumed at the reception included Indian dishes and a wedding cake. The only food that was statistically associated with illness was the butter chicken (OR 20, P value=0.017). All but one case (n=15) and 3/7 (43%) well people reported eating the butter chicken. An environmental health investigation observed large quantities of uncovered cooked food (rice dessert and dahl) in large containers and stored in the cool room uncovered. The environmental health officer reported that the food stored in the cool room would not have cooled in sufficient time to prevent the growth of potential pathogens. Samples (not same batch as the function) of dahl, rice dessert, garlic paste and chicken tikka were tested and *C. perfringens* was detected at >15000 CFU/g in the dahl. The two dahl dishes served at the wedding were not statistically associated with illness. Approximately 9% of people with *C. perfringens* illness are reported to experience vomiting (ref 3). As 35% of ill people vomited in this current outbreak, it is not clear whether *C. perfringens* was the aetiological agent for this outbreak. Mode of transmission was foodborne.

## Private function, *Salmonella* Typhimurium (outbreak code 042-2017-039)

An extended family of 10 people had a function together on 26/11/17 and seven became ill during their incubation period with two diagnosed with *S*. Typhimurium 03-17-09-12-523. The seven ill people lived in two different households. All cases had diarrhoea and three of the seven had bloody diarrhoea. The median diarrhoea duration was 5 days. The median incubation period was 3 days. The family had eaten a range of foods at the function including beef sausages, meat patties, BBQ chicken, tossed salad, commercially prepared pasta salad and homemade curried egg. No specific food was implicated and there was no leftover food for testing. One eight month old child of the family had onset of gastroenteritis on 6/12/17 and it is assumed that this child became ill by secondary transmission. The transmission for the seven cases was recorded as probable foodborne.

## Restaurant, *Salmonella* Typhimurium (outbreak code 042-2017-040)

In December 2017, 15 cases of *Salmonella* Typhimurium 03-17-07-12-523 had eaten food from one of four outlets of the same restaurant chain between 19/11/17 and 14/12/17. Two of the 15 diagnosed cases had consumed the food at a workplace Christmas function on 1/12/17 with 50 attendees. Seven other people from the function were reported as having gastroenteritis but were not diagnosed. Four of the 15 diagnosed cases were male (27%) and 11 (73%) were female and the median age of cases was 31 years. Symptoms included diarrhoea (15/15), bloody diarrhoea (6/13), abdominal pain (15/15), fever (12/15), and vomiting (5/15) with a median incubation period of 3 days and a median duration of diarrhoea of 6 days. Four (27%) cases were hospitalised as a result of their illness. All 15 cases had eaten pork or chicken Bahn mi from one of the four outlets during their incubation period. Local governments inspected the outlets. The only ingredient used in the Bahn mi and no other dishes, and that was supplied to all four outlets, was the mayonnaise. This was made at one outlet and distributed to the remaining outlets for use in the rolls. Raw eggs were used to prepare the mayonnaise/butter. Eggs used at the food business were from a WA egg producer.A large batch of mayonnaise was made each week and supplied to outlets through the week. Samples of raw egg mayonnaise were collected over a period of time from different outlets and were negative for *Salmonella*. The vehicle for this outbreak was recorded as raw egg mayonnaise. The mode of transmission was probable foodborne.

## Restaurant, *Salmonella* Typhimurium (outbreak code 042-2017-041)

Eight people in two independent groups became ill with gastroenteritis after visiting a restaurant in common on 15/12/2017. Four of the cases were diagnosed with *S*. Typhimurium MLVA 03-17-09-12-523 and one case was diagnosed with a very similar MLVA type, 03-17-09-11-523. There were one male and seven females, with a median age of 34 years. The median duration of diarrhoea was five days and the median incubation period was 26 hours. Cases ate a range of dishes but all cases ate arancini balls with mayonnaise and tiramisu containing raw egg. The Environmental Health Officers identified that preparation of raw egg foods may not have been under temperature control. The implicated food items (not the same batch as eaten by cases) were sampled and were negative for *Salmonella*. This MLVA type has been associated with other point source outbreaks and the implicated foods were egg dishes. Two WA egg brands may have been used to make the dishes. Mode of transmission was probable foodborne.

