Government of **Western Australia**
North Metropolitan Health Service
Mental Health, Public Health and Dental Services

Epidemiology of notifiable infectious diseases in metropolitan Perth

Annual report 2021

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Epidemiology of notifiable infectious diseases in metropolitan Perth: Annual report 2021.

Metropolitan Communicable Disease Control

Mental Health, Public Health and Dental Services

North Metropolitan Health Service

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.

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). The use of the term 'Aboriginal' within this document refers to Australians of both Aboriginal and Torres Strait Islander people. Within Western Australia, the term Aboriginal is used in preference to Aboriginal and Torres Strait Islander, in recognition that Aboriginal people are the original inhabitants of Western Australia. No disrespect is intended to our Torres Strait Islander colleagues and community.

Metropolitan Communicable Disease Control would like to acknowledge the assistance of medical, nursing and scientific staff working in general practices, hospitals and laboratories, for their assistance with public health follow-up of persons with notifiable diseases, and their essential contributions to prevention and control of communicable diseases in the Perth metropolitan area.

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Suggested citation:

Metropolitan Communicable Disease Control. Epidemiology of notifiable infectious diseases in metropolitan Perth: Annual report 2021. Perth (Australia): North Metropolitan Health Service; 2022.

Contents

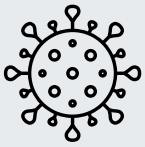
Executive summary

Metropolitan Communicable Disease Control (MCDC) is responsible for the public health management of notifiable infectious diseases in metropolitan Perth. This report is to inform health care providers and stakeholders about local trends in communicable disease epidemiology in 2021 and highlight related public health actions and issues requiring attention.

21 756 infectious disease notifications in metropolitan Perth in 2021; down 5.9%

On the rise: Syphilis

94.4% of 12-month-olds fully immunised in metropolitan Perth; benchmark 95%



Newly notifiable: Invasive Group A Streptococcus Respiratory Syncytial Virus

COVID-19 and its impacts

- In 2021, there were **227 notifications of COVID-19** in metropolitan Perth, 65% of which were acquired overseas and 15.4% were acquired at sea.
- The **COVID-19 pandemic response continued in WA**, with a goal of total elimination. This response included detailed contact tracing, social restrictions, border closures, and initiation of the COVID-19 vaccination program.
- **COVID-19 public health measures** continued to lessen the impact of some other notifiable communicable diseases, as seen in the decline in influenza, measles and pertussis notifications, and potential rabies exposures.

Sexually-transmitted infections and blood-borne viruses

- **Infectious syphilis notifications continued to increase**, including among pregnant women, people experiencing homelessness, and women of childbearing age.
- MCDC continued to respond to the **syphilis outbreak in metropolitan Perth** using a collaborative and coordinated approach involving multiple stakeholders.
- The number of **chlamydia notifications increased** in 2021, while gonorrhoea notifications decreased slightly for the second consecutive year.
- Notifications of **new Hepatitis C infections were steady** in 2021 compared to 2020, whereas newly-acquired hepatitis B notifications declined.

New, emerging, and vaccine-preventable diseases

- **Invasive meningococcal disease remained steady**, with no change in the number of notifications overall, and serogroups W135 and Y remaining the predominant strains.
- **Acute post-streptococcal glomerulonephritis (APSGN)** was notified for first time in metropolitan Perth, having been made notifiable in 2017.
- Both **invasive group-A streptococcus (iGAS) and respiratory syncytial virus (RSV) were made notifiable** in July 2021; iGAS has required substantial public health input.
- Childhood immunisation plays a fundamental role in prevention of communicable diseases. Despite the challenges of COVID-19 for healthcare providers and the community, **immunisation coverage was maintained at close to 95% for one year olds in metropolitan Perth**. Coverage remains lower in 24-month olds (92.1%) and 60-month olds (93.8%). MCDC implemented several projects in 2021 to increase coverage in priority populations.

Background

Purpose

The aim of this annual report is to inform healthcare providers and other stakeholders about important trends in notifiable infectious diseases in metropolitan Perth in 2021. The **Metropolitan Communicable Disease Control (MCDC)** team was established on 1 July 2016 and has responsibility for the public health management of notifiable diseases for the **East, North** and **South Metropolitan Health Services (EMHS, NMHS, SMHS)**. Related information, including childhood immunisation rates and post-exposure prophylaxis for rabies and Australian Bat Lyssavirus infection, is also presented.

Notifiable diseases

Under the Public Health Act 2016[1] (Part 9), any medical practitioner or nurse practitioner attending a patient who is known, or suspected, to have a notifiable infectious disease or related condition has a legal obligation to report it to the **Western Australian Department of Health (WA DOH)**. Similar obligations apply to pathology laboratories where test results indicate a notifiable disease or related condition.

Information on persons with notifiable diseases and related conditions is entered into the **Western Australian Notifiable Infectious Diseases Database (WANIDD)**, except for **Human Immunodeficiency Virus (HIV)** infection, antibiotic resistant organisms, acute rheumatic fever and rheumatic heart disease, for which separate databases are maintained. Communicable disease notifications are used to inform disease surveillance, public health management, policy and interventions, and enhance prevention and control of these diseases. A list of current notifiable infectious diseases and related conditions in **Western Australia (WA)**, along with case definitions, fact sheets, guidelines and data, is available online.[2]

Data sources

Notification data

Notifiable diseases data for metropolitan Perth and WA were extracted from WANIDD on 27 July 2022 and are subject to revision. Data were retrieved using an **optimal date of onset of disease** (ODOO) from 1 January 2021 to 31 December 2021. 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 2021 to 31 December 2021. National notification rates for 2021 were provided by the **National Notifiable Diseases Surveillance System** (NNDSS)[3], which is maintained by the Australian Government Department of Health and Ageing, on 4 August 2022. Summary statistics for enteric disease outbreaks in the metropolitan area in 2021 were cross-referenced with OzFoodNet, a program unit within CDCD that is responsible for enteric disease surveillance in WA. Aggregate COVID-19 data for metropolitan Perth were provided by **Public Health**

[1] Government of Western Australia, Department of Justice. Western Australian Legislation – Public Health Act 2016 [accessed 1 September 2022] https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_13791_homepage.html

[2] Government of Western Australia, Department of Health. Notification of infectious diseases and related conditions [accessed 1 September 2022] https://ww2.health.wa.gov.au/Articles/N_R/Notification-of-infectious-diseases-and-related-conditions

[3] Australian Government, Department of Health. National Notifiable Diseases Surveillance System [accessed 1 September 2022] http://www9.health.gov.au/cda/source/cda-index.cfm

Operations (PHOps) on 29 August 2022 using an ODOO from 1 January 2021 to 31 December 2021, with suppression of data where the number of individuals was less than five. Publicly available data on the daily and cumulative COVID-19 case counts for WA for 2021 were obtained from the COVID Live website[4], which collates the COVID-19 data from media releases verified against state and federal health departments. Publicly available media releases were also used to report on the COVID-19 outbreaks in metropolitan Perth in 2021.

Population data

Projected population data for metropolitan Perth and for the state of WA, as well as Aboriginal-specific population projections, were received from the Epidemiology Branch, Public and Aboriginal Health Division, WA DOH.[5] Overall population estimates for 2021 in metropolitan Perth and WA were 2 102 973 and 2 573 529 respectively.

Immunisation data

The **Australian Immunisation Register (AIR)** provides quarterly reports of immunisation coverage for three age groups: 12-<15 months, 24-<27 months, and 60-<63 months. Approval was provided by the AIR Data Steward for usage of this data from the quarterly reports for 2021 under the condition that data suppression rules for AIR data releases were complied with to protect the privacy of individuals (see Appendix 2).[6]

CDCD provided collated data on vaccine wastage and rabies post-exposure prophylaxis for 2021.[7] Vaccine wastage data for quarters 1 and 2 of 2021 were provided by CDCD, however data for quarters 3 and 4 were not available at the time this report was completed.

[4] COVID Live [accessed 8 October 2022] https://covidlive.com.au/
[5] Wendy Sun (personal communication), Epidemiology Branch, Public and Aboriginal Health Division, WA DOH, on 04 July 2022.
[6] AIR Data (personal communication), AIR Stewardship, Data Quality and Use, Immunisation and Communicable Disease Branch, Population Health Division, Primary and Community Care Group, Department of Health and Aged Care, Australian Government, on 13 September 2022.
[7] Vaccine Orders (personal communication), Vaccine Management, Immunisation Program, Communicable Disease Control Directorate, Department of Health, on 25 July 2022.

Overview of notifiable diseases

In metropolitan Perth, 21 756 notifications were received by MCDC for notifiable diseases in 2021. This was a 5.9% decrease from the 23 120 notifications received in 2020.

The relative proportion of notifications by disease category is demonstrated by **Figure 1** below. Sexually transmitted infections were the largest contributor to disease notifications in metropolitan Perth, accounting for 51.6% of the total notifications received in 2021. Except for the 'other diseases' category (which included two newly-notifiable diseases in 2021), the number of notifications for the rest of the disease categories in 2021 were below the five year average (for years 2016 to 2020).

Compared with 2020, there were increases in the number of notifications for blood-borne viruses, vector-borne diseases, and 'other diseases' categories in 2021. The largest increase was seen in the vector-borne diseases category, with a 22.7% increase from 322 notifications in 2020 to 395 notifications in 2021. Decreases were observed for the number of notifications in enteric, sexually transmitted, vaccine-preventable, and zoonotic diseases categories in 2021. The enteric diseases category had the largest reduction in notifications, with a 22.7% decrease from 4298 notifications in 2020 to 3 321 notifications in 2021.

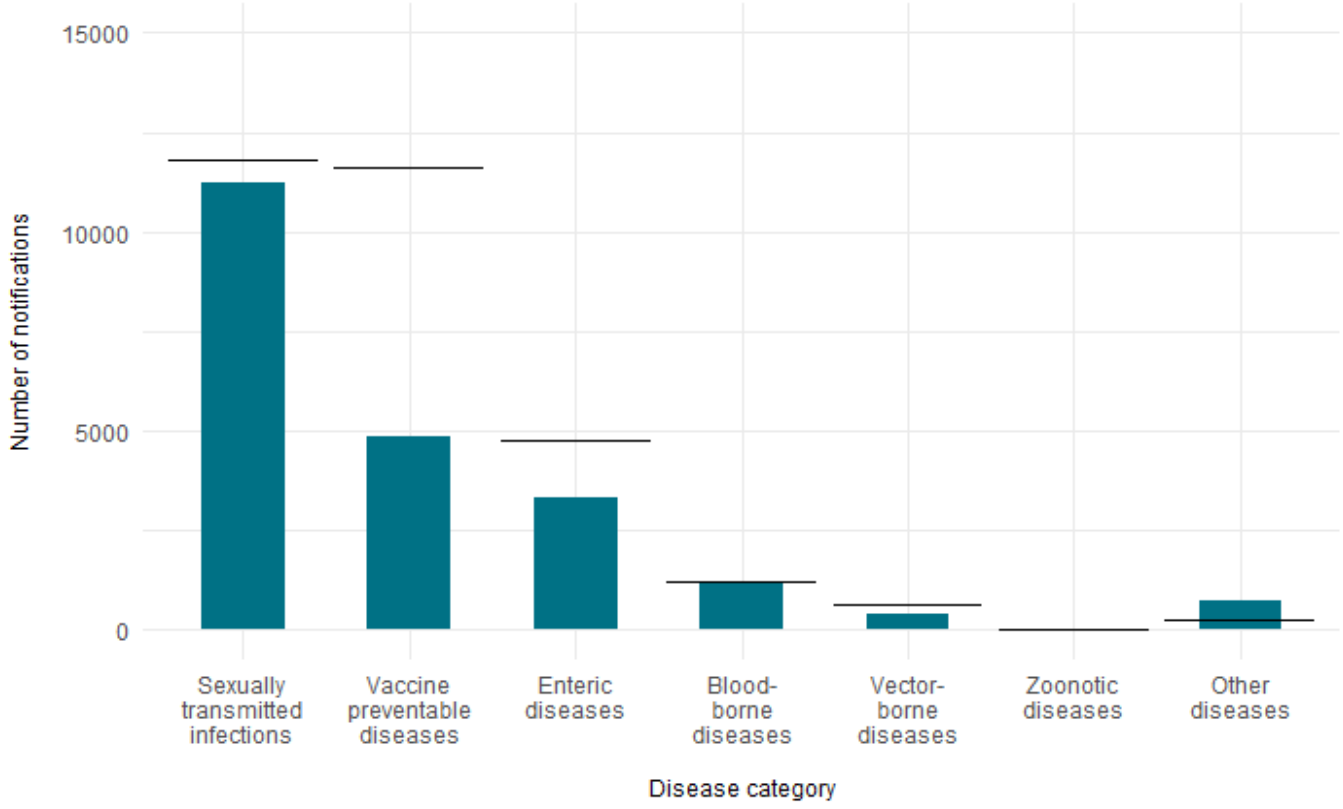


Figure 1: Number of notifications by disease category in 2021 (blue). The black lines represent the average number of notifications across 5 years (2016 to 2020) by disease category.

The total number of notifications for each disease notified in metropolitan Perth between 2017 and 2021 is presented below in **Table 1**. The 2021 crude notification rates for each disease are also presented and compared with the crude state and national rates where available. Of note, metropolitan Perth had disproportionately higher rates of newly acquired Hepatitis C in 2021, compared with the rest of WA and Australia. Rates of Shiga toxin-producing E. coli (STEC) were also higher in WA overall, compared with elsewhere in Australia. Communicable disease notification data by geographical health service area is presented in **Appendix 1**.

Table 1: Metropolitan Perth notifications (numbers) 2017 – 2021 & 2021 metropolitan, WA & national crude notification rates.

Notifiable disease	Number of notifications per year					2021 notification rate per 100 000 population		
	2017	2018	2019	2020	2021	Metro	WA	National
Blood-borne viruses								
Hepatitis B (newly acquired)	13	20	16	11	7	0.3	0.3	0.3
Hepatitis B (unspecified)	427	394	373	423	405	18.9	20.1	19
Hepatitis C (newly acquired)	94	97	89	73	73	3.4	2.9	2.9
Hepatitis C (unspecified)	774	658	600	611	697	32.5	35.1	26.9
Hepatitis D	2	7	10	2	9	0.4	0.4	0.3
Enteric diseases								
Campylobacteriosis	2679	2729	2881	2283	2437	113.5	118.3	149.3
Cholera	1	0	0	0	0	0	0	0
Cryptosporidiosis	292	65	122	425	53	2.5	5	7.2
Hepatitis A	10	11	22	5	1	0	0	0.1
Hepatitis E	4	2	4	3	0	0	0	0
Listeriosis	6	5	7	6	4	0.2	0.2	0.2
Paratyphoid fever	4	9	9	0	0	0	0	0
Salmonellosis	1999	1602	1699	1369	639	29.8	35.1	41.8
Shiga toxin-producing E.coli	44	79	119	80	83	3.9	4	2.4
Shigellosis	56	123	277	103	38	1.8	3.7	1.8
Typhoid fever	19	12	18	7	1	0	0.1	0.1
Vibrio parahaemolyticus	18	14	12	3	33	1.5	1.5	NN
Yersiniosis	14	10	22	14	32	1.5	1.4	NN
Sexually transmitted infections								
Chlamydia	8978	9016	9176	8395	8721	406.1	411.3	339.5
Lymphogranuloma venereum	8	5	2	3	0	0	0	NN
Gonorrhoea	2177	2327	2912	2286	1871	87.1	109.7	104.3
Syphilis (congenital)	0	1	0	3	1	0	0.2	0.1
Syphilis (infectious)	242	311	333	465	477	22.2	31.6	23
Syphilis (non-infectious)	137	168	154	179	159	7.4	9.2	7
Vaccine-preventable diseases								
Diphtheria	1	0	0	0	0	0	0	0
Haemophilus influenzae type B	0	0	1	1	0	0	0	0.1
Influenza	4475	4663	18468	981	19	0.9	1.2	2.9
Measles	16	33	42	4	0	0	0	0
Meningococcal disease (invasive)	34	23	12	5	5	0.2	0.4	0.3
Mumps	19	17	17	7	0	0	0	0.1
Pertussis	1037	916	440	99	40	1.9	1.8	2.1
Pneumococcal disease (invasive)	127	124	150	73	108	5	6.9	5.2
Rotavirus	327	220	443	154	531	24.7	26.8	10
Rubella	2	1	1	1	2	0.1	0.1	0
Tetanus	0	1	0	1	1	0	0	0
Varicella-Zoster	3436	3580	3420	3977	4150	193.2	192.8	129

Vector-borne diseases								
Murray Valley encephalitis virus	0	1	0	0	0	0	0	0
Japanese encephalitis virus	0	1	0	0	0	0	0	0
Barmah Forest virus	11	7	5	3	4	0.2	0.9	1.5
Chikungunya virus	9	1	9	3	0	0	0	0
Dengue virus	149	118	275	48	0	0	0	0
Malaria	49	44	52	22	9	0.4	0.4	0.2
Rickettsial disease (typhus)	11	10	20	9	7	0.3	0.8	NN
Ross River Virus	609	347	261	237	375	17.5	26.5	12
Zika virus	1	1	0	0	0	0	0	NN
Zoonotic diseases								
Brucellosis	0	0	0	0	0	0	0	0.1
Leptospirosis	1	5	4	0	0	0	0.1	1.1
Psittacosis	1	0	0	0	0	0	0	0.1
Q Fever	5	6	3	2	1	0	0.1	2
Other diseases								
Botulism	0	0	0	0	0	0	0	0
Creutzfeldt-Jakob disease	4	6	7	7	5	0.2	0.2	NN
COVID-19	NN	NN	0	543	227	10.6	14.3	2088.8
Haemolytic uraemic syndrome	3	0	0	0	2	0.1	0.1	0
Legionellosis	30	37	29	60	47	2.2	2.7	2.2
Leprosy	1	1	1	3	3	0.1	0.1	0.1
Melioidosis	3	2	2	0	2	0.1	0.3	NN
Tuberculosis	115	115	127	131	131	6.1	5.3	5.7
Invasive Group A Streptococcus	NN	NN	NN	NN	12	0.6	0.7	0.9
Acute Post-Streptococcal Glomerulonephritis	0	0	0	0	4	0.2	0.4	NN
Respiratory Syncytial Virus	NN	NN	NN	NN	330	15.4	18.4	6

Grey bars highlight diseases of interest in 2021.

