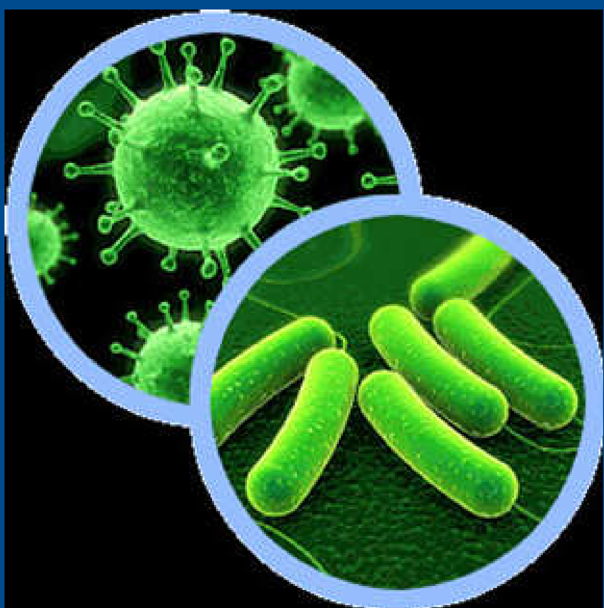
Enhancing Foodborne Disease
Surveillance Across Australia

Government of Western Australia
Department of Health
Public Health and Clinical Services
Communicable Disease Control Directorate

OzFoodNet Foodborne Disease Surveillance 2011 Report



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Executive summary and recommendations

This report contains a summary of OzFoodNet Western Australia (WA) enteric disease surveillance activities in 2011.

Incidence of specific enteric diseases

The overall notification rate for all notifiable enteric diseases in 2011 was 184 per 100 000 population (4315 notified cases). This rate was similar to the 2010 rate (198 per 100 000 population) and the mean of the previous five years. *Campylobacter* was the most commonly notified enteric disease in 2011, comprising 51% of enteric notifications. *Salmonella* and *Cryptosporidium* infections were the 2nd and 3rd most commonly notified enteric infections, respectively.

The notification rate for *Campylobacter* for 2011 was similar to the mean of the previous five years but the *Salmonella* rate was 22% higher than the previous five year mean. The increase in the notification rate for *Salmonella* was largely attributable to an increase in the number of cases who had acquired their infection in Bali, Indonesia. Rates for rotavirus, *Shigella,* hepatitis A, *Listeria* and shiga toxin producing *E. coli* were lower in 2011 than the mean of the previous five years. The notification rate for *Cryptosporidium* in 2011 was 47% higher than the mean of the previous five years, largely due to a community wide increase in the January to April period.

Notification rates were highest in the 0 to 4 year age group for all of the major enteric infections, with the exception of hepatitis A infection. For most of the enteric infections, notification rates were also higher for Aboriginal people as compared to non-Aboriginal people. The greatest difference was for *Shigella* infection, with the notification rate for Aboriginal people 28 times the rate for non-Aboriginal people. The rural regions had the highest notification rates for most of the enteric diseases, for both Aboriginal and non-Aboriginal people, with the Kimberley having the highest rates for *Salmonella*, *Cryptosporidium* and *Shigella*.

Foodborne and suspected foodborne outbreaks

There were 10 outbreaks of foodborne or suspected foodborne disease investigated in WA in 2011. Five of these outbreaks were caused by *Salmonella* species, one by both *Salmonella* and *Campylobacter*, one by norovirus, and for three outbreaks the infectious agent or toxin was unknown. The largest foodborne outbreak in 2011, which resulted in 65 people becoming ill, was caused by *Salmonella* and *Campylobacter* infection, with illness statistically associated with eating duck parfait at a large function. The next largest foodborne outbreak, with 53 people ill, was due to norovirus, and occurred amongst staff members and different groups of patrons at a hotel. Illness was statistical associated with eating salad.

Salmonella Typhimurium (STM) was the cause of five outbreaks with different pulsed field gel electrophoresis (PFGE) types. Significant STM outbreaks included one due to PFGE type 0001 (phage type 9) that caused illness in 15 people who had consumed Vietnamese pork rolls prior to illness in January. There were 24 people ill due to STM PFGE type 0003 (phage type 135) who ate different meals at a restaurant between January and March. Food handling deficiencies were found at the restaurant but the source of contamination was not found. There was also one STM outbreak due to PFGE 0386 (phage type 193) that caused illness in 30 people who attended a private party. There were several foods associated with illness but the source of the *Salmonella* contamination was not identified. A multi-jurisdictional STM outbreak due to phage type 135a affected seven crew and seven passengers on a cruise ship that visited the Papua New Guinea Islands. An investigation found no clear association between illness and eating a specific food item.

Non foodborne enteric disease outbreaks

There were 77 non-foodborne outbreaks reported in 2011 which was 20% less than for 2010. In 2011 there also 14 outbreaks with unknown modes of transmission compared to 8 outbreaks reported in 2010. The most common setting for outbreaks with transmission due to non-foodborne or unknown modes was aged care facilities (77% and 86% respectively). For non-foodborne outbreaks, the causative agent was norovirus for 49% (n=38) of these outbreaks, and *Cryptosporidium* was the cause of five outbreaks. The causative agent was unknown for the outbreaks with unknown mode of transmission.

Recommendations:

It is recommended that OzFoodNet WA:

1. Continue to improve enteric disease surveillance and investigation activities including developing strategies to monitor and investigate *Campylobacter*.
2. Continue with the investigation of outbreaks to help mitigate ongoing transmission of enteric pathogens.

3. Continue with enteric disease research to identify risk factors for infection.
4. Publish results of outbreak investigations and enteric disease research.
5. Engage with stakeholders to:
    - Improve the integration of enteric disease surveillance between food animals, food and humans.
    - Inform policy making in food safety to help reduce the burden of enteric disease in the community.
6. Continue regular working group meetings with PathWest Laboratory Medicine and the WA Health Food Unit.

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1. Introduction

This report describes Western Australian enteric disease surveillance and investigations carried out in 2011, by OzFoodNet WA and other Western Australian Department of Health Agencies. Most of the data presented in this report is derived from enteric disease notifications from doctors and laboratories received by the Department of Health, WA (WA Health) and are likely to underestimate the true incidence of disease. This data nevertheless remain the most important information on incidence of these infections for surveillance purposes in WA.

OzFoodNet is part of the Communicable Disease Control Directorate (CDCD) of WA Health. OzFoodNet in Western Australia is also part of a National OzFoodNet network funded by the Commonwealth Department of Health and Ageing [1]. The mission of OzFoodNet is to enhance surveillance of foodborne illness in Australia and to conduct applied research into associated risk factors. The OzFoodNet site based in Perth is responsible for the whole of WA, which has a total population of approximately 2.3 million. Three epidemiologists sharing two full time positions co-ordinate activities in WA, which are overseen by a coordinating national epidemiologist in Canberra. Collaboration between states and territories is facilitated by circulation of fortnightly jurisdictional enteric surveillance reports, monthly teleconferences, tri-annual face-to-face meetings and through the informal network. This network also includes communication and consultation with Food Standards Australia New Zealand, the Commonwealth Department of Health and Ageing, the National Centre for Epidemiology and Population Health, the Communicable Diseases Network of Australia (CDNA) and the Public Health Laboratory Network.

The primary objectives of OzFoodNet nationally are to:

- estimate the incidence and cost of foodborne illness in Australia
- investigate the epidemiology of foodborne diseases, by enhancing surveillance and conducting special studies on foodborne pathogens
- collaborate nationally to coordinate investigations into foodborne disease outbreaks, particularly those that cross State, Territory and country borders
- train people to investigate foodborne illness.

On a local level, OzFoodNet WA conducts surveillance of enteric infections to identify clusters and outbreaks of specific diseases and conducts epidemiological investigations to help determine the cause of outbreaks. OzFoodNet WA also conducts research into the risk factors for sporadic cases of enteric diseases and develops policies and guidelines related to enteric disease surveillance, investigation and control. OzFoodNet WA regularly liaises with staff from the Population Health Units (PHUs), the Food Unit in the Environmental Health Directorate of DoH; and the Food Hygiene, Diagnostic and Molecular Epidemiology laboratories at PathWest Laboratory Medicine WA.

CDCD maintains and coordinates the WA notifiable disease surveillance system (WANIDD) and provides specialist clinical, public health and epidemiological advice to all PHUs. The West Australian notifiable diseases surveillance system relies on the mandatory reporting by doctors and laboratories of 16 notifiable enteric diseases and syndromes.

PHUs are responsible for public health activities, including communicable disease control, in their Western Australian administrative health regions. There are 9 PHUs in WA: North Metropolitan, South Metropolitan, Kimberley, Pilbara, Midwest and Gascoyne, Wheatbelt, Goldfields, SouthWest, and Great Southern. The PHUs monitor residential care facility (RCF) gastroenteritis outbreaks and provide infection control advice. The PHUs also conduct follow up of single cases of important enteric diseases including typhoid, paratyphoid, hepatitis A and E, cholera and *Shigella dysenteriae*. OzFoodNet will also assist with the investigation of these enteric diseases if there is a cluster and/or they are locally acquired, and will investigate RCF outbreaks if they are suspected to be foodborne.

The Food Unit liaises with Local Government (LG) Environmental Health Officers (EHO) during the investigation of food businesses, and coordinates food business investigations when multiple LGs are involved.

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.

3. Data sources and methods

3.1. Data sources

Data on WA cases of notifiable enteric diseases were obtained from WANIDD. The notifications contained in WANIDD are received from medical practitioners and pathology laboratories under the provisions of the Health Act 1911 and subsequent amendments, and are retained in WANIDD if WA (for diseases not nationally notifiable) [2] or National case definitions are met [3].

Notifiable enteric diseases included in this report are campylobacteriosis, salmonellosis, rotavirus infection, cryptosporidiosis, shigellosis, hepatitis A infection, listeriosis, typhoid fever, shiga-toxin producing *E. coli* (STEC) infection, *Vibrio parahaemolyticus* infection, yersiniosis, hepatitis E infection, paratyphoid fever, cholera, haemolytic uraemic syndrome (HUS) and botulism. In February 2012, data for these diseases were extracted from WANIDD by optimal date of onset (ODOO) for the time period 01/01/2006 to 31/12/2011,and exported to Microsoft® Excel 2006. 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.

Notification data extracted for this report may have been revised since the time of extraction. Subsequent minor changes to the data would not substantially affect the overall trends and patterns.

Information on *Salmonella* serotypes and *Shigella* species was obtained from PathWest Laboratory Medicine WA, the reference laboratory for *Salmonella* isolates in WA. Phage typing, multi-locus variable-number-tandem-repeat analysis (MLVA) and other specialised diagnostic data were obtained from the Microbiological Diagnostic Unit (MDU), University of Melbourne; the Australian Salmonella Reference Laboratory, Institute of Medical and Veterinary Science (Adelaide) and the National Enteric Pathogens Surveillance Scheme. Pulsed field gel electrophoresis (PFGE) typing was carried out at PathWest Laboratory Medicine WA.

Information on RCF outbreaks was collected by PHU nurses who forward collated epidemiological and laboratory data to OzFoodNet.

2.2. Data changes

Several changes in notification and testing practices need to be considered in interpreting data for the time period covered by this report. Rotavirus infection became a notifiable disease in July 2006, so notification data for this year are incomplete. Prior to July 2007 all *Salmonella* Typhimurium (STM) and *Salmonella* Enteritidis isolates were sent to MDU for phage typing. From July 2007 onwards all STM isolates were typed by PFGE, and phage typing only carried out for isolates associated with clusters and outbreaks. From July 2007 onwards only *Salmonella* Enteritidis isolates from locally acquired infections were sent for phage typing. Notification data prior to 1 January 2009 includes cases that were diagnosed in WA but had a home address in another Australian jurisdiction, but excluded cases that were diagnosed in another jurisdiction but had a home address in WA. Notification data after 1 January 2009 includes cases that had a home address in WA but were diagnosed in another jurisdiction, but excludes cases diagnosed in WA with a home address in another jurisdiction.

2.3. Data Collection by Aboriginality

For the purposes of this report, the term ‘Aboriginal’ is used in preference to ‘Aboriginal and Torres Strait Islander’ to recognise that Aboriginal people are the original inhabitants of WA.

In WA, there is considerable mobility of Aboriginal people, both within WA and across the Northern Territory (NT) and South Australia (SA) borders, which means that some Aboriginal people will be patients of more than one health service. Due to the small size of the Aboriginal population in WA (3.3% of the total population in 2011) and the large number of cases reported in Aboriginal people, inaccuracies in the population estimates of Aboriginal people can have a disproportionate impact on calculated rates. In the preparation of this report, these factors are acknowledged as limitations. Information on Aboriginality is also missing in many instances.

2.4. Regional Boundaries

Notification data are broken down by regions that are based on Public Health Unit (PHU) boundaries, reflecting WA Health administrative regions. PHU contact numbers and details are outlined at the website location in reference 4.

2.5. Calculation of rates

Western Australia's estimated resident population figures used for calculation of rates were obtained from Rates Calculator version 9.5.4 (WA Health, Government of Western Australia). The Rates Calculator provides population estimates by age, sex, Aboriginality, year and area of residence, and is based on population figures derived from the 2006 census. The estimated population for WA in 2011 was 2 356 807 persons. Rates calculated for this report have not been adjusted for age.

3. Site activities including prevention measures during the year

During 2011 the following activities and prevention measures were conducted at the WA OzFoodNet site.

3.1. Surveillance and investigation

- Ongoing surveillance of foodborne disease in WA.
- Investigation of seven local foodborne outbreaks, two suspected foodborne outbreaks, eight *Salmonella* clusters and one hepatitis E cluster.
- Lead agency for a multi-jurisdictional outbreak investigation into a *Salmonella* outbreak on a cruise ship.
- Participated in multi-jurisdictional outbreak investigations into
    - *Salmonella* Virchow (March-April).
    - STM phage type 170/108 (March-May)
- Joint lead of a multi-jurisdictional cluster investigation into STM phage type 193.
- Investigation of seven *Listeria monocytogenes* cases.
- Surveillance of 15 typhoid and nine paratyphoid cases.

- Investigation of *S.* Enteritidis cases with unknown travel history and interviews of 17 locally acquired cases with a hypothesis generating questionnaire to identify risk factors for the cause of illness.
- Investigation of 77 non-foodborne gastroenteritis outbreaks, 59 of which occurred in RCFs, 10 in child care centres, three each in schools and hospitals, and one each in another institution and a camp. Investigation of 14 gastroenteritis outbreaks with unknown mode of transmission with 12 occurring RCFs, one in a school and one in an institution.
- Development of a questionnaire and protocol for follow up of sporadic cases of *Cryptosporidium*.
- Ongoing monthly meetings with the Department of Health Food Unit to improve foodborne disease surveillance and investigation in WA.

3.2. Conference meetings and presentations

- Attended OzFoodNet face-to-face meetings in Hobart in March, Darwin in August and Sydney in December, and gave the following presentations:
    - "Epidemiology of STEC in Australia and preliminary laboratory survey results" and "Increase in *Salmonella* Typhimurium notifications in Australia in 2010" in March.
    - "*Salmonella* Typhimurium 193 national cluster investigation". -August
    - "Duck parfait outbreak" in December
    - "Responded to the German STEC outbreak: options paper for CDNA on HUS surveillance, STEC testing and STEC surveillance" in December
- Joint author of presentation on "Outbreaks of gastroenteritis linked to eggs; Australia 2001-20", presented at the Communicable Disease Control Conference, Canberra, April 2011.
- Presentation in September of talk "*Cyclospora* outbreak on cruise ship" at a joint conference in Melbourne of the International Commission on Microbiological Specifications for Foods, The International Association for Food Protection, and the Australian Institute for Food Science.

- Presentation at a community reference group on infectious diseases in March on "Infectious diseases notified to the Department of Health".
- Presentation in April of "*Salmonella* Typhimurium outbreaks in Western Australia associated with Vietnamese pork rolls" at Environmental Health Association Australia (WA) Inc, 65th Annual Conference.
- Presentation for Public Health Nurses in May and November on 'Update of gastrointestinal disease in WA'.

3.3. Membership of national OzFoodNet working groups

- Developing exclusion guidelines for foodhandlers with non-typhoidal *Salmonella.* These guidelines were endorsed by CDNA.
- Reviewing the Outbreak Register, a national database of foodborne disease outbreaks.
- Multi-jurisdictional outbreak investigation guidelines.
- Writing and presenting to CDNA a document titled "Outbreak of STEC/HUS in Germany/Europe 2011: lessons learned from an Australian perspective."
- Writing and presenting to CDNA a document titled "Options paper on STEC testing practices and surveillance in Australia".

3.4. Projects

- Continuation of a *Cryptosporidium* Case Control study that started in the 2nd quarter of 2010.
- Recruitment of one *Salmonella* Mississippi case for the national case control study.