## Restaurant, Norovirus (outbreak code 12/17/LCR)

An extended family of six people had a meal together at a restaurant on 22/11/2017 and all became ill with gastroenteritis. The extended family lived in three separate households and had not met each other for at least two weeks prior to meeting at the restaurant. Cases reported that they had no contact with other people with gastroenteritis prior to visiting the restaurant. One case was diagnosed with norovirus and the symptoms of the other ill people were typical of norovirus. All cases had diarrhoea and vomiting and the median duration of diarrhoea was two days. The median incubation period was 14 hours. Food shared by the family at the restaurant included hummus dips, bread, beef brisket, chips and icecream cake. No specific food was implicated. The transmission was recorded as probable foodborne.

## Restaurant, Norovirus (outbreak code 12/17/LOO)

There was a report of nine people ill with gastroenteritis among a group of 10 who attended a dinner at a restaurant on 14/12/18. Symptoms were reported for six cases and included vomiting (n=6), diarrhoea (n=5), lethargy (n=3), fever (n=3), and abdominal pain (n=3). Possible secondary transmission to four others was reported by one case. Specimens were collected from two cases and one was positive for norovirus. The other specimen was negative for routine pathogens and not tested for viruses. All nine ill people who attended the dinner shared two charcuterie boards containing cured meats, cheeses, olives, pickles, breads and crackers. The one well person did not eat this dish. A variety of mains were eaten and a cake from a different food business that was served as dessert was eaten by all 10 people. Three staff also ate the cake and remained well. The ill members of the group were not aware of anyone ill beforehand, they had not seen each other recently before the meal, and they did not all use the toilets at the food business. The environmental health investigation did not identify any non-compliances that may have led to contamination of the food. Mode of transmission was probable foodborne.

# Cluster investigations

There were two ongoing and three new cluster investigations during the second quarter of 2017.

## *Salmonella* Typhimurium PFGE 0001, PT 9

Since the beginning of 2014, there has been an ongoing investigation of a community-wide outbreak in WA of notifications of MLVA types analogous to STM PFGE 0001 (Figure 2). PFGE 0001 includes multiple MLVA types. This has been the largest *Salmonella* outbreak ever investigated in WA. From January 2014 to December 2017 there were 1093 cases notified, which includes 36 cases with onset dates in the 4th quarter of 2017. Of the 36 cases, four were part of a single point source foodborne outbreak (see section 3, outbreak 042-2017-036). There was also an additional four cases of STM PFGE 0001 in a family outbreak (see section 3, outbreak: 042-2017-035) with onsets of illness in September, but this outbreak was investigated in the fourth quarter. The remaining seemingly sporadic 32 cases, comprised of 44% males and 56% females, ranged in age from 1 to 89 years (median 39 years), and most (88%) resided in the Perth metropolitan area.

Between January 2015 and June 2017 egg dishes have been the implicated food in 19 of 23 point source outbreaks due to STM PFGE 0001. The implicated egg dishes of the 19 outbreaks included raw egg desserts (n=9) and whole egg dishes such as fried/poached eggs (n=6). In 14 of these outbreaks, a specific egg producer was identified that supplied the eggs for the implicated dishes. One WA egg producer was associated with seven outbreaks, another WA egg producer was associated with two outbreaks and one outbreak each was associated with three other WA egg producers. Also one outbreak each was associated with two non-WA eggs producers. Eggs from all these producers are available in WA retail outlets.