Data retrieved from WANIDD; disease rows were excluded where no cases occurred locally, state-wide and nationally in the past 5 years. Data for rheumatic heart disease, antibiotic resistant organisms and HIV are collected and managed separately; NN=not notifiable. Varicella-Zoster includes chickenpox and shingles as well as those unspecified. From July 2018, the case definitions for shigella and rotavirus were altered; the former contributing to a larger number of notifications, and the latter having no substantial impact on number of notifications. From September 2018, the case definition for pertussis was made more stringent. From June 2021, Invasive Group A Streptococcal and Respiratory Syncytial Virus were added as notifiable diseases. Acute Post-Streptococcal Glomerulonephritis has been notifiable from September 2017 however no notifications were received for metropolitan Perth until 2021.

Sustained focus on eliminating COVID-19

A new strain of coronavirus, later termed SARS-CoV-2, emerged in January 2020. Initially identified as the cause of a viral pneumonia cluster in Wuhan in China, COVID-19 cases were soon reported across a number of different countries, including Australia. The first locally acquired confirmed case of COVID-19 in WA was diagnosed on 7 March 2020. A worldwide pandemic of COVID-19 was declared by the **World Health Organisation (WHO)** on 11 March 2020. Soon after, WA declared a State of Emergency under the *Emergency Management Act 2005* from 16 March 2020. Throughout 2021, Public Health Operations (a dedicated team that emerged from MCDC) and the State Health Incident Coordination Centre continued to oversee the state-wide COVID-19 response.

There was a total of 300 COVID-19 cases diagnosed in WA in 2021 (**Figure 2**). Of these, 227 were among residents of metropolitan Perth. The remainder were predominantly non-WA residents, such as overseas travellers and maritime workers arriving in Perth. Approximately 3.5% of notifications were among Aboriginal people. Overall, six of the COVID-19 cases were hospitalised in 2021, with the number of cases admitted to intensive care unit (ICU) and the number of deaths both less than five.

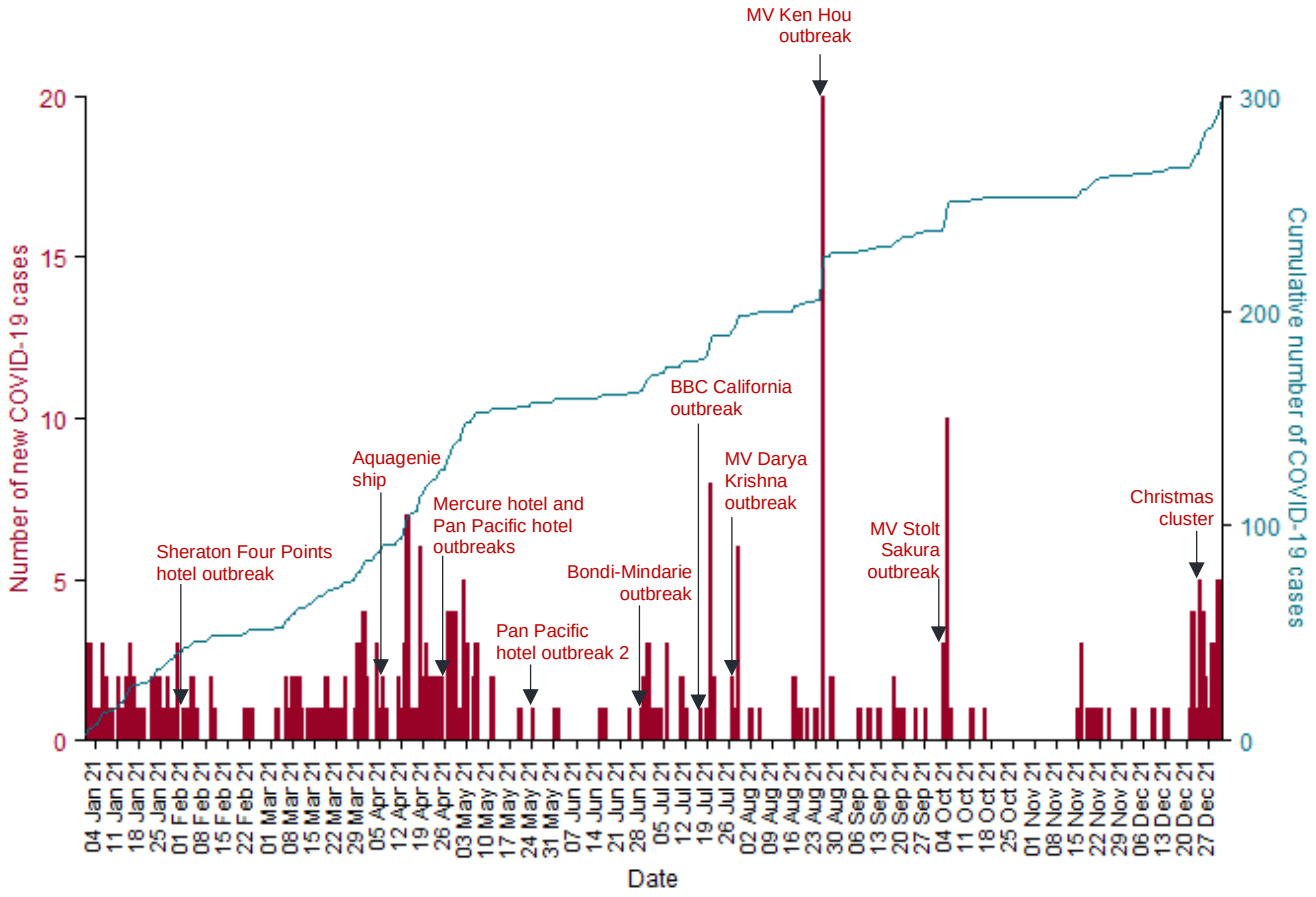


Figure 2: Number of COVID-19 cases in WA in 2021; bar plot shows the number of new cases daily on the specified date (left y axis) and line plot shows the cumulative number of cases for 2021 on the specified date (right y axis). Major COVID-19 outbreaks in 2021 labelled with arrows, MV = maritime vessel.

This year (2021) of the pandemic response was notable for:

- A focus on elimination of COVID-19, with high case ascertainment, high intensity responses to individual cases infectious in the community, detailed contact tracing efforts, and public health social measures that included 'lockdowns' and mask mandates;
- The introduction of new COVID-19 variants of concern (particularly Alpha and Delta, followed by Omicron toward the end of the year, **Figure 3**) into the Western Australian community;
- The staged rollout of vaccinations against COVID-19, initially Pfizer and AstraZeneca from February 2021, followed by Moderna in May 2021;
- The introduction of vaccine mandates for most Western Australians, particularly those in higher risk occupational groups, from November 2021; and
- Continued closure of WA borders to international travellers, as well as periodic closure to interstate travellers depending on caseloads in those jurisdictions, and the ongoing use of hotel quarantine.

There were 11 outbreaks of COVID-19 reported in 2021. Specifically, there were two community outbreaks, four hotel outbreaks, and five maritime vessel outbreaks.

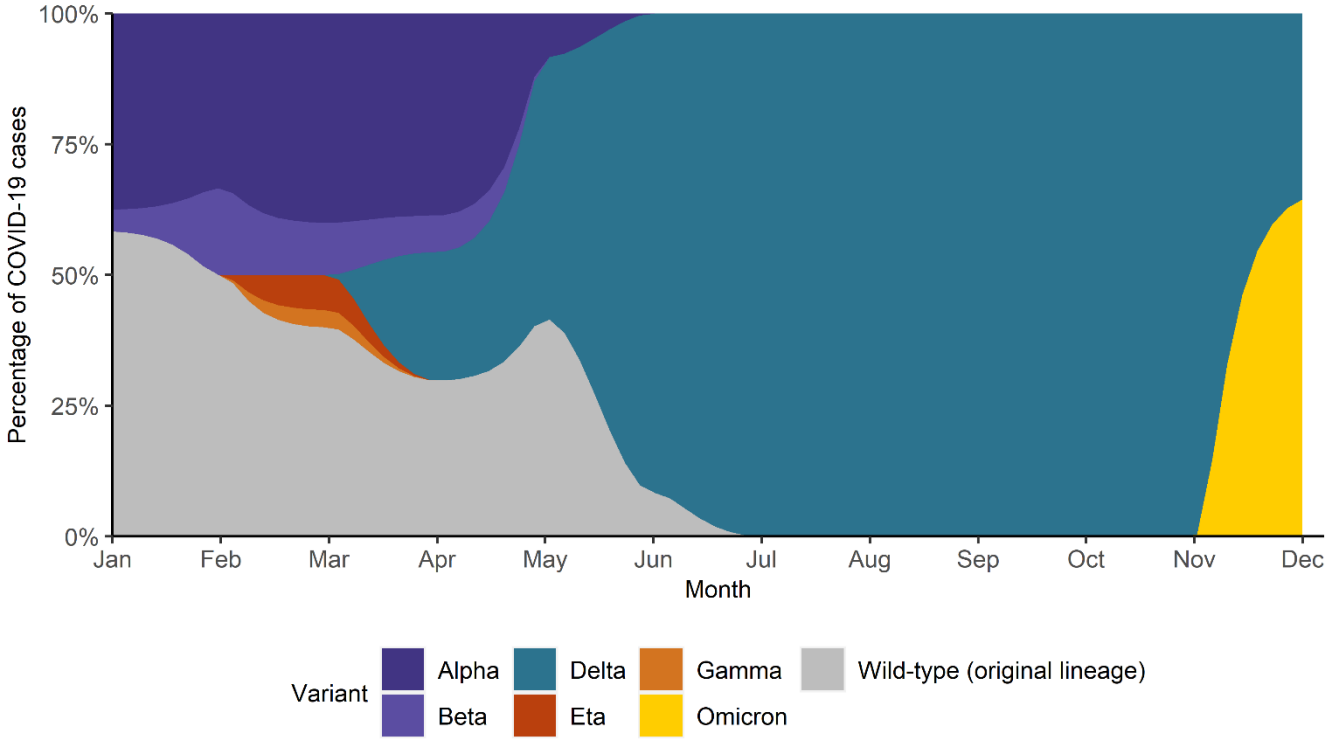


Figure 3: Schematic demonstrating the estimated prevalence of COVID-19 variants in Western Australia by month in 2021; approximation only. Based on COVID-19 update media releases for 2021 from WA DOH[8] and Outbreak.info[9], an open-source database of SARS-CoV-2 variant data.

[8] Government of Western Australia, Department of Health. Media releases [accessed 21 October 2022] https://ww2.health.wa.gov.au/News/Media-releases-listing-page.
[9] Gangavarapu K, Latif AA, Mullen JL, Alkuzweny M, Hufbauer E, Tsueng G, Haag E, Zeller M, Aceves CM, Zaiets K, Cano M, Zhou J, Qian Z, Sattler R, Matteson NL, Levy JI, Lee RT, Freitas L, Maurer-Stroh S, Suchard MA, Wu C, Su AI, Andersen KG, Hughes LD 2022, Outbreak.info genomic reports: scalable and dynamic surveillance of SARS-CoV-2 variants and mutations, medRxiv [accessed 21 October 2022] https://outbreak.info/

Sexually transmissible infections – increasing numbers and concerning subgroup trends

Syphilis notifications continue to rise

The number of infectious syphilis notifications in metropolitan Perth continued to increase with 477 notifications in 2021, a 2.6% increase from 2020 (**Figure 4**). A total of 107 827 tests for syphilis were performed in metropolitan Perth in 2021. This is in the context of the ongoing syphilis outbreak in metropolitan Perth, which was first declared in July 2020 by the WA Chief Health Officer. As part of the syphilis outbreak response, MCDC has delivered education sessions to health care providers; established a database for surveillance and management of all cases particularly those at highest risk; engaged with vulnerable and priority populations; collaborated on the King Edward Memorial Hospital's Syphilis in Pregnancy guidelines; advocated for increased routine testing including additional pregnancy screening; and facilitated multiagency case management meetings for pregnant cases and cases experiencing homelessness.

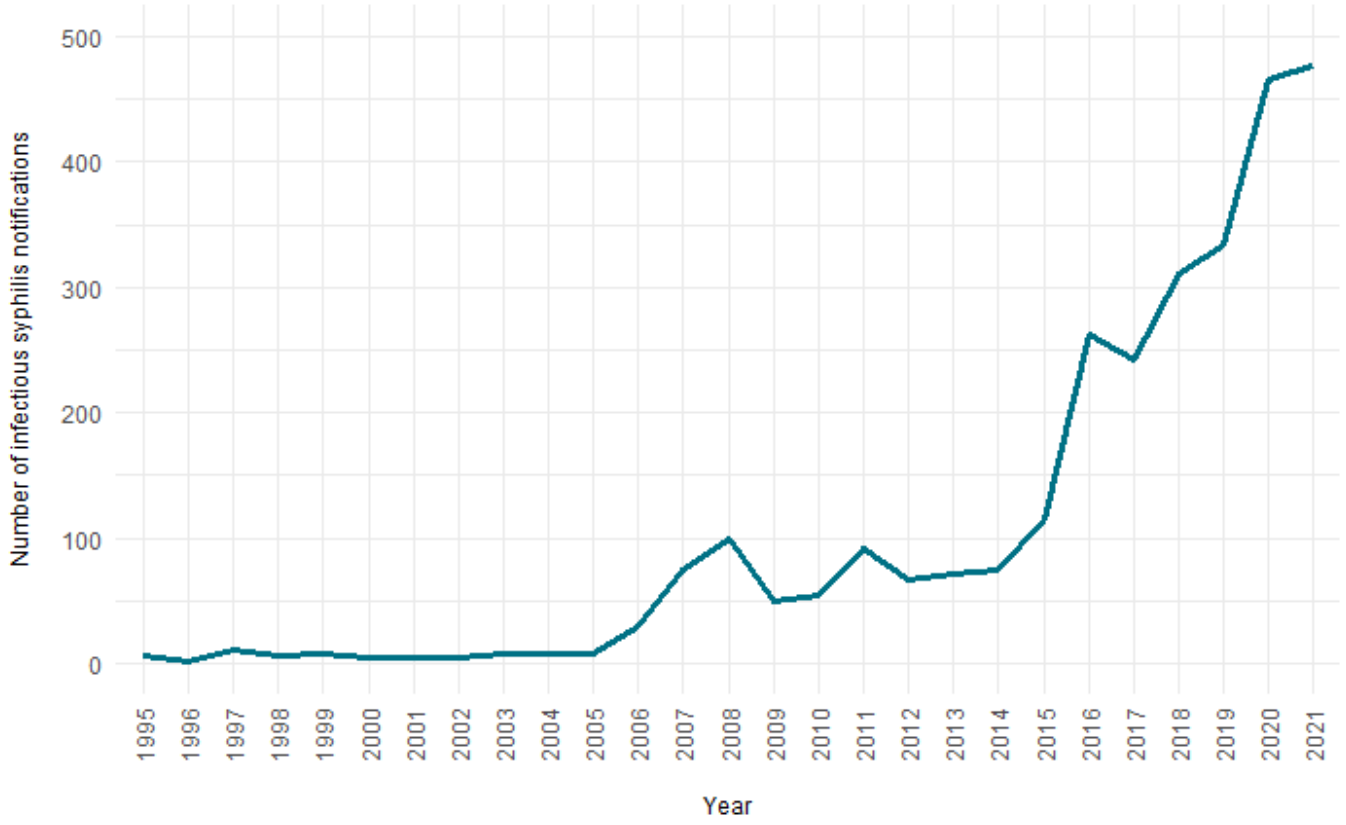


Figure 4: Number of notifications of infectious syphilis over time in metropolitan Perth.