3.5. Policy Documents

- Developed a questionnaire and protocol for follow up of sporadic cases of *Cryptosporidium*.
- Worked with the Food Unit to finalise the "Suspected Foodborne Disease Incident Onsite Assessment form" for use by EHO during outbreaks.
- Ongoing review of the WA "Guidelines for the management of gastroenteritis outbreaks in residential care facilities".

3.6. Other activities

- Assisted in web development of real time reporting of enteric disease notification data on the WA public health website.
- Supervision of a UWA PhD student on a project examining the epidemiology of rotavirus in Western Australia.

4. Incidence of specific enteric diseases

In 2011 there were 4315 notifications of enteric disease in Western Australia. This equated to an annual rate of 184 per 100 000 population. This was similar to the mean rate for the previous five years of 188 per 100 000 population.

4.1. Campylobacteriosis

Campylobacteriosis, which is infection due to *Campylobacter,* was the most commonly notified enteric infection in WA in 2011, comprising 51% of enteric notifications. There were 2200 notified cases, giving a rate of 93 per 100 000 population (Appendix 1). This was similar to the average rate for the previous five years. In 2011, notifications were highest in January with 266 cases and decreased to 152 cases in March, and fluctuated from 156 to 196 cases per month for the remainder of the year. This is similar to previous years, with the number of notifications per month higher during the summer months (Figure 1). The notification rate for campylobacteriosis was higher for males than females in 2011, with rates of 98 and 89 per 100 000 population, respectively. Campylobacteriosis notification rates for males were also higher than for females for the previous five years (Figure 2). Campylobacteriosis notification rates were highest in the 0 to 4 year age group with a rate of 136 per 100 000 population, with another peak in the 20-29 year age group and in cases 80 years and older (

Figure 3:).

Data on Aboriginality was missing for 12% of campylobacteriosis notifications in 2011, which was a slight decrease compared to 2010 (14%). Notification rates for Aboriginal people (48 per 100 000 population), were 42% lower than for non-Aboriginal people (83 per 100 000), which is unusual compared to other enteric infections, where rates are generally higher in Aboriginal people.

Campylobacteriosis notification rates varied from 78 cases per 100 000 population in the MidWest to 116 cases per 100 000 in the Wheatbelt. For most other enteric infections, rates were higher for the northern and eastern regions but these areas had lower rates for campylobacteriosis (Figure 4).

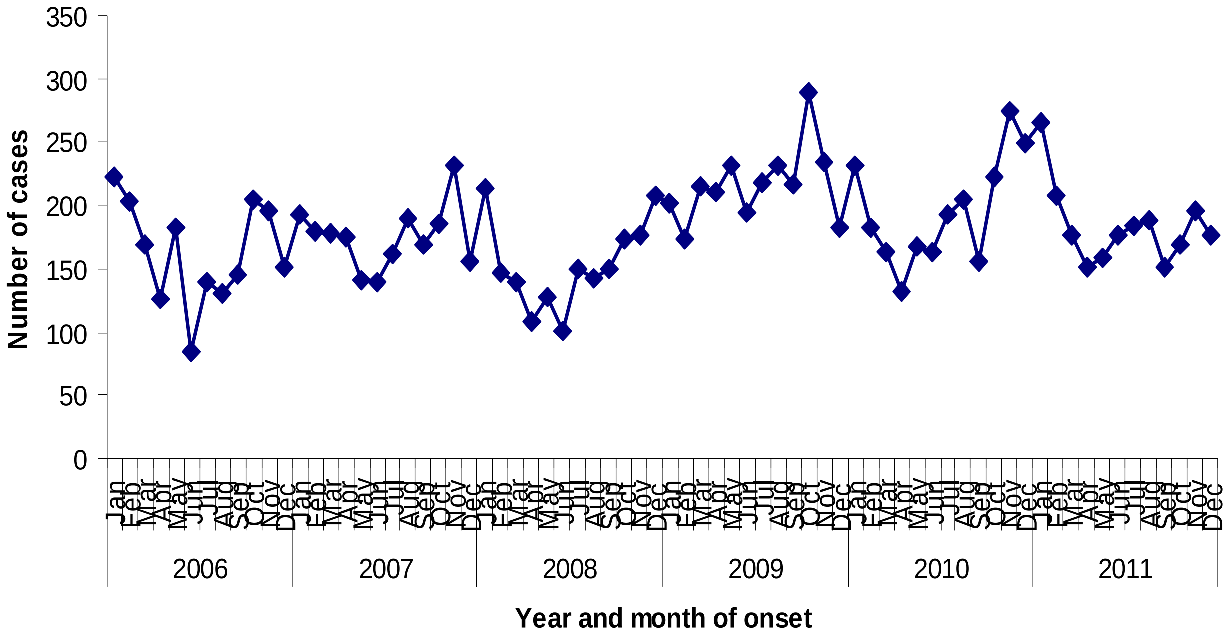


Figure 1: Number of cases of campylobacteriosis by month and year of onset, WA, 2006 to 2011

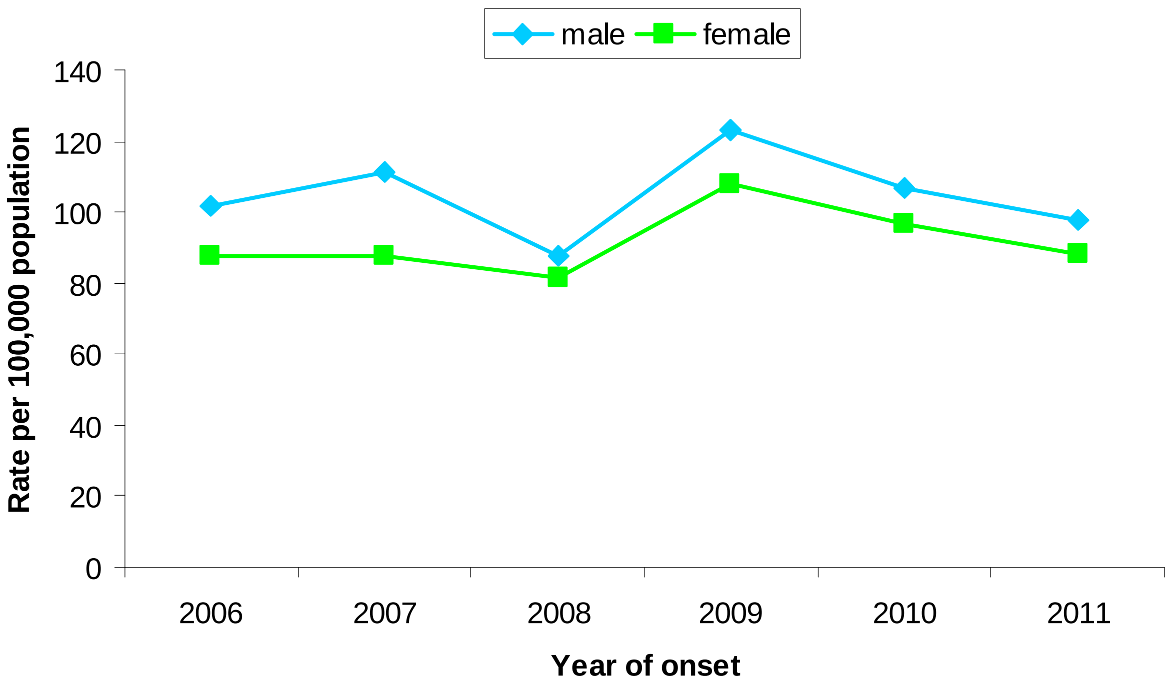


Figure 2.*Campylobacteriosis* notification rates by sex, WA, 2006 to 2011

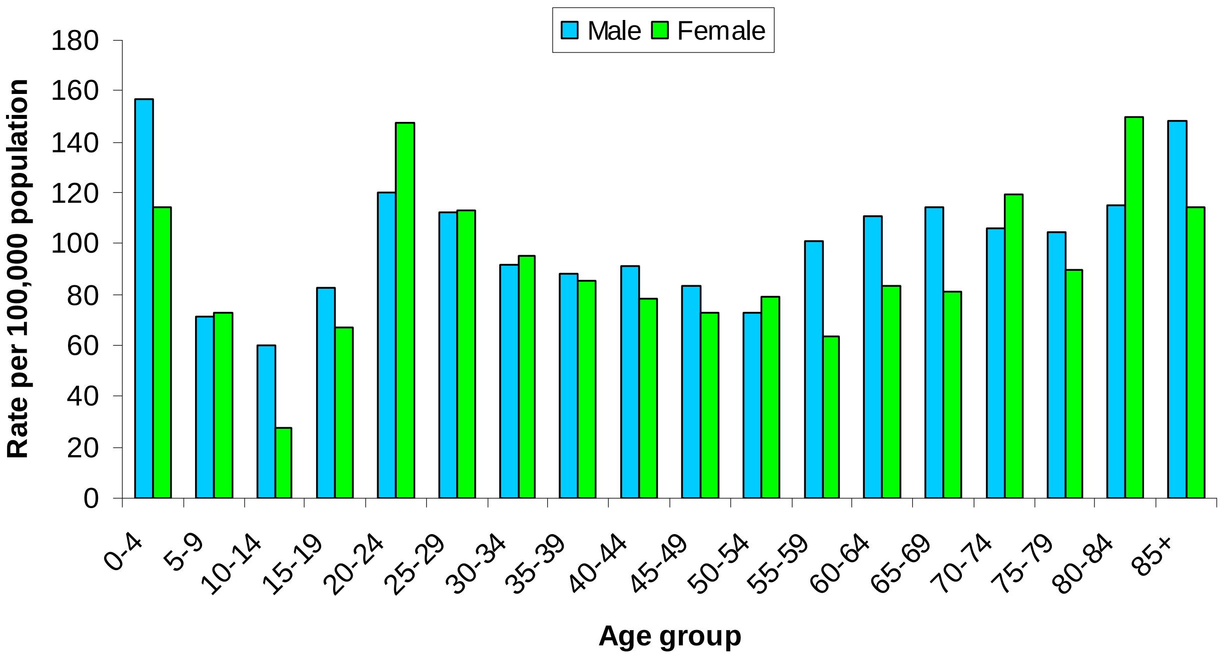


Figure 3: Age-specific notification rates for campylobacteriosis by sex, WA, 2011

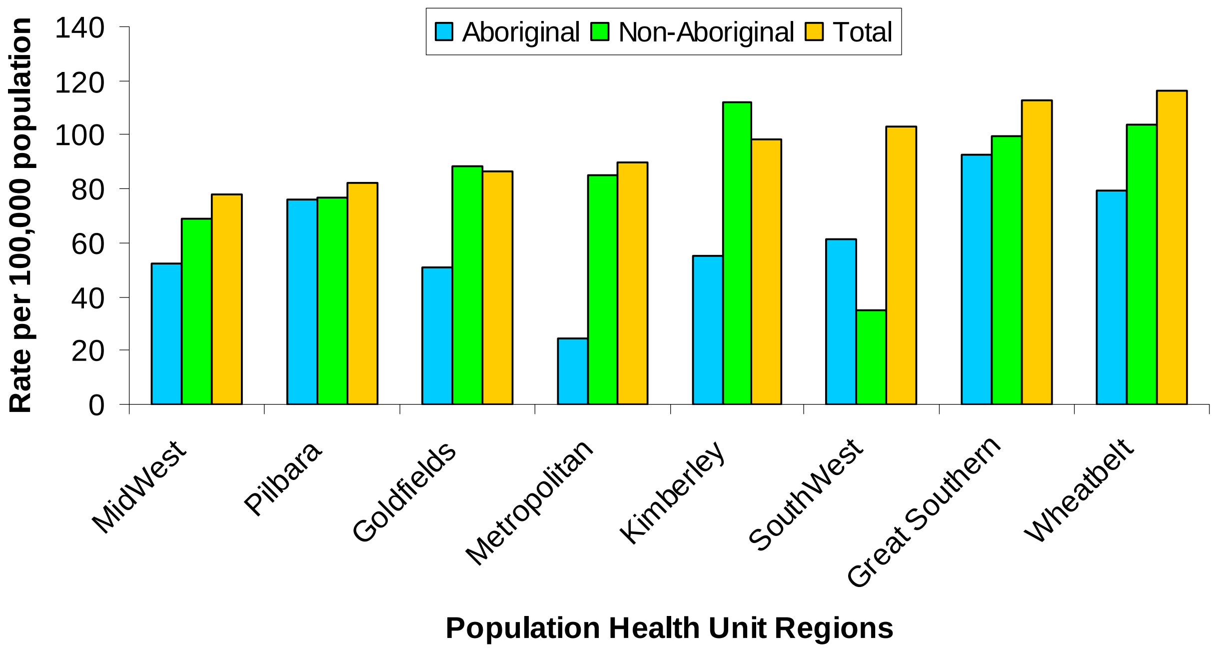


Figure 4. Campylobacteriosis notification rates by region and Aboriginality, WA, 2011

The proportion of campylobacteriosis cases acquired overseas increased through the years 2006 to 2010, from 6.7% to 14.6%. In 2011, 9.8% (n=216) of cases acquired their infection overseas and most reported travelling to Indonesia (67%) (

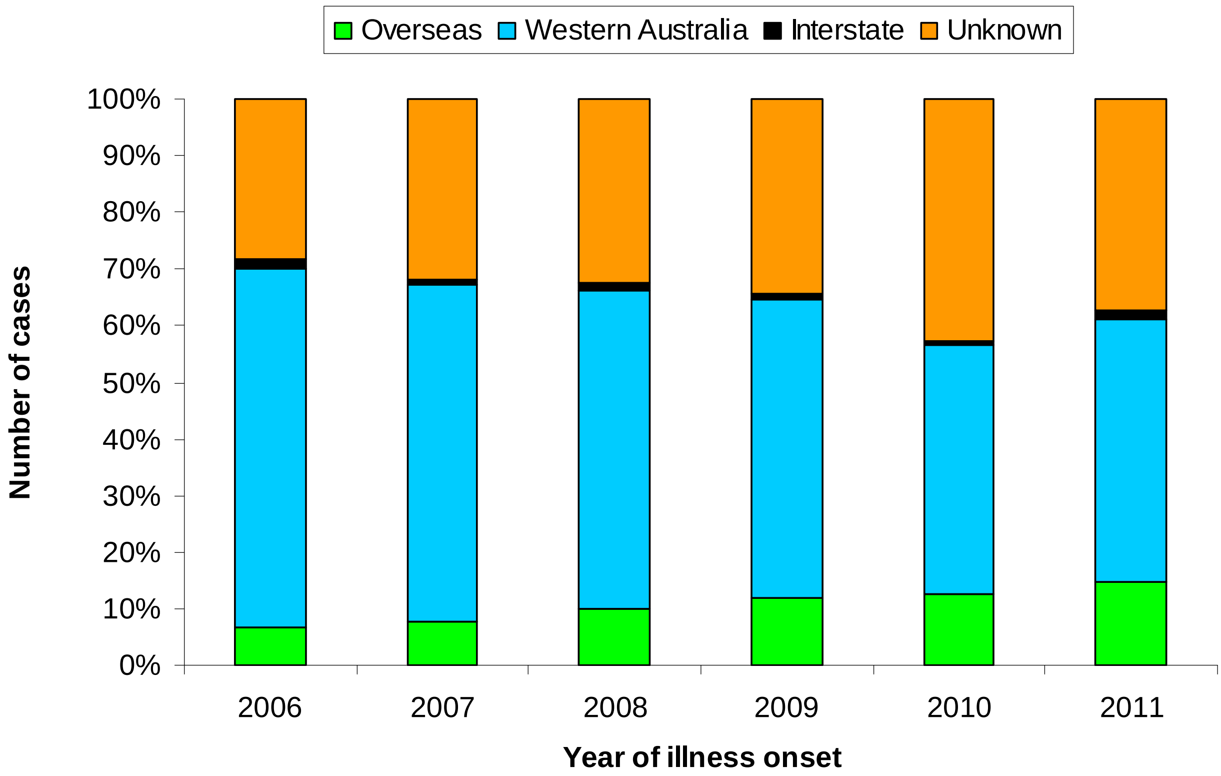


Figure 5). The proportion of cases with unknown travel history also increased from 28% in 2006 to 37% in 2011.