In 2016 and 2017, there were samples from eggs and egg laying chickens from two different egg producers that were positive for PFGE 0001. Eggs from these two egg producers have also been implicated in point source outbreaks. Previous interviews of sporadic cases (not in point source outbreaks) supported the hypothesis that the cause of illness was consumption of free range eggs and/or chicken meat at home. From February 2015 to March 2016, non-point source outbreak cases (community cases) were investigated as part of a case-control study of STM PFGE 0001 illness. Final analysis of the case control data showed that eating raw eggs was statistically associated with illness.

This evidence strongly suggests eating raw/runny eggs is the cause of STM PFGE 0001 point source outbreaks in WA and it is very likely the cause of many of the community cases.

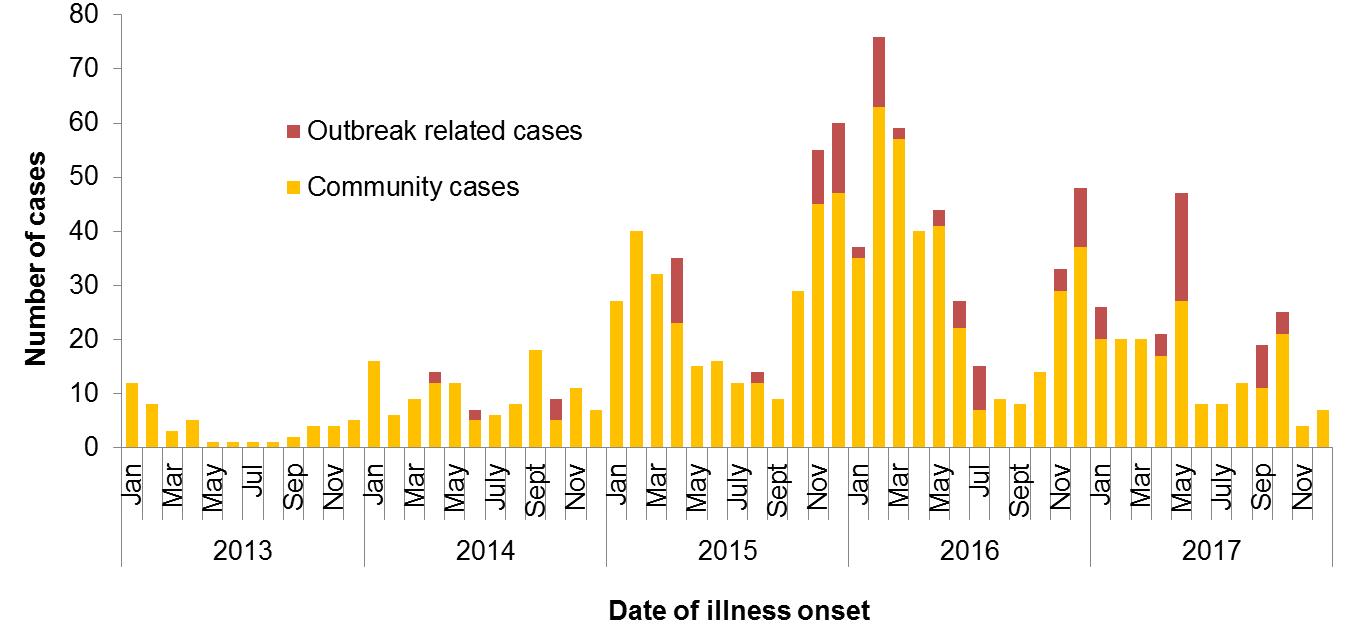


Figure 2: Notifications of *Salmonella* Typhimurium PFGE 0001 in WA, 2013 to December 2017

## *Salmonella* Typhimurium MLVA 03-17-09-12-523

STM MLVA 03-17-09-12-523 has been under investigation since the type emerged in 2016 following a single case in September 2016 (see 4Q16 report). From September 2016 to December 2017 there were 688 cases notified, including 93 cases in 4Q17 (Figure 3). This MLVA type was the single most common MLVA type notified in 4Q17, constituting 33% of STM notifications for the quarter. Of the 93 cases, 6 (6%) were part of two point source outbreaks in 4Q17 and 6 (6%) were part of two point source outbreak in early 2018. These 4Q17 outbreaks are detailed in Section 3. The remaining 81 cases, comprising 47% males and 53% females, ranged in age from <1 to 84 years (median 25 years), and most (80%) resided in the Perth metropolitan area. Hospitalisation data was confirmed for 65 community cases; 34% were hospitalised.