MCDC undertakes extensive follow up of every syphilis notification, including reviewing of current and previous results from all laboratories in WA; liaising with regional public health units if previously notified to them; and collaborating with health professionals at the requesting clinic to clarify stage, pregnancy status for women of childbearing age, and to confirm appropriate treatment and contact tracing. For cases that are managed by **general practitioners (GPs)**, MCDC has the additional role of following up with infectious syphilis cases and their contacts to assess public health risk, to provide guidance on treatment, testing, and prevention. Extensive documentation is completed by MCDC staff including an enhanced surveillance form.

Syphilis continues to affect priority groups

In the ten years prior to 2016, syphilis in metropolitan Perth predominantly occurred among **men who have sex with men (MSM)** or returned travellers. In the current outbreak, vulnerable and priority groups are increasingly affected, including people experiencing homelessness, Aboriginal people, pregnant women, and women of child-bearing age (**Figure 5**).

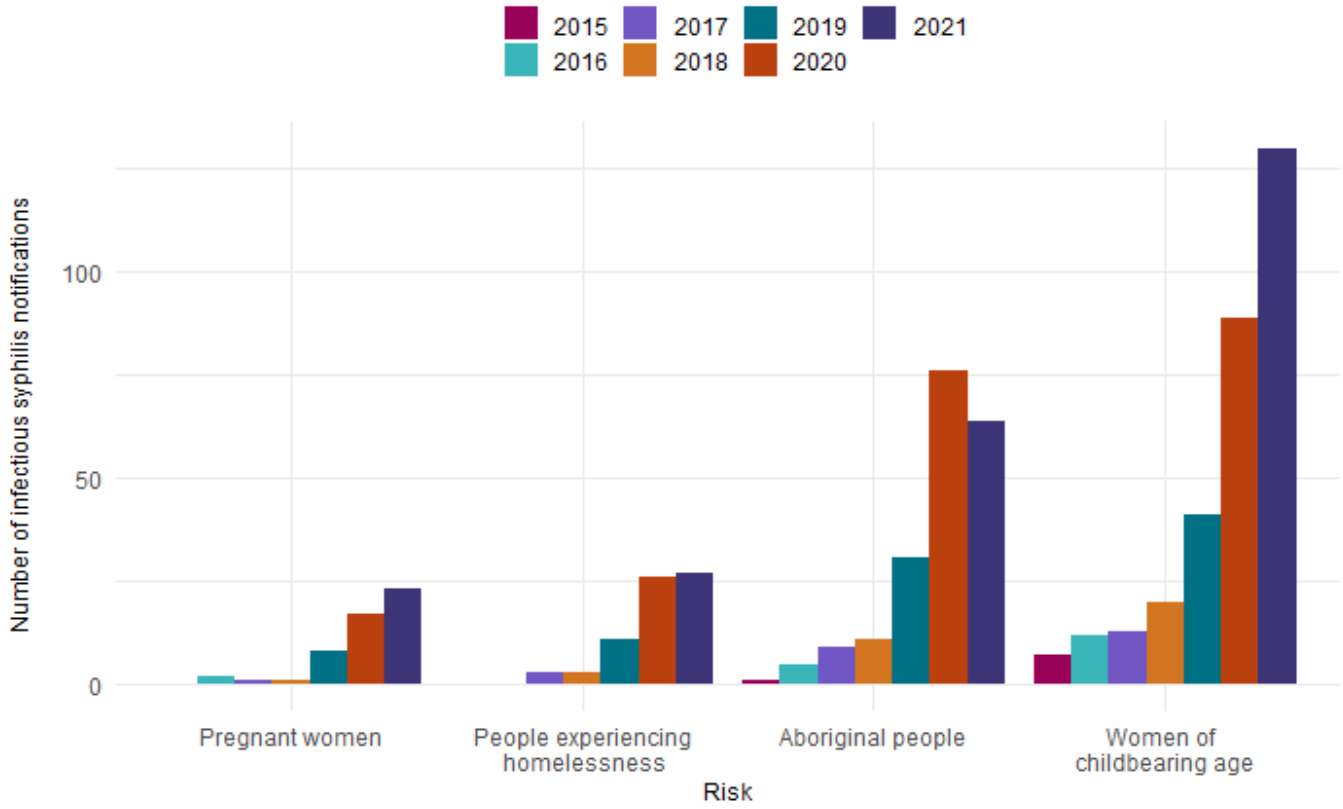


Figure 5: Number of infectious syphilis notifications among pregnant women, people experiencing homelessness, Aboriginal people, and women of childbearing age from 2015 to 2021 (categories are not mutually exclusive) in metropolitan Perth.

In 2021, there were 64 infectious syphilis notifications among Aboriginal people (13.4% of notifications), a 15.8% reduction compared to 76 notifications in 2020 (16.3%).

There were 27 infectious syphilis notifications among people experiencing homelessness (5.7% of notifications), compared to 26 notifications in 2020 (5.6%). There are additional complexities that complicate the management of infectious syphilis cases and their contacts in people experiencing homelessness. Difficulties can arise due to the lack of a regular doctor, challenges in contacting and locating cases, and complex social and medical histories, including co-morbid mental health concerns, substance use, or exposure to domestic violence. A series of case management meetings was initiated by MCDC in September 2020 specifically for people with syphilis who are experiencing homelessness. These meetings were set up as part of the syphilis outbreak response and often involve collaboration with many stakeholders, including public health, homeless health service organisations, sexual health specialists, and Aboriginal health services to enable coordination of management.

Syphilis during pregnancy

Women of childbearing age and women who are known or suspected to be pregnant are priority groups for syphilis management and follow up, due to the high risk of congenital syphilis to any current and/or future fetuses. Congenital syphilis is a serious condition that can result in

miscarriage, stillbirth and severe medical problems in the newborn, which can cause lifelong disability including organ, brain, and nerve damage, and bony and dental abnormalities. The risk of vertical transmission is particularly high in untreated primary and secondary syphilis (70% risk) and persists but at a lower level in untreated early latent (40%) and late latent (10%) syphilis, with a much smaller risk in tertiary syphilis.[10]

Congenital syphilis is of particular public health concern as it is preventable. Syphilis is part of the routine screening undertaken for all pregnant women at the antenatal booking visit and, since May 2021, routinely at 28 and 36 weeks (or at time of birth if delivery is before 36 weeks). Further screening is recommended at birth and six weeks post-partum in regional outbreak areas where syphilis notification rates per population are higher. The King Edward Memorial Hospital Syphilis in pregnancy guidelines are available online.

In 2021, the number of infectious syphilis notifications among women of childbearing age increased to 130 (27.2% of notifications), compared to 89 notifications in 2020 (19.1%). Women of childbearing age with suspected or confirmed syphilis should be considered for pregnancy testing, to enable early identification and protect the health of both mother and the child. MCDC follows up each case of infectious syphilis among women of childbearing age to determine pregnancy status and assist with treating and tracing.

Syphilis in pregnant women continues to be an issue in metropolitan Perth, with 23 women diagnosed with infectious syphilis whilst pregnant in 2021, compared to 17 women in 2020. MCDC has a role in active monitoring of pregnant women diagnosed with infectious and newly-diagnosed non-infectious syphilis for the length of the pregnancy; confirming effective treatment of pregnant cases and their partners to prevent reinfection; supporting antenatal clinic referrals and attendance; ensuring regular rapid plasma reagin (RPR) monitoring and follow up of results; and documentation of neonatal outcomes after delivery. As part of the syphilis outbreak response, MCDC initiated regular case management meetings specifically for pregnant women with syphilis in September 2020, enabling collaborative and coordinated engagement with clinicians involved in the management of pregnant women with syphilis and their neonates. The committee includes public health, sexual health specialists, midwives from the different maternal hospitals, obstetricians, paediatricians, neonatologists, clinical micrology, Aboriginal health services, and social workers.

A case of congenital syphilis

One case of congenital syphilis was notified in metropolitan Perth in 2021, which resulted in fetal death in utero. This case occurred in challenging circumstances, where antenatal care had been scarce and maternal syphilis was undiagnosed and untreated. This case highlights the importance of ensuring antenatal care including syphilis screening for pregnant women.

[10] Government of Western Australia, Women and Newborn Health Service. Syphilis in pregnancy [accessed 11 October 2022] https://www.kemh.health.wa.gov.au/~/media/HSPs/NMHS/Hospitals/WNHS/Documents/Clinical-guidelines/Obs-Gyn-Guidelines/Syphilis-in-Pregnancy.pdf?thn=0

Chlamydia notifications steadying, whilst gonorrhoea notifications may have peaked but remain well above historical average

There were 8721 notifications for chlamydia in 2021, a 3.9% increase from 2020, and 1 871 notifications for gonorrhoea in 2021, a 18.2% decrease compared to 2020 (**Figure 5**). The decrease in gonorrhoea notifications was observed despite an increase gonorrhoea testing in metropolitan Perth, from 144 504 tests in 2020, to 163 317 in 2021. The number of tests for chlamydia similarly increased with 167 305 tests in 2021 compared to 148 870 in 2020.

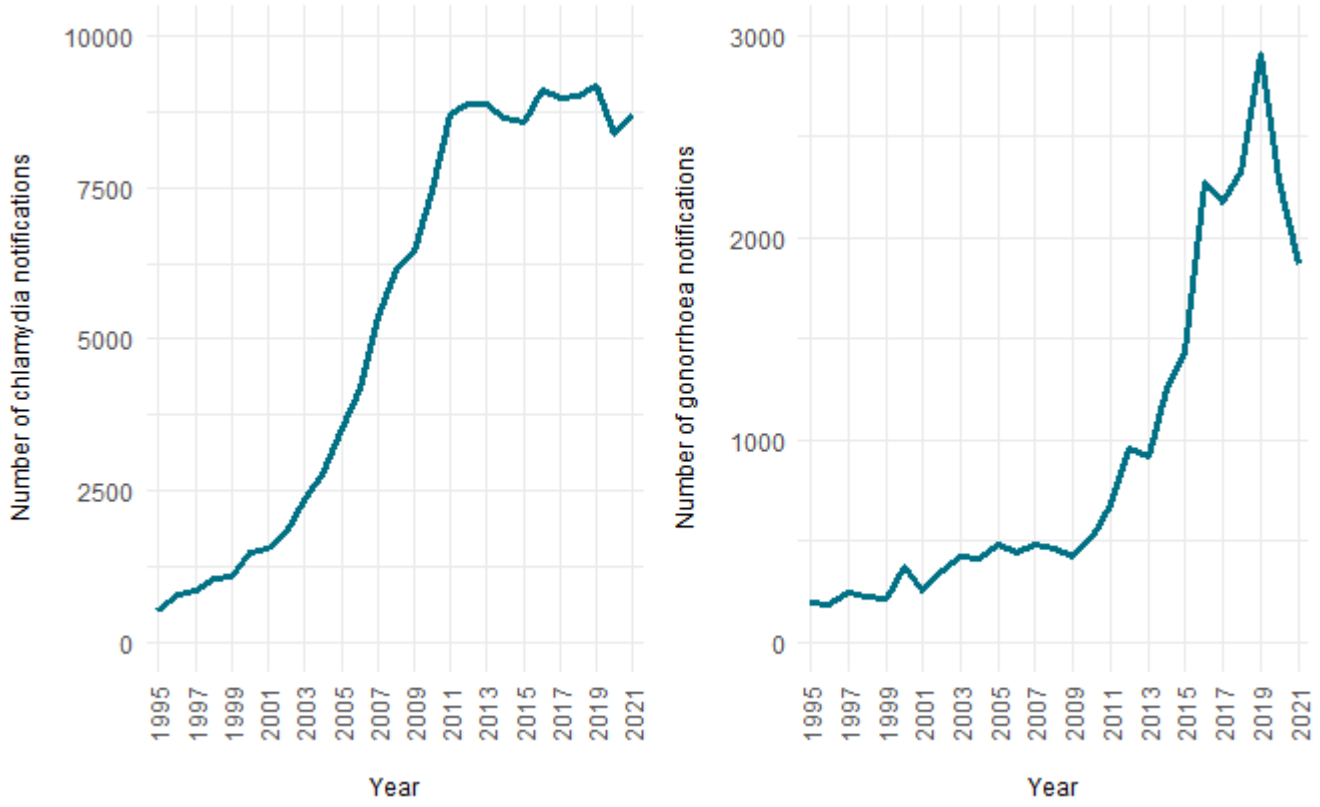


Figure 5: Number of chlamydia (left) and gonorrhoea (right) notifications over time in metropolitan Perth.

Co-infections with sexually transmitted infections

Co-infections with sexually transmitted infections are common, as people engaging in high risk sexual behaviours are at risk of contracting any infection that is sexually transmitted and even when treated are at risk of re-infection. In 2021, there were 518 people notified to MCDC for two or more notifiable STIs (excluding HIV which is not notified to MCDC) detected on specimens collected within three days of each other, accounting for 11 382 notifications in total. This was a 3.5% decrease from the 536 people notified for STI co-infections in 2020.

Seven of these people had two co-infections with STIs during the year, resulting in a total of 525 instances of co-infection with STIs in 2021 and accounting for 1060 notifications in total. Of the total occurrences of STI co-infections, 83.0% were for chlamydia and gonorrhoea, 9.5% were for chlamydia and syphilis, 4.2% were for gonorrhoea and syphilis, and 1.9% were for chlamydia, gonorrhoea and syphilis. The majority of cases were among young people, with 40.0% of occurrences of coinfections among people aged 20 to 29 years (**Figure 6**). 57.9% of occurrences of coinfections were among males and 15.2% occurrences were among Aboriginal people.

In the advent of growing antimicrobial resistance and growing re-infection risk, conducting a test of cure is of increasing importance for people with chlamydia and/or gonorrhoea. When one **sexually transmitted infection (STI)** is diagnosed, it is recommended that testing be undertaken for other STIs including syphilis serology (if not already arranged), as co-infections are common and are increasingly notified in metropolitan Perth.