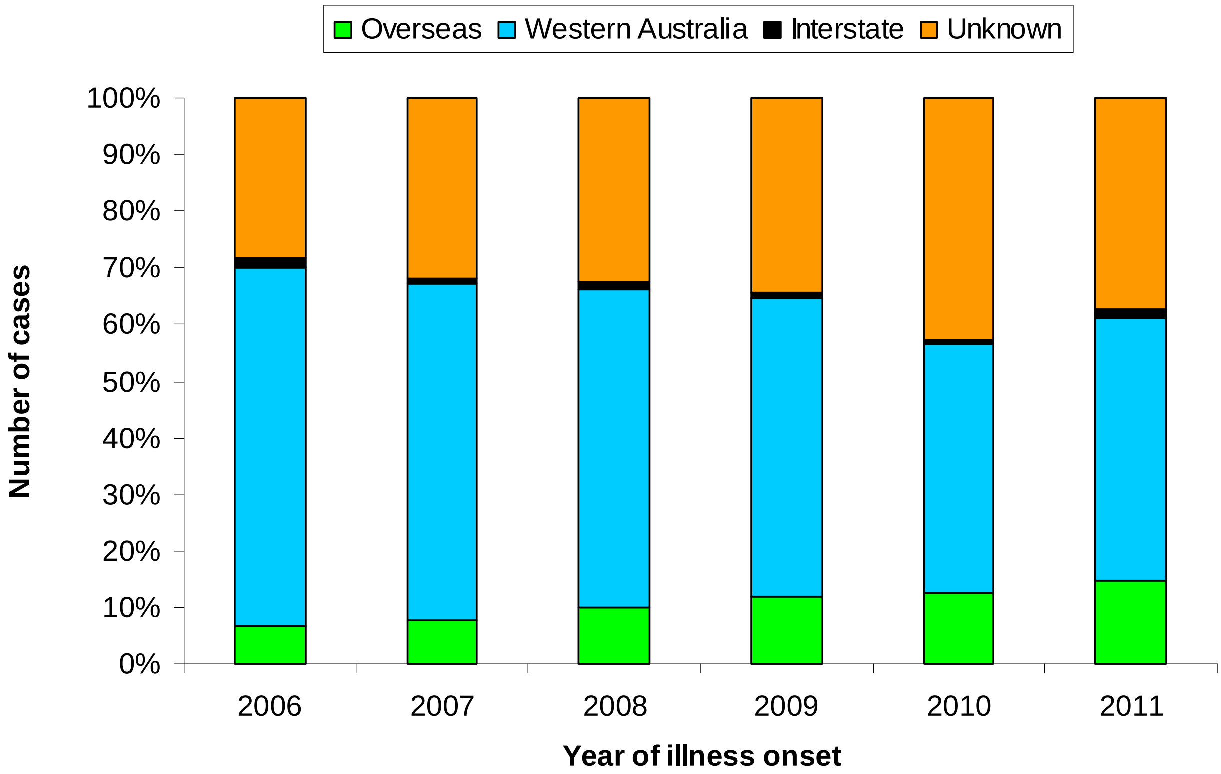


Figure 5. Proportion of overseas acquired campylobacteriosis cases by year of onset, 2006 to 2011

4.2. Salmonellosis

Salmonellosis, which is infection due to *Salmonella,* was the second most commonly notified enteric infection in WA in 2011, with 1323 cases (Appendix 1). The salmonellosis notification rate in 2011 (56.1 cases per 100 000 population), was only marginally higher than 2010 (55.2 cases per 100 000) but 20% higher than the previous five year average (46.1 cases per 100 000), illustrating the increasing incidence of this infection. The number of salmonellosis notifications was generally highest in the summer months (Figure 6) with a large peak in the 2010-2011 summer period.

The overall notification rate for females (56.8 per 100 000 population) was similar to the rate for males (55.4 per 100 000). As in previous years, the 0 to 4 year age-group had the highest notification rate (196 per 100 000 population) (

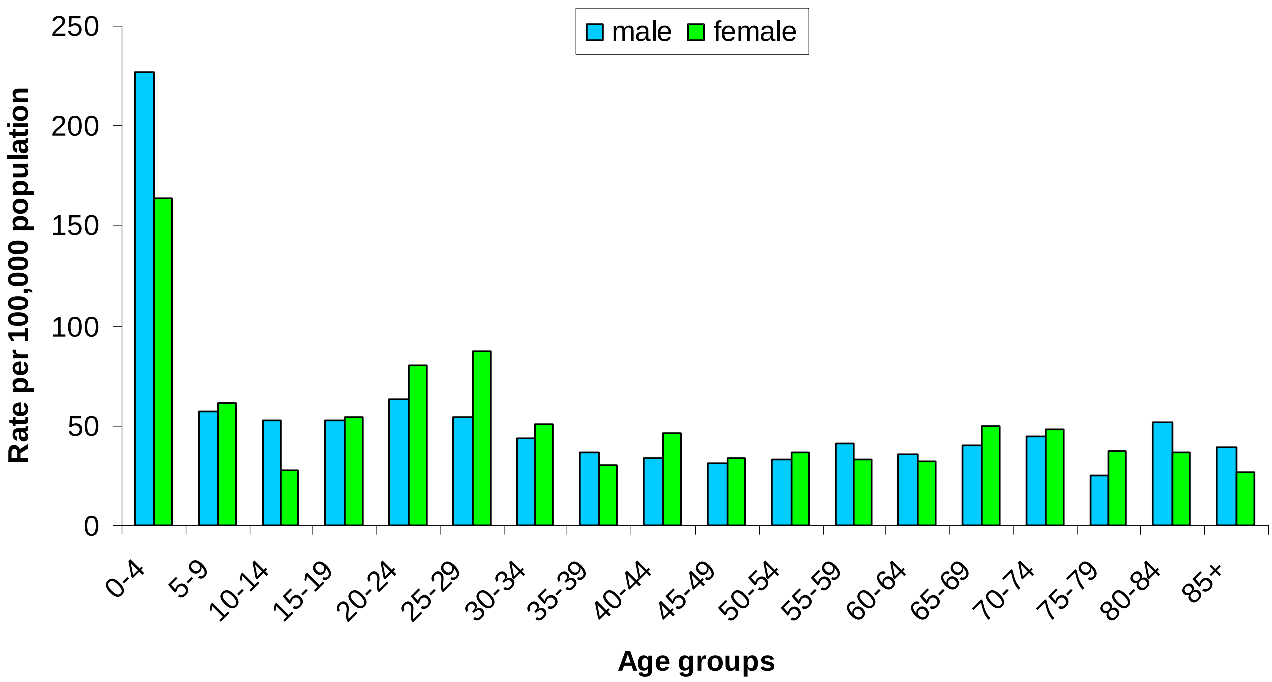


Figure 7). The young adult age groups of 20 to 24 years, and 25 to 29 years, had the next highest notification rates (71 and 70 per 100 000, respectively).

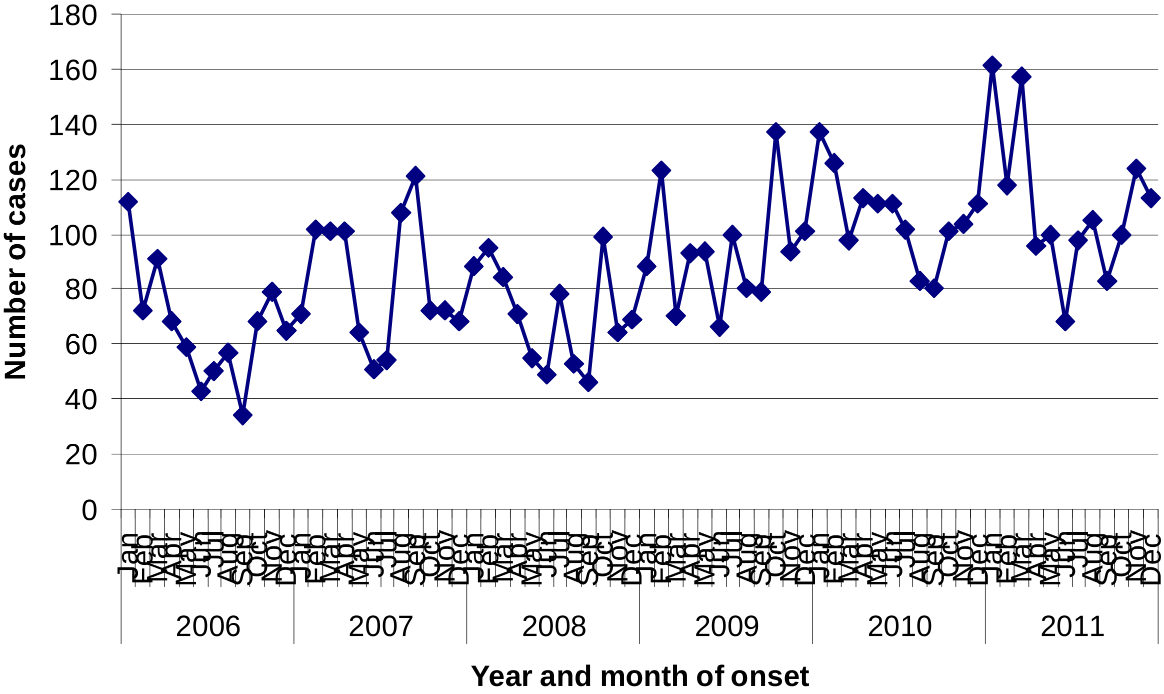


Figure 6. Number of cases of salmonellosis by month and year of onset, WA, 2006 to 2011

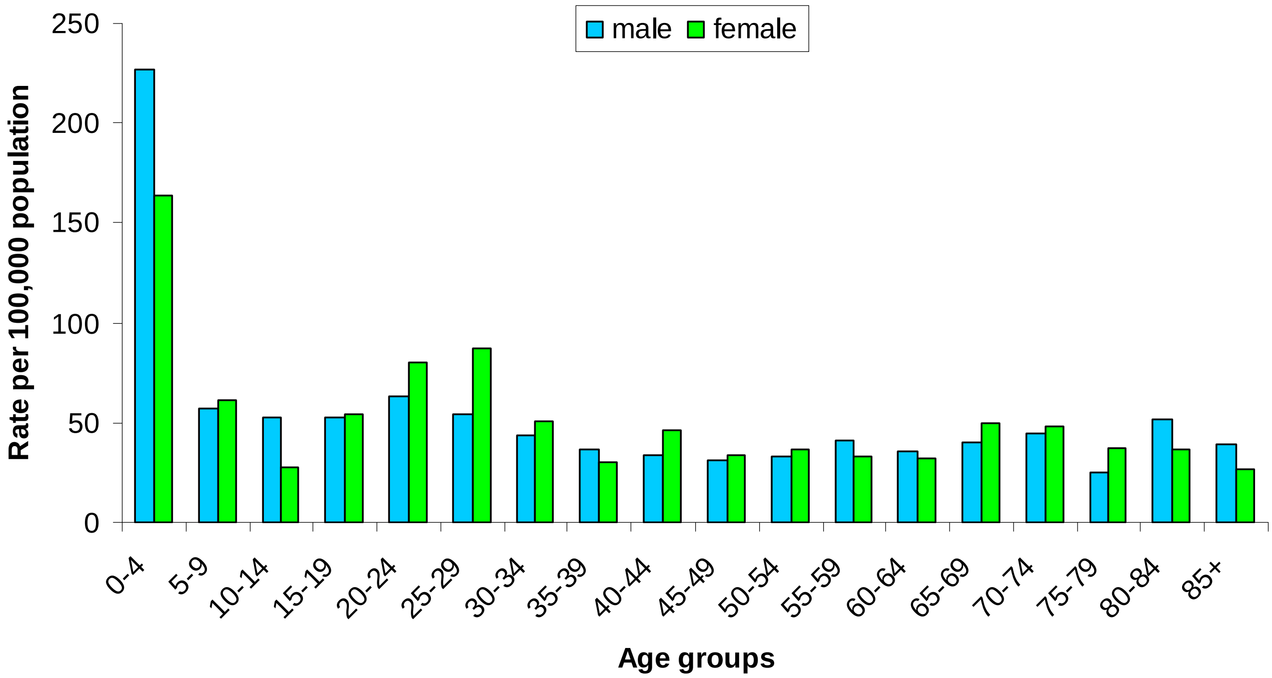


Figure 7. Age-specific notification rates for salmonellosis by sex, WA, 2011

Data on Aboriginality was missing for 6.7% of salmonellosis notifications in 2011, which is the same as the previous year. The overall salmonellosis notification rate for Aboriginal people (106.8 per 100 000 population) was more than double the notification rate for non-Aboriginal people (50.5 per 100 000 population).

The Kimberley region had the highest notification rate in 2011 (250.2 per 100 000 population) which was approximately six times the rate for the Great Southern region, which had the lowest notification rate (47.9 cases per 100 000). In the Kimberley, rates were higher for both Aboriginal and non-Aboriginal people when compared with other regions (Figure 8).

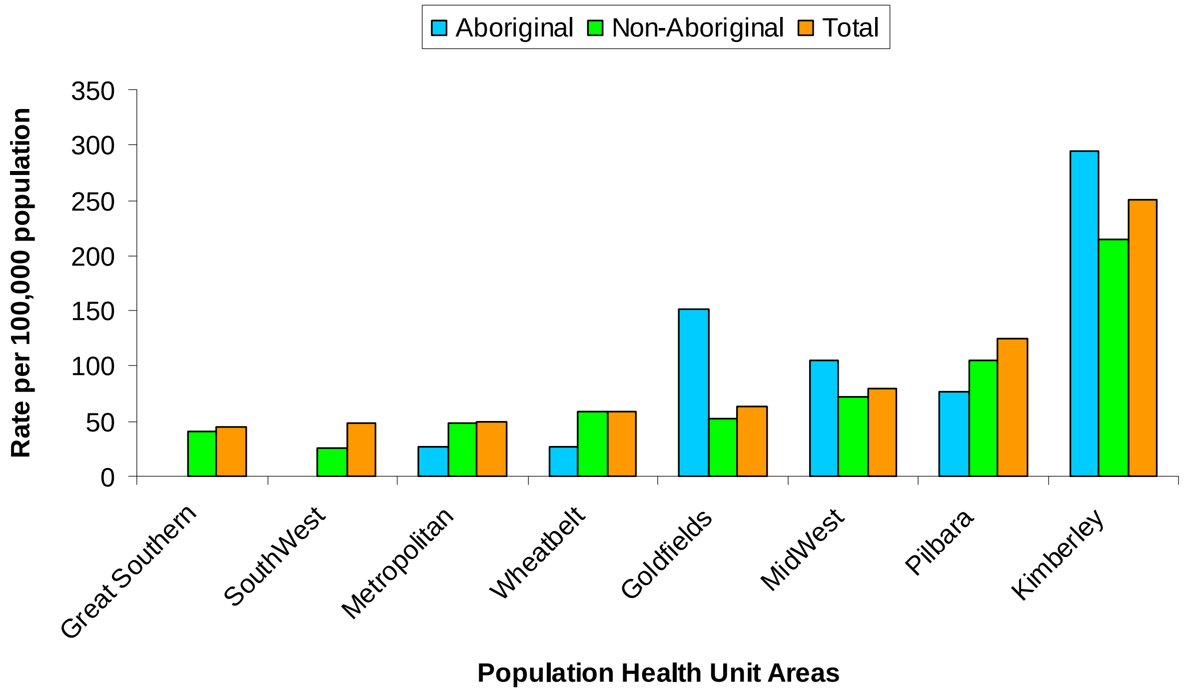


Figure 8. Salmonellosis notification rates by region and Aboriginality, WA, 2011

The most commonly notified *Salmonella* serotype in WA in 2011 was *S*. Typhimurium (STM), with 428 notifications (Table 1). The number of cases was approximately 30% higher than the mean of the previous five years. There were five foodborne and suspected foodborne outbreaks caused by STM (described in Section 4.1).

The second most commonly notified serotype was *S*. Enteritidis with a steady increase in notifications from 2006 to 2010 and then a 17% decrease in 2011, with 280 notifications (Figure 9). In 2011, most cases with *S*. Enteritidis infection (94%) travelled overseas during their incubation period and of these cases, 79% (n=207) had travelled to Indonesia, and most of these people had reported visiting Bali (84%, n=173). There were 17 (6%) cases of *S*. Enteritidis that appeared to be locally acquired and these were interviewed to identify possible risk factors for the cause of illness.

Notifications for *S*. Paratyphi B var Java, *S*. Infantis, *S*. Chester and *S*. Weltevreden were also substantially higher in 2011 compared to the five year mean. The increases in *S*. Paratyphi B var Java and *S*. Weltevreden were predominantly the result of overseas acquired infections, particularly from travel to Indonesia. The proportion of overseas acquired *Salmonella* cases increased steadily between 2006 and 2010, with a decrease in 2011 (Figure 10).

Table 1. Number and proportion of the top 10 *Salmonella* serotypes notified in WA, 2011, with comparison to 5-year average

Salmonella Serotype	2011 number	Percentage of total*	Mean number 2006-2010	Ratio‡
Salmonella Typhimurium	428	32.1	324.8	1.3
Salmonella Enteritidis	280	21.0	170	1.6
Salmonella Paratyphi B bv Java	61	4.6	32.6	1.9
Salmonella Chester	39	2.9	22.6	1.7
Salmonella Saintpaul	39	2.9	48	0.8
Salmonella Infantis	35	2.6	13	2.7
Salmonella Muenchen	32	2.4	24.6	1.3
Salmonella Corvallis	24	1.8	16	1.5
Salmonella Stanley	22	1.7	18.6	1.2
Salmonella Weltevreden	20	1.5	11.4	1.8

*Percentage of total *Salmonella* cases notified in 2011

‡Ratio of the number of reported cases in 2011 compared to the five year mean of 2006-2010.

