



Government of **Western Australia**  
North Metropolitan Health Service

# Report of notifiable infectious diseases in metropolitan Perth

## 2017

## **Report of notifiable infectious diseases in metropolitan Perth, 2017.**

Metropolitan Communicable Disease Control (MCDC)

Public Health and Ambulatory Care

North Metropolitan Health Service

Note: For this report, the geographical boundaries of metropolitan Perth are defined by the area within the East, North and South Metropolitan Health Services (EMHS, NMHS and SMHS).

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The NMHS acknowledges the traditional owners of the land, the Noongar people. We pay our respects to the elders past and present and recognise the continuing cultural and spiritual practices of the Noongar people.

MCDC would like to acknowledge the assistance of medical and nursing staff working in general practices, hospitals and laboratories, in monitoring and implementing public health interventions to secure communicable disease control in the Perth metropolitan area.

### **Suggested citation:**

Metropolitan Communicable Disease Control. Report of notifiable infectious diseases in metropolitan Perth, 2017. Perth (Australia): North Metropolitan Health Service; 2018.

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## List of abbreviations

ABL	Australian bat lyssavirus
ACIR	Australian Childhood Immunisation Register
AIR	Australian Immunisation Register
BBV	Blood-borne viruses
BOM	Bureau of Meteorology
CDCD	Communicable Disease Control Directorate
CDNA	Communicable Disease Network Australia
DOH	Department of Health (WA)
DOR	Date of receipt (of notification)
EMHS	East Metropolitan Health Service
GP	General Practitioner
HRIG	Human rabies immunoglobulin
IPD	Invasive pneumococcal disease
LGA	Local Government Area
MCDC	Metropolitan Communicable Disease Control
NIP	National Immunisation Program
NMHS	North Metropolitan Health Service
NNDSS	National Notifiable Diseases Surveillance System
ODO	Optimal Date of Onset (of notifiable disease)
PEP	Post exposure prophylaxis
RCF	Residential care facility
SMHS	South Metropolitan Health Service
STEC	Shiga toxin-producing <i>E. coli</i>
STI	Sexually transmitted infection
VPD	Vaccine preventable disease
WA	Western Australia
WANIDD	Western Australian Notifiable Infectious Diseases Database
WAVSS	Western Australian Vaccine Safety Surveillance system

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## Executive summary

In metropolitan Perth, there were **28 672 notifications** for communicable diseases in 2017; a decrease of 3.7% from 29 776 notifications in 2016. This was primarily due to a reduction in the number of influenza notifications. In 2017, there were 4463 laboratory-confirmed cases in Perth (notification rate: 206.5 per 100 000) compared with 6119 in 2016 (a 27.1% decrease). Indeed, 2016 was a moderately severe influenza season in Perth and was in contrast to Eastern Australia, which had a severe influenza season last year (notification rate in Australia: 1033.6 per 100 000).

The **Metropolitan Communicable Disease Control (MCDC)** team was established on July 1 2016 and is responsible for the public health management of notifiable infectious diseases such as pertussis (whooping cough), measles, meningococcal disease and rubella in metropolitan Perth. This protects the general public and helps to prevent infectious disease outbreaks.

### Key issues in 2017

#### Immunisation coverage is below the national benchmark

In 2017, the national immunisation benchmark was revised to 95% coverage from a 90% benchmark previously.

Children residing in only 18% of local government areas (LGAs) in metropolitan Perth have immunisation coverage rates at or above 90% in the three measured age groups at 1, 2 and 5 years. This is 6 of 33 LGAs. Discrete age groups of children in three LGAs met the 95% immunisation coverage rate: 1 year-olds in the Towns of Bassendean and Claremont, and 5 year-olds in the Shire of Serpentine-Jarrahdale.

While immunisation coverage remains lower in Aboriginal children at 1 and 2 years, Aboriginal children now have higher coverage rates than their non-Aboriginal counterparts at 5 years-old.

Gaps in immunisation coverage can result in conditions that are favourable for vaccine-preventable diseases to occur.

#### Emergence of meningococcal disease due to $W_{135}$ and Y serogroups

**Invasive meningococcal disease** due to serogroups  $W_{135}$  and Y is a recent occurrence in WA and cases rose sharply in 2017. A combination meningococcal A, C,  $W_{135}$  and Y vaccine is available and was funded by the WA Department of Health (DOH) in 2017 for adolescents aged 15-19 years. The state program was expanded in 2018 to include meningococcal ACW<sub>135</sub>Y vaccination for children from 12 months to under 5 years. On 1 July 2018, meningococcal ACW<sub>135</sub>Y vaccine was added to the national schedule for children at 12 months.

#### Importance of immunisation

Of the 4463 **influenza** notifications, one in five cases (966, 21.6%) were known to have been hospitalised. All cases required medical review. Hospitalisation rates were highest in the 0-4 year age group and people aged 60 years and above, particularly 75 years and over with more than 250 influenza hospitalisations per 100 000. Annual influenza immunisation can lessen the burden of illness. While influenza notifications were high in 2017, they were significantly lower than in 2016, which was a record year locally.

In 2017, **pertussis (whooping cough)** activity was at inter-epidemic levels. The last pertussis outbreak in Perth was in 2011/2012; in 2012, there were 2587 notifications. In the interim, the funded pregnancy booster has been introduced. It is possible that this immunity boost among women of child-bearing age is helping to limit pertussis activity and keep notifications stable.

There were 16 cases of **measles** in 2017 and 2 small outbreaks in Perth; each involving 6 and 4 cases, respectively. The former was acquired in Bali and the latter in Italy. On both occasions, a non-vaccinated child was the index case. The first outbreak occurred in a hospital setting and the second was based around a school. Outbreaks of measles are resource-intensive to manage. Maintaining high immunisation coverage is crucial to mitigate the spread of measles. Receipt of two doses of measles vaccine is generally effective in preventing the disease.

The rate of **invasive pneumococcal disease** (IPD) in the 0-4 year age group in metropolitan Perth was 9 per 100 000 in 2017. This is much lower than rates in the years before infant pneumococcal vaccination (national rate: 78 per 100 000 in the <2 year-olds in 2002-2004).

### Enteric diseases are rising

There is increasing **Salmonella Typhimurium** activity in Perth, associated with undercooked eggs. Large peaks in activity were noted in the warmer months.

There were more cases than usual of **typhoid fever** in returned travellers. Decreased susceptibility or resistance to the antibiotic ciprofloxacin was reported in several instances. As vaccination is available, immunisation prior to travel to endemic countries should be considered.

In 2017, there were 44 cases of **Shiga toxin-producing E. coli** (STEC), a serious cause of gastroenteritis. This was significantly higher than numbers in recent years (average of 1.2 cases per year in the years 2011-2015) and followed 20 cases in 2016. Thirty-two cases (73%) were acquired in Western Australia (WA). Note that the national surveillance case definition changed in July 2016 and may have contributed to the observed increase. Three people developed haemolytic uraemic syndrome (HUS), a rare but severe complication of STEC, which can result in renal failure. Safe food preparation and handling, and careful hygiene (for example, after petting farm animals) can prevent this disease.

### Increasing sexually transmitted infections

While similar to 2016, the number of notifications for **gonorrhoea** (2178) and **infectious syphilis** (239) remain well above the annual notifications in the four years prior (2012-2015). Since 2013, the number of gonorrhoea notifications has increased 2.4 fold (2178 notifications; up from 921). The number of notifications for infectious syphilis has increased 3.5 fold (239 notifications; up from 68 in 2013).

### Locally-acquired case of melioidosis

**Melioidosis** is a rare disease caused by *Burkholderia pseudomallei* and endemic to South East Asia and northern Australia, where it can be found in soil. This bacterial disease can present as pneumonia and septicaemia. In 2017, a case of locally-acquired melioidosis resulting in pneumonia was identified in a resident of the eastern outskirts of the Perth metropolitan area. There was also an outbreak of this disease among alpacas farmed in that region in February 2017 following unseasonal heavy summer rainfall. The serotype identified in both occurrences was consistent with rare cases of melioid identified in animals in the Avon Valley in the past.

## Introduction

The aim of this report is to present a summary of notifiable diseases in metropolitan Perth for the calendar year of 2017. For the purpose of this report, metropolitan Perth includes and is defined by the boundaries of the East Metropolitan Health Service (EMHS), the North Metropolitan Health Service (NMHS) and the South Metropolitan Health Service (SMHS) of the state of Western Australia (WA). Other information, including childhood immunisation rates and post-exposure prophylaxis for rabies and Australian Bat Lyssavirus infection, is also presented.

The **Metropolitan Communicable Disease Control (MCDC)** team was established on July 1 2016 and has responsibility for the public health management of notifiable infectious diseases such as pertussis (whooping cough), measles, meningococcal disease, mumps and rubella across metropolitan Perth. This protects the general public and helps to prevent infectious disease outbreaks.

MCDC also provides advice on immunisation including rabies vaccine, cold chain breaches, catch up immunisation schedules, and the use of immunoglobulin products for the prevention of infectious diseases.

This report seeks to inform healthcare providers about important local notifiable disease trends.

## Background

### Notifiable diseases

Under the Western Australian *Health Act of 1911* and following the enactment of the *Public Health Act 2016* (Part 9) [The Act], any medical practitioner or nurse practitioner attending a patient who is known, or suspected, to have a notifiable disease has a legal obligation to report it to the WA Department of Health (DOH). In addition, laboratory notification is mandatory for all notifiable diseases.

Notifiable diseases are entered into the **Western Australian Notifiable Infectious Diseases Database (WANIDD)** and cross-checked for duplication. Some diseases, including suspected meningococcal disease and measles, require the practitioner to notify the DOH urgently by telephone and these are marked on the notification form.

Communicable disease notifications are used to inform public health interventions and enhance the prevention and control of these diseases. A full list of current notifiable diseases in WA, along with case definitions, fact sheets and more, are available at:

[http://ww2.health.wa.gov.au/Articles/N\\_R/Notification-of-infectious-diseases-and-related-conditions](http://ww2.health.wa.gov.au/Articles/N_R/Notification-of-infectious-diseases-and-related-conditions)

The Act<sup>1</sup> stipulates the requirements for the control and management of notifiable infectious diseases, including testing, public health orders, reporting, and informing cases and contacts. The MCDC team located at the Anita Clayton Centre in Perth is responsible for following up notifiable diseases in the Perth metropolitan area, as required by national and state directives, protocols and guidelines.

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<sup>1</sup> [https://www.legislation.wa.gov.au/legislation/statutes.nsf/main\\_mrtitle\\_13791\\_homepage.html](https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_13791_homepage.html)

The purpose of follow up is to provide public health case management and contact tracing, including provision of prophylaxis to high risk contacts when indicated. This helps to prevent or reduce further cases of notifiable diseases in the population. Information to support this process is gathered with the assistance of general practice, hospital staff, pathology department staff, and the patient or next of kin.

## Data sources

### Notification data

The notifiable diseases data for metropolitan Perth and WA was extracted from the WANIDD on 31 March 2018 and is subject to revision. Data for notifiable diseases for the year 2017 was retrieved using an **optimal date of onset** of disease (ODO) from 1 January 2017 to 31 December 2017. Exceptions to this were diseases with a long delay between diagnosis and onset of disease, namely, non-infectious syphilis, tuberculosis, leprosy, Creutzfeldt-Jakob disease, and unspecified hepatitis B and hepatitis C. These diseases were retrieved by the **date of receipt** of notification (DOR) from 1 January 2017 to 31 December 2017.

A range of data are recorded on WANIDD including demographic information, Aboriginality<sup>2</sup>, pertinent laboratory details, immunisation status (where applicable), and travel.

National notification rates for 2017 were obtained from the National Notifiable Diseases Surveillance System (NNDSS) website which is maintained by the Australian Government Department of Health and Ageing. Data was retrieved on 31 March 2018.

### Population data

Projected population data for 2017 for metropolitan Perth, including and defined by the boundaries of the EMHS, the NMHS and the SMHS, and for the state of WA was obtained from the Epidemiology Branch, Public Health Division, Department of Health WA. The population of metropolitan Perth in 2017 was estimated at 2 161 155 and the population of WA, 2 727 920. The data was used for the calculation of disease notification rates in metropolitan Perth and each of the metropolitan health services, and statewide rates.<sup>3</sup>

### Immunisation data

The Australian Childhood Immunisation Register (ACIR) was established in 1996 and recorded details of vaccinations given to children. Children were added to the register at birth, when enrolled with Medicare. The register was expanded in late 2016 to include Medicare-card holders of all ages and is now known as the **Australian Immunisation Register (AIR)**. Any new immunisations are generally now recorded on the AIR, irrespective of age.

Immunisation coverage is reported quarterly by AIR for three age groups to represent coverage in 1 year-olds (12-<15 months), 2 year-olds (24-<27 months) and 5 year-olds (60-<63 months). The following information has been used for this report: State, Health Service/Public Health Unit, and Local Government Area Summary Coverage, and includes data on Aboriginality.

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<sup>2</sup> In the WA DOH, the term Aboriginal is used to refer to indigenous Australians.

<sup>3</sup> Supplied by Jag Atrie, 3/4/2018

The 2017 rabies post exposure prophylaxis database was provided by the Prevention and Control Unit<sup>4</sup> of the Communicable Disease Control Directorate (CDCD) and was used for the analysis of metropolitan data.

## Structure of the report

All notifiable communicable diseases have been classified according to disease category. There are seven disease categories in WANIDD: blood-borne viruses, enteric diseases, sexually transmitted infections, vaccine preventable diseases, vector-borne diseases, zoonotic diseases, and other diseases (Table 1).

**Blood-borne viruses (BBVs)** are infectious diseases that are transmitted predominantly through contact with blood (though may include other bodily fluids). Examples include hepatitis B and C.

**Enteric diseases** are typically infectious diseases that are transmitted orally via ingestion of contaminated food or water, or through contact with infected people, animals or environments. These diseases include campylobacteriosis and salmonellosis. Symptoms may include diarrhoea, nausea, vomiting and fever.

**Sexually transmitted infections (STIs)** are transmitted through sexual activity, including vaginal, anal and oral routes. Syphilis, gonorrhoea and chlamydia are notifiable STIs.

**Vaccine preventable diseases (VPDs)** cover a range of infectious diseases for which a vaccine is available. This includes diseases such as measles, influenza, pertussis (whooping cough), and rubella.

**Vector-borne diseases** are communicable diseases that are transmitted by blood-feeding insects such as mosquitoes, ticks, mites and fleas. Diseases include malaria, dengue and Ross River fever.

**Zoonotic diseases** are infectious diseases that can be transmitted from animals to humans, including psittacosis (from birds) and Q fever.

**Other diseases** is a catch-all category for remaining diseases, and includes legionellosis and tuberculosis.

In this report, diseases within each disease category will be presented in turn. Within each category, notifiable diseases will generally be presented by number of cases of disease recorded in 2017, from highest to lowest.

Notably, there are a number of diseases with low prevalence that require significant investigation by MCDC due to factors such as communicability, severity of illness, and preventability, so the workload for these diseases can be considerable. This includes measles and meningococcal disease.

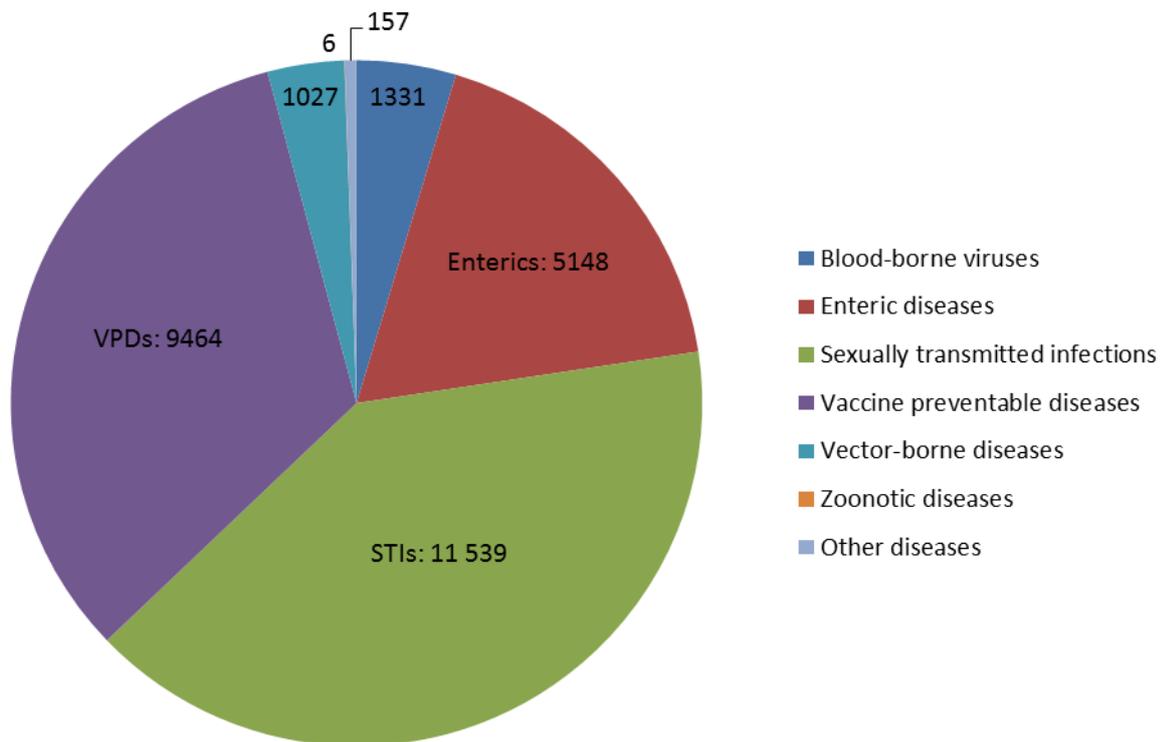
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<sup>4</sup> Supplied by Jenny Vo, 26/06/2018

## Overview of notifiable diseases

In metropolitan Perth, there were 28 672 mandatory notifications for gazetted communicable diseases in 2017. This was a decrease of 3.7% from 29 776 notifications in 2016. This was primarily due to a fall in influenza notifications in 2017, and in contrast to the severe activity in Eastern Australia during that year.