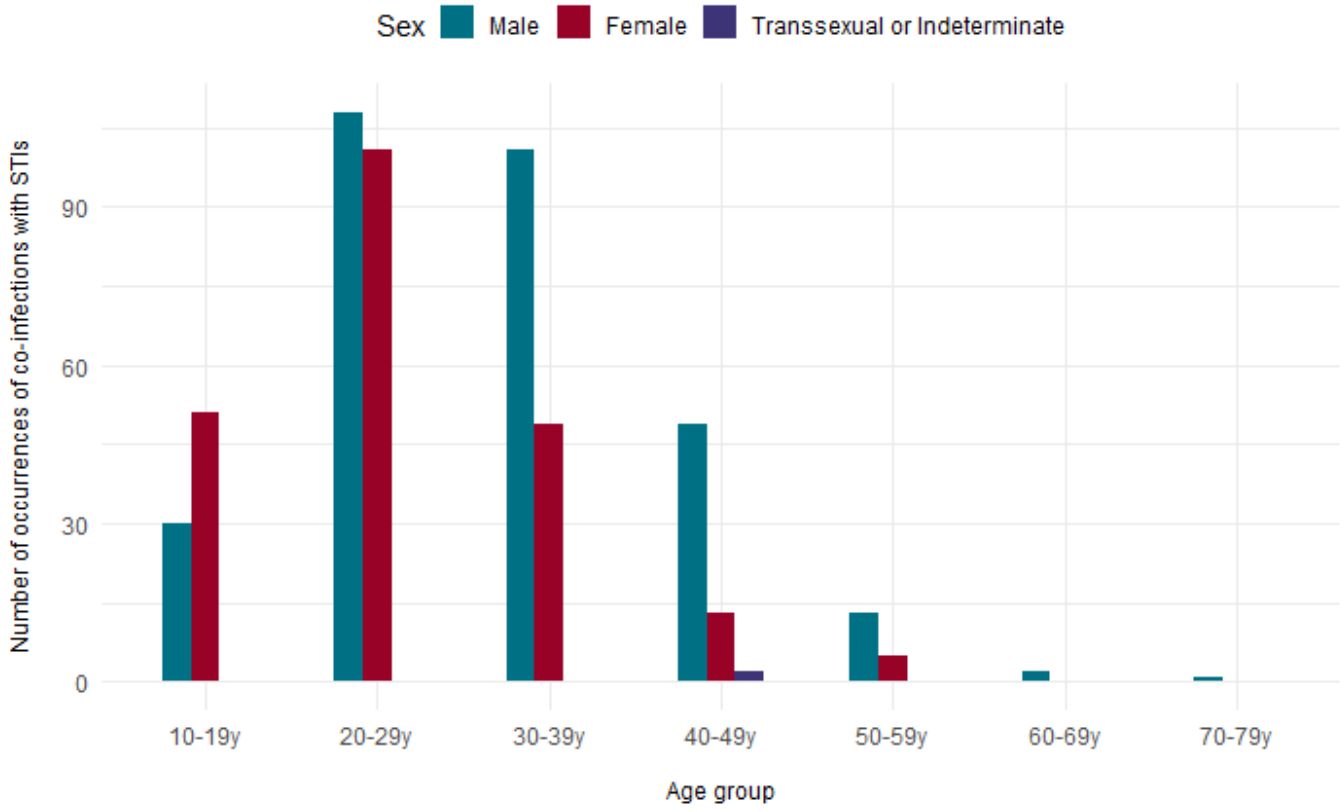


Figure 6: Number of occurrences of co-infections with STIs in metropolitan Perth in 2021 grouped by age group and sex.

The WA Silver Book provides recommendations on STI screening among different priority groups, providing guidance on the testing for combinations of STIs among people who are asymptomatic and opportunistic screening for other STIs among those people with genital symptoms (as opposed to testing for a single STI in isolation).

Sexual health specialist services have played an integral role both in the specialised management of people with STIs and in providing expert clinical guidance for many of the STI cases notified to MCDC.

Blood-borne viruses patterns changing

Hepatitis C – rates trending down

There were 770 notifications for hepatitis C virus in metropolitan Perth in 2021, a 12.6% increase from 2020 and a 22.0% decrease from 2016 (**Figure 7**) which is the year that new hepatitis C treatments became widely available in Australia. The recent hepatitis C treatments are effective, widely available and are low cost, however despite, this the proportion of people with chronic hepatitis C who have accessed treatment remains at 53% across Australia.[11] Part of the challenge is the disproportionate impact of hepatitis C among disadvantaged populations, including Aboriginal people, people with intravenous drug use, people experiencing homelessness, people who engage in high-risk sexual behaviour, and those incarcerated.

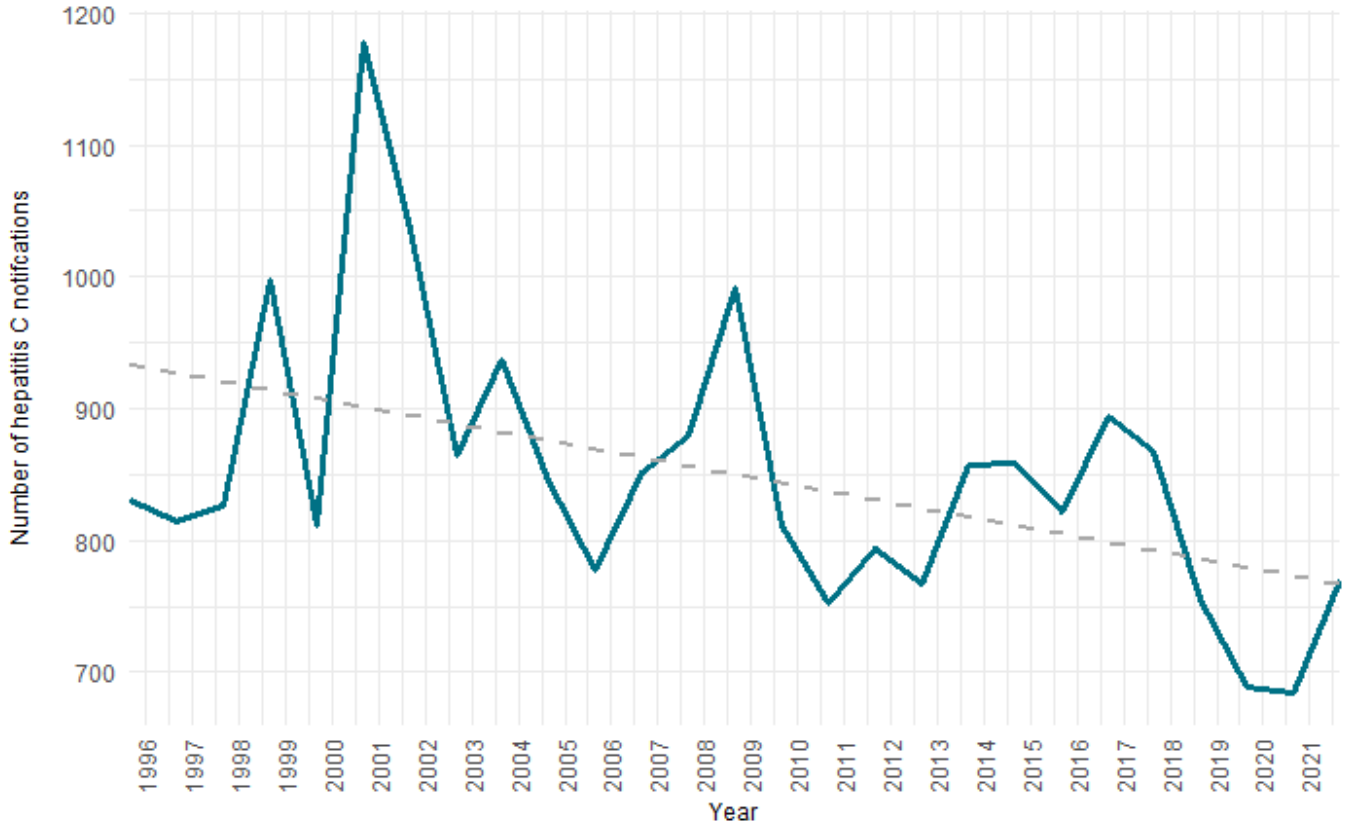


Figure 7: Number of hepatitis C notifications over time, 1995-2021; dashed line represents the trend (y axis commences at n=650) in metropolitan Perth.

Of the total hepatitis C notifications in 2021, 68.8% were men, 27.1% were Aboriginal people and 26.6% were in people tested while in the criminal justice system. There were 73 newly acquired hepatitis C notifications in 2021, which is steady from previous years. Among those newly infected, 72.6% were men and 42.5% were Aboriginal people. The median age at diagnosis for the newly acquired hepatitis C notifications was 38 years of age. Of the newly acquired hepatitis C notifications, 52.0% were for people within the criminal justice system at the time of notification, a reduction from 62% in 2020. The WA Department of Justice has a hepatitis C testing and treatment program which may contribute to the high levels of case ascertainment in that setting.

[11] The Kirby Institute. Monitoring hepatitis C treatment uptake in Australia (Issue 12) [accessed 11 October 2022] https://kirby.unsw.edu.au/report/monitoring-hepatitis-c-treatment-uptake-australia-issue-12-july-2022

Hepatitis B notifications declining

There were 412 notifications for hepatitis B in metropolitan Perth in 2021, a 28.1% decrease from the year 2000 when hepatitis B vaccination was introduced to the **National Immunisation Program (NIP)** infant schedule in Australia. Likely due to the success of the vaccination program, the number of notifications among people born in Australia has decreased substantially, from 93 in 2000, to 35 in 2021 (a 62.3% decrease, **Figure 8**).

Of the notifications in 2021, seven (1.7%) were newly acquired hepatitis B infections. Among these newly acquired infections, four were Australian-born, one of whom one was unvaccinated, two had unknown vaccination status, and one was fully vaccinated. Intravenous substance abuse was a possible contributing factor in three of these infections, and one was the result of vertical transmission from a chronic hepatitis B carrier.

Figure 8: Number of notifications of hepatitis B among people born in Australia by age group in 2000 (blue line) and 2021 (red line) in metropolitan Perth.

Of the hepatitis B notifications in 2021, seven were for Aboriginal people (1.7% of notifications) compared to the 14 in 2000 (2.4% of notifications). In 2021, there were no notifications among people within the criminal justice system at the time of notification, compared to 23 notifications in 2000 (4% of notifications).

There is a safe and effective immunisation available for hepatitis B, given at birth, then at 2, 4 and 6 months of age. The NIP funds catch-up immunisation for people up until the age of 19, and additionally for refugees and humanitarian entrants. Specific groups at increased risk of exposure are also recommended to receive the hepatitis B vaccine, such as household contacts of people with hepatitis B, Aboriginal people and people within the criminal justice system.

Influenza at an all-time low

The impact of COVID-19 mitigations on influenza continues

The influenza season for 2021 was greatly impacted by the ongoing impacts of COVID-19 response measures. There were only 19 influenza notifications received for metropolitan Perth in 2021. This was a substantial 98.1% reduction from the 981 notifications in 2020 (which occurred predominantly prior to COVID-19 restrictions being introduced in March 2020), and was considerably less than the five-year average (across 2015 to 2019) of 7 685 notifications per year (**Figure 9**).

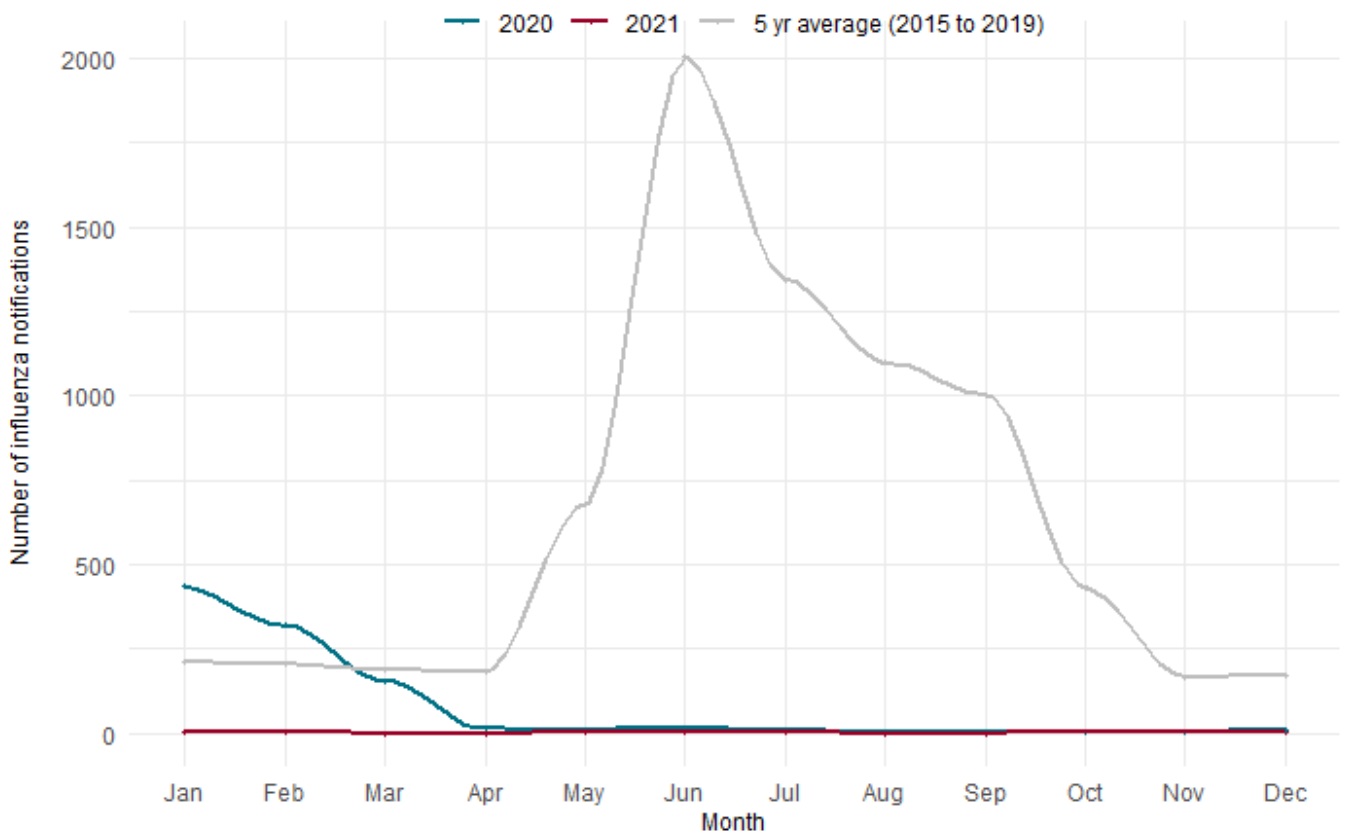


Figure 9: Number of influenza notifications in metropolitan Perth by month for 2021, 2020 and 5 year average (2015 to 2019).

The decrease was distributed equally across influenza types A and B, with a 98.0% decrease in the influenza type A from 780 in 2020 to 102 notifications in 2021 and a 98.0% decrease in influenza type B from 102 in 2020 to two notifications in 2021 (**Figure 10**). In 2021, influenza notifications peaked in June with four notifications (21.0%), with an average of two notifications per month overall.

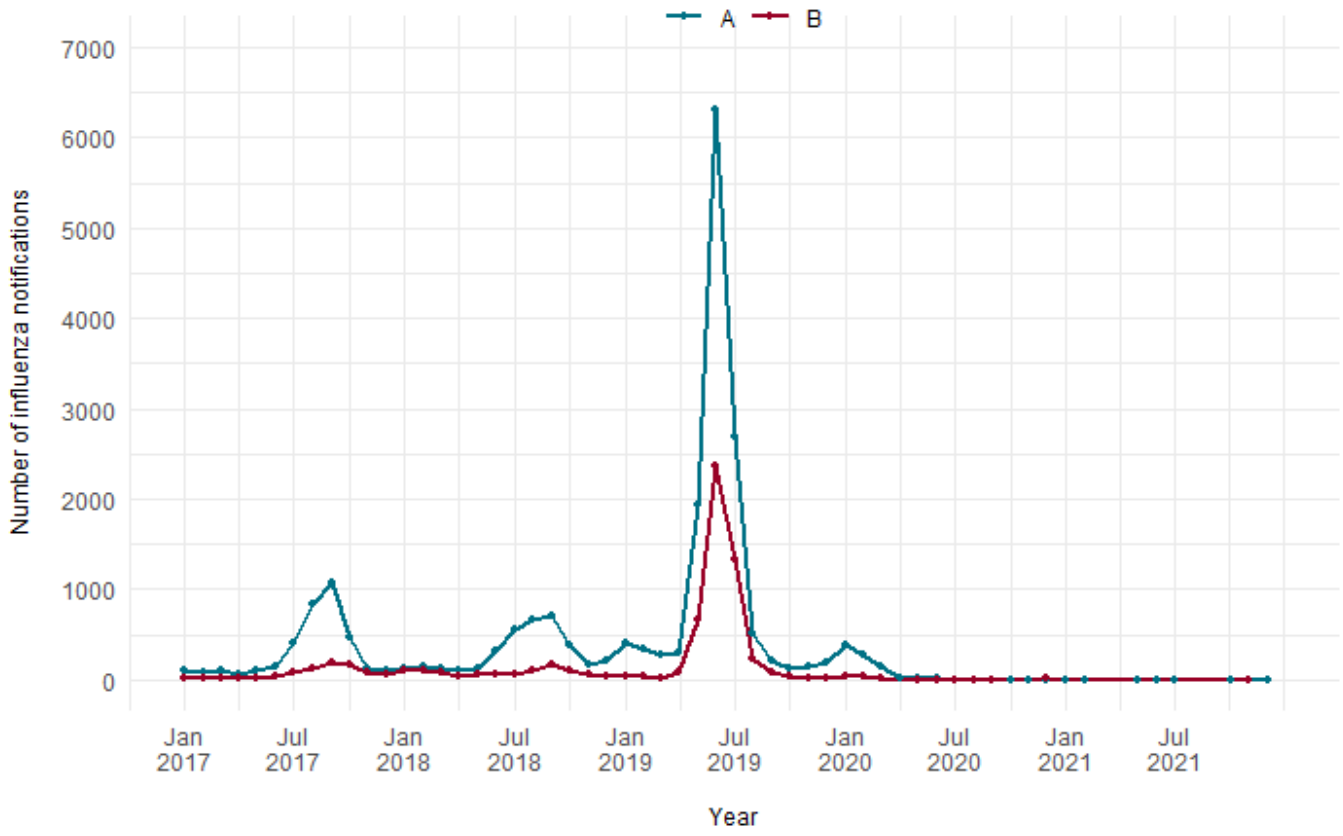


Figure 10: Seasonal trends in influenza notifications over 5 years in metropolitan Perth, by type.