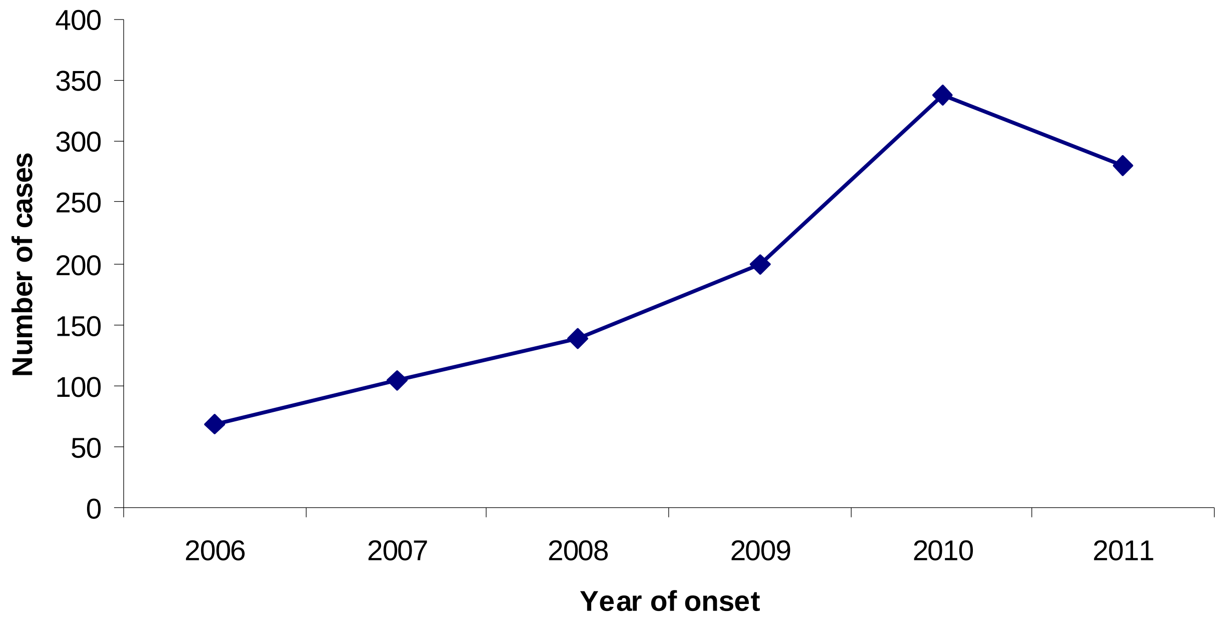


Figure 9. Number of cases of *S.* Enteritidis by year of onset, WA, 2006 to 2011

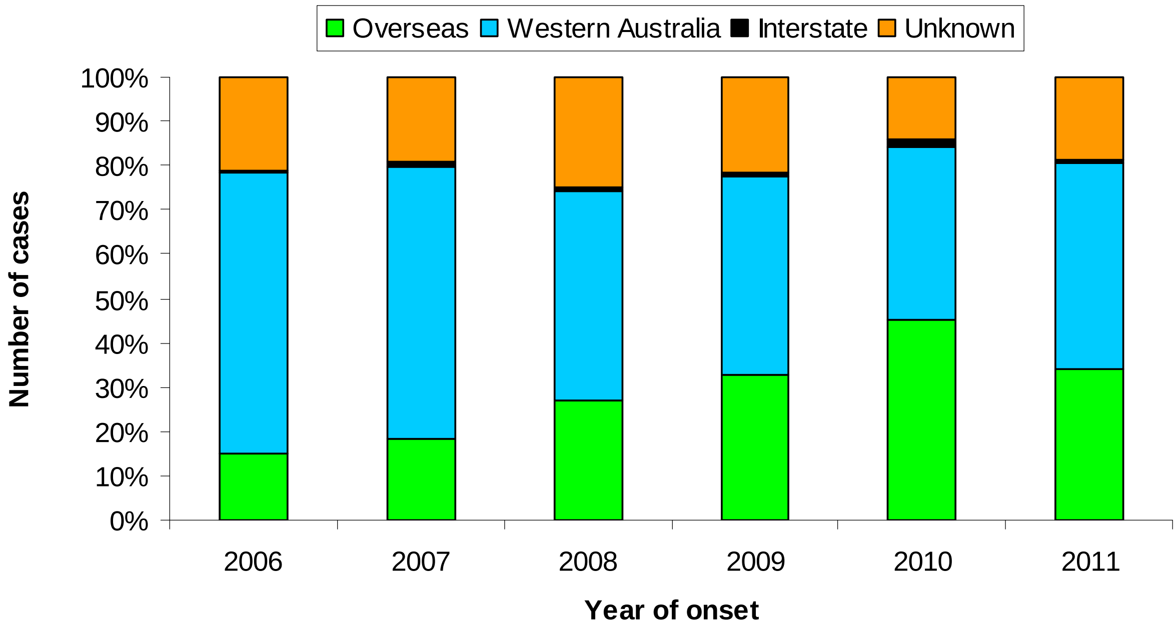


Figure 10. Proportion of salmonellosis cases acquired overseas, by year of onset, 2006 to 2011

4.3. Cryptosporidiosis

Cryptosporidiosis, which is infection due to *Cryptosporidium,* was the third most common notified enteric infection with 454 cases reported in 2011, a rate of 19.3 cases per 100 000 population (Appendix 1). There was a community wide outbreak in the January to April period which is similar to an increase in early 2007 (Figure 11). The 2011 rate represented a 47% increase compared to the mean five year rate. In each of the years from 2006 to 2011 the number of notifications was generally lower from May to October and higher in the months with warmer temperatures. The cause of increase in cases from January to April was unknown but may have been due to a number of reasons, including a new strain of *Cryptosporidium* circulating in the community, a new cohort of susceptible (<10 years old) people in the community or contamination of swimming pools. For public health reasons, cases contacted as part of case control study (to identify risk factors for illness) were asked if they had swum in swimming pools or attended childcare.

During the November 2010 to April 2011 period, cluster/outbreaks investigated included:

- A metropolitan public pool, as three people had visited the pool during a two week period. The Department of Health worked with pool management to remove any possible water contamination.
- Cluster of *Cryptosporidium* cases in an Aboriginal community: An Environmental Health Officer carried out an investigation and public health action.
- Four outbreaks in childcare centres due to *Cryptosporidium*, and one of these childcare centres had visited a petting zoo prior to illness.
- One *Cryptosporidium* outbreak in a residential care facility.

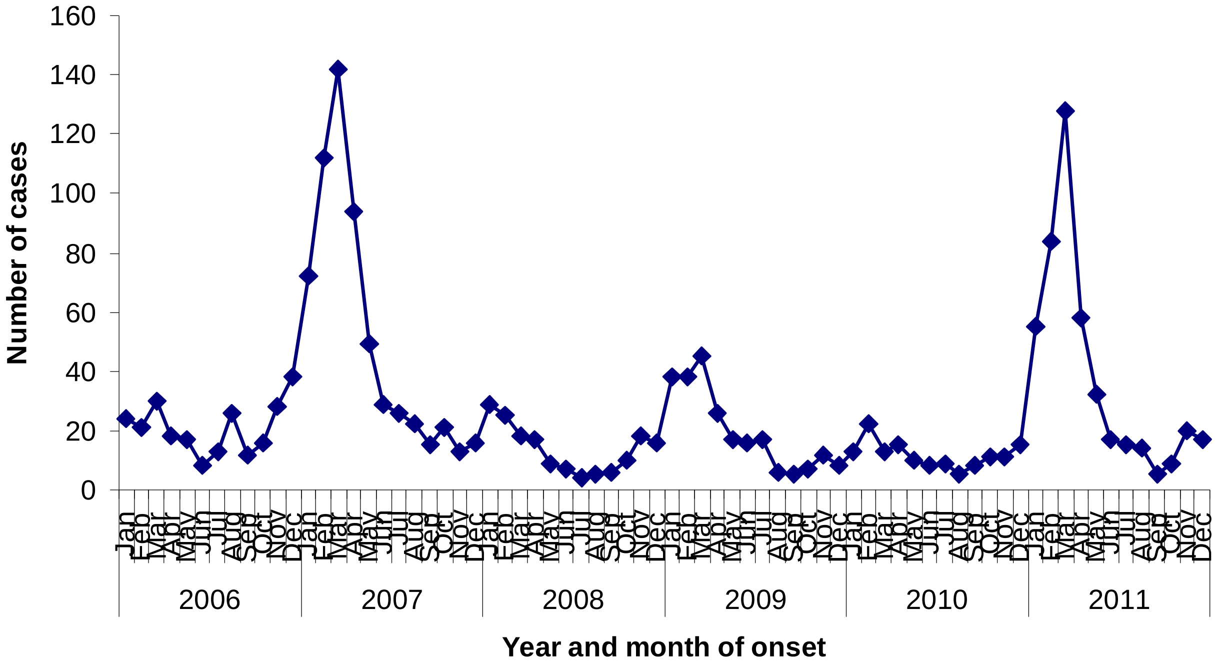


Figure 11. Number of cases of cryptosporidiosis by month and year of onset, WA, 2006 to 2011

The cryptosporidiosis notification rate was similar for females and males in 2011, with rates of 20.1 and 18.5 per 100 000 population, respectively. This is in contrast to 2010, where cryptosporidiosis notification rates in females were 65% higher than males. The notification rate was highest in the 0 to 4 year age-group, accounting for 50% of notifications (Figure 12). The overall cryptosporidiosis rate for the Aboriginal population was 127.9 cases per 100 000, eight times the rate for non-Aboriginal people (15 cases per 100 000). Aboriginal status information was missing for 3% of cases, an improvement from the previous year (9.3% unknown).

The Kimberley region had the highest cryptosporidiosis notification rate, with 160 cases per 100 000 population, three times higher than the rate in 2010 (56 cases per 100 000 population) (Figure 13). Notifications for Aboriginal people were higher (ranging from 2.3 to 11.3 times) than for non-Aboriginal people in all regions.

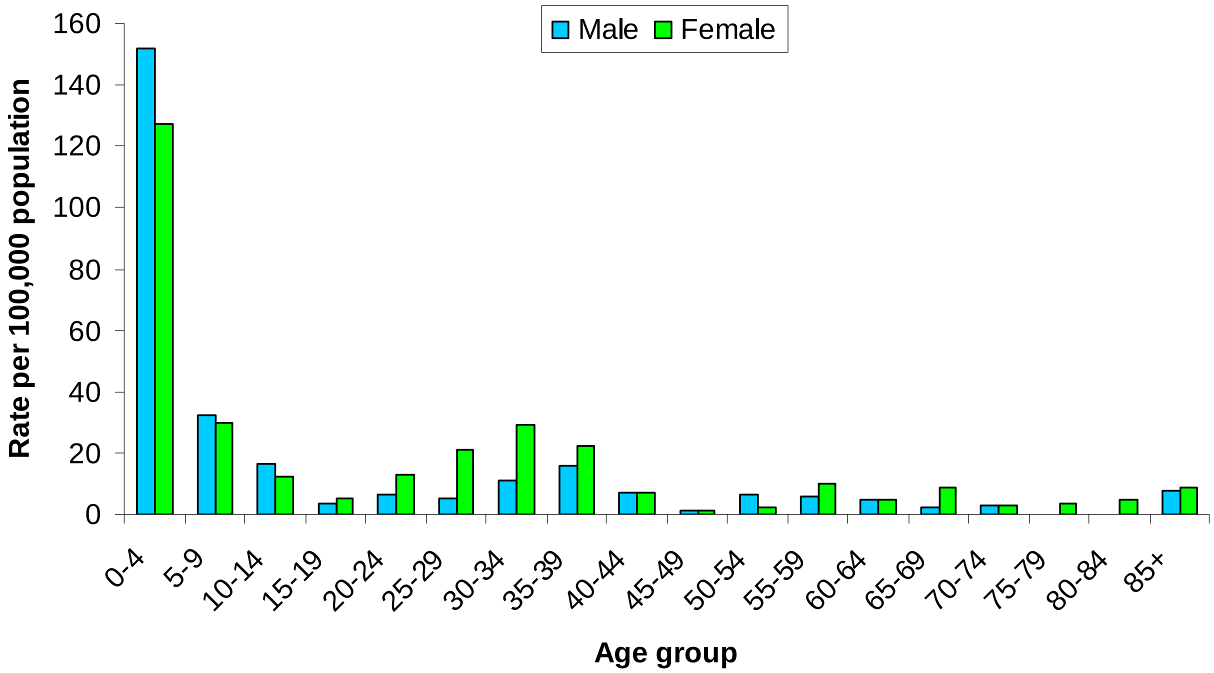


Figure 12. Age-specific notification rates for cryptosporidiosis by sex, WA, 2011

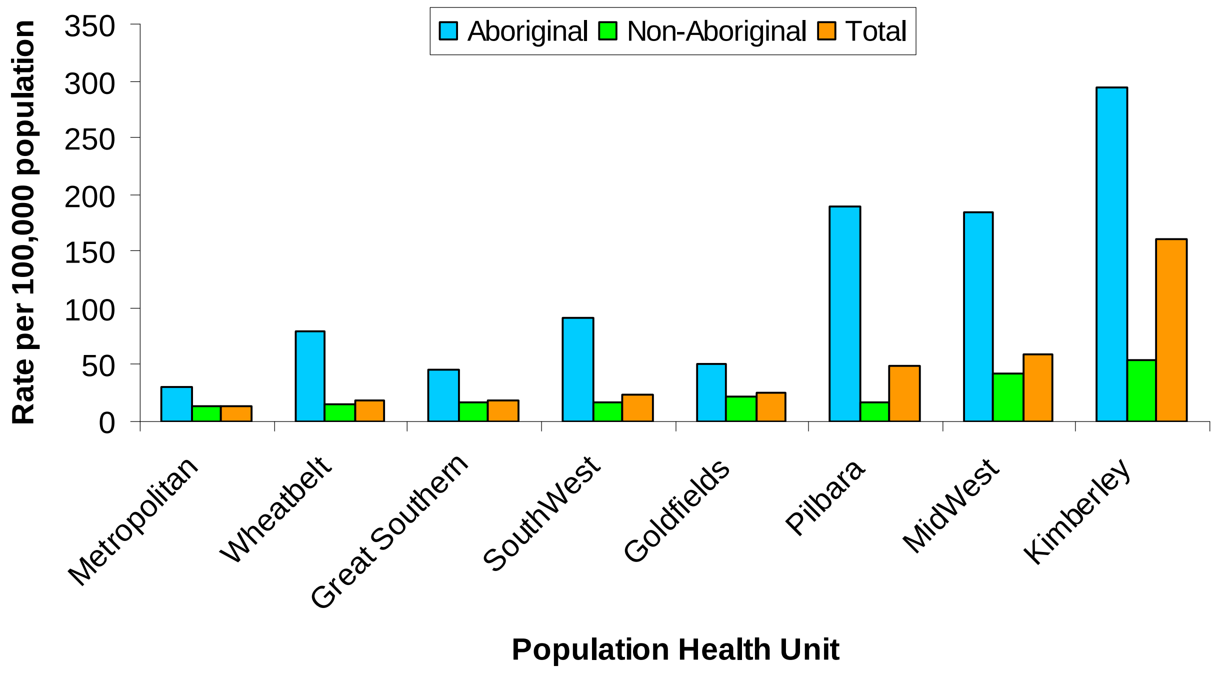


Figure 13. Cryptosporidiosis notification rates by region and Aboriginality, WA, 2011

4.4. Rotavirus infection

Rotavirus was the fourth most commonly notified enteric infection in WA in 2011, with 184 cases (7.8 per 100 000 population) which was a large decrease compared to the previous five year average of 489 cases (Figure 4, Appendix 1). The decrease in notifications in 2011 could however be due to changes in laboratory testing and notification practices for rotavirus, rather than representing a decrease in rotavirus infection rate. Through the years 2009 to 2011 other laboratories in WA started to send samples to PathWest for rotavirus testing, as a trial showed that the antigen tests used in other laboratories had low positive predictive values when compared to the polymerase chain reaction (PCR) test used at PathWest (unpublished results). Other laboratories subsequently stopped notifying rotavirus, contributing to lower notification results (Figure 145). This change in testing and notifying practices therefore makes it difficult to use the rotavirus data in WANIDD to describe any time trends.

In the four complete years after rotavirus became a notifiable disease in WA (which occurred in July 2006), monthly notification rates exhibited seasonal peaks.