The relative proportion of notifications by disease category is shown in the pie graph (**Figure 1**). The major contributors to disease notifications in 2017 were STIs (40.2%) and vaccine preventable diseases (33.0%).



**Figure 1: Pie graph of notifications by disease category**

The total number of notifications for each disease notified in metropolitan Perth between 2013 and 2017 is presented in **Table 1**. The 2017 crude notification rates for each disease are also presented and compared to crude state and national rates (where available).

**Table 1: Metropolitan notifications 2013-2017, & 2017 metropolitan, WA & national rates**

Notifiable disease	Number of notifications/year					2017 notification rate/100 000		
	2013	2014	2015	2016	2017	Metro	WA	National
<b>Blood-borne diseases</b>								
Hepatitis B (newly acquired)	28	22	23	22	<b>14</b>	0.6	0.7	0.6
Hepatitis B (unspecified)*	468	511	475	567	<b>447</b>	20.7	19.7	24.7
Hepatitis C (newly acquired)	99	126	150	94	<b>92</b>	4.3	4.6	2.5
Hepatitis C (unspecified)*	765	749	690	814	<b>776</b>	36.0	39.4	41.6
Hepatitis D	4	3	0	1	<b>2</b>	0.1	0.1	0.3
<b>Enteric diseases</b>								
Campylobacteriosis	1439	2325	2252	2715	<b>2678</b>	123.9	123.6	110.3
Cholera	0	0	0	0	<b>1</b>	0.0	0.0	0.0
Cryptosporidiosis	213	205	124	168	<b>292</b>	13.5	14.7	19.4
Hepatitis A	9	14	22	16	<b>10</b>	0.5	0.4	0.9
Hepatitis E	3	0	1	2	<b>4</b>	0.2	0.1	0.2
Listeriosis	8	5	6	5	<b>6</b>	0.3	0.2	0.3
Paratyphoid fever	7	8	10	11	<b>4</b>	0.2	0.1	0.3
Salmonellosis	880	874	1260	1511	<b>2002</b>	92.6	94.3	67.9
Shiga toxin-producing E coli	2	1	0	20	<b>44</b>	2.0	2.2	2.0
Shigellosis	40	37	41	59	<b>56</b>	2.6	7.3	7.2
Typhoid fever	7	10	7	9	<b>19</b>	0.9	0.8	0.6
<i>Vibrio parahaemolyticus</i>	13	14	5	22	<b>18</b>	0.8	0.7	NN
Yersiniosis	3	2	23	12	<b>14</b>	0.6	0.5	NN
<b>Sexually transmitted infections</b>								
Chlamydia	8880	8639	8606	9136	<b>8985</b>	415.7	419.6	399.6
Gonorrhoea	921	1259	1430	2276	<b>2178</b>	100.8	122.2	117.3
Syphilis (infectious)	68	75	114	260	<b>239</b>	11.1	11.8	18.1
Syphilis (non-infectious)*	70	52	59	50	<b>137</b>	6.3	5.7	8.5
<b>Vaccine preventable diseases</b>								
Diphtheria	NR	NR	NR	0	<b>1</b>	0.0	0.0	0.0
<i>Haemophilus influenzae</i> type B	0	0	1	0	<b>0</b>	0.0	0.0	0.1
Influenza	1945	3758	4705	6119	<b>4463</b>	206.5	219.1	1033.6
Measles	11	34	6	11	<b>16</b>	0.7	0.6	0.3
Meningococcal disease (invasive)	13	10	12	12	<b>34</b>	1.6	1.6	1.6
Mumps	41	20	46	28	<b>19</b>	0.9	0.8	3.4
Pertussis	1333	1339	1324	1181	<b>1035</b>	47.9	55.0	50.1
Pneumococcal disease (invasive)	109	113	100	112	<b>129</b>	6.0	7.3	8.4
Rotavirus	235	306	433	152	<b>327</b>	15.1	19.0	NN
Rubella	1	1	2	1	<b>2</b>	0.1	0.1	0.0
Tetanus	1	1	0	0	<b>0</b>	0.0	0.0	0.0
Varicella-Zoster	2351	2416	2770	3163	<b>3438</b>	159.1	155.8	116.1

Notifiable disease	Number of notifications/year					2017 notification rate/100 000		
	2013	2014	2015	2016	2017	Metro	WA	National
<b>Vector-borne diseases</b>								
Arboviral encephalitis	1	0	0	0	<b>0</b>	0.0	0.3	0.0
Barmah Forest virus	792 <sup>^</sup>	22	15	5	<b>11</b>	0.5	1.7	1.9
Chikungunya virus	51	22	8	14	<b>9</b>	0.4	0.4	0.4
Dengue virus	368	353	452	454	<b>149</b>	6.9	6.3	4.6
Malaria	68	40	42	43	<b>49</b>	2.3	2.1	1.5
Rickettsial disease (typhus)	15	9	18	28	<b>11</b>	0.5	0.7	NN
Ross River virus	764	986	574	233	<b>609</b>	28.2	42.4	28.6
Schistosomiasis <sup>†</sup>	55	152	185	246	<b>187<sup>†</sup></b>	8.7	7.1	NN
Zika virus	0	0	2	13	<b>2</b>	0.1	0.1	0.1
<b>Zoonotic diseases</b>								
Leptospirosis	1	2	1	3	<b>1</b>	0.0	0.1	0.6
Psittacosis	2	0	1	0	<b>1</b>	0.0	0.1	0.1
Q fever	3	2	2	4	<b>4</b>	0.2	0.3	1.9
<b>Other diseases</b>								
Botulism	0	0	1	0	<b>0</b>	0.0	0.0	0.0
Creutzfeldt-Jakob disease*	1	4	4	5	<b>4</b>	0.2	0.2	NA
Haemolytic uraemic syndrome	0	0	1	2	<b>3</b>	0.1	0.1	0.1
Legionellosis	71	91	50	50	<b>30</b>	1.4	1.4	1.6
Leprosy*	1	2	2	4	<b>1</b>	0.0	0.1	0.0
Melioidosis	5	0	2	1	<b>3</b>	0.1	0.3	NN
Tuberculosis*	116	126	106	122	<b>116</b>	5.4	4.9	5.9

\*Data retrieved from WANIDD based on date of receipt of notification (DOR). <sup>^</sup>Due to laboratory false positives. <sup>†</sup>Schistosomiasis no longer notifiable in WA after 1 September 2017 and will not be reported in future.

NR= Not reported; NN= Not notifiable; NA= Data not available at time of reporting

## BLOOD-BORNE VIRUSES

Blood-borne viruses (BBVs) include hepatitis B, C and D. All of these diseases have the capacity to cause significant illness, including liver cirrhosis and hepatocellular carcinoma (liver cancer). Hepatitis B and C are classified as 'newly-acquired' or 'unspecified' for surveillance purposes. Cases are classified according to the national surveillance case definitions based on laboratory results and timeframes.

### Role of MCDC

MCDC has a role in disease surveillance and advice for general practitioners (GPs). This is particularly important given that effective treatment is now available for hepatitis C and given that hepatitis B among close contacts can be prevented through vaccination. In 2017, a mail out process to GPs with advice regarding the work up, management and treatment of hepatitis C commenced.

Human immunodeficiency virus (HIV) is another BBV with the potential for serious consequences. MCDC provides support for HIV contact tracing when requested.

## Hepatitis C

### Newly acquired hepatitis C notifications

There were 92 cases of newly acquired hepatitis C diagnosed in metropolitan residents during 2017; the majority in males (73, 79%). The age range of cases was 17-66 years, with 69 (75%) aged between 20-35 years. Forty-one cases (45%) were in Aboriginal residents. Fifty cases (54%) acquired hepatitis C in WA, 1 interstate and the location of acquisition was unknown in 41 cases. The majority presented through screening (68, 74%), 6 (7%) presented clinically, and the remainder were unknown.

### Hepatitis C (unspecified) notifications

There were 776 notifications of hepatitis C (unspecified) in 2017. Males comprised 522 notifications (67.3%) and ages ranged from 10-88 years. There were 150 notifications (19.3%) in Aboriginal people and 566 (72.9%) in non-Aboriginal people. Race was unknown in 60 cases (7.7%).

## Hepatitis B

### Newly acquired hepatitis B notifications

There were 14 cases of newly acquired hepatitis B in metropolitan residents during 2017; the majority in males (12, 86%). The age range for cases was 25-71 years and all cases were non-Aboriginal. Seven cases (50%) acquired hepatitis B in Australia, four overseas, and the location of acquisition was unknown for three. The overseas-acquired cases contracted hepatitis B in Asia and North America. Two cases were identified on screening and 12 (86%) as a result of clinical presentation.

Of the newly-acquired cases in 2017, eight (57%) were born in Australia. Among these cases, five acquired hepatitis B in WA, one overseas, and the place of acquisition was unknown in two cases.

### Hepatitis B immunisation

Hepatitis B is a vaccine-preventable disease on the national immunisation program (NIP) schedule. From May 2000, hepatitis B has been a funded vaccine in childhood with a birth dose followed by three doses of combination vaccine at 2, 4 and 6 months (NCIRS, 2015). An adolescent school-based program was also instituted in WA until 2013. Accordingly, hepatitis B immunity among age cohorts into their mid-20s is expected to be high.

The age range for Australian-born, newly acquired cases of hepatitis B was 25 to 66 years; only the youngest case would have been eligible to receive hepatitis B immunisation through the NIP. The vaccination status for this person was unknown and not listed in the AIR.

### Hepatitis B (unspecified) notifications

There were 447 notifications of hepatitis B (unspecified) in 2017. The gender distribution was even (males: 227, 50.8%) and ages ranged from 8 to 85 years, with a peak between 26 and 45 years (280, 62.6%). Eight cases (1.8%) were in Aboriginal people, 384 (85.9%) in non-Aboriginal people, and race was unknown for 55 notifications (12.3%).

There were eight cases aged less than 18 years; only one was known to have been born in Australia. According to AIR, five were not vaccinated against hepatitis B, two were vaccinated

and one was not listed. Of the vaccinated cases, one received a delayed schedule and the other received an accelerated schedule receiving the final dose before 24 weeks of age (19 weeks), which is not recommended in the Australian Immunisation Handbook.<sup>5</sup> The hepatitis B status of their mothers was unknown.

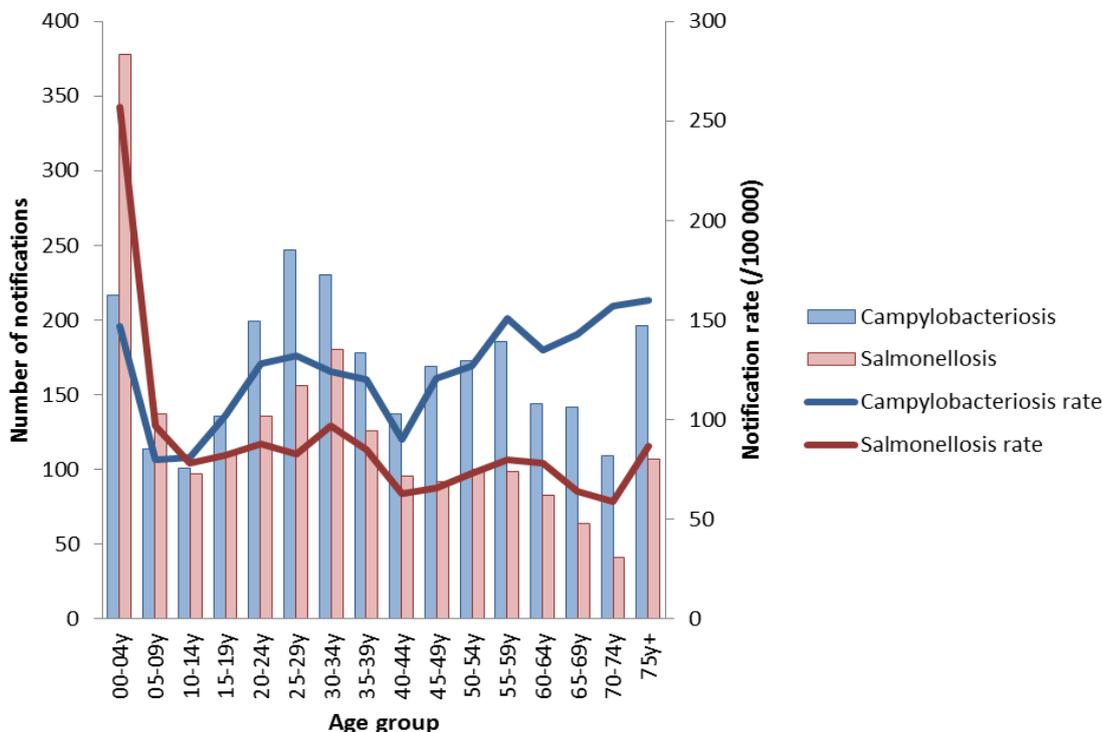
### Hepatitis D

There were two notifications of hepatitis D in 2017 in overseas-born, middle-aged adults from north-eastern Africa and the subcontinent, respectively. Both were detected on screening and were also known to be hepatitis B positive.

## ENTERIC DISEASES

In 2017, 5148 cases of enteric diseases were notified, representing a 13.1% increase from 2016. The most commonly reported enteric diseases were campylobacteriosis (2678, 52.0%) and salmonellosis (2002, 38.9%).

**Figure 2** shows the common enteric diseases notified in 2017 by age group. The figure summarises both the number of cases and the notification rates by age group. The bars represent the numbers and the line graphs represent the notification rates. The number of notifications and the notification rates were highest in the 0-4 year age group for salmonellosis. This reflects the higher risk in this age group due to opportunities for transmission in early childhood and lack of immunity. High rates of campylobacter are observed through the lifespan.



**Figure 2: Common enteric diseases notified in metropolitan Perth in 2017, by age group, number and notification rate**

<sup>5</sup> Australian Immunisation Handbook, 10<sup>th</sup> Edition (Jan 2014 update), p.212

## Role of MCDC

MCDC investigates and implements public health interventions for a number of enteric diseases including hepatitis A, and typhoid and paratyphoid fever. For example, MCDC will identify contacts of hepatitis A cases and arrange vaccination for them; and MCDC will arrange clearance faecal specimens for cases or contacts of typhoid and paratyphoid working in high risk professions, such as food handlers. These measures limit local spread of these diseases. Environmental follow up is completed through the OzFoodNet team of the WA DOH when required. MCDC also provides support to residential care facilities (RCFs) reporting gastrointestinal outbreaks and, commencing in 2018, schools and childcare centres.