Across WA, 50.8% of pregnant women received the influenza vaccine at some time during their pregnancy in 2021, compared to 62.2% in 2020, 55.5% in 2019, 44.2% in 2019, and 32.9% in 2017.[12] In 2021, 26.3% of the notified influenza cases were hospitalised, which was higher than the 20.3% reported to have been hospitalised in 2020.

Institutional outbreaks of influenza-like illness

MCDC receives notifications from **residential care facilities (RCFs)** for potential outbreaks of influenza, defined by the CDNA in 2021 as three or more staff or residents with acute respiratory infections within 72 hours. RCFs in metropolitan Perth were encouraged to notify MCDC if one resident or staff member became symptomatic with influenza-like illness to ensure appropriate surveillance and testing, as part of the COVID-19 response.

MCDC received 170 notifications from RCFs for potential acute respiratory outbreaks in 2021, an increase from the 76 potential outbreaks in RCFs in 2020. **Influenza was not isolated** in any of these outbreaks, likely due to a combination of low influenza prevalence in the community and COVID-19 public health measures, including RCF visiting restrictions and increased community awareness regarding staying at home when unwell.

Rhinovirus was isolated in 58.8% of acute respiratory illness outbreaks in RCFs (100 facilities), with other organisms isolated including parainfluenza (29 facilities), respiratory syncytial virus (19 facilities), and human metapneumovirus (16 facilities) (**Figure 11**). No organism was isolated in 14.1% of potential outbreaks.

[12] Government of Western Australia, Department of Health. Influenza vaccination [accessed 1 September 2022] https://ww2.health.wa.gov.au/Reports-and-publications/Western-Australias-Mothers-and-Babies-summary-information/data?report=mns_fluv_y

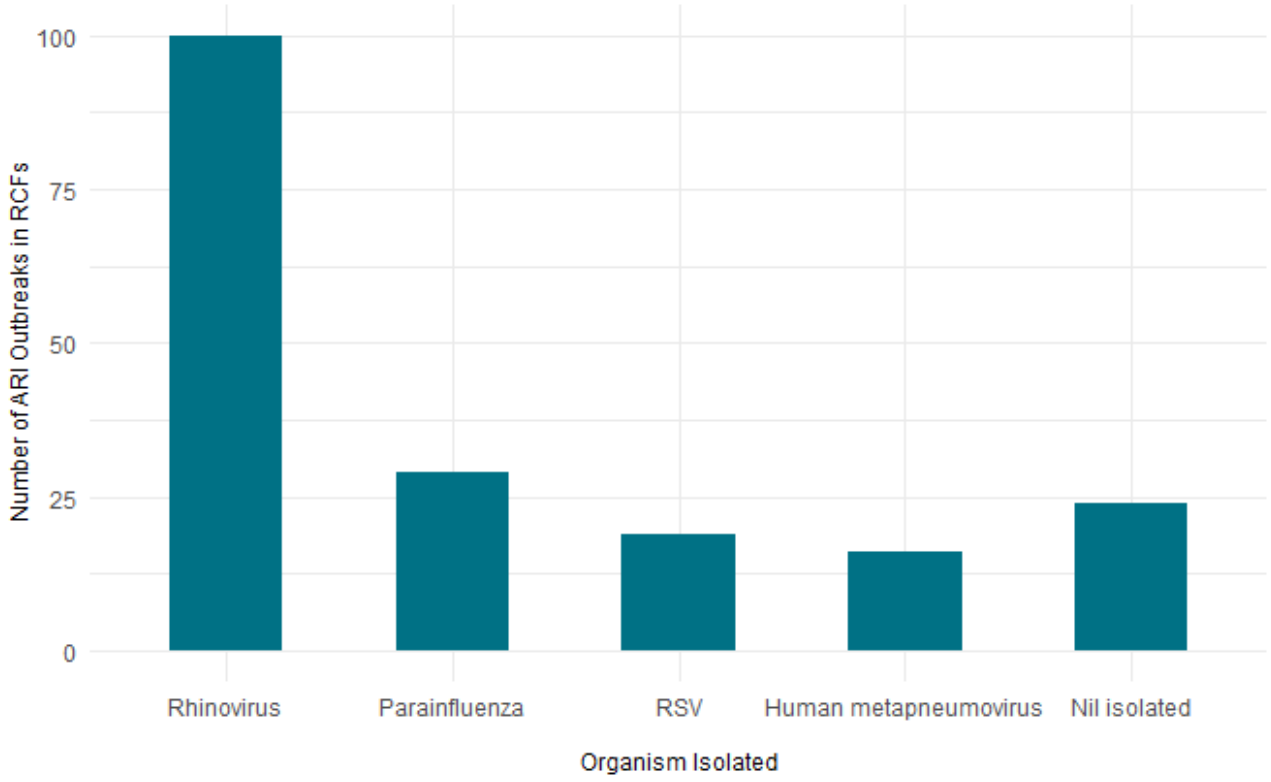


Figure 11: Number of ARI outbreaks in RCFs by organism isolated in metropolitan Perth.

Nine of these potential outbreaks were associated with deaths (one death in 7 facilities and two deaths in two facilities). There were no influenza-like illness outbreaks reported in schools, childcare centres, or prisons.

Vaccine-preventable diseases

No measles notifications

Measles is a highly infectious viral illness with potentially severe complications. Worldwide, 123 981 cases of measles were reported in 2021, a 22.1% reduction from 159 073 reported measles cases in 2020.[13] Endemic transmission of measles has been eliminated in Australia because of high immunisation coverage and strong public health responses, with measles cases being either imported from overseas or among contacts of imported cases.

For the first time since 2003, there were no notifications for measles in metropolitan Perth in 2021. This was likely influenced by ongoing travel restrictions and reductions in overseas travel due to the COVID-19 pandemic.

In 2019, the WA DOH introduced free **measles, mumps, rubella (MMR) vaccine** for adults born after 1965 with inadequate or unclear vaccination history – an important initiative, as many adults born after 1965 received none or only one dose of measles-containing vaccine due to changing immunisation schedules over the years.

Invasive meningococcal disease remains low

In 2021, there were five notifications for invasive meningococcal disease in metropolitan Perth, steady compared with the five notifications in 2020, and trending downward compared with recent years. The age of the notifications ranged from 2 to 53 years, with Aboriginal people over-represented among cases.

Serogroups W135 and (to a lesser extent) Y meningococci emerged as significant causes of invasive meningococcal disease in WA from 2015, peaking in 2017 when these two strains comprised 71% of all meningococcal cases in metropolitan Perth (**Figure 12**). Consequently, the WA DOH introduced the meningococcal ACWY immunisation program for the two most at risk age groups: 15 to 19-year-olds starting from April 2017 and 1 to 4-year-olds starting from July 2018. The vaccine was then incorporated in the NIP for 12-month-olds in July 2018 and 14 to19-year-olds in April 2019. The number of meningococcal notifications due to serogroups W135 and Y have since declined. Collectively serogroup W135 and Y were responsible for three of the meningococcal notifications in 2021, all of whom were either not vaccinated or too young to be fully vaccinated.

After peaking in 2000, the incidence of serogroup B meningococcal disease has remained relatively low since 2012. Vaccines specifically for serogroup B have been available in Australia since 2013 however for a majority of people it is not funded. The NIP has included meningococcal B vaccine for all Aboriginal and Torres Strait Islander children aged less than 12 months (with further funded catch-up vaccinations available for those under 2 years until 30 June 2023) and for all Australians with specific immunocompromising medical conditions since 1 July 2020. There was one notification for serogroup B meningococcal disease in 2021, compared with two notifications in 2020 and seven in 2019.

Monovalent serogroup C meningococcal vaccines were added to the NIP for 12-month-olds in January 2003 and serogroup C meningococcal disease has remained virtually eliminated since 2015 with the exception of the last case notified in 2017.

[13] World Health Organisation. Measles reported cases and incidence [accessed 7 October 2022] https://immunizationdata.who.int/pages/incidence/MEASLES.html?CODE=Global&YEAR=

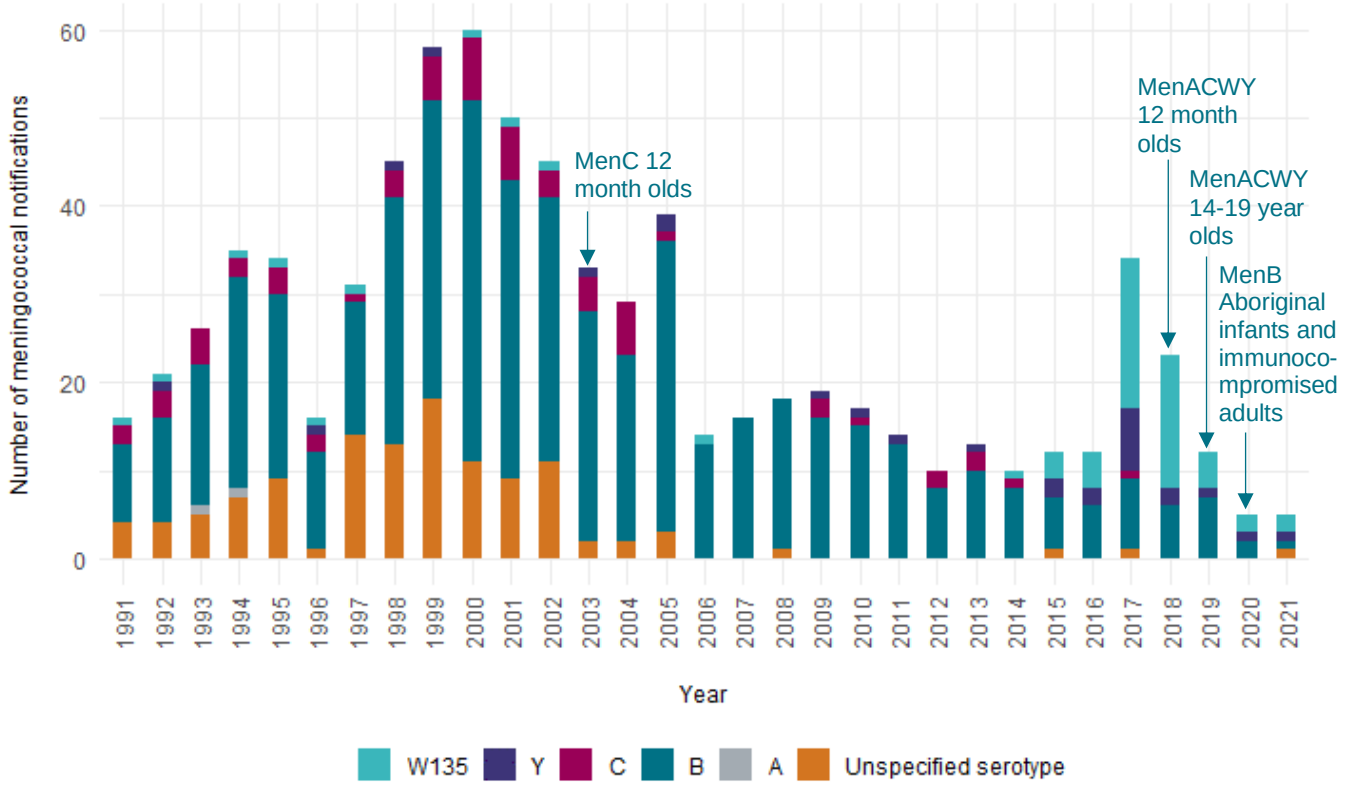


Figure 12: Number of invasive meningococcal disease notifications in metropolitan Perth since surveillance commenced (1991 – 2021), by serotype.

Uncommon meningococcal conjunctivitis

In addition to the invasive meningococcal disease notifications above, there were three cases of meningococcal conjunctivitis. Of these notifications, one case was serogroup B, one was serogroup C, and one was untypable. *Neisseria meningitidis* infrequently presents in the form of conjunctivitis. However, given the potential to evolve into severe invasive disease, MCDC undertakes the same follow up of cases and their contacts for these notifications as for invasive meningococcal disease notifications as per the Communicable Diseases Network Australia Series of National Guidelines.

Invasive pneumococcal disease notifications returning to usual numbers

Invasive pneumococcal disease describes a spectrum of clinical conditions including bacterial pneumonia, meningitis and sepsis that are caused by the different serotypes of *Streptococcus pneumoniae*, some of which are vaccine preventable. There were 108 notifications for invasive pneumococcal disease in 2021 for metropolitan Perth, a 47.9% increase from 73 in 2020. However, this increase reflected a return to more typical numbers and typical seasonal distribution (**Figure 13**) after an uncharacteristically low number of notifications and late seasonal peak observed in 2020. Among the 2021 notifications, 51.8% were male and 48.1% were female, and 12.0% of notifications were among Aboriginal people. The age of cases ranged from 0 to 94 years, with 26.8% of notifications for children under 5 years.

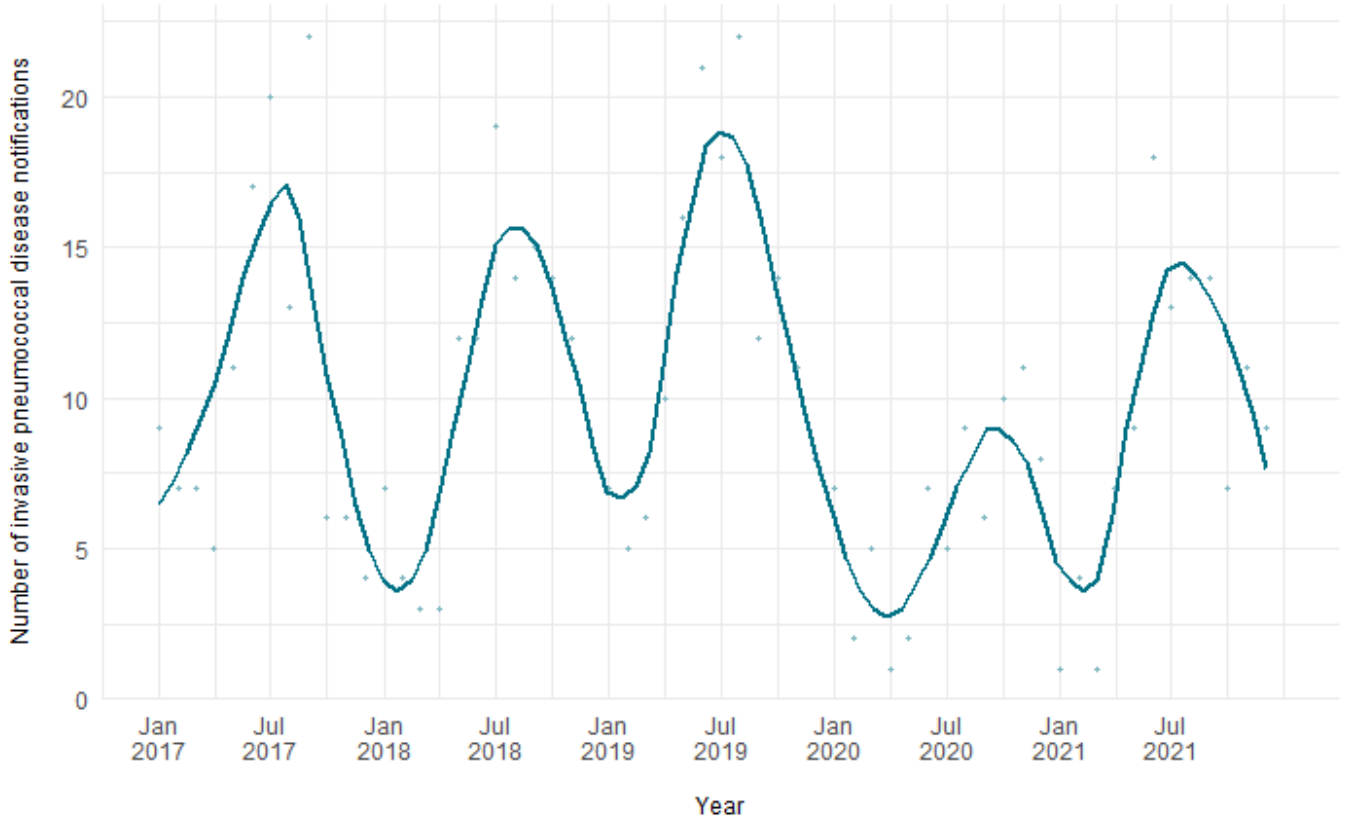


Figure 13: Number of invasive pneumococcal disease notifications in metropolitan Perth over the past five years. The points represent the number of notifications by month. The smoothed curve represents the overall trend.