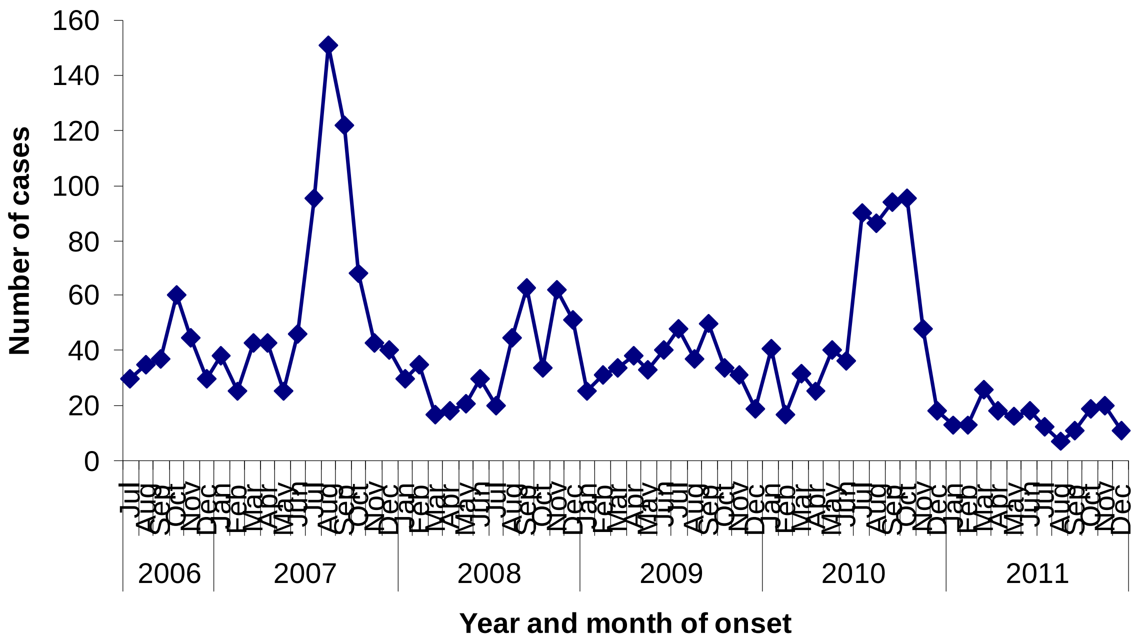
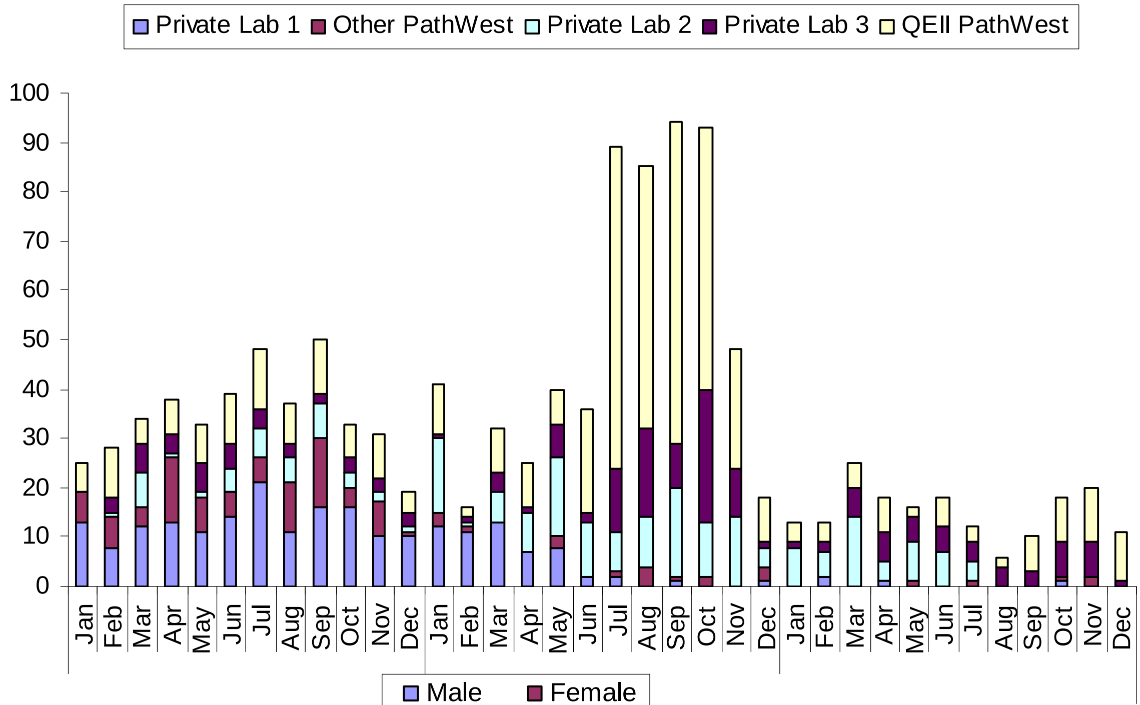


Figure 14. Number of cases of rotavirus infection by month and year of onset, WA, 2006 to 2011



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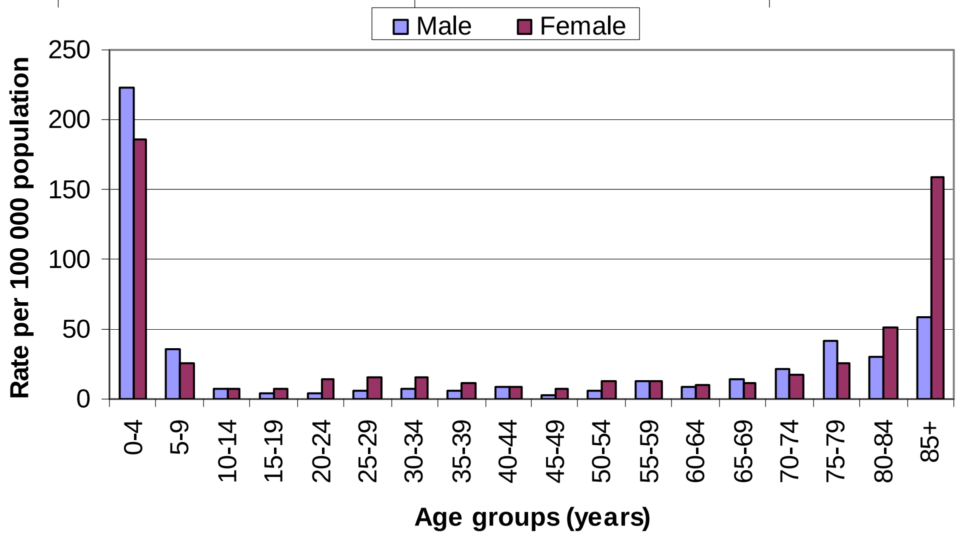

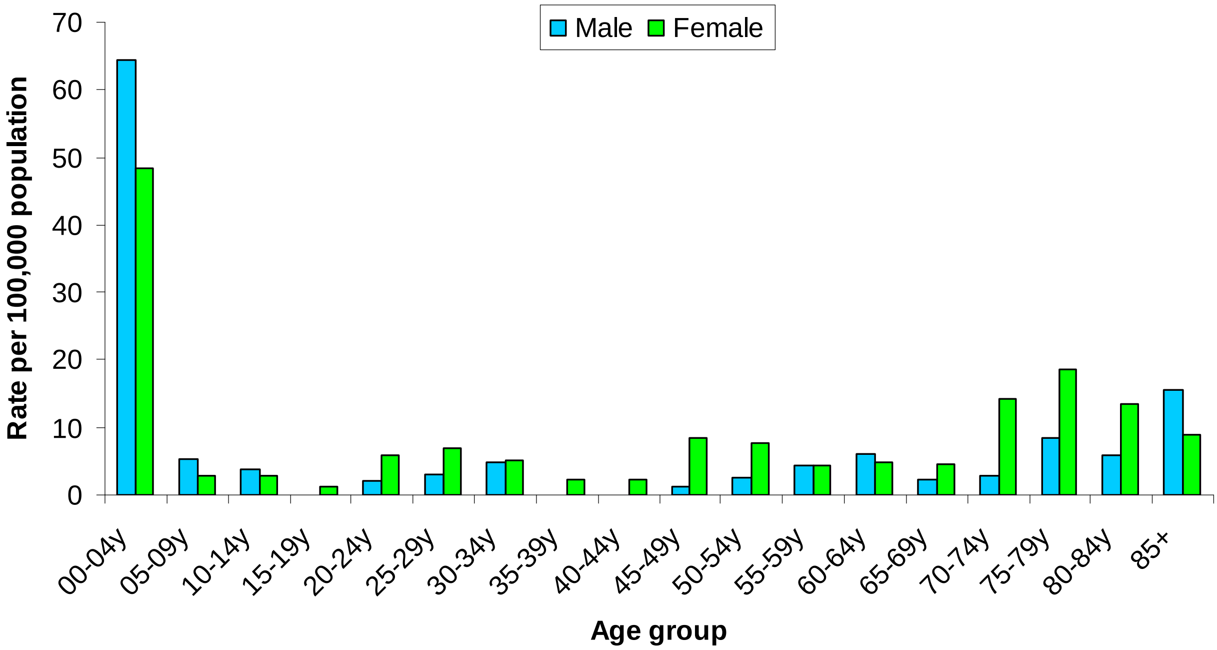

Figure 15. Age-specific notification rates for rotavirus by sex, WA, 2011

In 2011, the highest rates were in the Pilbara and Kimberley, with rates of 16.1 and 19.0 cases per 100,000 population respectively, more than double the rates of other PHUs (Figure 16).

Aboriginality status information was missing for 9% of rotavirus notifications in 2011, which was the same as 2010. The notification rate for the Aboriginal population (19.8 per 100 000 population), was over twice that of the non-Aboriginal population (6.7 per 100 000) and this proportional difference is consistent with previous years.

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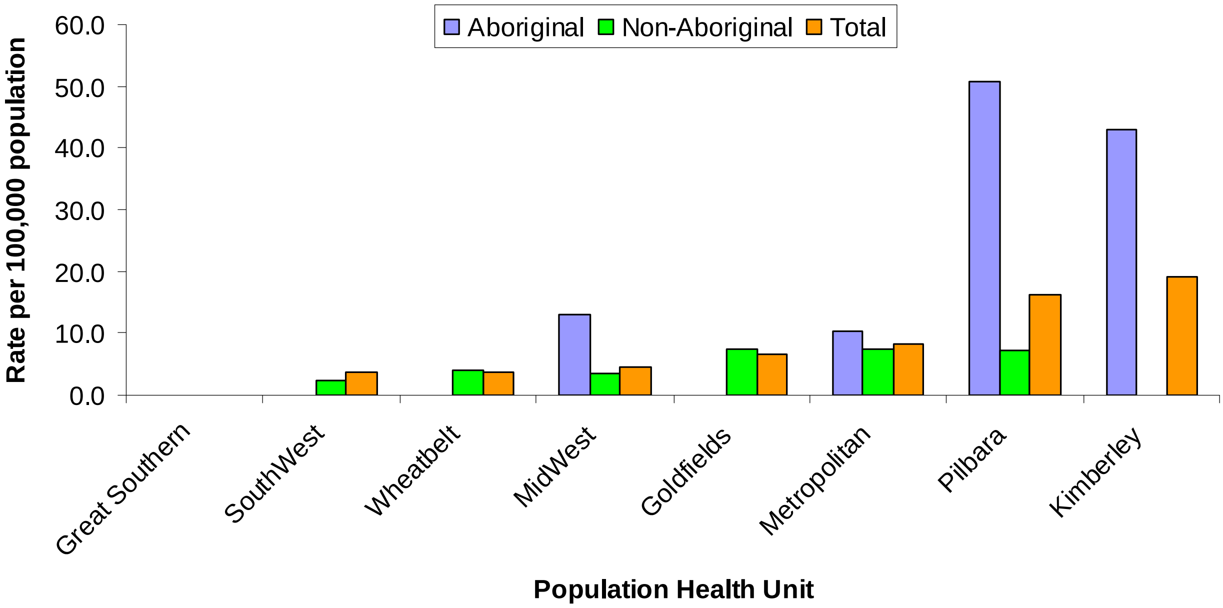

Figure 16. Rotavirus notification rates by region and Aboriginality, WA, 2011

Rotavirus vaccination was introduced in July 2007, with a two dose schedule at 2 and 4 months of age. In February 2009 this was changed to a three dose schedule at 2, 4 and 6 months of age. Due to the described changes in laboratory testing and notification practices it is, however, difficult to use rotavirus notifications from WANIDD to assess the effect of this vaccination program on notification rates in Western Australia.

There has been a small proportional increase in the number of rotavirus cases reported to have acquired their infection overseas, from 0.4% in 2006 to 7.6% of cases in 2011 (Figure 17).

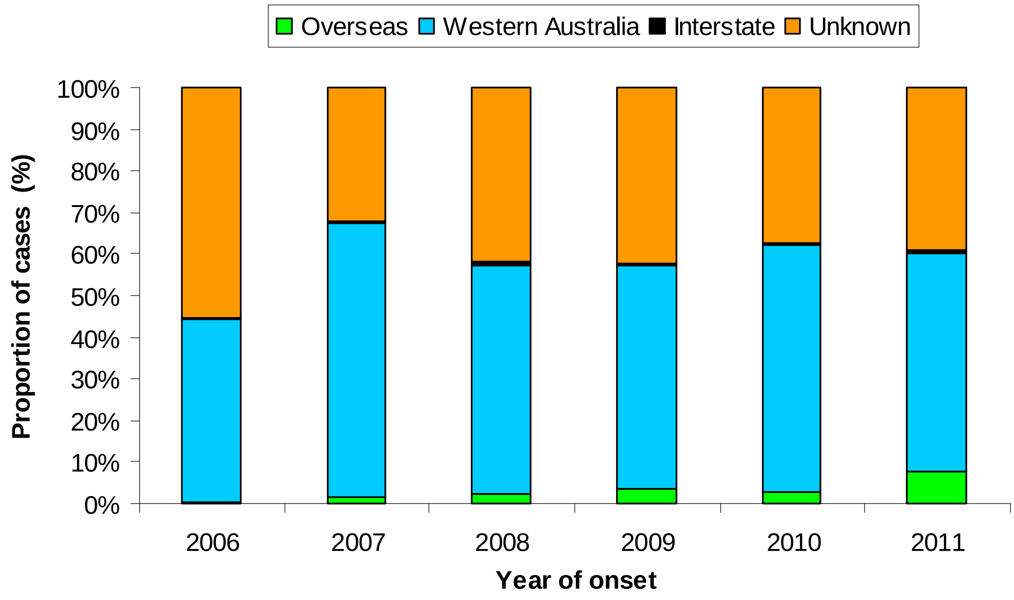

Figure 17. Proportion of overseas acquired rotavirus cases by year of onset, 2006 to 2011

4.5. Shigellosis infection

For shigellosis, which is infection due to *Shigella,* there were 86 notifications in 2011, a rate of 3.6 cases per 100 000 population, and a 39% reduction compared to the previous five year average (5.9 cases per 100 000) (Appendix 1). There was no clear seasonal pattern observed (Figure 18).

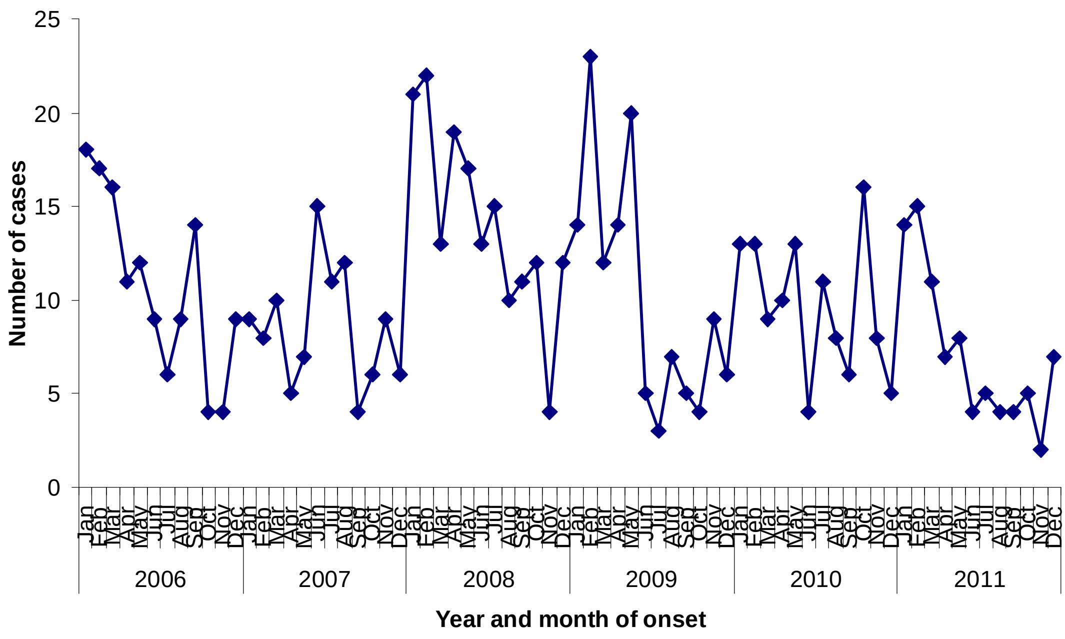

Figure 18. Number of cases of shigellosis by month and year of onset, WA, 2006 to 2011

The shigellosis notification rate for 2011 in females and males was similar with rates of 3.5 and 3.8 per 100 000 population, respectively. Children aged 0 to 4 years had the highest notification rate (18.6 per 100 000), accounting for 35% of notifications (Figure 19). The notification rate for Aboriginal people (52.7 per 100 000) was 28 times the rate for non-Aboriginal people (1.9 per 100 000). Aboriginality information was missing for 3.4% of shigellosis notifications. The Kimberley region had the highest shigellosis notification rate (59.8 per 100 000 population), followed by the Goldfields (18.2 per 100 000), while some regions (Wheatbelt and Great Southern) had no cases, while the rate in the Perth metropolitan region was only 2 per 100 000 (Figure 21).