## Campylobacteriosis

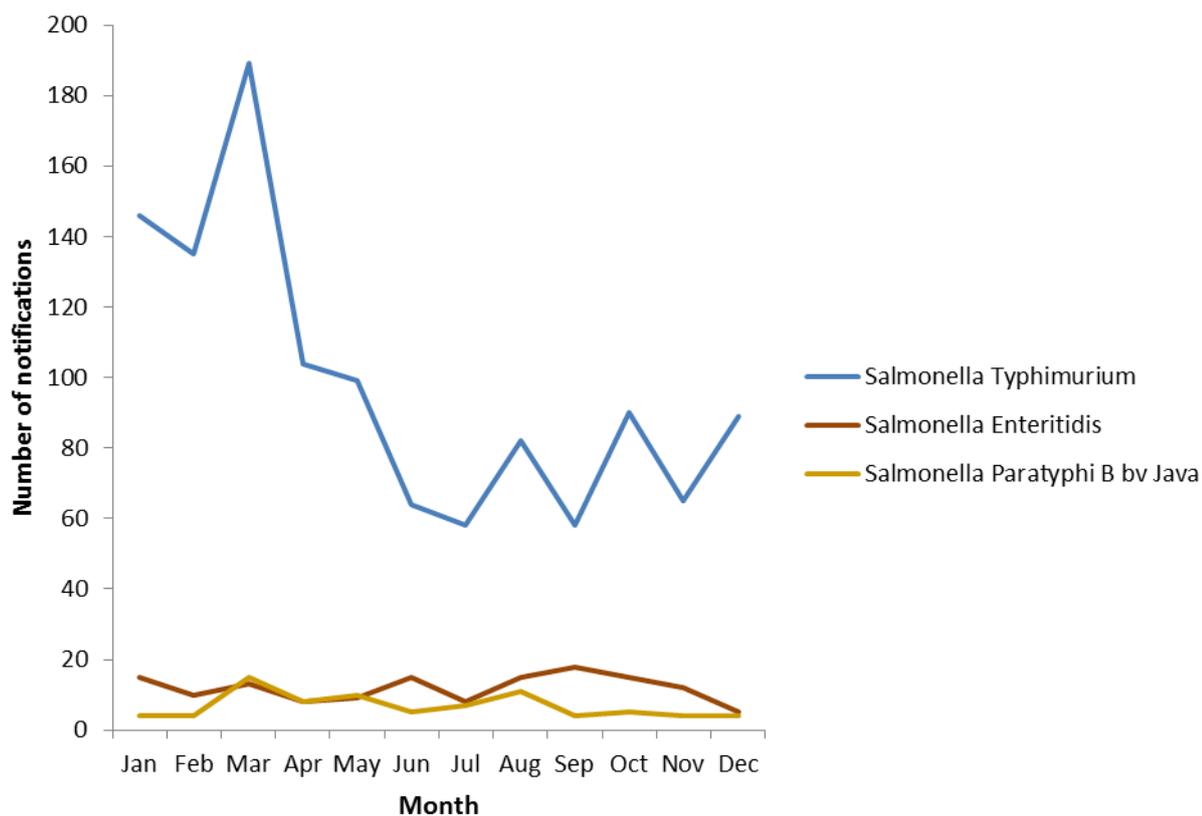
There were 2678 notifications of campylobacteriosis in metropolitan Perth in 2017. Males comprised 1426 cases (53.2%) and the age range was 0-96 years. Age group data is shown in **Figure 2**. The place of acquisition was known for 1427 notifications (53.3%); 1068 cases were acquired in WA, 17 interstate, and 342 overseas.

## Salmonellosis

There were 2002 notifications of salmonellosis in metropolitan Perth in 2017. The number of notifications has been increasing year on year since 2014 (Table 1; representing a 32.5% increase from 2016 and a 129% increase since 2014). There were 949 notifications in males and 1053 in females. The numbers and notification rate by age group are shown in **Figure 2** and the age range was 0-100 years. The place of acquisition was known for 1602 notifications (80.0%); 1258 were acquired in WA, 16 interstate, and 328 overseas. Of the overseas cases, the bulk were acquired in Indonesia (182), with a further 35 in Thailand, 28 in Malaysia, 16 in Vietnam and 10 in Singapore.

There were 82 different *Salmonella* serotypes identified; of which 17 serotypes were detected in 10 or more cases. The most common serotypes identified were: *Salmonella* Typhimurium (1179 notifications, 58.9%), *Salmonella enteritidis* (143, 7.1%), and *Salmonella* Paratyphi B bv Java (81, 4.0%). The frequency of these serotypes by month is shown in **Figure 3**. *Salmonella* Typhimurium was particularly prevalent during the warmer months (with peak activity in between January to March) and 82.1% of cases are known to be locally-acquired.

There were 29 *Salmonella* Typhimurium outbreaks in metropolitan Perth during 2017 involving a range of settings: 12 outbreaks in restaurants, 10 outbreaks in private residences, 3 outbreaks in childcare and 1 each in a hospital, a RCF, a picnic, and an 'other' setting. Egg or egg-containing dishes, particularly dishes with raw or undercooked egg, were commonly implicated in *S. Typhimurium* outbreaks in 2017 (Source: OzFoodNet, WA DOH).



**Figure 3: Common *Salmonella* serotypes by month in 2017**

## Typhoid and paratyphoid fever

In 2017, there were 19 cases of typhoid fever; all in returned travellers. This was substantially higher than the preceding 5-year average of 9 cases per annum. Cases returned from India (13 cases), Indonesia and Pakistan (2 cases each), and Eastern Europe and the Middle East (one each). Cases were aged between 0 and 37 years; 10 cases (53%) were under 10 years-old. Sixteen cases (84%) were hospitalised; another two were reviewed in hospital emergency departments. Decreased susceptibility or resistance to ciprofloxacin was reported in several instances.

Five cases worked in high risk occupations or attended childcare, and clearance specimens were arranged to ensure that they were no longer infectious prior to returning to work or day care. Four accompanying travellers were found to work in high risk occupations and faecal specimens were obtained from these individuals to ensure that they were not asymptomatic carriers. High risk occupations included commercial food handling and healthcare.

There were four cases of paratyphoid fever in returned travellers in 2017; acquired in India and Pakistan. The cases were in young to middle-aged adults and all required hospitalisation. The cases and their accompanying travellers were not involved in any high risk occupations (i.e. food handling, childcare or healthcare). All four cases were infected with a strain with decreased susceptibility to the antibiotic, ciprofloxacin.

## Hepatitis A and E

There were 10 cases of hepatitis A in 2017. Eight cases were acquired overseas, seven from Asian countries including the subcontinent. The age range was 4-61 years. Of the eight cases that were clinically unwell, four required hospitalisation. Two cases were detected as a consequence of an epidemiological investigation. MCDC identified and undertook the public health management of a small local outbreak associated with a residential facility, with two locally-acquired cases following contact with a returned traveller. Public health action included immunisation of residents and staff at the facility, information to low risk contacts, and advice on hand hygiene and infection control.

A vaccination for hepatitis A is available. Two doses are recommended for Aboriginal children at 12-months and 18-months. It is also available for purchase as a travel vaccine. Two-doses are required for long term protection. Of the 10 cases in 2017, 8 had not been vaccinated against hepatitis A and the vaccination status was unknown in 2.

There were four cases of hepatitis E in 2017 among adults aged between 19 and 62 years. All were returned travellers from Asia including the subcontinent. Two required hospitalisation.

## Shiga toxin-producing *E. coli* infections

There were 44 cases of Shiga toxin-producing *E. coli* (STEC) in the Perth metropolitan region in 2017, in persons aged between 0 and 91 years. Twelve people required hospitalisation. Thirty-two cases were acquired in WA, 11 overseas (5 in Indonesia), and location of acquisition was not able to be determined in 1 case. Nineteen notifications occurred in the final quarter of the year; of which 15 were WA-acquired.

The 44 notifications compare with 20 in 2016 and were significantly higher than in previous years (0 cases in 2015, 1 in 2014, 2 in 2013, 0 in 2012, 3 in 2011). The national surveillance case definition changed in July 2016. This may have contributed to the observed increase. Cases are reviewed by OzFoodNet.

A rare but serious complication of STEC is haemolytic uraemic syndrome (HUS), which can result in acute renal failure. Three cases developed HUS in 2017.

## Listeriosis

There were six cases of listeriosis in 2017; five cases in adults. There was one maternofetal pair, though that infection was acquired overseas. Remaining cases acquired the disease locally and had consumed foods that have been associated with listeriosis. Advanced age and/or immunosuppression were noted in three cases. All were hospitalised; there was one death.

Pregnant women are advised to avoid foods known to increase the risk of listeriosis due to the risk of harm to the foetus. These foods include soft cheeses, deli meats, and pre-prepared salads.

## Other enteric diseases

### Cryptosporidiosis

There were 292 notifications of cryptosporidiosis in metropolitan Perth in 2017; 120 (41.1%) in males. The age range was 0-75 years. The place of acquisition was WA in 197 cases (67.5%), overseas in 26 cases (8.9%), interstate in 2, and unknown for the remaining 67 notifications.

## Shigellosis

In 2017, there were 56 cases of shigellosis notified in metropolitan Perth; 34 (61%) in males. The age range was 1 to 67 years. Twenty-one cases (38%) were acquired overseas (of which, 8 were in India and 5 in Indonesia), 15 (27%) were acquired in WA, and the remainder were unknown.

## Vibrio parahaemolyticus

There were 18 notifications of *Vibrio parahaemolyticus* in metropolitan Perth in 2017; with a male preponderance (14, 78%). The age range was 21 to 73 years. Twelve cases (67%) were acquired overseas (6 in Indonesia), and 6 in WA.

## Yersiniosis

In metropolitan Perth, there were 14 notifications of yersiniosis (excluding plague, which is coded separately) in 2017. Nine (64%) of the notifications were in females. The age range was 2-88 years. Eleven cases were acquired in WA, one interstate, and location was unknown in two cases.

## Gastroenteritis outbreaks in residential care facilities

In 2017, there were 92 non-food related RCF gastro outbreaks in Perth reported to MCDC; of these, 46 (50%) were outbreaks of norovirus, one was caused by an astrovirus, and 45 had an unknown cause (Source: OzFoodNet, WA DOH).

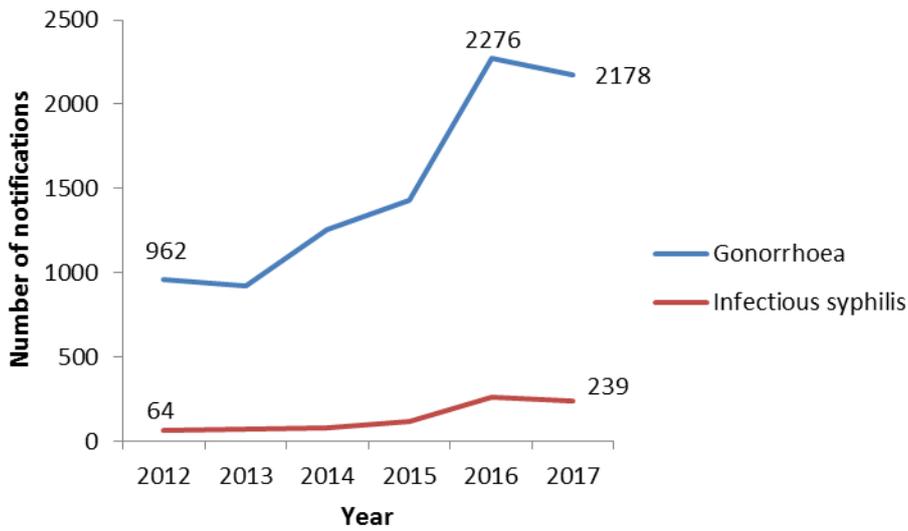
## MCDC Role

Perth RCFs report gastrointestinal outbreaks to MCDC. The MCDC team provides advice on collection of specimens to identify the outbreak cause, hygiene precautions, and isolation and restriction of movement of patients and visitors, as per the WA guidelines (CDCD, 2013). MCDC staff monitor the outbreak every weekday and support the facility until the outbreak is over. Food-borne outbreaks are referred to OzFoodNet for further investigation.

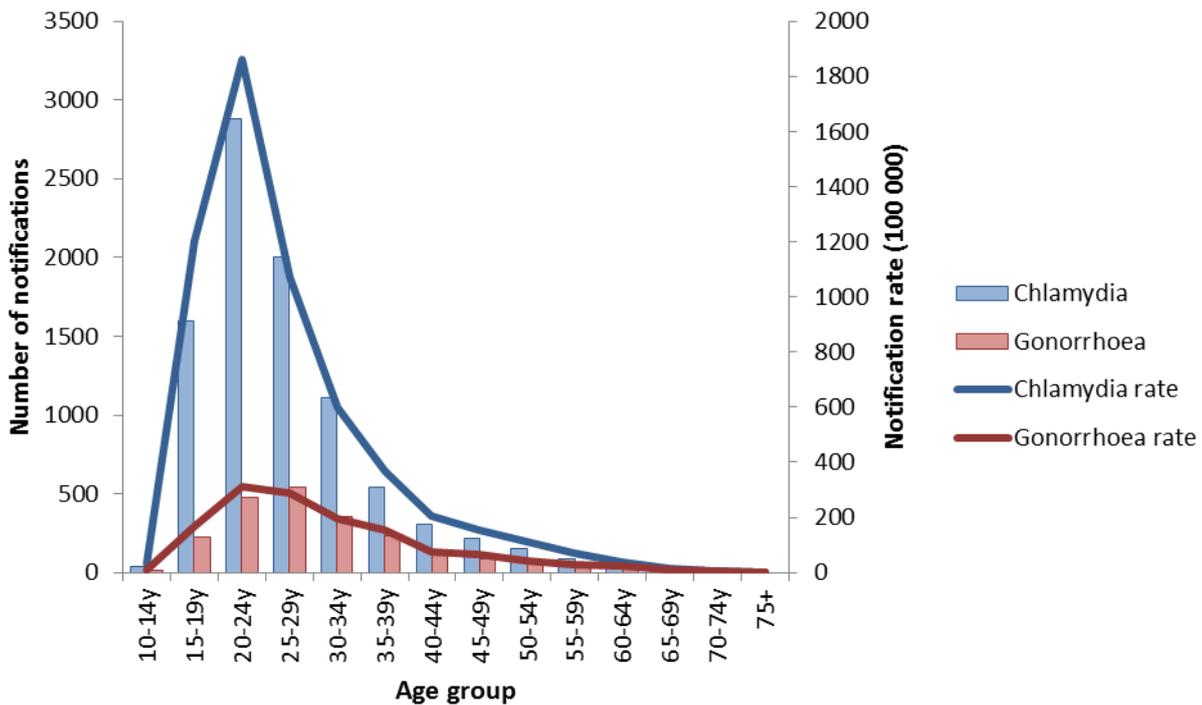
# SEXUALLY TRANSMITTED INFECTIONS

In 2017, there were 11 539 cases of notifiable sexually transmitted infections (STIs), representing a modest decrease from 2016 (11 722, 1.6%). STIs represented 40.2% of all notifiable diseases reported in 2017. Chlamydia accounted for 77.9% of all STI notifications. While notifications for chlamydia have remained relatively stable over the last five years, the number of notifications for gonorrhoea and infectious syphilis, while similar to 2016, remain well above the number of annual notifications in the five years prior (**Figure 4**).

**Figure 5** summarises the number of chlamydia and gonorrhoea cases and the notification rates per 100 000 by age group. The bars represent the numbers and the line graphs represent the notification rates.



**Figure 4: Trends in the number of notifications for gonorrhoea and infectious syphilis over the last 6 years in metropolitan Perth**



**Figure 5: Chlamydia and gonorrhoea notifications in metropolitan Perth in 2017, by age group, number and notification rate**

## Role of MCDC

MCDC supports general practitioners (GP) through:

- 1) the chlamydia mail out for risk groups, such as cases aged 16 to 24 years, which summarises patient management and partner notification
- 2) active follow up of cases of chlamydia in persons under 14 years as per the STI in minors directive, follow up of cases aged 14-15 years, and assistance with follow up of cases diagnosed through the WA Department of Corrective Services
- 3) the gonorrhoea mail out which provides information on treatment, patient follow up, and contact tracing
- 4) the syphilis mail out with information on treatment, follow up and special considerations
- 5) syphilis cases are actively investigated where required and may include cases of infectious syphilis and antenates
- 6) provision of enhanced surveillance forms
- 7) active assistance with contact tracing when requested; and
- 8) phone advice as required for the GP or the client (with GP consent).

## Chlamydia

There were 8985 cases of chlamydia notified in metropolitan Perth in 2017. This represented a modest decrease (1.7%) in notifications compared with 2016. Overall, the chlamydia notification rate was 415.7 per 100 000 in metropolitan Perth and 419.6 per 100 000 in WA. These rates were higher than the national rate of 399.6 per 100 000.

Notification rates varied widely by age group with a peak in people aged 20-24 years (1863 per 100 000 representing 1.9% of the population in that age group; **Figure 5**). Notification rates exceeded 1000 per 100 000 for the age band covering 15 to 29 years (i.e. greater than 1% of the population in those age groups had a chlamydia notification in 2017). These rates provide justification for the mail out process undertaken by MCDC.

There were 4849 cases (54.0%) in females and 4136 (46.0%) in males. There were 486 notifications (5.4%) in people who identified as Aboriginal or Torres Strait Islander and 8046 in non-indigenous people (89.5%), and race was unknown in 453 cases (5.0%). The chlamydia notification rate for Aboriginal people in metropolitan Perth was 1252 per 100 000, with a higher rate in Aboriginal females (306 cases; 1587 per 100 000) than Aboriginal males (180 cases; 921 per 100 000).

## Gonorrhoea

There were 2178 cases of gonorrhoea notified in metropolitan Perth in 2017. This represented a 4.3% decline in notifications compared with 2016 (2276 cases). However, this remains considerably higher than the number of notifications five years earlier in 2013 rising from 921 confirmed cases, a 2.36 fold increase (**Figure 4**). Rising rates are thought to be due to increasing disease in both heterosexual and homosexual adults (Giele *et al.*, 2017).