Eggs were implicated in one of the two point source outbreaks of STM 03-17-09-12-523 in the 4Q17. Two WA egg brands may have been used in this point source outbreak. These brands have either not or rarely been linked to this MLVA type in previous point-source outbreaks. The vehicle was unknown in the other 4Q17 outbreak of this MLVA type.

Of the 81 cases who were not part of point source outbreaks, 65 were interviewed regarding food and other exposures; 88% had consumed eggs in their incubation period, 8% had not, and 5% were unsure. Of the 46 interviewed cases who ate eggs at home, 65% could not recall the egg brand that they ate during their incubation period. Several different egg brands were reported by the remaining cases but did not include the egg brands implicated in the 4Q17 egg-associated point-source outbreak. Six (13%) cases who only ate eggs at home reported eating eggs from backyard chickens. Of the 57 interviewed cases who had consumed eggs in their incubation period, 26% ate eggs outside the home. Note that association via food consumption interviews does not prove causation and these observations need to be considered in the context of other parameters, including the background frequency of egg consumption in the community and the market share of particular brands, along with the findings from the identified point-source outbreaks and non-human sampling and investigation.

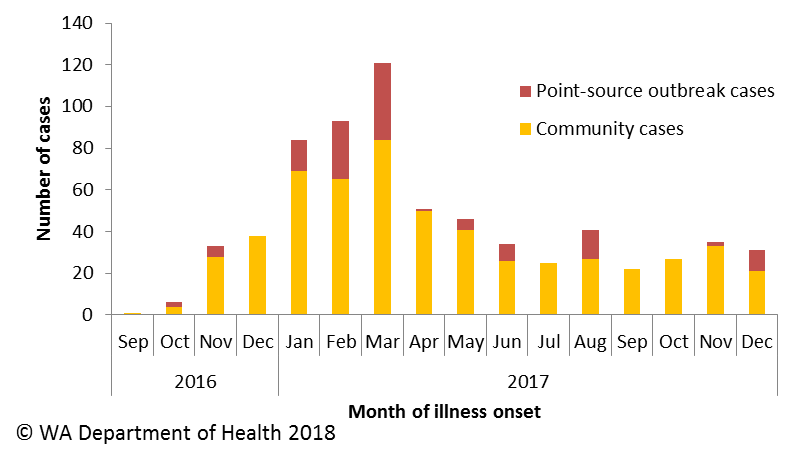


Figure 3: Notifications of *Salmonella* Typhimurium MLVA 03-17-09-12-523 in WA, 2016 to December 2017

## *Salmonella* Typhimurium MLVA 03-18-09-12-523

Five cases of STM 03-18-09-12-523 were notified in September to October 2017. This MLVA type is closely related to the epidemic strain STM 03-17-09-12-523 and was isolated from avian pericardial and coelomic samples collected earlier in September, but no further information was available about these samples. There had only been four other human cases of STM 03-18-09-12-523 notified in 2017 (onset dates April to June) and no cases in 2016. Of the five recent cases, four were male and one was female, the median age was 25 years (range 5-37), and all were residents of the Perth metropolitan area. Four of the five recent cases were interviewed with the *Salmonella* Hypothesis Generating Questionnaire. The fifth case was unable to be contacted. Onsets were 14/9/17 to 4/10/17 with symptoms including diarrhoea (4/4), fever (4/4), abdominal pain (4/4), headache (3/3), lethargy (3/4), vomiting (2/4), nausea (2/4) and joint/muscle pain (2/4). The median duration of diarrhoea was 6.5 days. No cases reported bloody diarrhoea and no cases were hospitalised. All cases were locally-acquired but no food business was common to two or more cases and no cases reported others ill. Three of the four cases reported eating eggs from WA producers at home during their incubation period including one person who ate 4-5 raw eggs in a milkshake twice a day, a second case who ate the same brand of eggs in an omelette, and a third case who ate runny eggs of a different brand at home as well as outside the home. The forth cases didn’t recall eating any eggs at home or outside the home. A hypothesis for the cause of illness was not able to be established.