Over time, the distribution of serotypes responsible for invasive pneumococcal disease notifications in metropolitan Perth has changed (**Figure 14**). The conjugate vaccine PCV7, which targets seven serotypes, was introduced to the NIP firstly for Aboriginal infants in 2003, and later for all children in 2005. Subsequently the number of invasive pneumococcal disease notifications due to the PCV7 serotypes has since declined, though this was accompanied with the emergence of new invasive serotypes (also known as the 'serotype replacement' phenomenon). The PCV13 vaccine which superseded PCV7 in July 2011 covered an additional 6 serotypes, leading to a reduction in notifications caused by these serotypes.

Adjustments were made to the timing of the PCV13 vaccines on the infant vaccination schedule, with a shift in the timing of the third dose of PCV13 vaccine from 6 months to 12 months of age, which was in response to increased cases of PCV13 vaccine failure in toddlers. Consequently, these adjustments to the PCV13 vaccine timing may have contributed further to changes in the notifications caused by these serotypes.

The PPV23 is a vaccine containing pneumococcal capsular polysaccharides for 23 serotypes. PPV23 is poorly immunogenic in infants and not a part of the routine childhood immunisation schedule. Since 1999, PPV23 has been funded in Australia for Aboriginal adults aged over 50 and individuals medically at risk who are aged over 15 years. PPV23 has further been funded for medically at-risk children aged 4 years since 2001 and all adults aged over 65 since 2005.

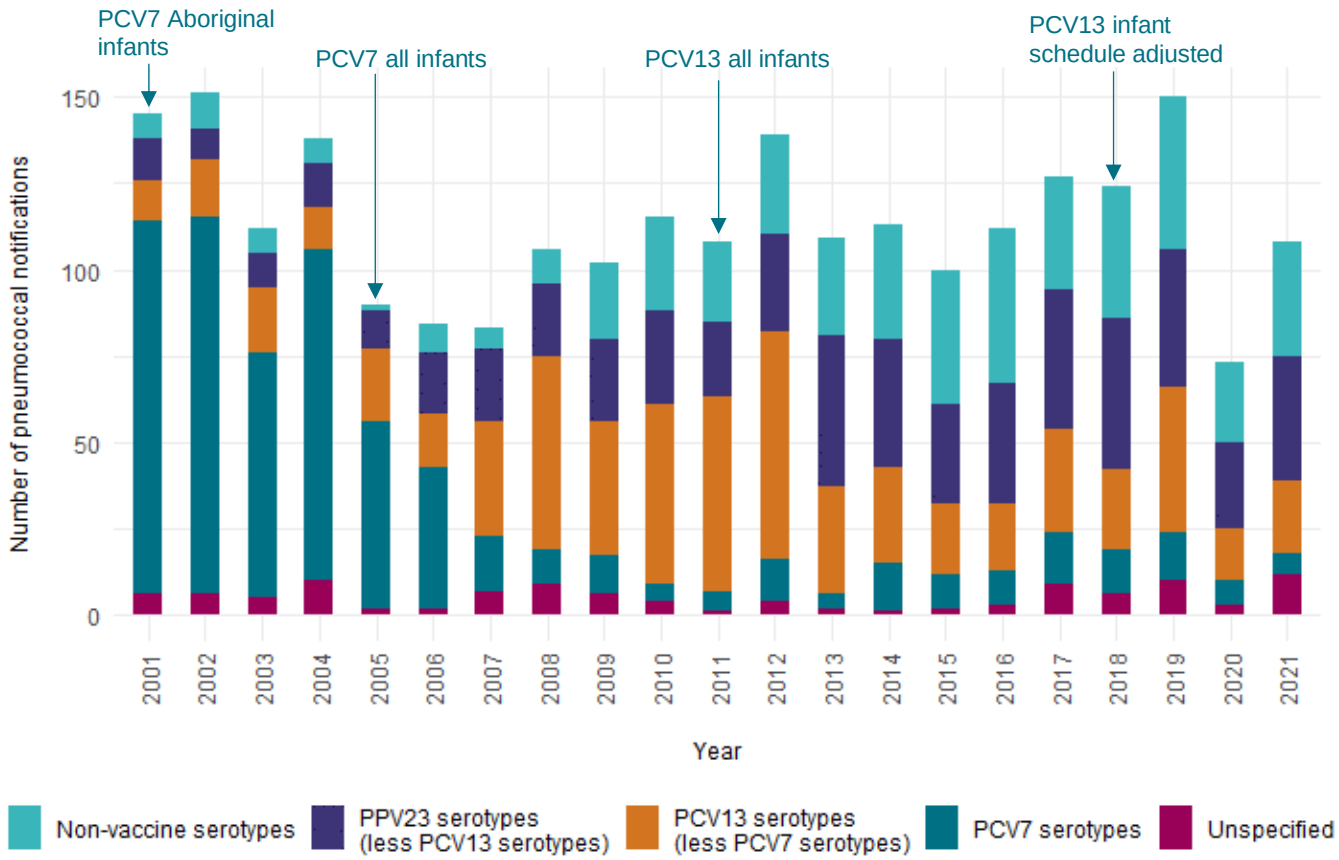


Figure 14: Number of invasive pneumococcal disease notifications in metropolitan Perth since becoming notifiable in 2001, by serotype.

The most common serotypes causing invasive pneumococcal disease in metropolitan Perth for 2021 were 22F and 3 (13% each, former contained in PPV23, latter contained in PCV13 and PPV23), followed by 9N (7.4%, contained in PPV23) and 19A (6.5%, contained in both PCV13 and PPV23).

Overall, 49.1% of invasive pneumococcal disease notifications were unvaccinated and a further 13.9% were partially vaccinated. Of the unvaccinated invasive pneumococcal disease notifications, 43.4% were for PPV23 serotypes, 26.4% were for non-vaccine serotypes, 18.9% were for PCV13 serotypes, 9.4% were for PCV7 serotypes, and the remaining 1.9% were for unspecified serotypes.

Pertussis trending downwards

In 2021, there were 40 notifications for pertussis in metropolitan Perth, a 59.6% decrease from 99 notifications in 2020. The number of pertussis notifications peaked in August and September (eight notifications for each month), remaining otherwise low for the rest of 2021. Pertussis is endemic in metropolitan Perth, and numbers of notifications have previously demonstrated cyclical peaks (**Figure 15**). This periodicity has been altered in the past decade, with the most recent peak observed in 2011-2012. Changes to reporting are partly responsible, with mucosal IgA not contributing to the case definition after 2018; however, numbers of cases diagnosed using other means have also decreased. Changes to the immunisation program (re-introduction of booster doses at 18 months of age, and a broadened window for vaccination during pregnancy), as well as the introduction of COVID-19 response measures from early 2020 have also likely contributed to the low number of pertussis notifications in 2021.

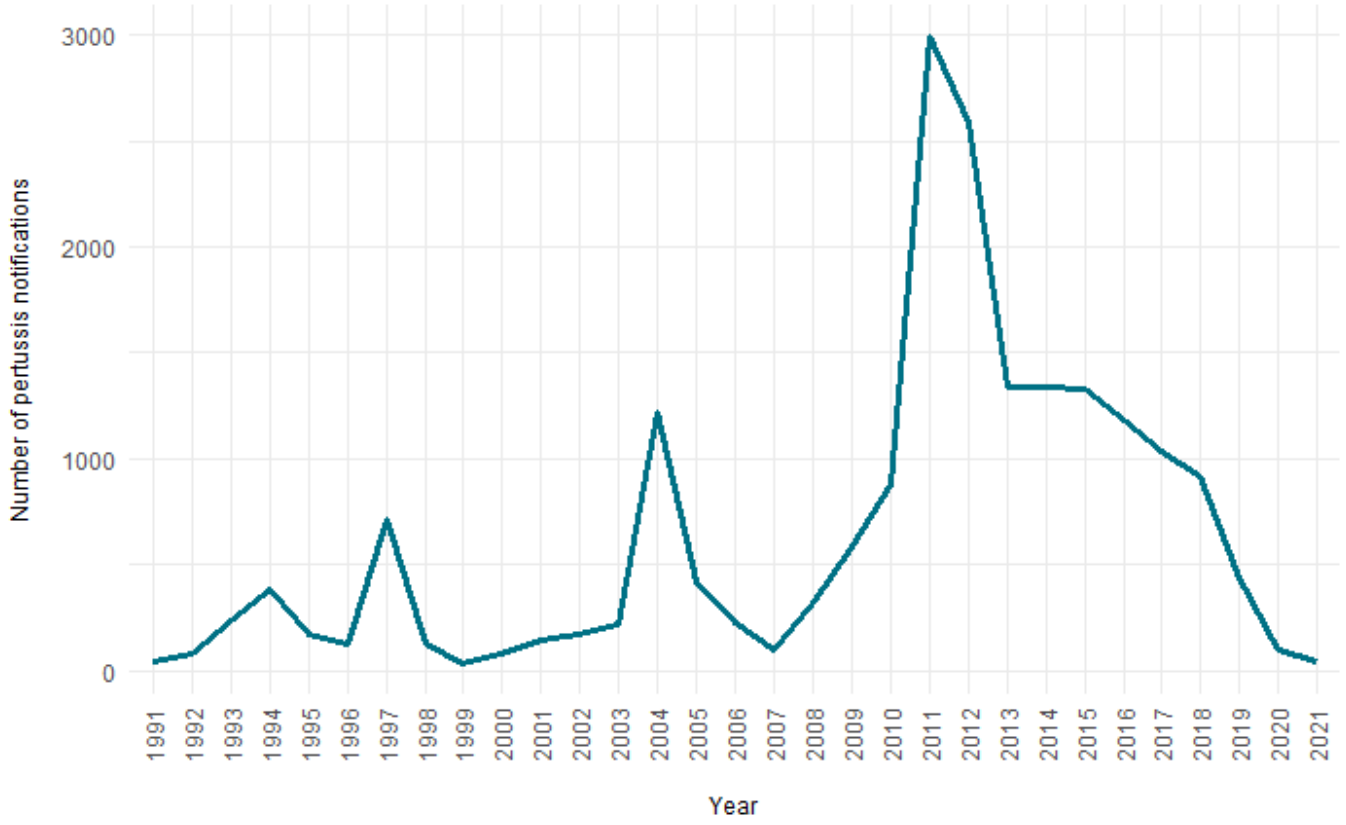


Figure 15: Number of pertussis notifications in metropolitan Perth by year.

There were no notifications for pertussis in infants under the age of 6 months in 2021, compared to the one notification in 2020 and the two notifications in 2019. Infants under the age of 6 months are at higher risk of more severe pertussis disease, as they are yet to receive all three doses of the primary vaccination course and consequently are not yet fully vaccinated. Pertussis immunisation during pregnancy (between 20 to 32 weeks gestation) is important as the placental transfer of maternal antibodies helps to provide early protection to infants.

Across WA, 73.4% of pregnant women were vaccinated for pertussis at some time during their pregnancy in 2021, a reduction compared to 76.9% in 2020.[14] However, there was an increase in the proportion of pregnant women with unknown pertussis immunisation status, from 13.6% in 2020 to 16.2% in 2021, reflecting reduced ascertainment and/or reporting of pertussis immunisation status. Prioritisation of COVID-19 immunisation for pregnant women, and initial recommendations for delays between administration of COVID-19 vaccines and other vaccines including pertussis vaccines (now rescinded), as well as as vaccine fatigue,[15] may have affected immunisation coverage in pregnant women.

[14] Government of Western Australia, Department of Health. Western Australia's Mothers and Babies summary information: Pertussis vaccination [accessed 1 September 2022] https://ww2.health.wa.gov.au/Reports-and-publications/Western-Australias-Mothers-and-Babies-summary-information/data?report=mns_pertv_y

[15] Su Z, Cheshmehzangi A, McDonnell D, da Veiga CP, Xiang YT. Mind the "Vaccine Fatigue". Front Immunol. 2022 Mar 10;13:839433. doi: 10.3389/fimmu.2022.839433. PMID: 35359948; PMCID: PMC8960954.

Tetanus in an unvaccinated child

One case of tetanus was notified in metropolitan Perth in 2021. The child, aged in their early teens, presented to hospital with back spasms and trismus, after sustaining a laceration to the knee which was contaminated with soil. The case required a prolonged hospitalisation, including time in ICU. The illness was complicated by fractures of the thoracic spine, a known complication of tetanus. The child was not vaccinated for tetanus, highlighting the importance of the tetanus vaccine as part of routine childhood immunisation.

Rubella detected in eye specimens

The two rubella notifications for 2021 were detections of rubella virus RNA in vitreous humour from eye specimens. Detection of rubella in eye specimens usually occurs as a result of persistent infection or reinfection after latent infection, rather than as acute rubella infection. The ages of the two cases suggest that they would have been children when rubella outbreaks were occurring globally, which was prior to the introduction of the routine MMR vaccine for 12-month-olds in Australia in 1989. Rubella has been identified as a potential cause of a type of uveitis, termed Fuch's uveitis syndrome, which has declined in incidence following the introduction of routine rubella vaccination. From a public health perspective, acute rubella symptoms were excluded in these two cases, and no further public health measures were undertaken.

Enteric diseases and food outbreaks remain steady

Gastroenteritis in childcare, schools and residential care

MCDC receives notifications of gastroenteritis outbreaks from childcare centres, schools, and RCFs in metropolitan Perth. A gastroenteritis outbreak is defined as two or more people experiencing diarrhoea and/or vomiting within a 24-hour period. Advice is provided to facilities on the collection of specimens, hygiene precautions, and isolation requirements.

Across metropolitan Perth, 121 gastroenteritis outbreaks in childcare centres were notified in 2021, a 20.0% decrease from the 151 outbreaks in childcare centres in 2020. Specimens were not collected for a majority of outbreaks, however from those where samples were collected, rotavirus was isolated in four outbreaks, norovirus in two, and adenovirus in one. MCDC was notified of eight outbreaks of gastroenteritis in schools, of which two had norovirus isolated and one had rotavirus isolated. Overall, there were 14 hospitalisations resulting from childcare and school gastroenteritis outbreaks.

In 2021, 75 gastroenteritis outbreaks in RCFs were reported to MCDC, an increase from the 68 outbreaks in RCFs reported in 2020. Among these, 31 were attributed to norovirus, and four to rotavirus. Other organisms implicated in RCF outbreaks in 2021 included Salmonella, blastocystis, and *Clostridium difficile*. In total, there were 16 hospitalisations across all RCF gastroenteritis outbreaks and no deaths.

Clusters and outbreaks of enteric diseases

In total, 3 321 notifications were received for enteric diseases in metropolitan Perth in 2021, a 22.7% decrease compared to the 4 298 notifications in 2020. The number of enteric infections that were acquired overseas remained low in 2021, similar to 2020, reflecting the context of very limited overseas travel (**Figure 16**). Campylobacteriosis was responsible for a majority of enteric infections (1 367 notifications, 73.4%) in 2021. Salmonellosis was responsible for 13 of the 18 notifiable enteric disease outbreaks reported to MCDC in 2021.