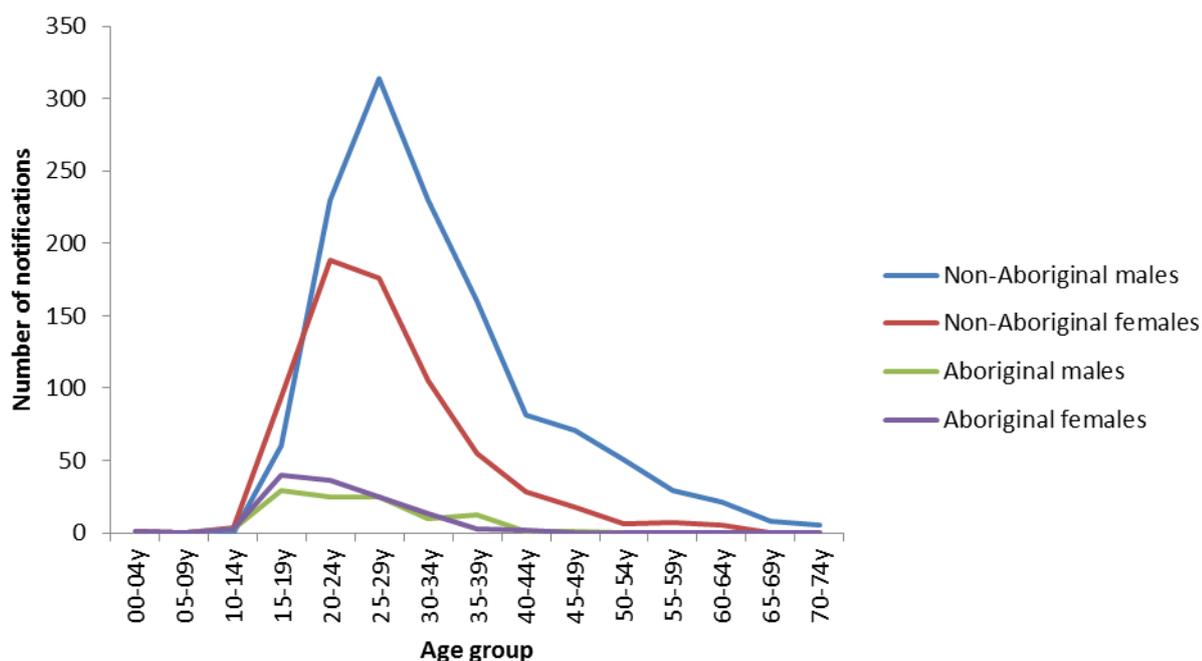
The gonorrhoea notification rate was 100.8 per 100 000 in metropolitan Perth and 122.2 per 100 000 in WA. The national notification rate was 117.3 per 100 000. Gonorrhoea rates varied

markedly by age group (**Figure 5**) with a peak in people aged 20-29 years. In that age group, the notification rate was around 3 per 1000 or 0.3% of this population.

Gonorrhoea was notified in 1367 males (62.8%) and 810 females (37.2%) and the age range of cases was 0-73 years. Note that all gonococcal infections are notifiable regardless of site or mechanism of infection. There were 229 cases (10.5%) in Aboriginal people and 1948 cases (89.4%) in non-indigenous persons. Race was unknown in a single case.

The gonorrhoea notification rate for Aboriginal people was 589 per 100 000; 542 per 100 000 among Aboriginal males (106 cases) and 638 per 100 000 among Aboriginal females (123 cases). The gender distribution demonstrated a modest preponderance among women (53.7%), unlike the non-indigenous population in which cases among males predominated (64.7%). The peak age group among Aboriginal cases was 15 to 29 years of age (oldest cases in their forties), resulting in a younger average age (23.7 years, median age 23 years) compared with non-indigenous cases (30.8 years, median age 28 years).

**Figure 6** shows the number of gonorrhoea notifications by age group, gender and Aboriginality. The graph for male and female Aboriginal persons by age group is similar. The number of notifications was highest among non-indigenous males.



**Figure 6: Number of gonorrhoea notifications by gender, Aboriginality and age group**

Cases of gonorrhoea were identified on the basis of clinical presentation (905, 41.6%), contact tracing (218, 10.0%) and screening (961, 44.1%). The remainder were unknown.

In 2017, the majority of cases were acquired in WA (1793, 82.3%). There were 106 cases (4.9%) acquired overseas, and 35 interstate (1.6%). The remainder were unknown. Of the cases acquired overseas, 22 each were infected in Indonesia and Thailand and 8 in the United Kingdom. The rest were infected in a range of other countries; each with six or fewer cases.

## Syphilis

### Infectious syphilis

Syphilis cases are classified as infectious or non-infectious according to the national surveillance case definitions based on laboratory results and timeframes. Infectious syphilis is defined as syphilis of less than two year's duration. In 2017, there were 239 notifications of infectious syphilis. This represents a modest decrease of 8.1% since 2016 (260 cases), though notifications remain significantly higher than five years ago with a 251% increase from 68 cases in 2013. While there was a change to the case definition on 1 July 2015, this has not substantially influenced the observed trend (SMHS, 2016).

Infectious syphilis in metropolitan Perth was predominantly a disease of males with 225 cases (94.1%). There were 14 cases in females; all except one in women of child-bearing age. There were nine cases in Aboriginal persons; seven in males. The remainder of cases were in non-Aboriginal people. Cases were aged from 17 to 81 years. The peak age group was 25-34 years (99 cases, 41.4%). However, there were more than 30 cases per 5-year age group from the 20-24 year group through to the 35-39 year group.

There were 70 cases of primary syphilis, 49 cases of secondary syphilis, and 120 cases of early latent syphilis documented on the basis of clinical presentation and timeframes. Cases were identified through clinical presentation (98 cases, 41.0%), contact tracing/epidemiological investigation (33 cases, 13.8%), and screening (108 cases, 45.2%).

Of the cases of infectious syphilis, 194 (81.2%) were acquired in WA, 14 (5.9%) interstate, 27 overseas (11.3%), and the remainder were unknown. Overseas acquisitions were from a range of countries in Asia/Oceania, Europe and the Americas.

### Congenital syphilis

There were no cases of congenital syphilis in metropolitan Perth in 2017.

### Non-infectious syphilis

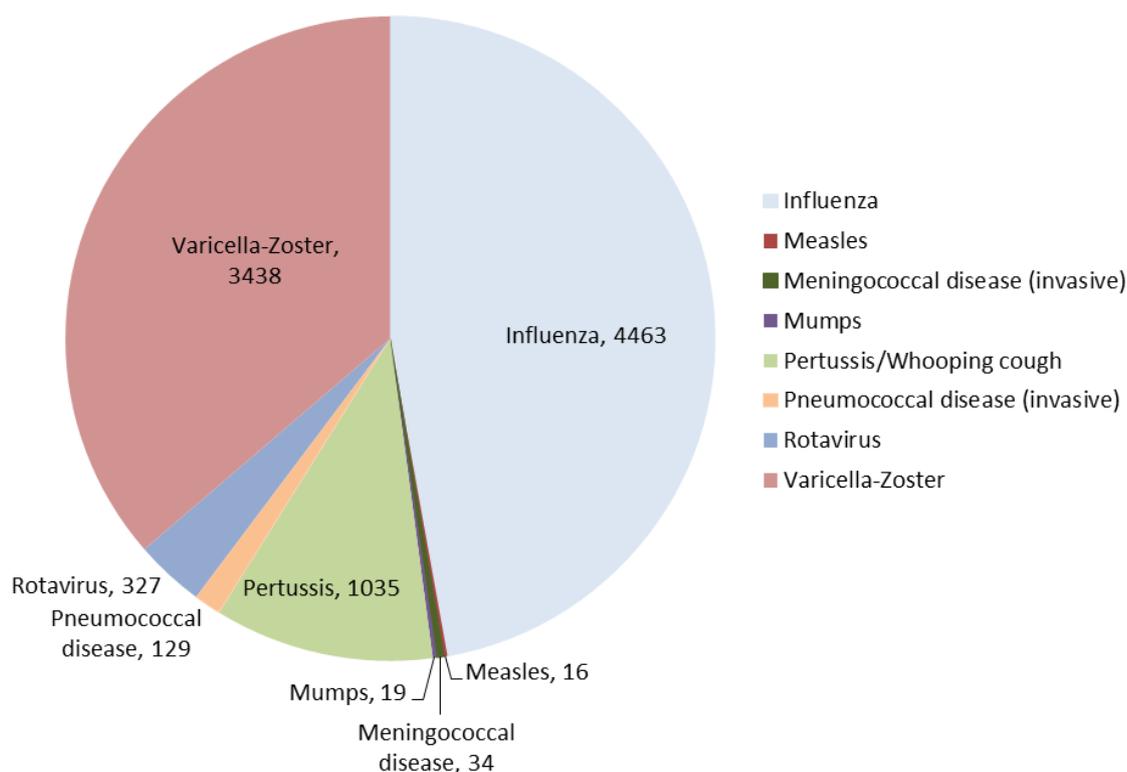
There were 137 cases of non-infectious syphilis, 100 cases (73.0%) in males and 37 (27.0%) in females. Eight cases (5.8%) were in Aboriginal persons, 123 (88.5%) in non-Aboriginal people and race was unknown in 6 cases. Cases were aged 18-94 years, with a peak in the 25-29 year age group.

## VACCINE PREVENTABLE DISEASES

Vaccine preventable diseases (VPDs) cover a range of infectious diseases that are administered to certain cohorts as part of the national immunisation schedule. These diseases can have serious sequelae, which may include hospitalisation and death. Effective and safe vaccinations have been developed for these diseases and, as such, they are recommended as part of the NIP.

Although hepatitis B has an effective vaccine, it has been described under blood-borne viruses.

In 2017, there were 9464 notifications of VPD in metropolitan Perth (excluding hepatitis B). Influenza (4463, 47.2%), varicella-zoster (chicken pox or shingles; 3438, 36.3%) and pertussis (whooping cough; 1035, 10.9%) comprised the vast majority of VPD notifications. **Figure 7** shows the relative proportions attributable to various VPDs. The two cases of rubella and one case of cutaneous diphtheria in 2017 have been excluded from the pie graph.



**Figure 7: Notifications of vaccine preventable disease in metropolitan Perth, 2017**

There was a 12.2% decrease in notifications due to VPD in 2017 from 2016 (10 779). This was predominantly due to a fall in influenza notifications of 27.1% (**Figure 8**). This is in contrast to Eastern Australia that had the highest influenza notification rate on record in 2017 (Australia-wide notification rate: 1033.6 per 100 000). In fact, metropolitan Perth had record activity in 2016, not 2017 (2017 metropolitan notification rate: 206.5 per 100 000). In 2017, all three major strains circulated; however, influenza A/H3N2 was predominant.

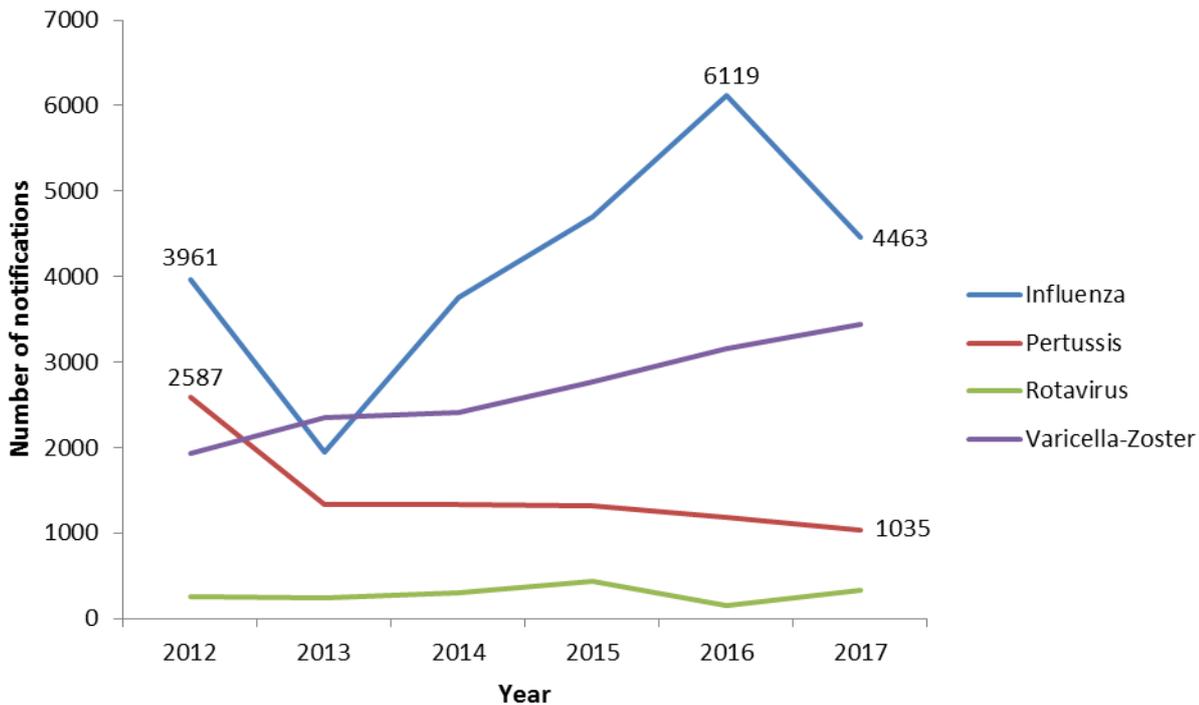
## Role of MCDC

MCDC helps to protect the public from a range of VPDs by the following methods:

- 1) immunisation advice to general practices including education to GPs and practice nurses, management of cold chain breaches, and catch up schedules
- 2) education and advice to hospitals (for example, staff influenza vaccination program) and residential care facilities (management of influenza outbreaks)
- 3) management and control of VPDs through contact tracing, prophylaxis, advice on isolation for infectious cases, and information for cases, contacts and treating doctors in accordance with the national guidelines developed by the Communicable Disease Network Australia (CDNA) and including diseases such as measles, invasive meningococcal disease and pertussis (whooping cough)

- 4) medical authorisation and advice regarding immunisation schedules and immunoglobulin for rabies post exposure prophylaxis

There are a number of notifiable, vaccine preventable diseases that require a great deal of follow up by MCDC due to factors such as communicability, severity of illness, risk to the community, and preventability, so the workload can be considerable even if these diseases occur infrequently. This includes measles and meningococcal disease.



**Figure 8: Most common vaccine preventable diseases in metropolitan Perth by year**

## Influenza

Annual influenza vaccine is funded by the NIP for the following groups:

- Persons aged 65 years or over
- Aboriginal people 6 months and older
- People aged 6 months and over with medical risk factors such as significant heart or respiratory diseases
- Pregnant women in any trimester

Moreover, the WA DOH funds influenza vaccine for all children aged between 6 months and less than 5 years of age. In 2017, both trivalent and quadrivalent influenza vaccines were available. These covered three or four influenza strains, respectively; two A strains plus one or two B strains. As the circulating strains can vary from year to year, annual vaccination is recommended.

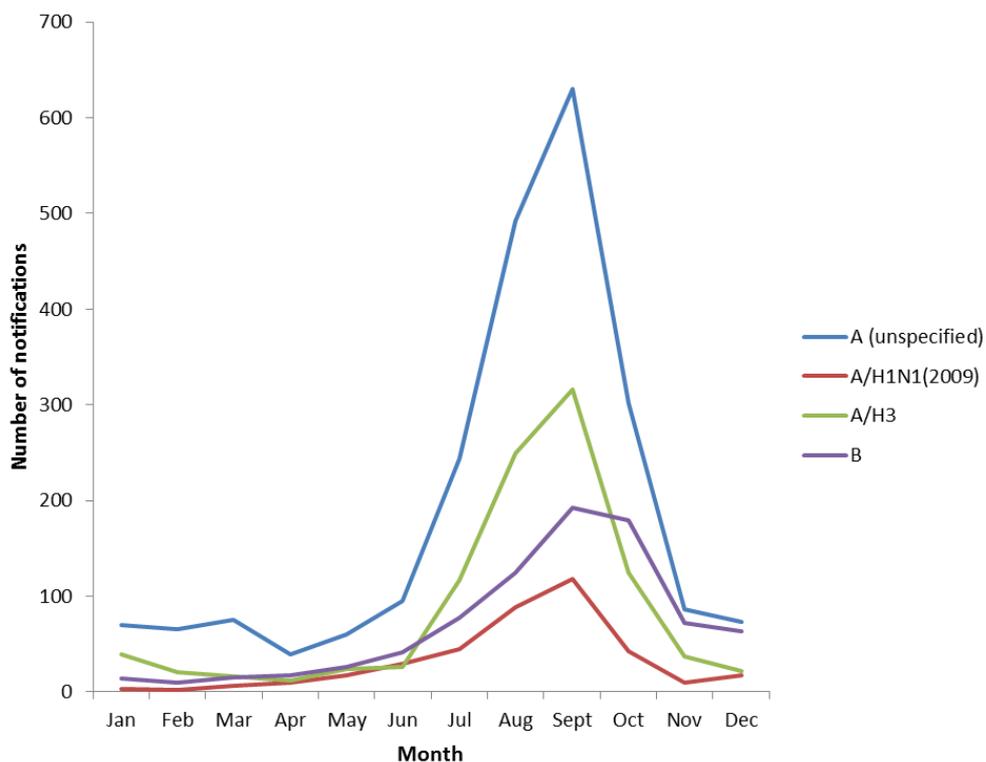
While the NIP recommendations cover groups known to be at increased risk for serious complications of influenza, this disease can still cause significant illness in otherwise healthy people.