## *Salmonella* Typhimurium MLVA 03-17-10-12-523

Sixteen cases of STM 03-17-10-12-523, including two hospitalised, were notified in November 2017 compared with an average of 5.5 notifications per month in the previous 6 months and four in November 2016. This consisted of nine males and seven females with a median age of 21 (range <1-82). Most (81%) were residents of the Perth metropolitan area. Of the remaining three cases, two were from the same household in the Goldfields, and the third was from the Wheatbelt. Eight cases were interviewed. Symptoms included diarrhoea (8/8) for a median of 7.5 days, abdominal pain (8/8), lethargy (8/8), fever (8/8), vomiting (2/8), headache (3/6) and joint/muscle pain (7/7). Bloody diarrhoea was reported by 5/8 cases. Cases ate out at a variety of businesses but none in common. All 8 cases reported eating chicken either prepared at home (6/8) or outside the home (7/8) during their incubation period, and 5/8 reported eating eggs either at home (4/8) or outside the home (1/8). Chicken was from a variety of businesses and no cases could recall the brand of eggs eaten. A hypothesis for the cause of illness could not be established.

## *Salmonella* Stanley

There were 11 cases of *S*. Stanley notified in October compared to the five year average of 2.6 cases. Of the 11 cases, eight were male and three were female with a median age of 28 years (range 14-75 years). Ten cases were interviewed and six had travelled to S.E. Asia including Malaysia (n=2), Thailand (n=2), Viet Nam (n=1) and Indonesia (n=1).

# Non-foodborne disease outbreaks and outbreaks with an unknown mode of transmission

There were 59 outbreaks of enteric disease in this quarter that appeared to be non-foodborne (Table 6). Of these, 52 outbreaks were ascribed to person-to-person transmission and seven outbreaks had an unknown mode of transmission. A total of 1351 people were affected in these 59 outbreaks, with 22 reported hospitalisations.

Table 6: Outbreaks with non-foodborne transmission, 4th Quarter 2017, WA



1 Not all cases are diagnosed with the pathogen

2 Deaths temporally associated with gastroenteritis, but contribution to death not specified

## Person-to-person outbreaks

Of the 52 non-foodborne outbreaks that were suspected to be due to person-to-person transmission, 29 (56%) outbreaks occurred in RCFs, 16 (31%) were in child care centres, and six (12%) in schools. The causative agent for 21 (40%) of these outbreaks was confirmed as norovirus, while rotavirus caused one outbreak. The remaining 30 (58%) outbreaks were of unknown aetiology as specimens were either not collected (n=26) or were negative for common bacterial and viral pathogens (n=1), or were negative for common bacteria but no viral tests were done (n=3).

A total of 1274 people were affected in these 52 outbreaks, with 21 reporting hospitalisation. The number of person-to-person outbreaks in the 4Q17 was 30% higher than the fourth quarter 5-year mean (n=40).

## 5.2 Outbreaks with unknown mode of transmission

There were seven outbreaks in this quarter with an undetermined mode of transmission, with 77 people ill and one reported hospitalisation.