The most common *Shigella* species notified in 2011 was *Shigella sonnei* with 61 cases (71%). The most frequent biotype of *S. sonnei* was biotype A (52%), which was predominantly acquired in Western Australia (72% of cases). The second most common species was *S. flexneri* with 20 cases (23%) which were mostly acquired in WA (75%), and a single case of *S. boydii* was reported, which was acquired in Guinea. No cases of *S. dysenteriae* were reported in WA in 2011. The proportion of overseas acquired *Shigella* cases in 2011 was half that of the previous year (22% versus 40.4%); with 74% of the 19 overseas acquired cases travelling to Indonesia (Figure 22).

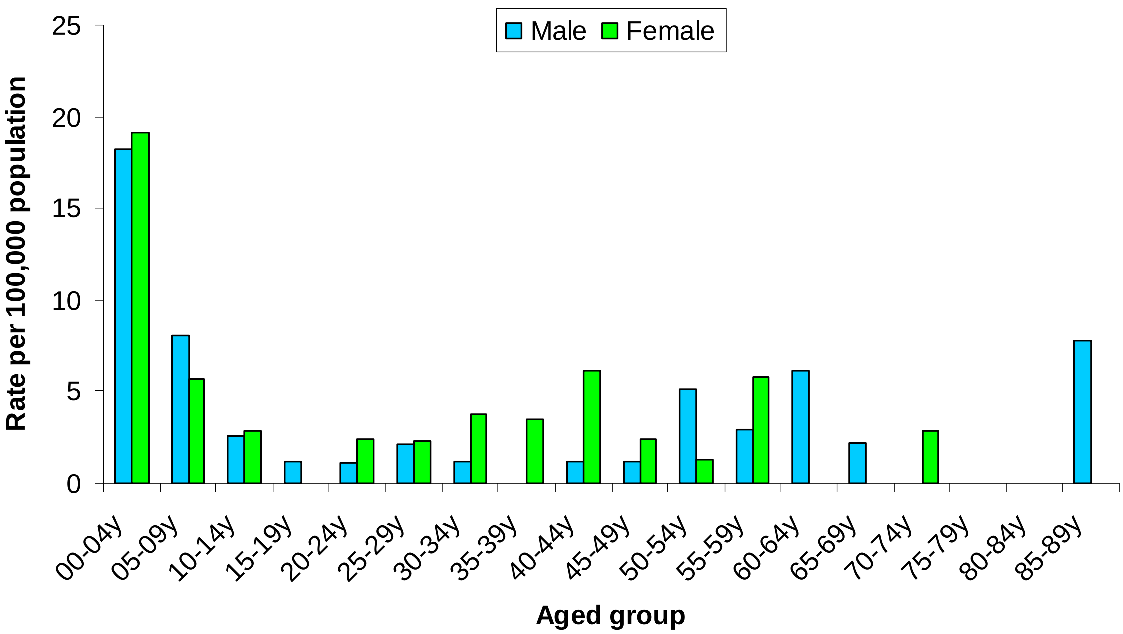

Figure 19. Age-specific notification rates for shigellosis by sex, WA, 2011

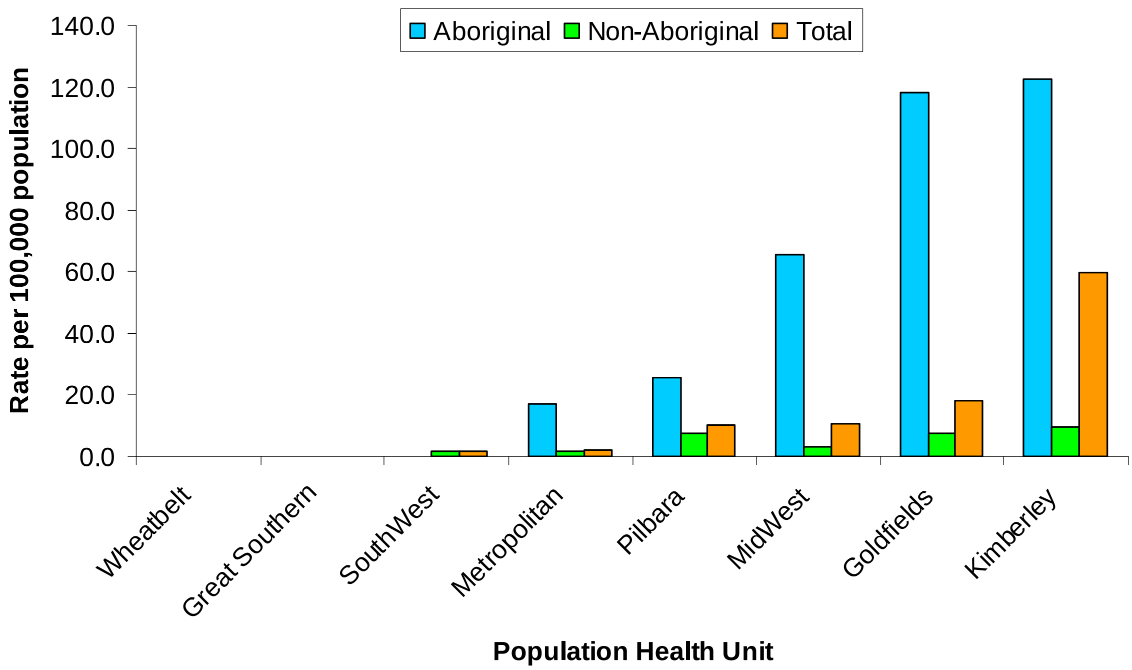

Figure 20. Shigellosis notification rates by region and Aboriginality, WA, 2011

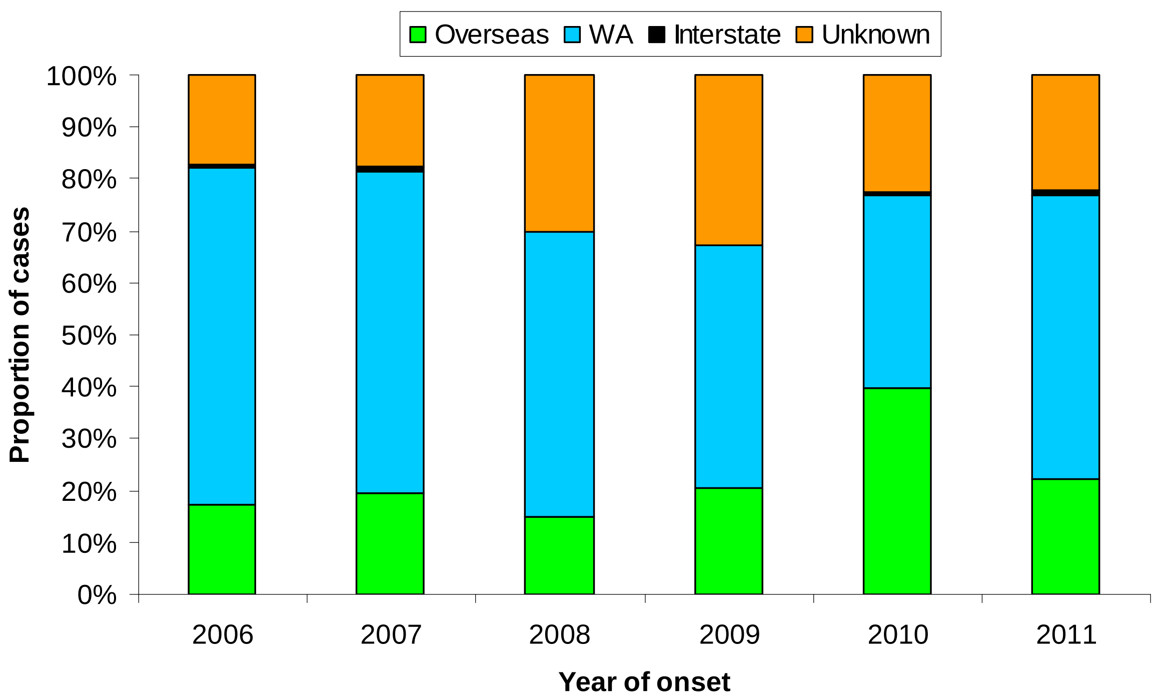

Figure 21. Proportion of overseas acquired shigellosis by year of onset, 2006 to 2011

4.6. Hepatitis A virus infection

There were 13 cases of hepatitis A notified in 2011, with a rate of 0.6 cases per 100 000 population, which is a 65% decrease in notification rate compared to the mean of the previous five years (Appendix 1). Notifications did not show distinct seasonal patterns through the years 2006 to 2011 (Figure 22).

Hepatitis A vaccine was introduced for Aboriginal children in November 2005. There were no hepatitis A notifications in Aboriginal people during the five year period 2007 to 2011. This was unusual compared to previous experience: the mean annual notification rate for the 10 years prior to 2007 was ten times higher in Aboriginal (40 cases per 100 000 population) than non-Aboriginal (4 cases per 100 000) people. This data suggests that the vaccination program has been effective in reducing hepatitis A incidence amongst all age groups of Aboriginal people, not just the target age of young children.

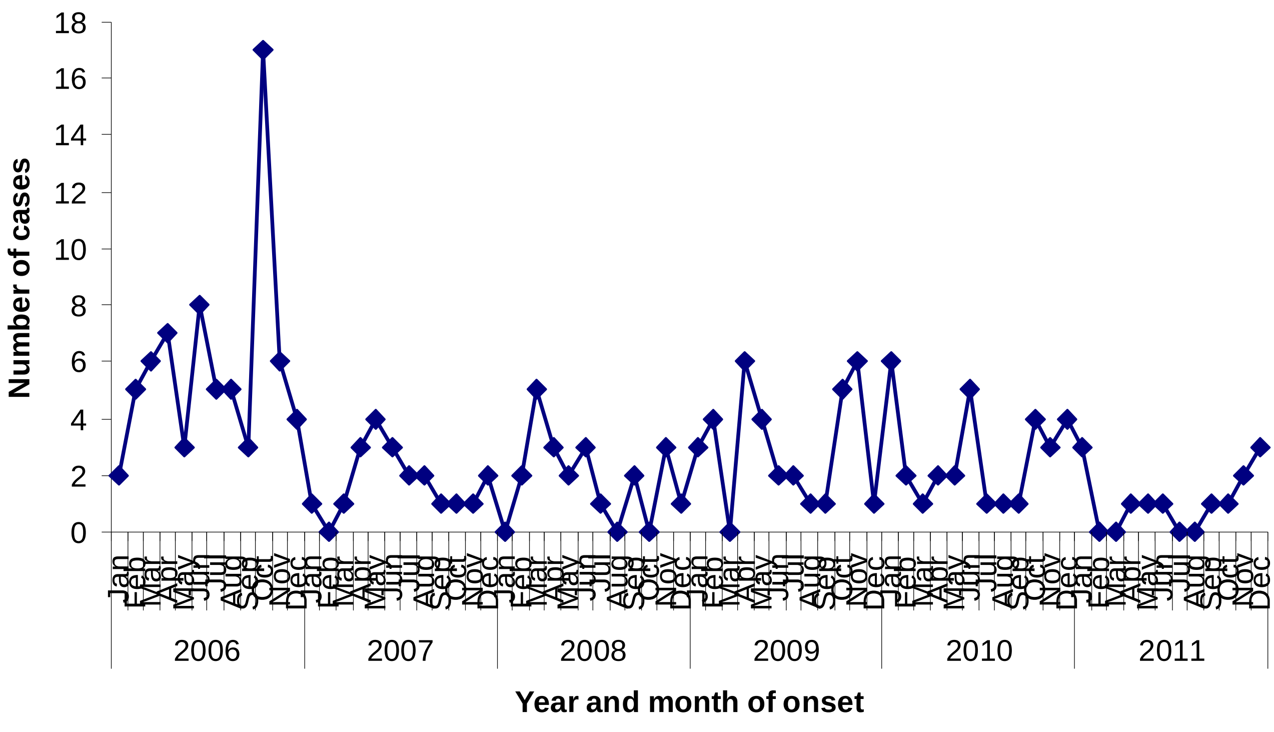

Figure 22. Number of cases of hepatitis A infection notified by month and year of onset, WA, 2006 to 2010

Hepatitis A cases in 2011 ranged in age from 3 to 67 years (median 22 years), with nine male and four female cases. The majority of cases (n=8, 62%) were acquired overseas, which is similar to 2010 when 75% of cases acquired their infection overseas. Cases were reported to have acquired infection in Indonesia (2), India (1), Fiji (1), Iraq (1), Philippines (1), South Africa (1) and Egypt (1).

4.7. Typhoid and Paratyphoid fever

In 2011, there were 15 reported cases of typhoid fever, which is caused by *Salmonella* Typhi, and all cases had a history of recent overseas travel, to India (8), Indonesia (4), Bangladesh (1), Iraq (1) and Pakistan (1). Twelve of these cases were born in countries where typhoid is endemic. Nine cases of paratyphoid fever (all infections were with *S*. Paratyphi A, two PT 1 and two PT 13, remainder not phage typed) were notified in 2011, all with overseas acquisition: India (7) and Bangladesh (2). All of these cases were born in countries where paratyphoid is endemic.

4.8. Listeriosis

There were seven cases of *Listeria monocytogenes* infection notified in 2011 which is similar to the previous five year average of eight cases per year. Five cases were non-pregnancy related (2 females and 3 males) and ranged in age from 55 – 94 years. While two cases had immunocompromising illnesses, and one case routinely took stomach acid lowering medication, the other two cases did not have underlying risk factors for infection. There were two maternal *Listeria* isolations (Figure 24). In the first case the baby survived, however in the second case the mother miscarried at 14 weeks gestation. All cases reported eating foods considered to be high risk for *Listeria* infection.

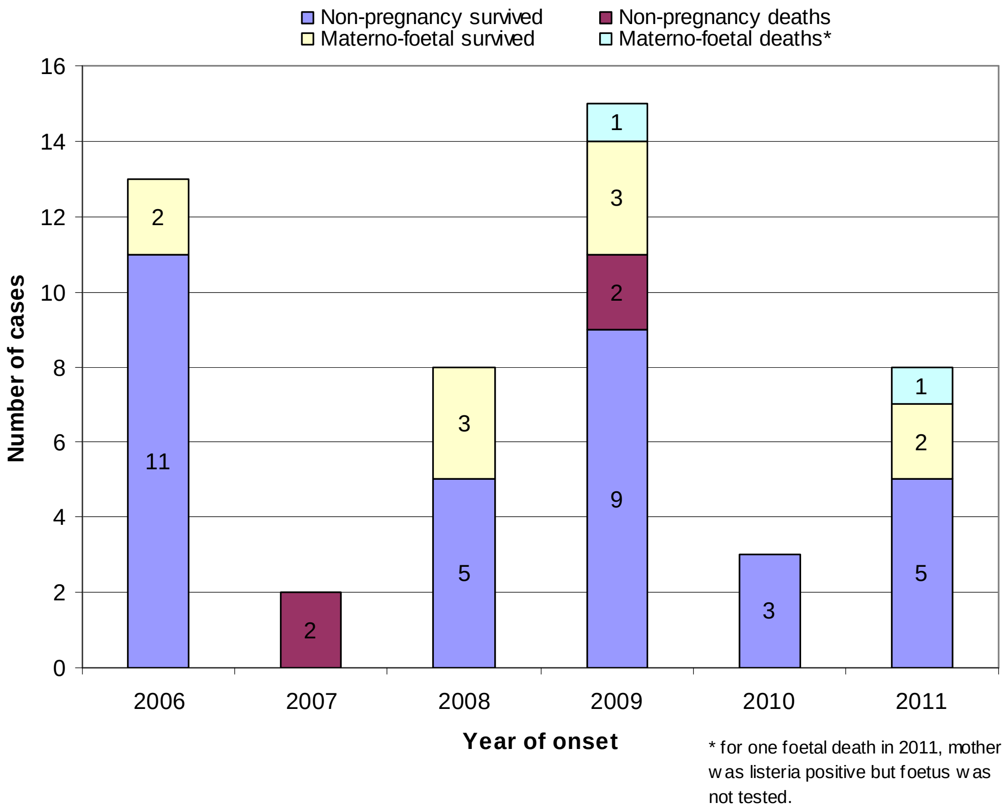

Figure 23. Notifications of listeriosis showing non-pregnancy related infections and deaths, and materno-foetal infections and deaths, WA, 2006 to 2011.