## Epidemiology

In 2017, there were 4463 cases of influenza notified in metropolitan Perth: 3630 (81.3%) influenza subtype A and 833 (18.7%) subtype B.

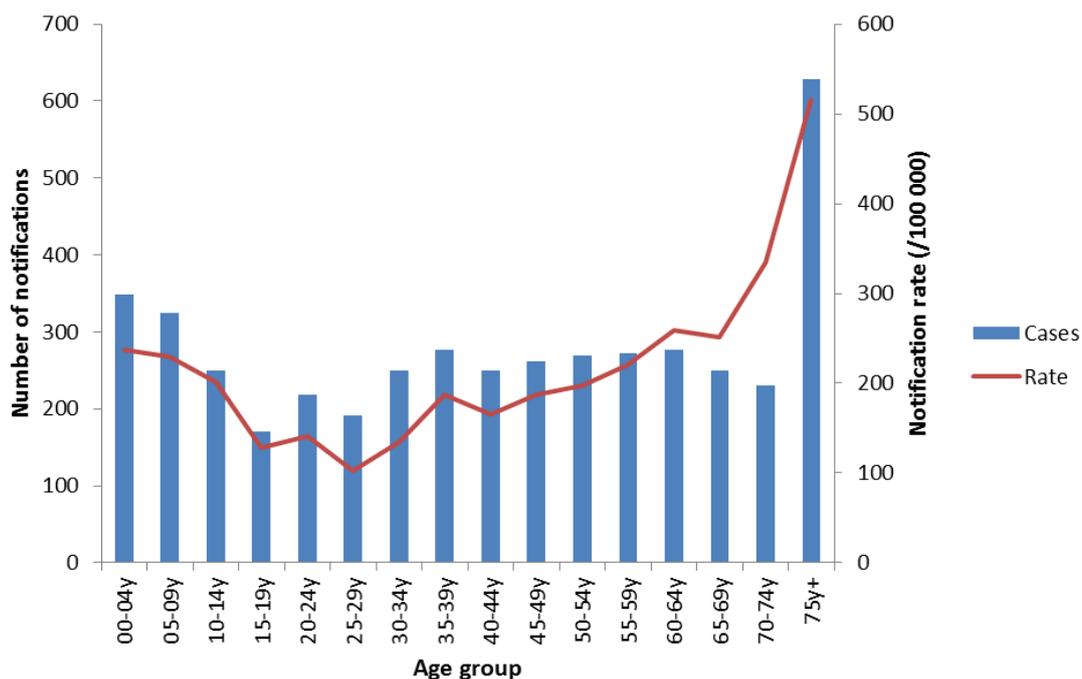
Of the identified subtypes, 1004 (22.5%) were A/H3N2, 393 (8.8%) were A/H1N1 2009, 2233 (50.0%) were A subtype (not further specified). The B subtype was not specified further in the database.

In temperate climates such as Perth, influenza tends to peak in the colder months. In 2017, Perth had above average temperatures during winter (BOM, 2017a) as compared to colder than average temperatures during the more severe influenza season of 2016 (BOM, 2017b). Influenza activity peaked during the months of August (955 notifications) and September (1257 notifications, **Figure 9**).



**Figure 9: Influenza notifications by month of onset and influenza subtype in metropolitan Perth, 2017**

Cases of influenza were reported among people aged between 0 and 104 years. **Figure 10** summarises the number of influenza cases and the notification rates per 100 000 by age group. The bars represent the number of influenza notifications and the line graph represents the notification rate by age group. The notification rates peak at above 500 per 100 000 in the age groups aged 75 years and over.



**Figure 10: Influenza notifications and rates by age group in metropolitan Perth, 2017**

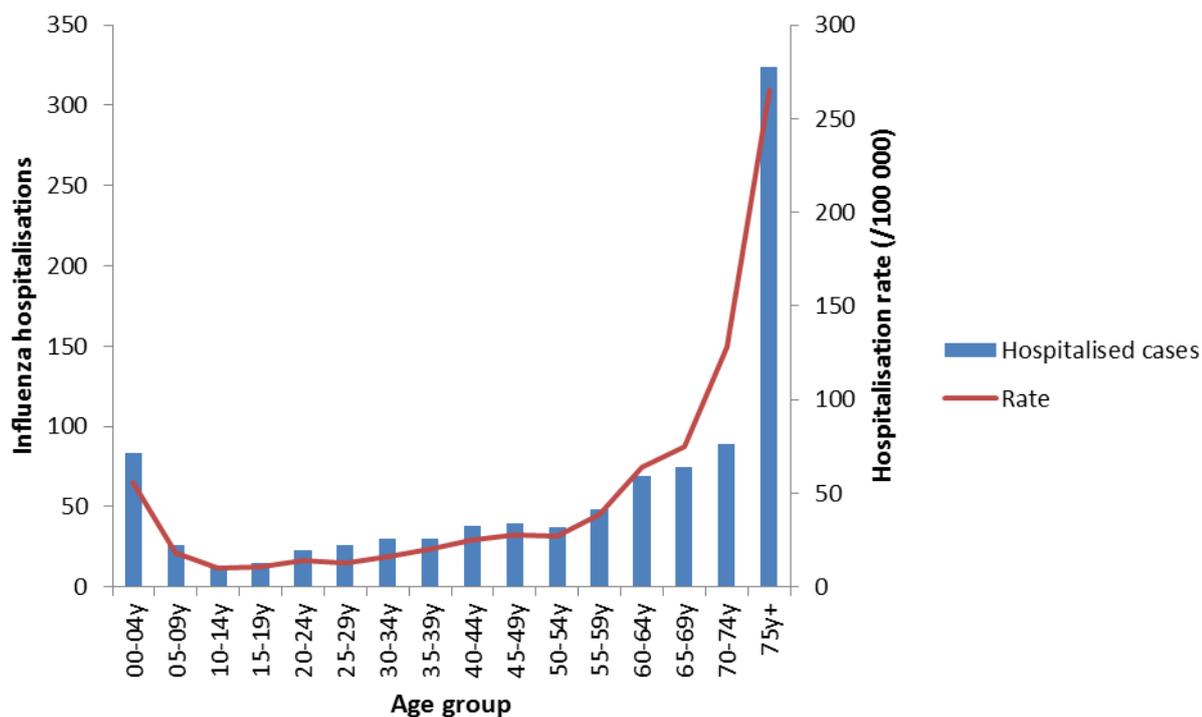
Seventy-one cases (1.6%) were identified as Aboriginal and 4092 cases (91.9%) were non-Aboriginal. Race was unknown in the remainder. The age range was 0-83 years among Aboriginal people.

### Influenza hospitalisations

Around one in five cases (966, 21.6%) were known to have been hospitalised. All cases required medical review, given that influenza notifications require laboratory testing for confirmation.

Hospitalisation rates were highest in the 0-4 year age group and people aged 60 years and above, particularly those aged 75 years and over, with 265 influenza hospitalisations per 100 000 (**Figure 11**). In the figure, the bars represent the number of influenza hospitalisations and the line graph represents the hospitalisation rate by age group.

The higher hospitalisation rates in the very young and in the elderly help to inform recommendations about influenza immunisation for these groups to prevent this serious disease.



**Figure 11: Influenza hospitalisations (number and rate) by age group in metropolitan Perth in 2017**

### Influenza in children aged 6 months to <5 years

There were 322 notifications of influenza in this age group. This group is eligible for the state-funded vaccine. Among this group, 25 (7.8%) were fully vaccinated and 267 were not (status unknown for 30). Seventy (21.7%) were known to have been hospitalised; 60 (86%) of these were known to be unvaccinated.

There were 61 influenza notifications in children under 12 months, of these 26 were too young to be vaccinated (<6 months). Of the 35 eligible for immunisation, only 4 (11%) had been vaccinated. Twenty-five children (41%) were known to have been hospitalised.

### Influenza outbreaks in residential care facilities

Three or more cases of influenza-like illness in a residential care facility (RCF) within 72 hours warrant testing for influenza.

### Role of MCDC

Outbreaks are notified by the RCFs or identified by the MCDC team based on WANIDD influenza notifications. MCDC can support the RCF with urgent specimen collection to confirm the diagnosis and provides interim infection control advice. The latter includes isolation of ill residents and restriction of movement of residents and visitors. Once influenza is confirmed, the team monitors outbreak progress through daily line listings, and advises GPs regarding the use of antiviral prophylaxis and treatment for residents and staff. The influenza vaccination coverage of residents and staff is also reviewed. This is in accordance with the CDNA national guidelines (CDNA, 2017). MCDC provides support and advice to the facility until the outbreak is declared over.

## Epidemiology

There were 41 reports of outbreaks of influenza-like illness in RCFs in 2017. There were 24 outbreaks of influenza A (5 of which were A/H3N2) and 1 outbreak of influenza B. Cases of influenza were confirmed on two other occasions, however, the case definition for an influenza outbreak was not met. Other respiratory pathogens were identified in seven other outbreaks of influenza-like illness, including respiratory syncytial virus, human metapneumovirus, adenovirus, rhinovirus and parainfluenza virus.

MCDC was involved in a further two influenza outbreaks in other institutional settings.

Of the 25 outbreaks of influenza, 7 were located in the EMHS region, 13 in the SMHS and 5 in the NMHS. Outbreaks followed a seasonal pattern with a peak from August to October.

Infection control precautions were discussed with RCF staff in every instance. The GPs servicing the facilities were contacted for 23 influenza-confirmed outbreaks (92%). Tamiflu was used for treatment (and, on occasion, prophylaxis) in 14 outbreaks (56%).

## Pertussis (whooping cough)

Pertussis (whooping cough) is a highly contagious, vaccine-preventable respiratory illness characterised by a paroxysmal cough that can persist for many weeks. It can cause very serious disease in babies. In Australia, the primary course of immunisation for pertussis is offered at 2, 4 and 6 months of age. Among babies, three doses of pertussis-containing vaccine are needed for maximum protection. As immunity to the vaccine (and natural disease) wanes over time, boosters are offered at various ages through childhood and adolescence, including at 18 months, 4 years and in Year 8 at school (12-13 years). A non-funded booster is also recommended for adults every 10 years.

In WA, a funded booster dose is recommended for all pregnant women in the third trimester. This can be given in each pregnancy regardless of the spacing between pregnancies. Pertussis vaccination in the third trimester boosts the maternal immune response which is then transferred to the baby in utero, providing newborns with vital protection while they are still too young to receive the pertussis vaccine. Research from the United Kingdom has shown that vaccination in pregnancy is over 90% effective in preventing whooping cough in babies too young to be fully vaccinated (Amirthalingam *et al.*, 2014). Pertussis vaccine has been demonstrated to be safe for use in pregnancy (Donegan *et al.*, 2014).

## Role of MCDC

MCDC follows up cases of pertussis to reduce the risk of transmission to infants less than 6 months old and their carers. Public health action can include contact with the GP via phone call or letter, information for cases and high risk contacts, advice to childcare centres including need for antibiotic prophylaxis, if indicated, and information for schools.

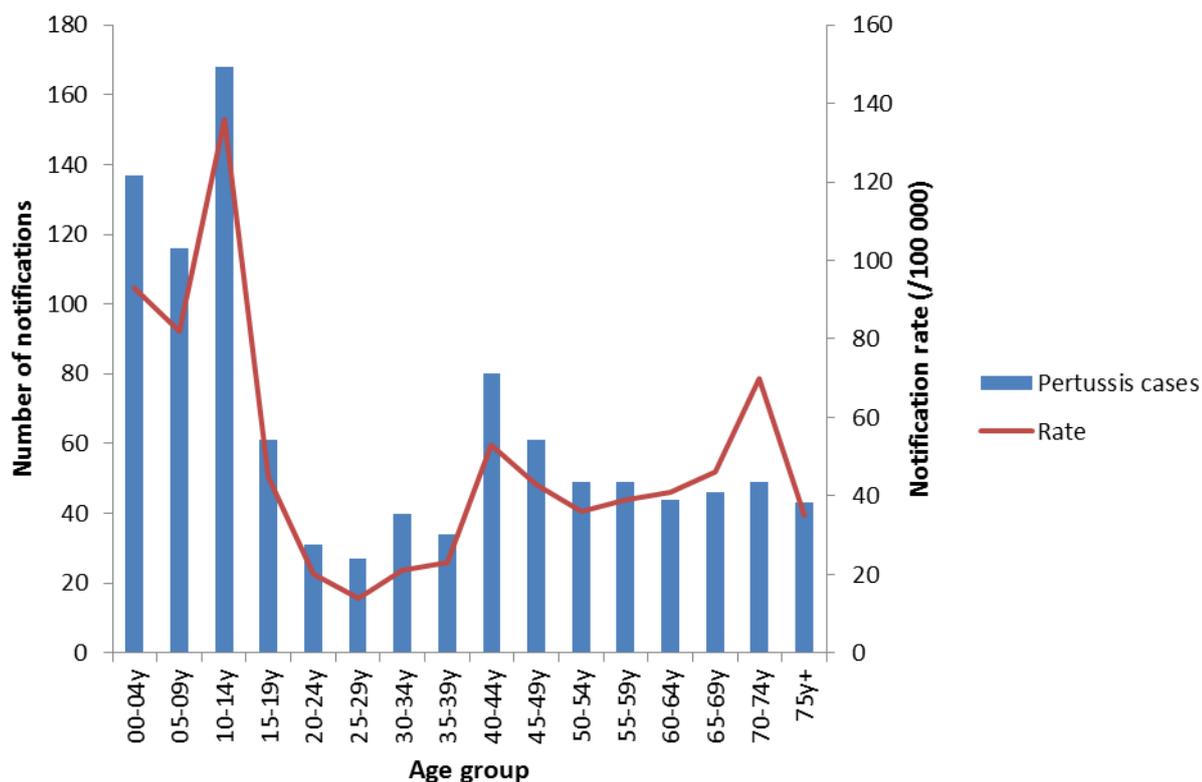
## Epidemiology

In 2017, there were 1035 cases of pertussis notified in metropolitan Perth. This is modestly lower than recent years (12.4% lower than the 1181 cases notified in 2016) and reflects inter-epidemic activity. The last pertussis outbreak in Perth was in 2011/2012; in 2012, 2587 cases were notified. In the interim, the funded pregnancy booster has been introduced and it is possible that this boost to immunity among women of child-bearing age is helping to limit pertussis activity and keep notifications stable.

In 2017, cases of pertussis were aged between 0 and 91 years. **Figure 12** shows the number and notification rates of pertussis by 5-year age group. The bars represent the numbers and the line graph represents the notification rate. Pertussis notifications peaked in the 10-14 year age group.

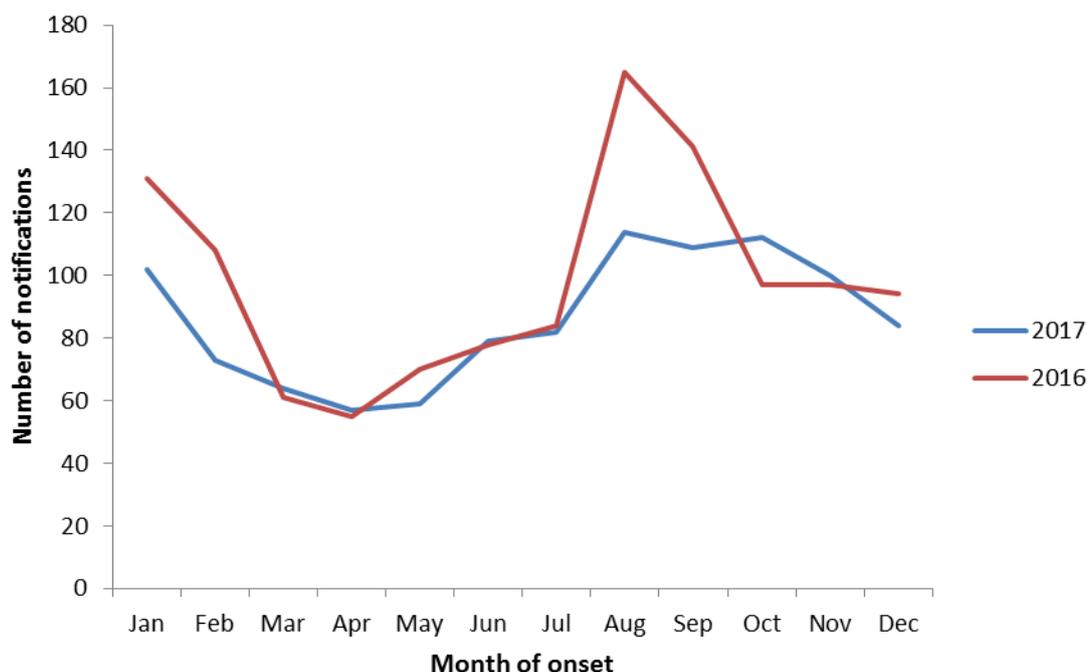
The peak number of notifications was 66 among children aged 12 years; this is prior to the year 8 school booster. Pertussis infections can spread readily in the school setting among non-vaccinated children and children with waning immunity, whose last pertussis booster was at 4 years of age.