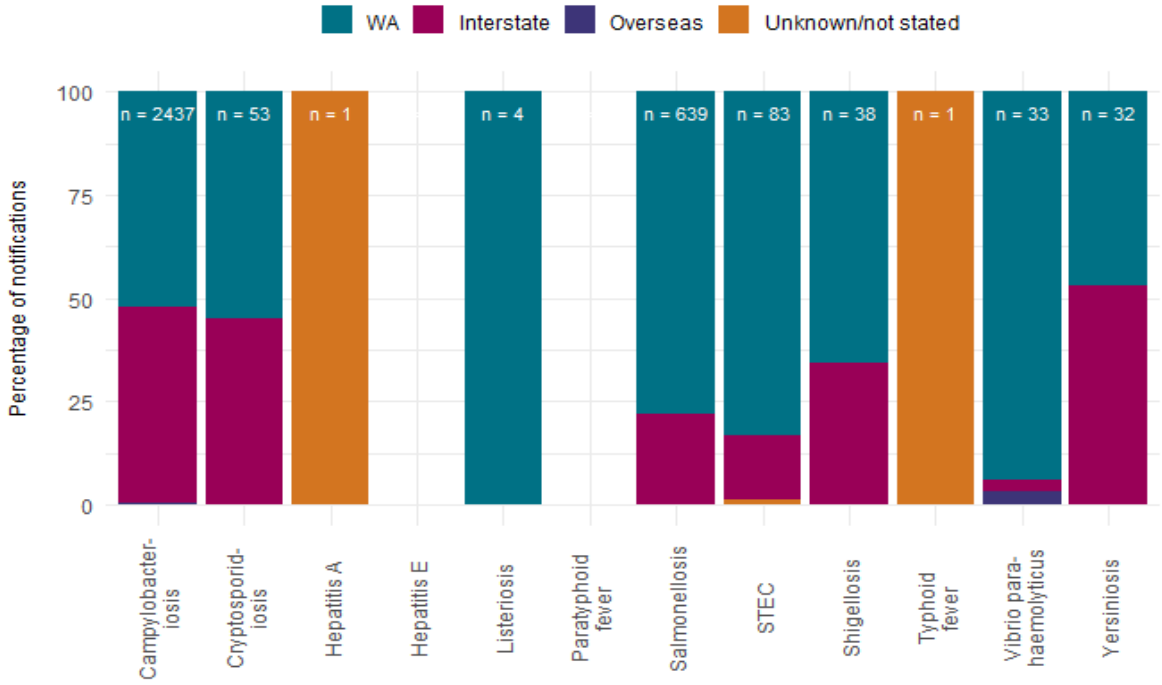


Figure 16: Enteric disease by place of acquisition in metropolitan Perth in 2021; STEC= Shiga-toxin producing E.coli.

Emerging and newly notifiable diseases

Respiratory syncytial virus newly notifiable

Respiratory syncytial virus (RSV) was made notifiable in WA in June 2021. RSV is a common cause of respiratory infections in children, particularly as a cause of bronchiolitis and pneumonia in infants and young children. Across metropolitan Perth, 330 RSV notifications were reported to MCDC since June 2021, peaking with 281 notifications in December. The majority of cases were in the 0 to 4-year-old age group (66.4% of notifications) and 3.9% were Aboriginal.

Invasive Group A streptococcus newly notifiable

In July 2021, **Invasive Group A streptococcus (iGAS)** was made a nationally notifiable disease in Australia, and subsequently was made notifiable in WA from August 2021. iGAS disease is defined as the isolation of **Group A streptococcus (GAS)** from a normally sterile site and can present in various clinical presentations, including severe potentially fatal disease (sepsis, necrotising fasciitis and streptococcal toxic shock syndrome).

Noting that iGAS became notifiable in WA in the latter half of 2021, 12 notifications were received for iGAS in metropolitan Perth for 2021 from the time it became notifiable in WA. All the notifications were for non-Aboriginal people, with ages ranging from 1 to 84 years old. Of the 12 notifications, seven had bacteremia, two had necrotising fasciitis and four had other clinical presentations.

First notifications for acute post-streptococcal glomerulonephritis

Acute post-streptococcal glomerulonephritis (APSGN) was made notifiable in WA in September 2017, however no metropolitan notifications were received prior to 2021. APSGN is caused by immune-mediated glomerular inflammation and resultant impaired kidney function following streptococcal pharyngitis or skin infection. APSGN is most commonly caused by GAS, however Group C Streptococci has also been implicated as causative organism.

In 2021, four notifications were received for APSGN in metropolitan Perth. The ages of notifications ranged from 2 to 10 years of age and there was over-representation of Aboriginal people among the cases.

Extensive follow up is required for APSGN close contacts including screening for symptoms such as skin sores and scabies, blood pressure measurement to identify hypertension, testing of urine for haematuria, and treatment of contacts who have skin sores with prophylactic benzathine penicillin. Follow-up can be challenging in the context of complex social factors.

Immunisation

Annual immunisation data summary

Annual immunisation data for 12-month-olds, 24-month-olds, and 60-month-olds was calculated by combining data on the total number of children in each region and the number of children fully vaccinated for their age group from the quarterly AIR coverage reports (see **Table 2**). Immunisation coverage represents the overall proportion of children who were up to date by age during 2021 (see **Appendix 3**). The immunisation coverage among Aboriginal children is also presented across the age groups.

Across Australia, the benchmark for immunisation coverage is considered to be 95% as per the Department of Health Annual Report 2021-22.[16] This differs from the immunisation coverage target of 90% as per the Western Australian Immunisation Strategy Implementation Steering Committee in the Western Australian Immunisation Strategy 2016-23.[17] Immunisation coverage in metropolitan Perth exceeded this coverage target of 90% across all age-cohorts. Overall, the immunisation coverage for the 12 and 24-month-old cohorts in 2021 remained similar to 2020, while the immunisation coverage for the 60-month-old cohort decreased from 2020 to 2021.

Table 2: Immunisation coverage by region and age cohort in 2021, coverage below 90% shown in red, coverage between 90% and < 95% shown in orange, and coverage ≥ 95% shown in green.

Age Group	Region	Immunisation coverage among all children (%)	Immunisation coverage among Aboriginal children (%)
12 months	Metro	94.36	86.76
12 months	NMHS	94.93	90.48
12 months	EMHS	94.09	84.68
12 months	SMHS	94.05	87.55
12 months	WA	93.85	87.00
12 months	Aus	94.43	91.98
24 months	Metro	92.15	84.72
24 months	NMHS	92.27	82.84
24 months	EMHS	92.22	86.21
24 months	SMHS	91.95	83.71
24 months	WA	91.76	85.73
24 months	Aus	92.73	91.02
60 months	Metro	93.79	95.12
60 months	NMHS	94.02	95.60
60 months	EMHS	93.75	95.39
60 months	SMHS	93.60	94.40
60 months	WA	93.72	95.12
60 months	Aus	94.73	96.79

[16] Australian Government, Department of Health. Department of Health Annual Report 2021-22 [accessed 14 November 2022] https://www.health.gov.au/sites/default/files/documents/2022/10/department-of-health-annual-report-2021-22.pdf

[17] Government of Western Australia, Department of Health. Western Australian Immunisation Strategy 2016–2023 [accessed 5 September 2022] https://ww2.health.wa.gov.au/~/media/Files/Corporate/general-documents/Immunisation/PDF/13187-WA-Immunisation-Strategy-2016-2023.pdf

There are 33 **Local Government Areas (LGAs)** in metropolitan Perth. **Appendix 2** shows the immunisation coverage in each of the age cohorts by LGA in 2021. The coverage benchmark of 95% or above across all age cohorts was not achieved by any LGA, however Bayswater, Cambridge, Cottesloe, East Fremantle, Joondalup, Kwinana, and Subiaco all achieved over 95% coverage in the 12 month-old cohort, and Armadale, Bassendean, Claremont, and Swan all achieved over 95% coverage in the 60 month-old cohort. MCDC continues to actively follow up overdue children in local government areas with low immunsiation coverage. Support is also provided for children who are not up to date prior to pre-school or childcare enrolment.

Metropolitan immunisation coverage over time

Figures 17 to **19** present the trends in immunisation coverage for Aboriginal and non-Aboriginal children across metropolitan Perth from 2018 to 2021. Immunisation coverage appears to have improved between 2018 and 2021 for all age cohorts of non-Aboriginal children and for the 24-month-old and 60-month-old cohorts of Aboriginal children. There continues to be a difference in immunisation coverage between Aboriginal and non-Aboriginal children, particularly at 12 months and 24 months of age, however the immunisation coverage of Aboriginal children at 60 months of age is greater than that of non-Aboriginal children at 60 months of age.

MCDC undertook several programs in 2021 which aim to close the gap in coverage between Aboriginal and non-Aboriginal children. The **Moorditj Start** pilot program commenced in November 2021 and provides culturally-safe support to parents of Aboriginal infants to assist families to commence the immunisation schedule on time. The **Moorditj Kids** program continues to support Aboriginal families whose children are overdue for immunisation, and offers a culturally-safe home visiting service staffed by an Aboriginal Health Liaision Officer and immunisation nurse. The definition of fully vaccinated for children is determined by AIR and changes in definition affect the interpretation of trends in immunisation coverage (**Appendix 3**).

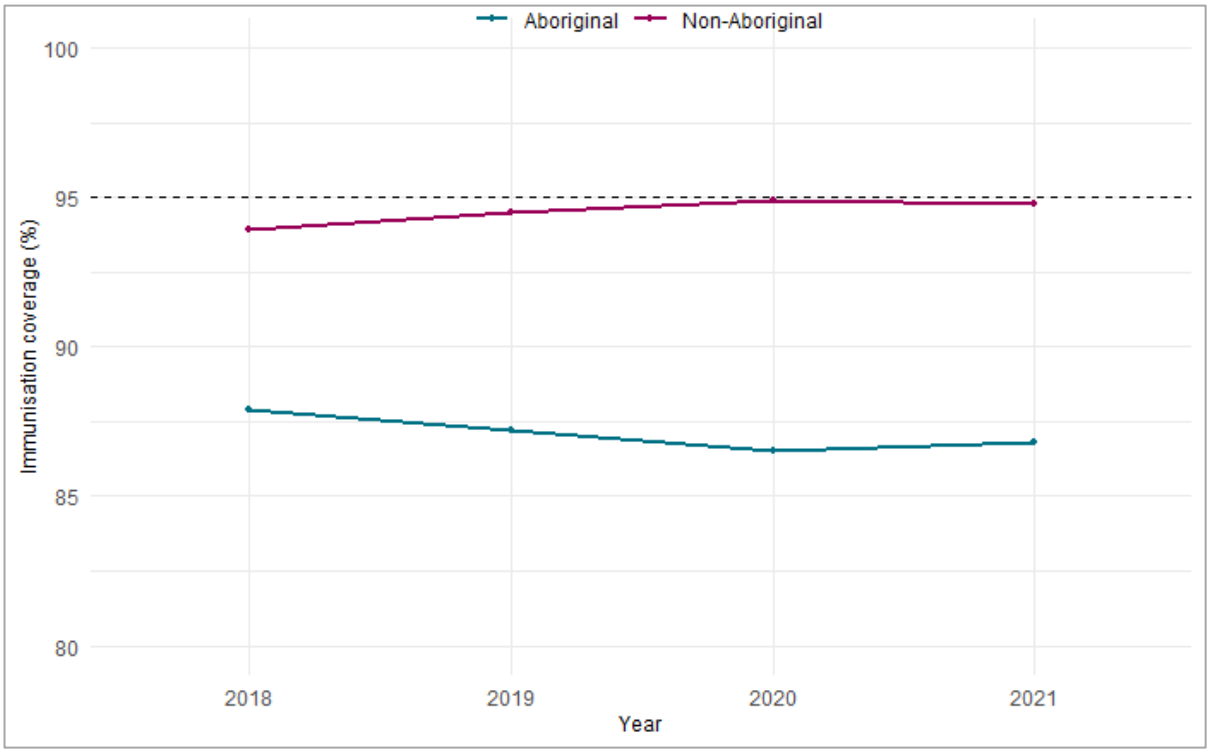


Figure 17: Immunisation in metropolitan Perth, 2018 to 2021, vaccination coverage for 12-month-olds.

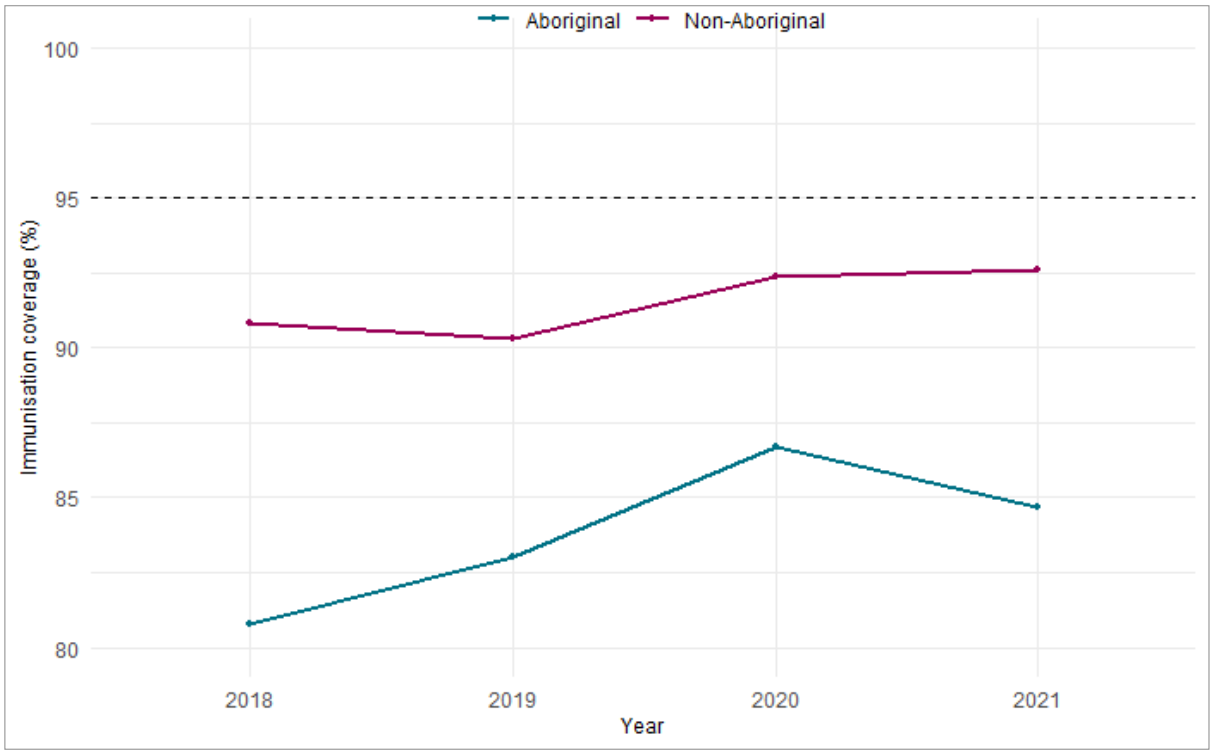


Figure 18: Immunisation in metropolitan Perth, 2018 to 2021, vaccination coverage for 24-month-olds.