4.9. *Vibrio parahaemolyticus* infection

There were 14 cases of *Vibrio parahaemolyticus* infection in 2011. Eleven cases developed gastroenteritis after travelling overseas (Indonesia [5], Thailand [3], Vietnam [1], Philippines [1] and unknown country of travel [1]). Two cases had locally acquired wound infections, and the other case had an ear infection acquired interstate.

4.10. Shiga toxin producing *E. coli* infection

There were three cases (all male, 3, 6 and 24 years old) of shiga toxin producing *E. coli* (STEC) infection in WA in 2011. None of the cases reported overseas travel. All cases lived in the metropolitan area. One case reported contact with farm animals, and all cases reported eating foods considered to be potentially high risk for STEC. All cases were infected with *E. coli* O157 (H typing not specified).

4.11. Hepatitis E virus infection

In 2011, there were four cases of hepatitis E infection notified in WA. Hepatitis E was detected in an eight year old during screening prior to a liver transplant. The other three cases were male defence force personnel who had travelled on the one ship. These cases are described further in Section 4.3

4.12. *Yersinia* infection

There was one case of *Yersinia enterocolitica* infection notified in 2011, in a 2 year old male from the Perth metropolitan area.

4.13. Cholera

There was one case of toxigenic *Vibrio cholerae* O1 infection notified in 2011, in a 40 year old male who had travelled to the Philippines during his incubation period.

4.14. Botulism and HUS

There were no cases of botulism or HUS notified in WA in 2011.

5. Gastrointestinal disease outbreaks and investigations

5.1. Foodborne/suspected foodborne outbreaks

There were 10 foodborne or suspected foodborne gastroenteritis outbreaks investigated in WA in 2011, including one multi-jurisdictional outbreak investigation led by WA (Table 2). This compares to an average of 10 (range 4-12) foodborne or suspected foodborne outbreaks in the last five years. Three of the outbreaks were caused by unknown pathogens and one outbreak each was caused by STM PFGE type 0011, STM PFGE 0001, STM PFGE 0003, STM PFGE 0386, STM PFGE 0039 and norovirus. In one outbreak, multiple pathogens were the cause of illness (*Campylobacter*, STM PFGE 0007 and *S*. Infantis).

Foodborne outbreaks

Restaurant Outbreak, *S.* Typhimurium PT 170, PFGE 0011 (Outbreak code: 042-2011-001)

Four STM PFGE 0011 cases with onset dates from 28/12/2010 to 01/01/2011 were notified in January. The age range for cases was 20 to 47 years, comprising two females and two males. These cases had separately eaten at an Asian restaurant on either 27/12/2010 or 28/12/2010. Cases ate different meals, but all contained chicken. An environmental investigation was conducted. Swabs and food samples were not collected during the initial investigation. Deficiencies were found with food handling practices, particularly temperature control. The source of contamination was not found.

Vietnamese pork rolls, *S.* Typhimurium PT 9, PFGE 0001 (Outbreak code: 042-2011-002)

In January, 15 cases (10 laboratory-confirmed as S. Typhimurium PFGE 0001) reported eating Vietnamese pork rolls (VPR) over a 9 day period, with a median incubation period of 20 hours. The VPR were produced at one food business and distributed to at least three retail food premises. No product or swabs tested positive for *Salmonella*. The VPR ingredients included cooked pork, pickled vegetables, a chicken liver pate and a raw egg ‘butter’ spread. The rolls were not refrigerated during transport to retail shops, or during storage at these shops, which is likely to have contributed to proliferation of bacteria.

Restaurant Outbreak, *S.* Typhimurium PT 135, PFGE 0003 (Outbreak code: 042-2011-003)

Between January and March, 23 cases of STM PFGE 0003 were associated with an Asian restaurant. Six isolates were confirmed as STM PT 135. Cases ate at the restaurant between 26/1/11 and 26/3/11, with a median incubation period of 5 days. This STM strain appeared to be associated with unusually severe illness, with 62.5% of cases hospitalised. A variety of foods were eaten by cases. Investigation of the premises identified deficiencies that may have resulted in cross-contamination. These included cooked food being served on the same plates that had held raw or partially cooked meats; and a food handler that handled raw/partly cooked meats and raw garnishes with the same gloves. A variety of food samples and swabs were collected, all were negative for *Salmonella*. The premises was cleaned and sanitised on 31/3/11. The source of the outbreak was not determined, although the extended duration of the outbreak and the long incubation period is suggestive of low level, intermittent *Salmonella* contamination.

The Asian restaurant associated with this outbreak and the Asian restaurant associated with the outbreak due to STM PT 170, PFGE 0011 (Outbreak code: 042-2011-001) are part of the same restaurant franchise. *Salmonella* outbreaks associated with restaurants from this franchise were also investigated in 2007 and 2009.

Party Outbreak, *S.* Typhimurium PT 193, PFGE 0386 (Outbreak code: 042-2011-004)

In April, approximately 30 of 120 attendees at a birthday party were reported to have had gastroenteritis following the party. Of 31 attendees interviewed, 12 reported illness, with symptoms of diarrhoea (n=12), vomiting (n=5) and fever (n=9). There were seven confirmed *S.* Typhimurium PFGE 0386 cases and two isolates were further characterised as STM PT 193, and fully susceptible to the antibiotics tested. The median incubation period was 22.5 hours and median duration of diarrhoea was six days, with two cases hospitalised. Food eaten at the party included roast beef (prepared privately), bread rolls, gravy (prepared privately), a cake purchased from a bakery and five salads prepared by a caterer. A case control study showed that gravy (odds ratio [OR] 10.0, confidence interval [CI] 1.8-53.7), waldorf salad (OR 7.0, CI 1.1-42.2) and bread rolls (OR 17.2, CI 2.2-not defined) were associated with illness. Samples of coleslaw, potato salad, macaroni salad, waldorf salad, greek salad and commercial mayonnaise were all negative for *Salmonella,* although the salads were from batches different to those served at the party. The source of the *Salmonella* contamination could not be identified.

Hotel Outbreak, Norovirus (Outbreak code: 07/11/ING)

There were 15 staff and 38 patrons (from 16 separate groups) with gastroenteritis who either ate or worked at a hotel from the 15/7/2011 to 18/7/2011. Staff and patrons had similar symptoms (diarrhoea, vomiting and fever) and duration of illness. For patrons, the median incubation period was 31 hours. One faecal specimen from a patron was positive for norovirus. A case control study of 33 ill and 31 not ill patrons with multivariate analysis showed that eating any salad (case exposure [CE] 73%, odds ratio [OR] 5.31, confidence interval [CI] 1.31-21.57) and aioli (CE 30%, OR 12.75, CI 1.36-120) were significantly associated with illness. At least two staff-members were ill prior to the date that ill patrons attended the hotel. There were also reports of ill staff returning to work before exclusion periods were completed. Most of the ill staff had also eaten meals at the hotel. It is most likely that patrons became ill after eating salad and possibly other foods contaminated with norovirus. It is possible, but cannot be proven, that one or more infected food handlers may have been responsible for the contamination of food. However, other mechanisms of transmission such as person to person (eg via contaminated surfaces in toilets/bathrooms) may also have caused some illness, especially among staff.

Function Centre, *Campylobacter*, *S.* Typhimurium PT 22, PFGE 0007 and *S*. Infantis (Outbreak code: 011-2011-001)

An outbreak of gastroenteritis occurred amongst attendees at a gala dinner at a function centre on 3/9/11. Some cases had mixed infections, with two cases positive for *Campylobacter* and STM PFGE 0007; one case positive for *Campylobacter* and *Salmonella* Infantis; and three cases positive for *Campylobacter* only. The 705 people that attended the dinner were asked to complete a self administered questionnaire. Of the 136 questionnaires returned, 65 people reported gastroenteritis (minimum attack rate of 9.2%). Median incubation period was 60 hours and median duration of illness was 5 days. Symptoms reported included diarrhoea (n=64), abdominal pain (n=58), nausea (n=41), chills (n=33), fever (n=30), vomiting (n=9) and bloody diarrhoea (n=6). The multivariate analysis of significant food exposures found that illness was statistically associated with consumption of duck parfait (OR 13, 95% CI 1.9-91.5, p 0.01). None of the parfait served at the dinner was available to be tested at the time of the investigation. A sample of frozen duck livers from a different batch to that used in the parfait served at the function was positive for *S.* Orion and *Campylobacter*.

Hospital Staff Outbreak, Unknown aetiology (Outbreak code: 11/11/2011)

In November, 17 out of 47 ward and theatre staff from a hospital were ill with gastroenteritis. Eleven cases were interviewed and reported symptoms of nausea (n=7), diarrhoea (n=11) and abdominal cramps (n=9). None of the cases reported vomiting or fever. The median duration of illness was 18 hours. All of the interviewed staff had consumed a chicken biriyani rice dish prepared by one of the staff members. The biriyani was partially prepared the evening before, then heated in the morning and transported to work, and stored at room temperature for up to eight hours before consumption. The median incubation time was 9 hours. Nine faecal samples were collected and all were negative for foodborne pathogens, including *Clostridium perfringens*. Faecal samples were not tested for *Bacillus cereus*, or *B. cereus* or *C. perfringens* toxin. No left over food was available for testing.

Cruise Ship Outbreak, *S.* Typhimurium PT 135a, PFGE 39 (Outbreak code: 042-2011-005 / MJOI 2011-004)

Cases of gastroenteritis in passengers and crew were reported on a WA owned ship cruising Papua New Guinea (PNG) in December. There were 22 passengers on the cruise (from NSW, VIC, SA and WA) and 16 crew members. There were three confirmed STM PT 135a cases (1 case each from SA, VIC and WA), and isolates had MLVA profiles of 03-08-10-16-523, 03-09-10-15-526 and 03-08-10-14-523 (Australian nomenclature). One isolate was typed as PFGE type 0039. An OzFoodNet multi-jurisdictional outbreak investigation was commenced. Passengers and crew members were asked to complete a self-administered form via email, with questions about food items consumed (based on a menu supplied by the cruise company), and illness details. Fourteen out of 31 people who returned questionnaires reported illness (7 passengers, 7 crew). Most people became ill on the 1/12/11 (range 1/12/2011 to 3/12/2011) with a median duration of illness of 8 days (range 2-14 days). For two cases who did not compete the questionnaire (but were briefly interviewed) onset of illness was 30/11/11. Two crew members and one passenger were hospitalised. There was no significant association between illness and eating any particular food item. An Environmental Health Officer inspected the vessel on 21/12/11. The majority of food consumed on the ship was supplied from Australia, mostly from QLD. All meat was from WA. Some produce from PNG was used on board, including eggs, pineapple, watermelon, mangos, pawpaw, cucumber, pumpkin, coconut and avocado. A number of sauces (including mayonnaise, hollandaise, anglaise) and desserts (icecream, tiramisu) contained raw eggs. No samples were collected during the inspection. The food vehicle in this outbreak was unknown.

Suspected foodborne outbreaks

Restaurant Outbreak, Unknown aetiology (Outbreak code: 12/11/BUR)

Gastroenteritis was reported among a group of women (n=126) who ate a buffet lunch at a restaurant on 6/12/11. The group was reluctant to be involved in the investigation so an analytical study could not be conducted. Information was obtained from seven people who had diarrhoea, with three of these people also reporting vomiting. The incubation period was three to six hours and duration of illness was one to 36 hours. No specimens were collected. People who were ill had not met with each other within one week prior to the meal. An environmental investigation reported that the restaurant was compliant with the food safety standards of the Australia New Zealand Food Standards Code. Food samples including oysters, salmon, smallgoods, Asian dinner, teppanyaki dinner, western foods, prawn, duck, ice and beef sous were negative for *Staphylococcus*, *Bacillus*, *E. coli* and *Salmonella*. In summary, the aetiology and the possible food vehicle of the outbreak was unknown, due partly to the reluctance of the patrons to be involved in the investigation.

Christmas function Outbreak, Unknown aetiology (Outbreak code: 12/11/MSS)

Gastroenteritis was reported among people who attended an evening work Christmas party on 17/12/11 in a public park, with food supplied by a catering company and a soft ice-cream van. Approximately 120 people attended the party and attendees were emailed a questionnaire on illness and food eaten. Only 12 questionnaires were returned with 10 people reporting diarrhoea, five abdominal pain, one chills, and none reporting vomiting. The median incubation period was 12 hours and median duration of illness was 2 days. Cases reported eating turkey (n=8), chicken (n=7), beef (n=6), garden salad (n=9), potato salad (n=6) and soft serve ice-cream (n=6). No statistical analysis was carried out due to the small number of questionnaires returned. No faecal specimens were collected but symptoms, duration of illness and incubation period were consistent with a *Clostridium perfringens* outbreak. An environmental investigation of the caterers was delayed so no food samples were collected. The caterers were instructed to improve the cleanliness and maintenance of their food preparation area.

Table 2, Foodborne and suspected foodborne outbreaks, 2011

Suspected mode of transmission	Outbreak number	Month of outbreak[1]	Where food prepared	Where food eaten	Agent responsible	Number affected	Hospitalised	Died	Evidence	Responsible vehicles
Foodborne	042-2011-001	Jan	restaurant	restaurant	*Salmonella* Typhimurium PT 170, PFGE 0011	4	1	0	D	unknown
Foodborne	042-2011-002	Jan	take-away	community	*Salmonella* Typhimurium PT 9, PFGE 0001	15	5	0	D	Vietnamese pork roll
Foodborne	042-2011-003	Feb	restaurant	restaurant	*Salmonella* Typhimurium PT 135, PFGE 0003	24	15	0	D	unknown
Foodborne	042-2011-004	Apr	other	private residence	*Salmonella* Typhimurium PT 193, PFGE 0386	30	2	0	D	unknown
Foodborne	07/11/ING	Jul	restaurant	restaurant	norovirus	53	0	0	A	salad
Foodborne	011-2011-001	Sept	commercial caterer	restaurant	Campylobacter, *Salmonella* Typhimurium PFGE 0007, Salmonella Infantis	65	0	0	A	duck parfait
Foodborne	11/11/OSB	Nov	private residence	hospital	unknown	17	0	0	D	chicken biriyani
Suspected foodborne	12/11/BUR	Dec	restaurant	restaurant	unknown	7	0	0	D	unknown
Suspected foodborne	12/11/MSS	Dec	commercial caterer	picnic	unknown	10	0	0	D	unknown
Foodborne	042-2011-005	Dec	cruise/airline	cruise/airline	Salmonella Typhimurium PT 135a	16	3	0	A	unknown

1 Month of outbreak is the month the outbreak was first report or investigated, which ever is earliest

*PT = phage type, PFGE=pulsed field gel electrophoresis

[#] D = descriptive, M= microbiological, A=Analytical

5.2. Outbreaks due to non-foodborne transmission or with an unknown mode of transmission

There were 77 outbreaks of gastroenteritis reported in 2011 that appeared to be non-foodborne and 14 outbreaks were the mode of transmission was unclear or unknown.

Non-foodborne outbreaks

The 77 non-foodborne outbreaks were suspected as person to person transmission, with 59 (77%) of which occurred in aged care facilities, 10 (13%) in child care centres, three (4%) in schools, three (4%) in hospitals, one each at a institutions (1%) and a camp (1%) (Table 3). The causative agent for 38 (49%) of the outbreaks was confirmed as norovirus and for five (7%) of the outbreaks the causative agent was *Cryptosporidium*. In the remainder of the outbreaks (53%) the causative agent was unknown, either because a pathogen was not identified during testing, specimens were not collected, or viral testing was not requested. A total of 1621 people were affected by these outbreaks. The number of non-foodborne gastroenteritis outbreaks in 2011 was 20% less than the number of outbreaks in 2010 (96), and 33% lower than the average of the previous five years (115). While the number of gastroenteritis outbreaks reported varied by month (Figure 24), there was no distinct seasonal increase in the number of outbreaks, as was seen in previous years.

Outbreaks with unknown mode of transmission

In the remaining 14 outbreaks the likely mode of transmission was unclear or unknown, with 12 (86%) occurring in aged care facilities, and one each at a institutions (7%) and a school (7%) (Table 3). Below are descriptions of these outbreaks.

- There were 8 outbreaks in aged care facilities where diarrhoea was the predominant or only symptom. The mode of transmission in these outbreaks was not norovirus-like and therefore described as unknown rather than person-to-person. The specimens collected during these outbreaks were negative for routine bacterial and viral pathogens, but not tested for the presence of *Clostridium perfringens* toxin, as this testing capacity is not available in WA.