Fourteen cases were among Aboriginal people; the age range was 0 to 60 years.



**Figure 12: Pertussis notifications and rates by age group in metropolitan Perth, 2017**

In 2017, peak pertussis activity occurred in late winter and spring (>100 cases per month), but there were more than 50 cases per month in every month of the year (**Figure 13**). The peak activity was lower in 2017 compared with 2016.



**Figure 13: Pertussis notifications by month of onset in metropolitan Perth, 2016-2017**

Polymerase Chain Reaction (PCR) testing for *Bordetella pertussis* from a nasopharyngeal aspirate (NPA) is the investigation of choice to diagnose pertussis in the first 2-3 weeks of infection. Pertussis-specific IgA rises over a few weeks after the onset of symptoms and can be measured either from blood serology or mucosal IgA from an NPA. In metropolitan Perth, diagnosis can be ascertained from any of these tests though PCR diagnosis is superior as this is positive early in disease enabling prompt public health action to limit spread.

### Infants aged $\leq 6$ months

In 2017, there were 25 cases of pertussis in infants aged 6 months or less, 24 were non-Aboriginal; 12 required hospitalisation (48%). This highlights the severity of the disease in infants and indicates the importance of maternal pertussis vaccine in the third trimester. Twenty were diagnosed by pertussis PCR testing and five by mucosal IgA only (PCR negative). Of those diagnosed using PCR, 11 were hospitalised and several more had emergency department presentations. Of those diagnosed by mucosal IgA only, one required hospitalisation.

Of the infants with pertussis:

- Nine (36%) were too young to have received any pertussis-containing vaccines; eight of these infants were hospitalised
- Seven babies had received one pertussis-containing vaccine
- Five had received two doses of pertussis-containing vaccine
- One baby had received three pertussis-containing vaccines
- Three babies were unvaccinated though old enough to have commenced the schedule
- 16 mothers reported a pertussis booster in the third trimester of pregnancy

## Rotavirus

Rotavirus is a vaccine-preventable illness that can cause serious gastroenteritis, particularly in young children. The oral vaccine was introduced into the national childhood schedule in July 2007. In July 2017, WA changed over to the two-dose Rotarix<sup>®</sup> vaccine schedule from the three-dose Rotateq<sup>®</sup> schedule.

There were 327 cases of rotavirus notified in metropolitan Perth during 2017. This was significantly higher than in 2016 but in keeping with other recent years. Gender distribution was largely even, and there were nine cases (2.8%) in Aboriginal people.

Cases were aged between 0 and 90 years, with 4 in 10 (133, 40.7%) aged under 2 years. Sixty cases (18.3%) were known to have been hospitalised; 41 (68%) of these were aged less than 2 years.

There were 128 cases (39.1%) in persons born prior to the introduction of the rotavirus immunisation program.

## Varicella-Zoster infection (chicken pox and shingles)

Varicella-zoster virus (VZV) is a highly contagious infection spread by respiratory secretions and vesicle fluid from the skin lesions. While chicken pox is generally a condition of moderate severity that leads to recovery, VZV can be serious in immunocompromised people, in neonates, and may lead to congenital anomalies if acquired in pregnancy. Reactivation of latent VZV can result in shingles later in life which can cause debilitating post-herpetic neuralgia.

A single dose of varicella-containing vaccine has been funded in the NIP since November 2005 and is given at 18 months (measles, mumps, rubella and varicella vaccine, MMRV). In November 2016, the shingles vaccine Zostavax<sup>®</sup> was added to the NIP for persons aged between 70-79 years as a single dose (IAP, 2015).

### Role of MCDC

MCDC does not routinely investigate chicken pox or shingles notifications. However, there are instances when MCDC assistance is sought. Examples include GPs seeking Zoster immunoglobulin advice for non-immune pregnant women who are exposed to VZV; guidance to schools and residential facilities with cases; information to GPs and practice nurses about vaccination; and advice to members of the public.

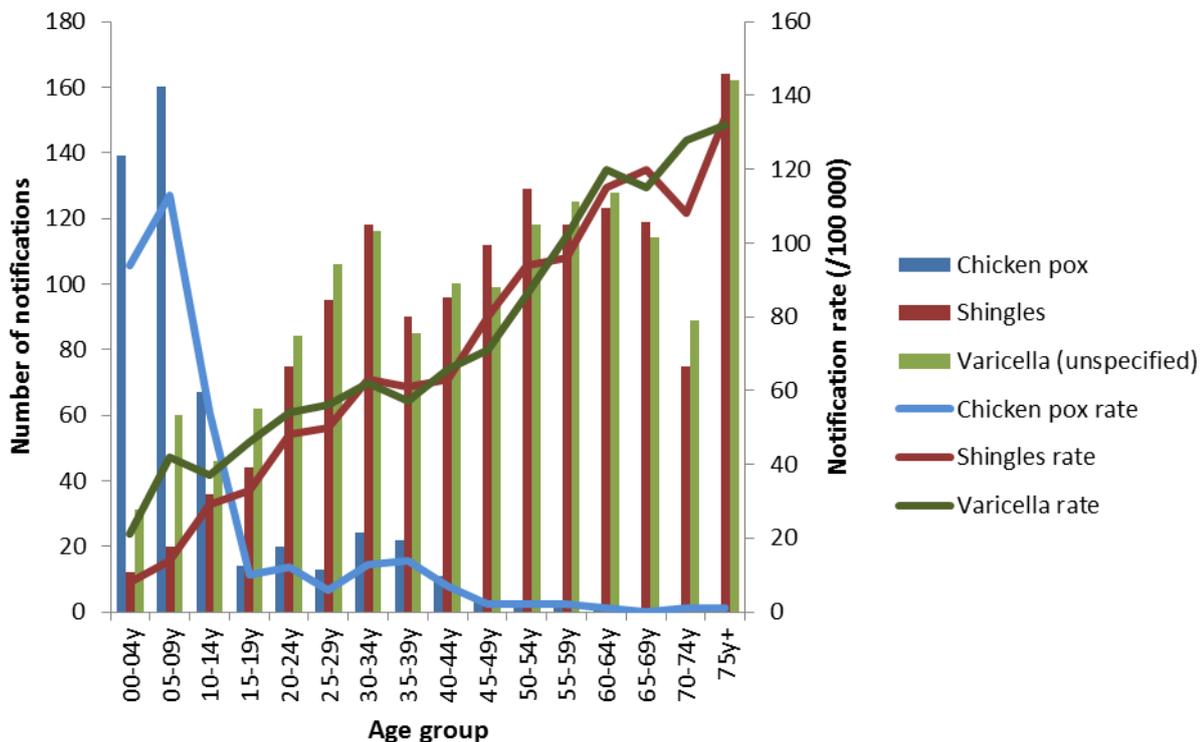
### Epidemiology

In 2017, there were 3438 notifications for varicella in metropolitan Perth. The notification rate was 159 per 100 000, which was higher than the national rate (116/100 000). Of these, 487 (14.2%) were for chicken pox and 1426 (41.5%) were for shingles. The rest (1525, 44.4%) were not specified.

Varicella notifications have been trending upwards, with an 8.7% increase since 2016 and a 46.2% increase from 2013.

There were 1569 males (45.6%) and 1869 females (54.4%) with VZV notified. Thirty notifications were among Aboriginal people. Chicken pox notifications, both in number and rate, peak in the 0-9 year age group. Shingles and varicella (unspecified) rates were highest in persons aged over 60 years (rate exceeds 100 per 100 000). **Figure 14** shows the number and

notification rates of VZV by 5-year age group. The bars represent the numbers and the line graph represents the notification rate. Sixty-six cases were known to have been hospitalised.



**Figure 14: Varicella notifications and rates by age group in metropolitan Perth, 2017**

There were 182 notifications among 0-4 year-olds. Ninety (49.5%) were too young to be vaccinated (under 18 months), 72 (39.6%) were vaccinated, 16 (8.8%) were not vaccinated and vaccination status was unknown in four (2.2%). While disease is reported among vaccinated children, it is characteristically mild in this group (AIH, 2017).

Among 70-79 year-olds, there were 277 notifications: 185 (66.8%) were not vaccinated with Zostavax, 51 (18.4%) were vaccinated, and status was not recorded for the remainder.

### Invasive pneumococcal disease (IPD)

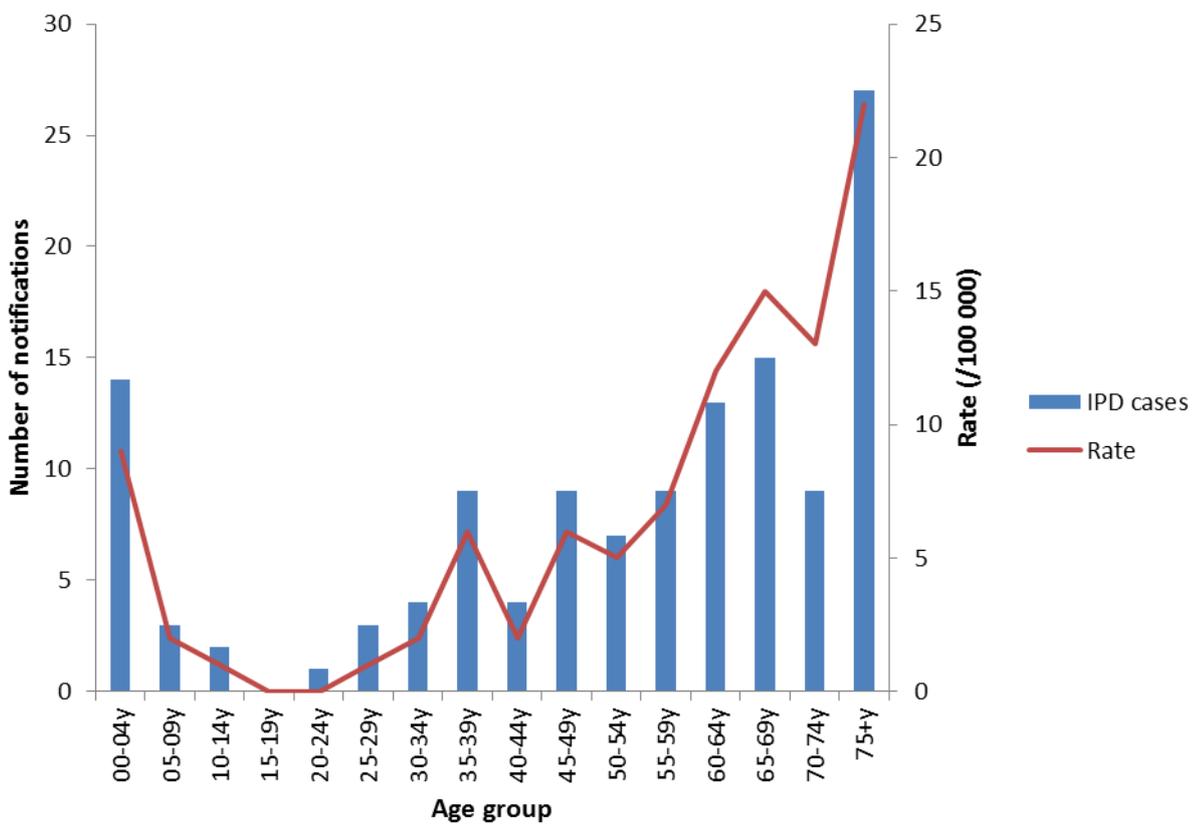
Invasive pneumococcal disease (IPD) is a serious bacterial disease that can manifest as septicaemia, pneumonia and meningitis. It is caused by *Streptococcus pneumoniae* and up to 90 serotypes are known to cause disease. Vaccines are available for the most common serotypes. Prevenar 13<sup>®</sup> is listed on the childhood immunisation schedule and, in 2017, was given at 2, 4 and 6 months of age. As the name suggests, it covers 13 common serotypes. Pneumovax 23<sup>®</sup> is recommended for people aged 65 years and over. There are separate recommendations for others who belong to certain risk groups (AIH, 2017).

### Epidemiology

There were 129 cases of IPD in metropolitan Perth in 2017. Notifications were modestly higher compared with the previous four years. There were 68 cases in males (52.7%) and 12 cases (9.3%) in Aboriginal people. The notification rate was significantly higher in Aboriginal people

(30.9 cases per 100 000) in metropolitan Perth than in non-Aboriginal people (5.5 cases per 100 000).

Cases were aged 0 to 94 years. There were 19 cases in persons under 18 years, 59 cases in persons aged 18-64 years, and 51 cases in people aged 65 years and above. Notification rates were highest in the over 75 year age group, with a smaller peak in the 0-4 year group (**Figure 15**). The bars represent the numbers and the line graph represents the notification rate. The rates seen in the 0-4 year age group (9 per 100 000) are much lower than rates observed in the years prior to pneumococcal vaccination for infants (national rate of 78 per 100 000 in the <2 year age group in 2002-2004; AIH 2017).



**Figure 15: Invasive pneumococcal notifications and rates by age group in metropolitan Perth, 2017**

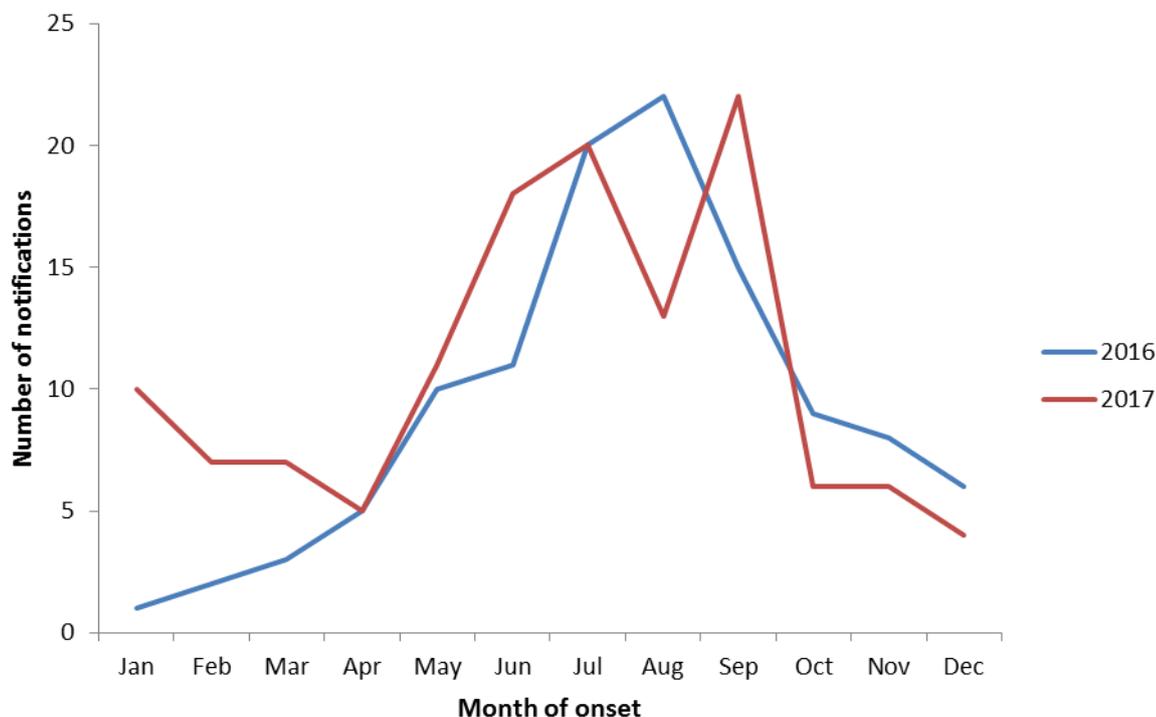
IPD has a seasonal distribution with a peak in winter and early spring (**Figure 16**). It is not uncommon for pneumococcal disease to complicate another respiratory infectious illness, such as influenza. While IPD is more likely in certain age groups and among people with comorbid conditions, it can occur in otherwise healthy people.

The majority of cases (116, 89.9%) were hospitalised. The most common presentation was pneumonia. However, there were also several cases of septicaemia and meningitis. The latter were associated with complications of middle ear infections, including mastoiditis. Another 10 cases were identified at post mortem; none of whom was known to be vaccinated.

The serotype was known in 120 cases (93%); 9 were untypable. The common types were 3 (15 cases), 19A (14), 19F (11), 9N and 22F (10 each), and 8 (9). Twenty-one other serogroups were also identified, giving a total of 27.

Of the 19 cases in children, 14 were fully vaccinated; 10 of whom were infected with a pneumococcal strain that was not in the vaccine.

In the 51 cases who were aged 65 and above and thus eligible for Pneumovax 23<sup>®</sup>, only 17 (33%) were vaccinated. Thirty-seven cases (73%) had a vaccine-preventable strain; 26 of whom were not known to be vaccinated.