1. Three of these outbreaks were in RCFs and one in a hospital, where the predominant or only symptom was diarrhoea. These outbreaks were unlikely to be due to norovirus due to no or limited vomiting reported. In two of the four outbreaks, the specimens collected were negative for common bacterial and viral pathogens; in one outbreak the specimens were negative for common bacterial pathogens and viral tests were not requested, and in one outbreak no specimens were collected.
2. There were two norovirus outbreaks associated with groups at restaurants and outbreak at a private function (no specimens collected) where there was insufficient information to determine the mode of transmission. The restaurant outbreaks are described below.

* Restaurant outbreak, Norovirus (outbreak code 11/17/WGC)

Approximately 92 people attended a catered ladies dinner at a restaurant on 17/11/2017 and at least 40 people including staff and patrons developed gastroenteritis. Symptoms of ill people included diarrhoea (78%), vomiting (78%), fever (51%), abdominal pain (79%) with a median duration of diarrhoea of 2 days. The incubation period was 39 hours. One ill person was diagnosed with norovirus. The median age of cases was 65 years and 10% were male and 80% were female. A cohort study was conducted and multivariate analysis showed that the only exposure associated with illness was visiting the toilet. There were 11 staff preparing and serving food and drinks at the dinner. Analysis of staff survey responses showed that there was a statistical association among staff between eating food and becoming ill. The environmental health investigation did not identify any non-compliances that may have led to contamination of food. Mode of transmission was unknown.

* Restaurant outbreak, Norovirus (outbreak code 11/17/SPU)

Of 18 people who attended a 30th birthday party at a restaurant on the 25/11/17, 12 people developed diarrhoea and/or vomiting. Of these ill people, three were diagnosed with norovirus. Symptoms of ill people included diarrhoea (92%), vomiting (83%), abdominal pain (82%), and fever (78%) with a median duration of illness of 1 day. The median incubation period was 39.5 hours. The median age of cases was 30 years and 50% were male and 50% were female. There was no statistical association between illness and eating the main meals, side dishes, homemade birthday cake, or visiting the toilets. The environmental health investigation did not identify any non-compliances that may have led to contamination of food. Mode of transmission was unknown.

# Site activities

During the fourth quarter of 2017, the following activities were conducted at the WA OzFoodNet site:

* Ongoing surveillance of foodborne disease in WA.
* Monitoring culture-independent nucleic acid amplification diagnostic testing in private laboratories and impact on notification rates.
* Investigation of 11 foodborne outbreaks.
* Investigation and monitoring of 52 person-to-person gastroenteritis outbreaks and seven outbreaks with unknown mode of transmission.
* Ongoing investigation of community-wide increases in *Salmonella* Typhimurium PFGE 0001 and PFGE 0043, and investigation of three other clusters.
* Part of inter-agency working group developing WA Foodborne Illness Reduction Strategy that will be used to try and reduce the record levels of foodborne salmonellosis.
* Interviewing *Salmonella* Enteritidis cases regarding travel status and attempting to identify risk factors in locally acquired cases.
* Participation in combined meeting with the Department of Agriculture and Food and the Environmental Health Directorate and Communicable Disease Control Directorate to discuss zoonotic disease issues.
* Participation in combined Food Unit, OzFoodNet and PathWest meeting to help improve surveillance and investigation.
* Participation in monthly national OzFoodNet teleconferences.
* Provided enteric disease data, interpretation and advice upon request to local government environmental health officers, laboratory and public health unit staff. This includes assisting PHUs with distribution of shigellosis information in response to increase in regional areas and neighbouring jurisdictions.
* Developed a guide and forms for Public Health Units for monitoring, surveillance and reporting of gastroenteritis outbreaks in schools, childcare facilities and other settings in WA.
* Together with the Food Unit, conducted foodborne outbreak investigation training for environmental health officers and public health nurses in metropolitan Perth in November and December.
* Attended the national OzFoodNet face-to-face meetings in Canberra in December.
* Membership of OzFoodNet and other National working groups on:
  + Foodborne disease tool kit
  + Hepatitis Series of National Guidelines
  + Antimicrobial resistance in *Salmonella* isolates from egg laying environments.

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