- An outbreak at a school affecting 19 people in March. Symptoms of vomiting and dizziness were reported. As no diarrhoea was reported, no specimens were collected.
- An outbreak in April at a mental health facility involved four in-patients ill with diarrhoea only. While one of the three specimens collected was positive for *Campylobacter*, but there was insufficient evidence to suggest this was a foodborne outbreak.
- An outbreak at an aged care facility in June reported seven cases of diarrhoea only. The facility staff believed this may have been due to use of aperients. No specimens were collected.
- An outbreak at an aged care facility in October reported seven cases of diarrhoea only. No specimens were collected.
- There were two outbreaks, in July and November at aged care facilities where diarrhoea was the predominant or only symptom. Specimens were negative for routine bacterial and viral pathogens, including *Clostridium perfringens* culture.

Table 3. Outbreaks of non-foodborne transmission or unknown mode of transmission in WA by setting and agent, 2011

OUTBREAKS WITH NON-FOODBORNE TRANSMISSION					
Setting Exposed	**Agent responsible**	**Number of outbreaks**	**Number of cases**	**[1]Number of cases hospitalised**	**[2] Number of cases died**
Aged Care	Norovirus	34	1059	13	4
	Cryptosporidium	1	7	0	0
	Unknown	24	284	2	0
Aged Care Total		**59**	**1350**	**15**	**4**
Child Care Ctr	*Cryptosporidium*	3	20	0	0
	Norovirus	1	11	0	0
	Unknown	6	128	2	0
Child Care Ctr Total		**10**	**159**	**2**	**0**
Camp	Unknown	1	16	0	0
Hospital	Norovirus	2	47	NR	0
	Unknown	1	5	NR	0
Hospital Total		**3**	**52**	**NR**	**0**
Institution	Unknown	1	9	0	0
School	*Cryptosporidium*	1	9	2	0
	Norovirus	1	13	1	0
	Unknown	1	13	0	0
School Total		**3**	**35**	**3**	**0**
Sub Total		**77**	**1621**	**20**	**4**
OUTBREAKS WITH UNKNOWN MODE OF TRANSMISSION					
Setting Exposed	**Agent responsible**	**Number of outbreaks**	**Number of cases**	**[1]Number of cases hospitalised**	**[2] Number of cases died**
Aged Care	Unknown	**12**	**125**	**2**	**0**
Institution	Unknown	1	4	0	0
School	Unknown	**1**	**19**	**0**	**0**
Sub Total		**14**	**148**	**2**	**0**
Grand Total		**91**	**1769**	**22**	**4**

[1] NR= data not recorded

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

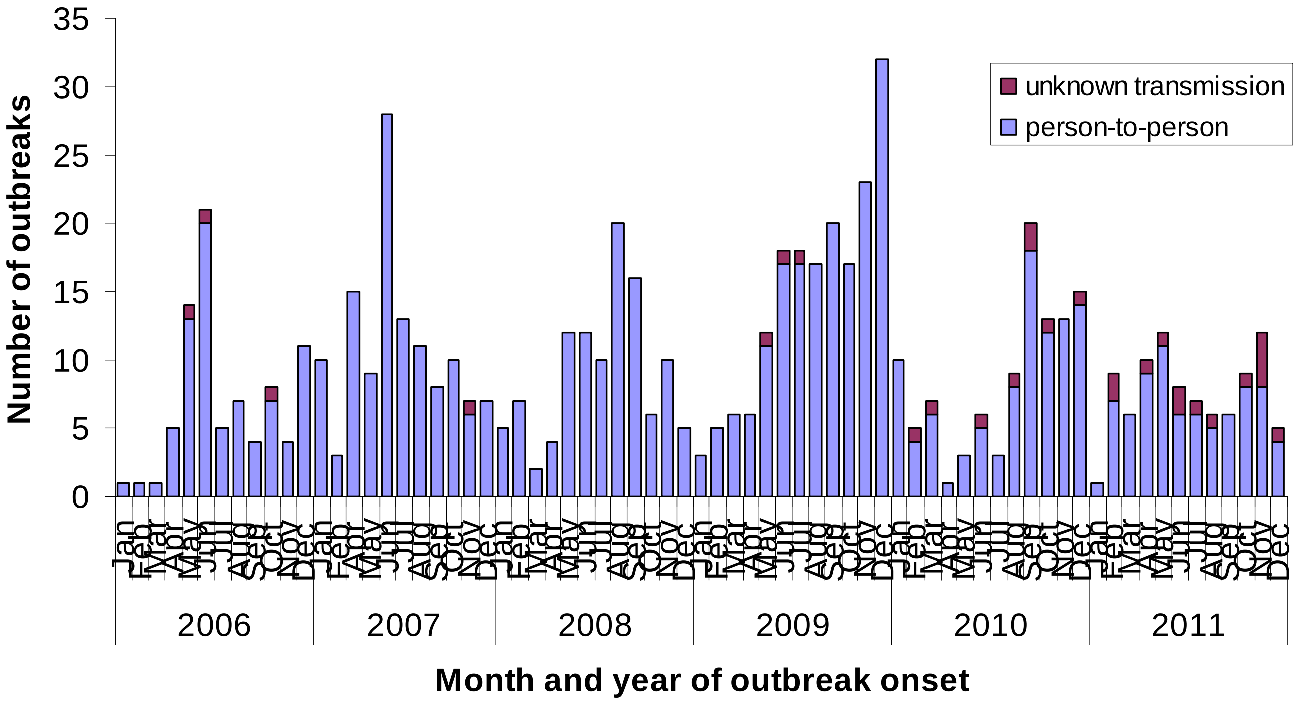

Figure 24. Number of gastroenteritis outbreaks designated as non-foodborne or with unknown mode of transmission reported in WA, 2006 to 2011

5.3. Cluster investigations

Salmonella Typhimurium PFGE type 0039, PT 135a

Monthly notifications of STM PFGE type 39 infections in WA residents initially exceeded expectancy in December 2010, with 16 notifications. A cluster investigation was commenced in January 2011, and this continued through the year. There were 75 cases of STM PFGE 0039 with onset dates in 2011, which was nearly 5 times higher than the yearly average for the years 2008 to 2010 (16 cases). There were 39 females and 36 males, and cases were geographically distributed as expected, with 80% of cases residing in the Perth metropolitan area. Nearly a third of cases were aged 4 years and under (n=22), which is similar to the age distribution for other *Salmonella* cases in 2011.

Hypothesis generating interviews were conducted with 17 cases, and no common venues were identified. The foods most frequently eaten by cases were eggs (88% of cases), chicken (82% of cases) and pasteurised milk (82% of cases). It was then hypothesised that this cluster was caused by chicken or egg consumption. During the fourth quarter of 2011, 18 cases were interviewed about their chicken consumption. Chicken was consumed by 16/18 (89%) cases, in comparison with 74% of historical *Salmonella* cases.

Four STM isolates with PFGE 0039 were typed by MLVA and two isolates had a MLVA pattern of 03-12-11-13-526, one had a pattern of 03-12-11-13-523 and the other 03-12-12-10-526 (Australian nomenclature). The OzFoodNet network was asked to report if they had observed an increase in STM cases with these MLVA types in their jurisdictions, and Queensland and NSW (the states that routinely used MLVA typing) reported that they had not seen an increase.

PFGE typing showed that a number of non-human isolates collected during this year were STM PFGE 0039, and these were all associated with chicken production. A Department of Health Food Unit investigation was commenced to trace the origin of these chicken isolates. In addition, PFGE typing showed that 7/9 retail raw chicken samples collected in October 2011 were positive for STM PFGE 0039.

In December, one case with STM PFGE 39 infection developed rhabdomyolysis, a rare and serious syndrome characterised by muscle breakdown, and which resulted in acute renal failure. Food samples were collected from the home of this case, and both Lebanese cucumber and Weis ice-cream were positive for STM PFGE 39. It was thought that these foods may have been cross-contaminated from another food item. Lebanese cucumber samples were collected from the store that supplied the cucumber, and these were negative for *Salmonella.* This cluster investigation is on-going.

Salmonella **Saintpaul**

Five cases of *S*. Saintpaul from one regional town were notified with onset dates between 01/02/2011 and 27/03/2011. This was above expected compared to the historical average notification rate of 1 case per year for this town. Cases ranged in age from <1 to 57 (median 3) years, and four of the cases were male. PFGE typing was conducted and it was found that two isolates from cases had indistinguishable PFGE profiles, and the profiles from the other 3 cases were different. It was therefore concluded that this was unlikely to be a common source outbreak.

Salmonella **Typhimurium PFGE type 0377, PT 12a**

Five cases with onset dates from 3/2/2011 - 15/2/2011 were investigated. There were two females and three males, aged 20 to 37 years. Four cases were clustered near a local university. Three cases reported recent consumption of kebabs from the same premises. However, recall was poor, with the other two cases not able to confirm kebab consumption during their incubation period.

Salmonella **Bovismorbificans**

There were 12 cases with onset dates in March and April, with ten cases living in metropolitan Perth and two in rural areas. The ten metropolitan cases had an indistinguishable PFGE pattern and comprised six males and four females, with ages ranging from 4 to 74 (median 33) years. Nine of the 10 metropolitan cases were interviewed and no hypothesis for the source of infection was determined, although four cases reported consumption of sushi prior to onset. Four isolates from metropolitan cases were typed as PT 32 (only one of these reported eating sushi), and one rural case was typed as PT 4.

Salmonella Typhimurium PFGE type 0006 (historically PT 12a and 6)

There were seven cases of STM PFGE type 0006 with onsets in February and March, comprising five females and two males, and ranging in age from 14 to 75 years. Four lived in the Perth metropolitan area and three in rural areas. Five cases were interviewed and no hypothesis for the cause of illness was established.

Salmonella Singapore

Six cases of S. Singapore with onset dates from 31/1/2011 to 5/3/2011 were investigated. There were five metropolitan Perth cases and one rural case, ages ranged from 5 to 60 years and all cases were male. Four cases were interviewed and no hypothesis for the cause of illness was established.

Salmonella Typhimurium PFGE type 0138 (PT 12 x 4 cases and PT 170 x 1 case)

There were 20 cases of STM PFGE type 0138 with onsets in February, March, April and June, 10 females and 10 males aged from <1 to 54 (median 7) years. Thirteen cases lived in the Perth metropolitan area and seven in different rural areas. Sixteen cases were interviewed and no hypothesis for the cause of illness was established.

Salmonella Typhimurium PFGE type 0011 (historically PT 170)

Eleven cases were notified in November and December. Median age was 18 years (range 1-89 years) with 6/11 cases male. 10/11 cases resided in metropolitan Perth with 1 case residing in a rural area. Seven cases were interviewed but no hypothesis for the cause of illness was established.

Hepatitis E

There were three cases of hepatitis E who had onset dates on 28/11/2011 (n=2) and 11/12/2011 (n=1). Cases had been on a defence force ship and had shore leave in Oman and India during their incubation period. Cases did not socialise together and did not report any common food or drinking venues on-shore except for two cases who had visited the same restaurant in India. High risk foods/drinks consumed by cases included eating fresh salad ingredients, drinks with ice and a fruit juice. Fresh food was taken on board the ship in India. Water was also taken on board in India but this was chlorinated prior to use. The mode of transmission was unknown. Defence personnel on the ship were provided with hepatitis E advice and asked to visit a doctor if symptoms developed.

Table 4. Cluster investigations in WA by month investigation started, setting and agent, 2011

Month	Setting Exposed	Agent responsible	Number affected	Hospitalised	Deaths	Epidemiological Study
Jan	community	S. Typhimurium PT 135a, PFGE 39	38	5	0	D
Feb	community	*S.* Saintpaul	5	999	0	D
Feb	community	S. Typhimurium PT 12a, PFGE 377	5	999	0	D
Mar	community	*S*. Bovismorbificans	7	0	0	D
Mar	community	*S*. Typhimurium PT 12a or 6, PFGE 6	7	2	0	D
Mar	community	S. Singapore	6	2	0	D
Mar	community	*S.* Typhimurium PT 12 or 170, PFGE 138	10	2	0	D
Apr	community	*S*. Typhimurium PFGE 138 (PT 12 and 170)				
Sep	community	*S*. Typhimurium PT 135a, PFGE type 0039	15	8	0	case series
Dec	community	*S*. Typhimurium PT 170, PFGE type 0011	11	2	0	case series
Dec	military institution	Hepatitis E	3	0	0	case series

*PT = phage type, PFGE=pulsed field gel electrophoresis

*D= descriptive case series

6. OzFoodNet WA research projects

6.1. *Cryptosporidium* project

A case-control study of sporadic *Cryptosporidium* cases was started in June 2010 to determine risk factors for infection. By the end of 2011, 169 cases and 474 controls were enrolled. It is anticipated that 220 cases and 660 controls will be enrolled, which may take two years. Molecular typing of *Cryptosporidium* positive specimens is also being conducted by Murdoch University, and depending on the results, sub-analysis may be conducted by molecular type.

6.2. National survey on jurisdictional practices for STEC diagnosis and surveillance.

STEC notification rates differ substantially between states and territories and this is thought to be due to different diagnostic testing practices. To help understand the difference in STEC notification rates, reference laboratories and other laboratories that conduct STEC testing were asked to fill in a survey describing when stool samples were tested for STEC, how many were tested and what methods were used to test samples. Jurisdictional surveillance practices were also surveyed. The results of this survey will be written up as a report in 2012.

6.3. Review of Guidelines for the Management of Gastroenteritis Outbreaks in Residential Care Facilities

In Dec 2010 a review of the "Guidelines for the Management of Gastroenteritis Outbreaks in Residential Care Facilities" was commenced. Meetings were held with WA partners in residential care to seek comment on the present guidelines, and on processes for managing gastroenteritis outbreaks, including roles, responsibilities and reporting, to identify what could be improved. Groups consulted were the WA Health public health staff, infection control consultants, the WA office of Aged Care Quality and Compliance, Commonwealth Department of Health and Ageing, residential care peak bodies (Aged and Community Services WA and Aged Care Association of WA), WA Health Aged and Continuing Care Directorate, and the Aged Care Standards and Accreditation Agency. As a result of this consultation a draft 2nd edition of the guidelines was produced, and will be circulated for further comment before release in 2012.

7. References

1 OzFoodNet Working Group. A health network to enhance the surveillance of foodborne diseases in Australia. Department of Health and Ageing 2012. www.ozfoodnet.gov.au/internet/ozfoodnet/publishing.nsf/Content/Home-1 [14/03/2012]

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4 Western Australian Department of Health. Contact details for regional population / public health units. Western Australian Department of Health 2012. http://www.public.health.wa.gov.au/3/280/2/contact_details_for_regional_population__public_he.pm [05/04/3012]

Appendix 1: Number of notifications, notification rate and ratio of current to historical mean by pathogen/condition, 2006 to 2011, WA

Pathogen/ Syndrome	2006		2007		2008		2009		2010		2011		2006-2010 Mean Rate	2011 to mean Rate Ratio
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate		
Campylobacter	1949	94.6	2102	99.8	1836	84.6	2597	117.7	2322	101.4	2200	93.3	99.62	0.94
Salmonella	798	39.2	985	47.3	849	39.7	1113	50.4	1264	55.2	1323	56.6	46.36	1.22
Cryptosporidium[2]	251	12.2	611	29	164	7.6	235	10.6	140	6.1	454	19.3	13.1	1.47
Rotavirus[2]			724	34.8	424	19.8	418	18.9	609	26.6	184	7.8	25.025	0.31
Shigella	129	6.3	102	4.8	169	7.8	122	5.5	114	5	86	3.6	5.88	0.61
Hepatitis A	71	3.5	21	1	22	1	36	1.6	32	1.4	13	0.6	1.7	0.35
Typhoid fever	11	0.5	9	0.4	8	0.4	8	0.4	11	0.5	15	0.6	0.44	1.36
Listeria	13	0.6	2	0.1	8	0.4	15	0.7	3	0.1	7	0.3	0.38	0.79
Vibrio parahaemolyticus	3	0.1	9	0.4	7	0.3	9	0.4	10	0.4	14	0.6	0.32	1.88
STEC[1]	3	0.1	2	0.1	0	0	6	0.3	8	0.3	3	0.1	0.16	0.63
Hepatitis E	1	0	0	0	6	0.3	5	0.2	1	0	4	0.2	0.1	2
Paratyphoid fever	1	0	3	0.1	3	0.1	5	0.2	11	0.5	9	0.4	0.18	2.22
Yersinia	3	0.1	5	0.2	7	0.3	3	0.1	3	0.1	1	0	0.16	0
Cholera	0	0	0	0	2	0.1	0	0	1	0	2	0.1	0.02	5
HUS[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
Botulism	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
Total	3233	158.8	4575	219.9	3505	163.9	4572	207.1	4529	197.8	4315	183.5	189.5	0.97

[1]Abbreviations: STEC: Shiga-toxin producing *E. coli*; HUS: Haemolytic Uraemic Syndrome [2]Rotavirus was made notifiable in July 2006 [3]Rate is cases per 100 000 population [4]Mean of rates between 2006 and 2010 where applicable

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