**Figure 16: Invasive pneumococcal notifications by month of onset in metropolitan Perth, 2016-2017**

### Invasive meningococcal disease

Invasive meningococcal disease is caused by the bacterium, *Neisseria meningitidis*, and can lead to meningitis and septicaemia, which can be life threatening. Serogroups A, B, C, W<sub>135</sub>, and Y are associated with disease. During 2017, the NIP included immunisation for meningococcal C disease only at 12 months. Immunisation against meningococcal B and a combined vaccine against meningococcal A, C, W<sub>135</sub>, and Y were also available but were not funded nationally. In 2017, the WA DOH funded the combined meningococcal A, C, W<sub>135</sub>, and Y vaccine for adolescents aged 15-19 years. This was available through the school based immunisation program and, later in the year, through general practices and university health services.

### Role of MCDC

Although invasive meningococcal disease (IMD) is relatively rare, its effects can be devastating, therefore public health action is undertaken to limit additional cases of disease among contacts of cases. Household and other close contacts are given information and antibiotic prophylaxis to help prevent disease. Depending on the serogroup, immunisation is also offered. Low risk contacts are given information to ensure that they seek medical assistance rapidly should they develop symptoms. In certain circumstances, MCDC will arrange a site visit, for example, to a

childcare centre. MCDC also undertakes the public health management of any cases of meningococcal conjunctivitis, as this can be a harbinger of invasive disease. These are not included in the IMD data provided below.

## Epidemiology

In 2017, there were 34 cases of meningococcal disease in the Perth metropolitan area, giving a notification rate of 1.6 per 100 000. This was a significant increase compared to the preceding five years (0.6 per 100 000). There were almost three times as many cases in 2017 compared with 2016 (12 cases, 183% increase). Seventeen cases were W<sub>135</sub> (4 cases in 2016), seven cases were serogroup Y (two cases in 2016), eight were serogroup B, and one was serogroup C. The serogroup was unable to be typed for one case.

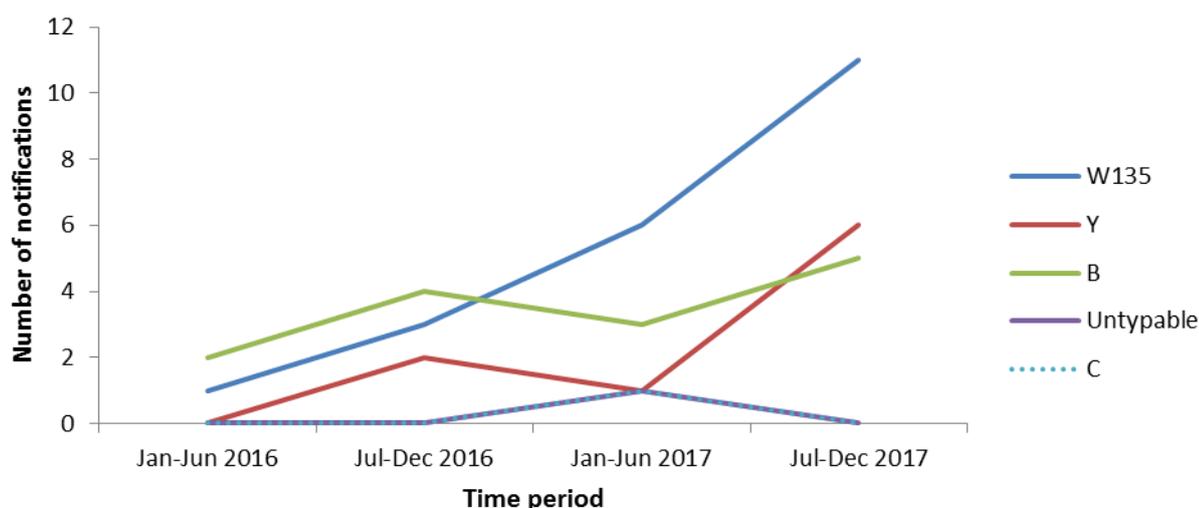
Cases were aged between 0 and 83 years, although 22 cases (65%) were aged below 40 years. Gender distribution was relatively even (18 females, 16 males). Thirty-three cases were hospitalised, the remaining case was identified on post mortem. Several cases required admission to intensive care and deaths were recorded.

There were five cases in Aboriginal people (serogroup W<sub>135</sub> in four cases). The notification rate among Aboriginal people (12.9 per 100 000) was substantially higher than in non-Aboriginal persons (1.4 per 100 000).

The emergence of meningococcal disease due to serogroups, W<sub>135</sub> and Y, is recent in Western Australia (**Figure 17**) and has resulted in the adoption of a vaccination program for high-risk groups. Interestingly, there were no cases of meningococcal W<sub>135</sub> or Y disease recorded in the 15-19 year age group targeted by the state program during 2017.

No cases involved persons who had received vaccination for the relevant serogroup.

There was a single case of meningococcal C disease in an unvaccinated adult, indicating the efficacy of the immunisation program.



**Figure 18: Changing epidemiology of invasive meningococcal disease, metropolitan Perth, 2016-2017**

## Measles

Measles is a highly infectious, vaccine-preventable, viral illness, marked by coryzal symptoms, fever and rash. It can be a serious disease and results in pneumonia in 10% of cases. In any given year, 20%-40% of cases diagnosed in Perth require hospitalisation. Receipt of two doses of measles-containing vaccine is effective at providing durable immunity. The NIP recommends vaccination against measles at 12 months (measles, mumps, rubella vaccine, MMR) and 18 months (MMRV, including varicella).

People who are susceptible to measles include immunocompromised and unvaccinated individuals. This can include babies under 1 year who are too young to be vaccinated against measles. There is also a cohort of adults who may have only received one dose of measles vaccine as children who may be at increased risk of getting measles particularly when they travel to countries where measles is still endemic. This includes most of Asia and many developing countries. Due to inadequate immunisation rates in many parts of Europe, a large measles outbreak is in progress there and deaths have been reported in several European countries during 2017 (ECDC, 2017).

### Role of MCDC

A case of measles requires intensive contact tracing and post-exposure intervention, which can include vaccination, immunoglobulin, isolation of the case, quarantine of susceptible contacts, and education. Often there are more than 100 contacts per case across a range of settings. Follow up of contacts at schools, healthcare settings, and residential institutions, is needed to rapidly identify people who are susceptible to the disease. In 2017, MCDC with the assistance of the WA DOH Community and Adolescent Health Service provided an MMR vaccination clinic at a school with low immunisation coverage following a case in an unvaccinated student who had travelled overseas.

### Epidemiology

There were 16 cases of measles in 2017; 5 cases in males, 11 in females. Age range of cases was 0 to 43 years. There were no cases in Aboriginal people.

There were two small outbreaks in Perth in 2017; involving six and four cases, respectively. The former was acquired in Bali and the latter in Italy. In each instance, a non-vaccinated child was the index case. The first outbreak occurred in a hospital setting and the second was based around a school.

There were a further six single cases; five acquired in Indonesia (four in Bali) and one in Italy. Four were Australian born and aged between 35 and 43 years. This is a risk age group as many will have received none or only one dose of measles-containing vaccine, because a two-dose schedule was not introduced until 1998. While a school catch-up was available, uptake is not well documented.

Of the 16 cases in 2017, none was able to provide documented evidence of two measles-containing vaccines. Of the 10 cases aged less than 18 years, none had received any measles-containing vaccines (only three were too young to be vaccinated).

Six cases (38%) were hospitalised, of whom two developed pneumonia (13%) and two were infants. Another two had emergency department presentations.

Endemic cases of measles do not occur in Australia, as a result of our immunisation coverage. The cases who acquired the disease in WA did so through contact with an overseas case.

Early notification and extensive public health action meant that preventive management by vaccination or immunoglobulin were able to be administered to at-risk persons. This prevented further spread of the disease.

### **Key points**

Outbreaks of measles are resource-intensive to manage. Maintaining high immunisation coverage is crucial to mitigate spread of measles. Receipt of two doses of measles-containing vaccine is an effective means to reduce the risk of the disease.

## **Mumps**

Mumps is an acute viral illness associated with fever and parotitis (swollen parotid glands). A vaccine is available as part of the childhood immunisation schedule and is given at 12 months (MMR) and 18 months (MMRV).

### **Role of MCDC**

Public health action includes advice regarding isolation of the case, follow up of household and close contacts, assistance and letters to schools and workplaces, and guidance on immunisation.

### **Epidemiology**

In 2017, there were 19 cases of mumps in metropolitan Perth; 13 cases in males and 6 in females. The age range was 5-81 years.

There were no cases in Aboriginal people. Mumps activity in the Aboriginal community resulting from a large mumps outbreak which began in Aboriginal communities in north-west WA during 2015 has ceased in the Perth metropolitan region.

Ten cases were acquired overseas in the Asia-Pacific region. Seven were acquired in WA. There were two small outbreaks, one related to an unvaccinated international exchange school student and another following a sports team tour to China.

Of the 19 cases, 3 had received two doses of mumps-containing vaccine (MMR) and 2 had had one dose. Three were unvaccinated, though eligible by age to have received mumps vaccine. Nine were too old to have been vaccinated against mumps as children. Vaccination status was unknown in two persons.

One case required hospitalisation; that person was unvaccinated.

## **Other vaccine preventable diseases**

In 2017, there were two confirmed cases of rubella in unvaccinated persons, associated with travel to Indonesia. Public health action included follow up of the household, school and hospital contacts. Both had emergency department presentations. No further cases were detected.

There was one case of toxigenic diphtheria in a middle aged adult associated with an open wound. The infection was acquired in Indonesia and there was no evidence of involvement of the upper respiratory tract. There was record of one diphtheria-containing vaccine in 2009. Close contacts were followed up by MCDC for testing, antibiotic prophylaxis and a vaccine booster. No further cases were recorded.

There were no cases of tetanus and *Haemophilus influenzae* type B recorded in metropolitan Perth during 2017. This reflects the success of the childhood immunisation program.

## Rabies and Australian bat lyssavirus

While not a routine vaccine in the NIP, MCDC provides advice to GPs and practice nurses relating to rabies post exposure prophylaxis (PEP) and authorises the use of DOH funded supplies. Rabies and the related Australian bat lyssavirus (ABL) are fatal viral diseases acquired from bats, and in the case of rabies, terrestrial mammals in rabies-affected countries.

When a person has sustained an injury from a bite or scratch from a mammal or bat, medical authorisation is given for the administration of the vaccine course and human rabies immunoglobulin (HRIG), when indicated, according to the national guidelines.

In metropolitan Perth in 2017, 236 courses of rabies post exposure prophylaxis (PEP) was arranged for 126 females and 110 males, compared with 237 courses in 2016. The ages ranged from 1 year to 81 years (mean 33.4 years). The most common scenario (74 cases, 31.4%) was a rabies-prone injury sustained in Indonesia (generally Bali) from a monkey bite or scratch, often when visiting a monkey park or temple (**Table 2**). Injuries relating to dog bites and scratches were also common, with 107 travellers requiring PEP for dog-related injuries across a number of countries. Most injuries occurred during the peak school holiday periods of January and July, with a lesser peak in April (**Figure 19**). Nine people sustained their injuries in 2016.

There were nine bat-related incidents in Australia which required PEP due to the risk of ABL.

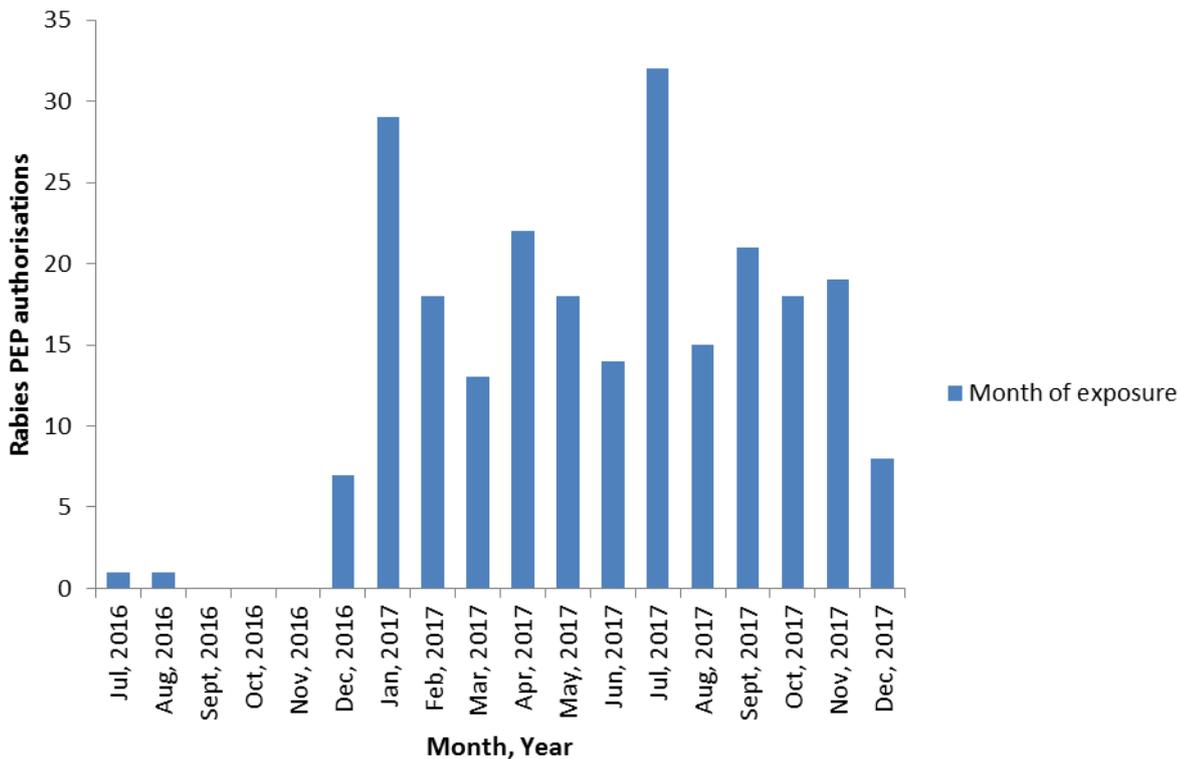
Rabies vaccine plus HRIG was arranged in 122 instances (51.7%) and vaccine only was arranged for the remainder (114, 48.3%). Immunoglobulin is given for more serious wounds with bleeding and must be given in the 7-day window following commencement of the rabies vaccine course.

Rabies vaccine and HRIG was predominantly given through specialist travel clinics, with smaller numbers at university health centres and individual general practices. Occasionally, metropolitan hospitals would give initial doses with completion of the course at a patient's general practice.

**Table 2: Persons sustaining rabies prone injuries by animal and location, 2017**

Country	Animal						Total
	Dog	Monkey	Cat	Bat	Squirrel	Other	
Indonesia	25	74	8		3	3	113
Thailand	30	7	3			2	42
India	11	2			1		14
Vietnam	10			1			11
Philippines	7		1	1			9
Australia				9			9
Malaysia	3	5					8
Sri Lanka	6					1	7
China	5		2				7
Other country <sup>1</sup>	10	4	2				16
<b>Total</b>	<b>107</b>	<b>92</b>	<b>16</b>	<b>11</b>	<b>4</b>	<b>6</b>	<b>236</b>

<sup>1</sup>All other countries each had fewer than five rabies prone exposures notified



**Figure 20: Number of rabies post exposure prophylaxis authorisations by date of exposure to a rabies-prone wound**

## VECTOR-BORNE DISEASES

Vector-borne diseases are communicable diseases that are transmitted by blood-feeding insects such as mosquitoes, ticks, mites and fleas. These diseases can cause significant illness, for example, haemorrhagic fever caused by dengue virus or congenital microcephaly related to Zika infection in pregnancy.

In 2017, there were 1027 cases of vector-borne diseases notified in metropolitan Perth, predominantly due to imported cases of dengue (149 notifications), imported cases of schistosomiasis<sup>6</sup> (187 notifications), and local cases of Ross River virus (609 cases). This was comparable to 2016 (1036 notifications).

### Role of MCDC

The MCDC team determine place of acquisition of disease, for example, for dengue notifications; provide advice and investigate all cases of Zika infection, particularly in relation to exposure among pregnant women or their partners; and review case classification and clinical history for uncommon vector-borne diseases, such as typhus and leptospirosis.

<sup>6</sup> Notifications until 1 September 2017, schistosomiasis was no longer notifiable after this date

## Dengue

There were 149 dengue notifications, which was significantly lower than the 454 notifications in 2016 and represents a 67.2% decline. All cases were acquired overseas. The majority of cases were acquired in Indonesia (50, 33.6%), India and Thailand (17 each, 11.4%), Sri Lanka (15, 10.1%), Malaysia (13, 8.7%), and Vietnam (10, 6.7%). There were cases recorded from another 14 countries predominantly in Asia. Cases were aged from 1 to 76 years.

## Schistosomiasis

After 1 September 2017, schistosomiasis was no longer notifiable and will not be reported from 2018. Until that date, there were 187 schistosomiasis notifications; all acquired overseas. Many were detected through migrant and refugee health services.

## Ross River and Barmah Forest viruses

Ross River and Barmah Forest viruses are both mosquito-borne infections which can be acquired locally, and may cause an acute febrile illness with rash and arthralgia, as well as chronic symptoms in some people. These viruses follow a seasonal pattern with a summer peak associated with increased mosquito activity and increased human outdoor activity at that time of the year.

In 2017, there were 609 notifications of Ross River virus, a significant rise from 233 cases in 2016. However, the notifications in 2017 were more similar to numbers reported in earlier years. Moreover, the national surveillance case definition was revised on 1 January 2016, so this may partly explain the fluctuation seen.

Notifications were detected throughout the Perth metropolitan area. Although residential postcode may not reflect the location of acquisition, the SMHS had 245 notifications (40.2%), of which the Mandurah postcode recorded 52 cases (21.2% of the SMHS notifications). The age range of cases was 2 to 89 years.

There were 11 notifications of Barmah Forest virus.

## Malaria

Malaria is a mosquito-borne disease caused by a parasite of the *Plasmodium* species. There were 49 malaria notifications in 2017; all were acquired overseas. Cases from 23 countries were reported, primarily from the African continent (18 countries involving 39 cases). The rest were from the Asian region. Cases were aged from 1 to 71 years. Twenty-three (47%) were hospitalised. *Plasmodium falciparum* was the causative agent in 35 cases, *Plasmodium vivax* in 8 cases, *Plasmodium ovale* in 5 cases and *Plasmodium malariae* in 2 cases (note that 1 person had both *P. falciparum* and *P. vivax* identified).

## Rickettsial disease (typhus)

There were 11 cases of typhus during 2017. Two cases were confirmed, the rest were probable. The majority of cases (10) were acquired overseas; 4 in Indonesia. Five notifications were in the spotted fever group (*Rickettsia conorii*), five in the typhus group (*Rickettsia typhi*) and one in the scrub typhus group (*Orientia tsutsugamushi*).

## Chikungunya virus

There were nine cases of the mosquito-borne chikungunya virus in 2017. They were all acquired overseas; four in India.

## Zika virus

In 2017, there were only 2 cases of the mosquito-borne, Zika virus notified, compared with 13 cases in 2016. There were no cases acquired in Central and South America last year. These cases were acquired in Indonesia and Thailand.

In adults, acute symptoms can include fever, headache, red and painful eyes, rash, and aches. It has also been associated with Guillain-Barre syndrome. The Zika virus can cause congenital anomalies, including microcephaly.

## Other vector-borne diseases

There were no cases of arboviral encephalitis (Murray Valley virus, Kunjin virus) in residents of metropolitan Perth in 2017. These diseases are mosquito-borne and are generally acquired in Northern WA and the Northern Territory.

# ZOONOTIC DISEASES

There were four confirmed cases of Q fever in 2017. Two infections were acquired in WA, one in Queensland and one overseas. Three had acute Q fever and one was a first report of chronic Q fever. All cases were symptomatic and had relevant exposures in farm settings. Three required hospitalisation and the remaining case was reviewed in an emergency department. The cases were not linked to any workplace.

There was one case of leptospirosis in 2017; acquired in Asia.

# OTHER DISEASES

## Melioidosis

There were three cases of melioidosis in 2017. Two were acquired overseas in South-East Asia. The other case was acquired locally in a semi-rural suburb on the eastern border of the metropolitan area in the Avon Valley. Multilocus sequence typing (MLST) of the specimen indicated that the strain was one documented previously in the Avon/Chittering region of WA (ST-284; Chapple *et al.*, 2016). The bacterium known to cause disease, *Burkholderia pseudomallei*, is found in soil and the case had been undertaking landscaping on a property prior to illness. This was coupled with winter rainfalls in the district. This is only the second recorded human case of melioidosis acquired from a local environmental (soil) source. The previous case was documented in the early 1990s from the same region (Golledge *et al.*, 1992).

Notably, unseasonal heavy summer rains in Perth on February 9 and 10, 2017 may have contributed to an outbreak of melioidosis among alpacas in that area in mid-late February. MCDC undertook public health action to identify and provide information to humans exposed to the ill and deceased animals. Antibiotics were recommended for those with significant exposure who were immunocompromised. No human cases were documented in relation to that incident.

While melioidosis is characteristically a disease acquired in tropical and sub-tropical regions, the locally-acquired case in 2017 serves as a reminder that human cases can occur from time-to-time in the outer metropolitan area east of Perth. As this is a disease that can cause severe pneumonia and septicaemia, it should be considered as a potential diagnosis even in the absence of travel if a patient has had environmental exposures in the Avon/Chittering region.

## Tuberculosis

There were 116 tuberculosis notifications in 2017, giving a metropolitan notification rate of 5.4 per 100 000, which is consistent with the national rate.<sup>7</sup> Cases were aged from 1 to 96 years. Most (100, 86.2%) presented with clinical symptoms, and 27 (23.3%) were hospitalised. The majority of cases were known to have been acquired overseas (76, 65.5%).

## Legionellosis

*Legionella pneumophila* is associated with exposure to warm water aerosols containing the bacteria from environmental sources, such as air conditioning cooling towers, showers, spas, misting or droplet sprays, and fountains. It can cause severe pneumonia which may require intensive care treatment.

*L. longbeachae* is the most common species of legionella notified in WA and is associated with exposure to soils, potting mixes and mulches. While it can cause pneumonia, it is characteristically a milder disease than *L. pneumophila*.

## Role of MCDC

MCDC undertakes an investigation to ascertain case and illness details, risk factors, exposures, and travel. For cases of *L. pneumophila* thought to be acquired locally, the WA DOH environmental health staff are notified.

## Epidemiology

There were 30 notifications of legionellosis in metropolitan Perth in 2017. *L. pneumophila* was identified in 12 cases (compared with 18 in 2016) and *L. longbeachae* in 18. This was lower than the 50 notifications of legionellosis in 2016 and the 5-year average (58 cases annually).

The age range among cases of *L. pneumophila* was 31 to 87 years; 9 (75%) were aged 65 years and over. Nine cases were acquired in WA and three overseas. All were hospitalised and a few required intensive care admission. Many cases had co-morbidities or were immunosuppressed.

The age range among cases of *L. longbeachae* was 35 to 87 years; 12 (67%) were aged 65 years or over. Fifteen were known to have been infected in WA. Eleven (61%) were hospitalised. Several were gardeners and/or confirmed potting mix/mulch use in the fortnight prior to illness.

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<sup>7</sup> An annual report is available upon request to the Medical Director, WA Tuberculosis Control Program.

# IMMUNISATION

The WA Immunisation Schedule follows the NIP recommendations. On occasion, variations occur due to local circumstances, for example, the WA meningococcal ACW<sub>135</sub>Y vaccine program for adolescents aged 15-19 years, which commenced in 2017.

Immunisations help to prevent and limit the spread of a range of serious diseases. The safety of vaccines is carefully monitored through the Western Australian Vaccine Safety Surveillance (WAVSS) system, and nationally through AusVaxSafety and the Therapeutic Goods Administration. Active surveillance of vaccine safety is undertaken by numerous local GPs using the SmartVax text messaging service.

## Immunisation rates

The tables below show the annual immunisation data for 1 year-olds, 2 year-olds and 5 year-olds during 2017. The data comes from the AIR. It was calculated by combining the quarterly AIR data and represents the proportion of children who were up to date by age. An immunisation coverage rate of 95% (or more) is considered the Australian benchmark. This was a change in 2017, as previously the national benchmark was 90% (and above).

**Table 3** shows the percentage of children who turned 1, 2 or 5 years of age in 2017 who were considered to be fully vaccinated by health service (EMHS, NMHS and SMHS), Perth metropolitan area, WA and Australia. The table shows immunisation coverage for all children and for Aboriginal children. The latter is shown because immunisation coverage in Aboriginal children has been lower historically. MCDCC helps to identify and facilitate catch up for Aboriginal children who are not up to date.

Immunisation coverage below 90% is shown in **red**, coverage in the range of 90% to <95% is shown in **blue**, and coverage of 95% and above is shown in **black**. No region achieved the benchmark of 95% or above in the 1 and 2 year categories. Aboriginal children aged 5 years exceeded 94% coverage in all regions.

**Table 3: Immunisation coverage by region and age cohort in 2017**

Age	Region	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)	Aboriginal immunisation coverage (%)
1 year	EMHS	9 616	10 280	93.5	82.7
	NMHS	8 707	9 266	94.0	82.4
	SMHS	7 792	8 353	93.3	88.0
	Metro total	26 115	27 899	93.6	84.4
	WA	32 757	35 012	93.6	87.7
	Australia	292 716	311 248	94.1	92.5

Age	Region	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)	Aboriginal immunisation coverage (%)
2 years	EMHS	8 765	9 866	<b>88.8</b>	<b>79.4</b>
	NMHS	8 113	9 104	<b>89.1</b>	<b>81.7</b>
	SMHS	7 424	8 343	<b>89.0</b>	<b>82.8</b>
	Metro total	24 302	27 313	<b>89.0</b>	<b>81.0</b>
	WA	30 696	34 450	<b>89.1</b>	<b>82.6</b>
	Australia	279 931	309 243	<b>90.5</b>	<b>88.4</b>
5 years	EMHS	8 831	9 567	<b>92.3</b>	<b>94.1</b>
	NMHS	8 660	9 455	<b>91.6</b>	<b>94.4</b>
	SMHS	8 166	8 825	<b>92.5</b>	<b>97.3</b>
	Metro total	25 657	27 847	<b>92.1</b>	<b>95.1</b>
	WA	32 600	35 239	<b>92.5</b>	<b>95.9</b>
	Australia	307 218	326 020	<b>94.2</b>	<b>96.5</b>

There are 33 Local Government Areas (LGAs) in the metropolitan Perth region. **Table 4** shows the percentage of children up to date in each age cohort by LGA in 2017.

Immunisation coverage was at or above 90% in all three age cohorts in the following 6 or 18% of metropolitan Perth LGAs, namely, City of Armadale, Town of East Fremantle, Town of Kwinana, Town of Mosman Park, Shire of Serpentine-Jarrahdale, and City of Wanneroo. Notably, the City of Wanneroo has the highest number of children of all the metropolitan LGAs.

Immunisation coverage was below 90% in all three age cohorts in the following four LGAs: City of Belmont, Shire of Mundaring, Shire of Peppermint Grove and City of South Perth. In these settings, spread of vaccine-preventable diseases is facilitated due to inadequate herd immunity.

Immunisation coverage below 90% is shown in **red**, coverage in the range of 90% to <95% is shown in **blue**, and coverage of 95% and above is shown in **black**. No LGA achieved the benchmark of 95% or above in all or even two age categories. Only three LGAs achieved the national benchmark for a single age cohort: Town of Bassendean (1 year-olds), Town of Claremont (1 year-olds) and Serpentine-Jarrahdale (5 year-olds).

**Table 4: Immunisation coverage by LGA and age cohort in 2017**

Local Government Area (LGA)	Age	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)
<b>Armadale</b>	1 year	1495	1581	94.6
	2 years	1387	1540	90.1
	5 years	1348	1430	94.3
<b>Bassendean</b>	1 year	209	220	95.0
	2 years	177	209	84.7
	5 years	193	207	93.2
<b>Bayswater</b>	1 year	875	929	94.2
	2 years	774	863	89.7
	5 years	720	771	93.4
<b>Belmont</b>	1 year	554	679	81.6
	2 years	501	579	86.5
	5 years	493	565	87.3
<b>Cambridge</b>	1 year	258	280	92.1
	2 years	219	246	89.0
	5 years	352	387	91.0
<b>Canning</b>	1 year	1155	1228	94.1
	2 years	1050	1171	89.7
	5 years	1227	1312	93.5
<b>Claremont</b>	1 year	89	93	95.7
	2 years	79	91	86.8
	5 years	104	111	93.7
<b>Cockburn</b>	1 year	1549	1658	93.4
	2 years	1382	1577	87.6
	5 years	1463	1578	92.7
<b>Cottesloe</b>	1 year	47	53	88.7
	2 years	72	82	87.8
	5 years	57	63	90.5
<b>East Fremantle</b>	1 year	60	66	90.9
	2 years	69	75	92.0
	5 years	92	102	90.2

Local Government Area (LGA)	Age	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)
<b>Fremantle</b>	1 year	339	375	90.4
	2 years	279	319	87.5
	5 years	262	294	89.1
<b>Gosnells</b>	1 year	1713	1832	93.5
	2 years	1687	1887	89.4
	5 years	1759	1891	93.0
<b>Joondalup</b>	1 year	1729	1841	93.9
	2 years	1710	1908	89.6
	5 years	1918	2085	92.0
<b>Kalamunda</b>	1 year	646	692	93.4
	2 years	624	698	89.4
	5 years	676	749	90.3
<b>Kwinana</b>	1 year	728	770	94.6
	2 years	706	782	90.3
	5 years	663	710	93.4
<b>Mandurah</b>	1 year	769	833	92.3
	2 years	728	817	89.1
	5 years	831	896	92.8
<b>Melville</b>	1 year	971	1050	92.5
	2 years	995	1119	88.9
	5 years	1127	1231	91.6
<b>Mosman Park</b>	1 year	69	75	92.0
	2 years	86	94	91.5
	5 years	91	99	91.9
<b>Mundaring</b>	1 year	340	385	88.3
	2 years	339	393	86.3
	5 years	405	457	88.6
<b>Murray</b>	1 year	233	254	91.7
	2 years	248	276	89.9
	5 years	293	315	93.0

Local Government Area (LGA)	Age	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)
<b>Nedlands</b>	1 year	156	168	92.9
	2 years	153	178	86.0
	5 years	221	244	90.6
<b>Peppermint Grove</b>	1 year	14	18	77.8
	2 years	<10	13	61.5
	5 years	11	14	78.6
<b>Perth</b>	1 year	187	203	92.1
	2 years	147	167	88.0
	5 years	91	117	77.8
<b>Rockingham</b>	1 year	1966	2086	94.3
	2 years	1804	2035	88.7
	5 years	2059	2213	93.0
<b>Serpentine-Jarrahdale</b>	1 year	483	512	94.3
	2 years	430	476	90.3
	5 years	439	457	96.1
<b>South Perth</b>	1 year	397	442	89.8
	2 years	406	456	89.0
	5 years	358	408	87.8
<b>Stirling</b>	1 year	2768	2966	93.3
	2 years	2544	2910	87.4
	5 years	2432	2710	89.7
<b>Subiaco</b>	1 year	197	212	92.9
	2 years	179	208	86.1
	5 years	203	229	88.7
<b>Swan</b>	1 year	2133	2254	94.6
	2 years	1940	2162	89.7
	5 years	2046	2167	94.4
<b>Victoria Park</b>	1 year	458	485	94.4
	2 years	374	433	86.4
	5 years	335	386	86.8

Local Government Area (LGA)	Age	No. of fully vaccinated children	Total children in region	Immunisation coverage (%)
<b>Vincent</b>	1 year	387	420	92.1
	2 years	344	383	89.8
	5 years	340	369	92.1
<b>Wanneroo</b>	1 year	3039	3205	94.8
	2 years	2773	3059	90.7
	5 years	2954	3175	93.0
<b>Waroona</b>	1 year	49	53	92.5
	2 years	41	51	80.4
	5 years	32	37	86.5

## MCDC role

MCDC plays an active role in immunisation in the Perth metropolitan area. The service provides education to medical and nursing staff in hospitals and in general practice; takes an active part in the planning and delivery of the annual WA DOH healthcare worker influenza vaccination campaign, including immunisation of staff; provides immunisation clinics as required when outbreaks of vaccine preventable diseases occur at schools or workplaces; monitors and facilitates immunisation catch ups for Aboriginal children; manages cold chain breaches; and devises immunisation catch up plans for children when requested by general practices. With the introduction of 'No jab, no pay' legislation in January 2016, the number of catch ups has continued to increase substantially in the last 12 months. Moreover, staff at MCDC provide phone advice in relation to immunisation and disease control issues, attending to over 1000 incoming calls per month.

## Immunisation catch ups

MCDC provided general practices with catch-up plans for 1446 metropolitan children in 2017. Children overdue for their vaccinations or not vaccinated at all are missing out on protection from vaccine preventable diseases. Furthermore, there is a risk of spread of highly infectious diseases such as measles if the immunity in the population is below a threshold level.

The written catch-up plans for overdue or unvaccinated children also include information on the correct spacing between doses. For children born overseas now living in WA, MCDC ensures vaccines administered abroad are added to the AIR. This process also supports families whose children have been identified as not fully immunised, so that they can access Commonwealth government family payments.

During the year, MCDC provided 16 education sessions to over 300 practice nurses to assist general practice staff in planning immunisation catch ups for their overdue patients aged <20 years. These sessions were delivered in partnership with the WA Primary Health Alliance (WAPHA).

## Cold chain breaches

A vaccine cold chain breach occurs when vaccine storage temperatures have been outside the recommended range of +2C to +8C (Strive for 5, 2013). In such instances, vaccine safety and efficacy needs review.

In 2017, 492 cold chain breaches were reported to MCDC. General practice and other immunisation service providers are required to report cold chain breaches to MCDC as part of their supply agreement with the WA DOH for government funded vaccines. Depending on the nature of the breach and the vaccines involved, outcomes can include no action, reducing the expiry date, or discarding vaccines, as well as advice on appropriate temperature monitoring and equipment. MCDC provides this advice to ensure that vaccines retain safety and potency, while minimising costly wastage of vaccines, where possible.

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