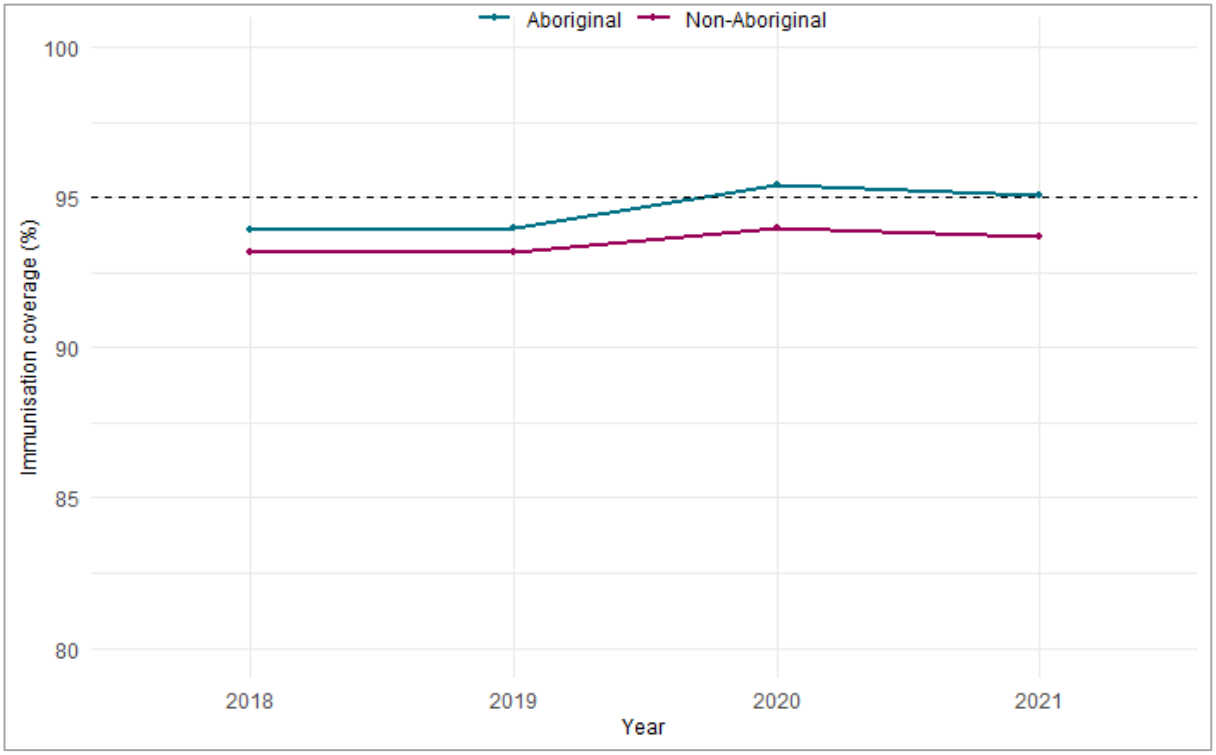


Figure 19: Immunisation in metropolitan Perth, 2018 to 2021, vaccination coverage for 60-month-olds.

Routine provider support for immunisation

Immunisation catch ups

Families and immunisation providers are supported by MCDC to produce immunisation catch up plans (including information on the correct spacing of dosing) for children who are overdue

for vaccination. In 2021, 673 catch up plans were developed for children in metropolitan Perth.[18] MCDC liaises with healthcare providers to ensure that vaccinations that are administered overseas are recorded in AIR for children born overseas currently living in metropolitan Perth, such as by facilitating access to translation services to enable vaccination records in languages other than English to be documented. Overall, this helps to improve understanding of the vaccination status and needs of these children, and enables identification of families whose children are identified as not fully immunised to support them in accessing Commonwealth support services.

Cold chain breaches and vaccine wastage

MCDC managed 513 cold chain breaches in 2021.[18] A cold chain breach is defined as vaccine storage temperatures outside the recommended range of +2ºC to +8ºC. Metropolitan providers of immunisation are required to notify MCDC of cold chain breaches, which is part of a supply agreement regarding government-funded vaccines with the WA DOH. Multiple factors, including the nature of the breach, the cumulative breach time and the vaccines involved, affect the outcome of the cold chain breach and whether vaccines should be discarded. MCDC provides advice on appropriate cold chain management and monitoring, to ensure that vaccines are safe and effective, and to minimise the amount of vaccine wastage that occurs.

In 2021, MCDC conducted an audit of cold chain management, which is defined as the processes, procedures and contingencies that are required of vaccine providers to ensure that vaccines are kept within the range of optimal temperatures. A total of 355 metropolitan pharmacies were invited to participate in the audit and of these, 227 pharmacies completed the survey. The survey assessed specific criteria required for cold chain management, consistent with the national guidelines. Two criteria with the lowest rates of compliance were the requirement for a data logger in every fridge used for vaccine storage, and the recommendation for a minimum/maximum portable thermometer to be available for every fridge. Recommendations of the audit were communicated to WA DOH.

Immunisation providers are required to report vaccine wastage to MCDC. Currently information on vaccine wastage is only available for quarters one and two of 2021, as only the Vaccine Wastage Quarterly Reports for quarter one and quarter two have been completed. For the first half of 2021, 86 245 doses of vaccine were wasted in metropolitan Perth, with an estimated value of $1 364 430. This was higher than the total of 31 325 doses of vaccine wasted in metropolitan Perth for the first half of 2020. The leading cause of vaccine wastage was failure to use the dose prior to its expiry date (88.9%), followed by cold chain breaches (11.0%).

COVID-19 immunisation program

Following the implementation of the COVID-19 immunisation program in February 2021, MCDC provided a specialised phone and email support service for providers and consumers. Between June and December 2021, the service received 1 937 contacts, predominantly from the public and general practice. Given the evolving recommendations for COVID-19 vaccines over 2021, the service was well received as an up-to-date source of information on vaccine choice, exemptions, adverse events, and guidance from the Australian Technical Advisory Group on Immunisation.

NMHS also delivered a COVID-19 immunisation program among priority populations in Perth, including an outreach service for people experiencing homelessness and an in-home service for mental health clients. **Pop-up vaccination clinics** for Aboriginal and Culturally and

[18] Tracie Chong (personal communication), Public Health Intelligence, Metropolitan Communicable Disease Control, on 18 October 2022.

Linguistically Diverse populations, established in collaboration with non-government organisations (NGOs) as well as homeless shelters and at-risk drop-in centers, delivered 499 COVID-19 vaccines in 2021. The **outreach vaccination service** in partnership with Nyoongar Outreach delivered 714 COVID-19 vaccines to people experiencing homelessness, including Aboriginal clients**. In-reach vaccination clinics** in congregate living facilities (including residential aged care and mental health hostels) and in primary schools in areas of need delivered 476 COVID-19 vaccines. The **in-home vaccination service** delivered 263 COVID-19 vaccines to persons with limited access to primary care (including Aboriginal people, community mental health clients, and people who were elderly or had a disability) referred via community engagement sessions, primary health services, NGOs, the Department of Communities, and self-referrals.

Rabies and Australian Bat Lyssavirus post-exposure prophylaxis

There were no rabies prone exposures for metropolitan Perth in 2021 and so no courses of rabies **post-exposure prophylaxis (PEP)** were arranged.[19] This was considerably reduced from the 62 courses of rabies PEP arranged in metropolitan Perth in 2020 and reflects the impact of the COVID-19 pandemic on reductions in international travel, and the introduction of Australian border restrictions.

[19] Vaccine Orders (personal communication), Vaccine Management, Immunisation Program, Communicable Disease Control Directorate, Department of Health, on 25 July 2022.

Appendices

Appendix 1: Communicable disease notification rate by geographical health service area

Notifiable Disease	2021 notification rate per 100 000 population					
	North	East	South	Metro	WA	National
Blood-borne disease						
Hepatitis B (newly acquired)	0.1	0.4	0.4	0.3	0.3	0.3
Hepatitis B (unspecified)	15.1	23.9	17.4	18.9	28.7	19
Hepatitis C (newly acquired)	0.9	5.2	4.2	3.4	2.9	2.9
Hepatitis C (unspecified)	17.7	40.9	39.5	32.5	50	26.9
Hepatitis D	0.8	0.4	0	0.4	0.4	0.3
Enteric diseases						
Campylobacteriosis	114.9	116.8	108.2	113.5	118.3	149.3
Cholera	0	0	0	0	0	0
Cryptosporidiosis	1.6	2.6	3.3	2.5	5	7.2
Hepatitis A	0	0.1	0	0	0	0.1
Hepatitis E	0	0	0	0	0	0
Listeriosis	0.1	0.4	0	0.2	0.2	0.2
Paratyphoid fever	0	0	0	0	0	0
Salmonellosis	29.8	31.4	27.9	29.8	35.1	41.8
Shiga toxin-producing E.coli	3.4	4.9	3.3	3.9	4	2.4
Shigellosis	1.8	1.6	1.9	1.8	3.7	1.8
Typhoid fever	0.1	0	0	0	0.1	0.1
Vibrio parahaemolyticus	2.2	1	1.5	1.5	1.5	NN
Yersiniosis	1.5	1.1	1.9	1.5	1.4	NN
Sexually transmitted infections						
Chlamydia	354.1	472	391.2	406.1	411.3	339.5
Lymphogranuloma venereum	0	0	0	0	0	NN
Gonorrhoea	70.1	116.6	73.7	87.1	109.7	104.3
Syphilis (infectious)	15.1	29.6	21.9	22.2	31.6	23
Syphilis (non-infectious)	5.3	10.7	6.1	7.4	13.6	7
Syphilis (congenital)	0	0.1	0	0	0.2	0.1
Vaccine preventable diseases						
Diphtheria	0	0	0	0	0	0
Haemophilus influenzae type B	0	0	0	0	0	0.1
Influenza	1.2	0.7	0.7	0.9	1.2	2.9
Measles	0	0	0	0	0	0
Meningococcal disease (invasive)	0	0.5	0.1	0.2	0.4	0.3
Mumps	0	0	0	0	0	0.1
Pertussis	1.8	1.8	2.1	1.9	1.8	2.1
Pneumococcal disease (invasive)	4.3	5.8	4.9	5	6.9	5.2
Rotavirus	24	30.2	19.5	24.7	26.8	10
Rubella	0.3	0	0	0.1	0.1	0
Tetanus	0	0.1	0	0	0	0

Varicella-Zoster	196.3	164.1	221.9	193.2	192.8	129
Vector-borne diseases						
Murray Valley encephalitis virus	0	0	0	0	0	0
Kunjin/West Nile virus	0	0	0	0	0	0
Japanese encephalitis virus	0	0	0	0	0	0
Barmah Forest virus	0	0	0.6	0.2	0.9	1.5
Chikungunya virus	0	0	0	0	0	0
Dengue virus	0	0	0	0	0	0
Malaria	0.3	0.8	0.1	0.4	0.4	0.2
Rickettsial disease (typhus)	0.5	0.1	0.3	0.3	0.8	NN
Ross River Virus	13.8	17	22.1	17.5	26.5	12
Zika	0	0	0	0	0	NN
Zoonotic diseases						
Leptospirosis	0	0	0	0	0.1	1.1
Psittacosis	0	0	0	0	0	0.1
Q Fever	0.1	0	0	0	0.1	2
Other diseases						
Brucellosis	0	0	0	0	0	0.1
Botulism	0	0	0	0	0	0
Creutzfeldt-Jakob disease	0.3	0.3	0.1	0.2	0.3	NN
Haemolytic uraemic syndrome	0.1	0	0.1	0.1	0.1	0
Legionellosis	2.8	2.2	1.5	2.2	2.7	2.2
Leprosy	0	0.4	0	0.1	0.2	0.1
Melioidosis	0.1	0.1	0	0.1	0.3	NN
Tuberculosis	5	8.2	5.1	6.1	7.1	5.7
COVID-19	4.6	23.9	2.5	10.6	14.3	2088.8
Invasive Group A Streptococcus	1.1	0.3	0.3	0.6	0.7	0.9
Acute Post-Streptococcal Glomerulonephritis	0.3	0.3	0	0.2	0.4	NN
Respiratory Syncytial Virus	12.1	17.1	17	15.4	18.4	6

Data retrieved from WANIDD; NN = not notifiable. Varicella-Zoster includes chickenpox and shingles, as well as those unspecified. From July 2018, the case definitions for shigella and rotavirus were altered; the former contributing to a larger number of notifications, and the latter having no substantial impact on number of notifications. From September 2018, the case definition for pertussis was made more stringent.[20] From June 2021, Invasive Group A Streptococcal and Respiratory Syncytial Virus were added as notifiable diseases. Acute Post-Streptococcal Glomerulonephritis has been notifiable from September 2017 however no notifications were received for metropolitan Perth until 2021.

[20] Government of Western Australia, Department of Health. Case Definitions for Notifiable Infectious Diseases and Related Conditions in Western Australia [accessed 6 October 2022] https://ww2.health.wa.gov.au/~/media/Corp/Documents/Health-for/Communicable-Diseases/definitions/wa-notifiable-infectious-disease-case-definitions.pdf

Appendix 2: Immunisation coverage for all children for 2021 by Local Government Area (LGA)

Local Government Area (LGA)	Age Group	Immunisation coverage for all children (%)
Armadale	12 months	94.06
	24 months	92.11
	60 months	96.09
Bassendean	12 months	93.16
	24 months	90.59
	60 months	96.77
Bayswater	12 months	95.27
	24 months	92.78
	60 months	93.20
Belmont	12 months	93.37
	24 months	90.87
	60 months	91.09
Cambridge	12 months	97.58
	24 months	92.04
	60 months	93.92
Canning	12 months	94.75
	24 months	93.50
	60 months	93.81
Claremont	12 months	90.91
	24 months	94.06
	60 months	96.33
Cockburn	12 months	94.86
	24 months	92.21
	60 months	93.66
Cottesloe	12 months	≥ 95.00*
	24 months	90.11
	60 months	89.66
East Fremantle	12 months	≥ 95.00*
	24 months	94.81
	60 months	94.12
Fremantle	12 months	91.87
	24 months	89.08
	60 months	90.08
Gosnells	12 months	94.07
	24 months	92.48
	60 months	93.45
Joondalup	12 months	95.29
	24 months	91.88

	60 months	94.37
Kalamunda	12 months	94.25
	24 months	92.08
	60 months	94.07
Kwinana	12 months	95.20
	24 months	93.13
	60 months	93.88
Mandurah	12 months	93.83
	24 months	89.59
	60 months	94.08
Melville	12 months	94.79
	24 months	91.87
	60 months	93.04
Mosman Park	12 months	93.75
	24 months	92.06
	60 months	91.86
Mundaring	12 months	91.49
	24 months	87.93
	60 months	89.00
Murray	12 months	89.12
	24 months	89.43
	60 months	90.94
Nedlands	12 months	94.33
	24 months	90.00
	60 months	92.21
Peppermint Grove	12 months	NP*
	24 months	NP*
	60 months	NP*
Perth	12 months	92.72
	24 months	88.11
	60 months	83.23
Rockingham	12 months	93.00
	24 months	91.83
	60 months	94.07
Serpentine-Jarrahdale	12 months	94.34
	24 months	93.17
	60 months	94.93
South Perth	12 months	94.78
	24 months	92.60
	60 months	92.61
Stirling	12 months	94.62
	24 months	91.41

	60 months	93.28
Subiaco	12 months	96.37
	24 months	94.94
	60 months	93.39
Swan	12 months	94.37
	24 months	93.08
	60 months	95.01
Victoria Park	12 months	94.86
	24 months	93.12
	60 months	92.64
Vincent	12 months	94.88
	24 months	91.67
	60 months	89.14
Wanneroo	12 months	94.98
	24 months	93.64
	60 months	94.87
Waroona	12 months	86.11
	24 months	92.50
	60 months	94.44

*The following data suppression rules have been applied to protect the privacy of individuals as per the requirements of AIR data publication[21]:

1. Not Published (NP) indicates the number of individuals for that row is less than 25.
2. ≥ 95.00 indicates that the number of individuals for that row is between 25 and 100, and the coverage rate for that population is equal to or greater than 95%.
3. ≥ 99.00 indicates that the number individuals for that row is greater than 100, and the coverage rate for that population is equal to or greater than 99%.

[21] AIR Data (personal communication) AIR Stewardship, Data Quality and Use, Immunisation and Communicable Disease Branch, Population Health Division, Primary and Community Care Group, Department of Health and Aged Care, Australian Government, on 13 September 2022.

Appendix 3: AIR criteria for determining whether a child is classified as fully vaccinated

To be considered fully vaccinated in 2021:

A 12-<15 month old child requires three doses of **diphtheria, tetanus and pertussis vaccine (DTPa)**, polio, and hepatitis B vaccines; two or three doses of **Haemophilus influenza type b (HiB)**; and two doses of pneumococcal vaccine.

A 24-<27 month old child requires four doses of DTPa; three doses of polio, hepatitis B, and pneumococcal vaccines; three or four doses of HiB; two doses of **measles, mumps and rubella vaccine (MMR)**; one dose of **meningococcal C (menC)** and varicella vaccines.

A 60-<63 month old child requires five doses of DTPa and four doses of polio vaccine.

Appendix 4: List of acronyms used in this report

AIR: Australian Immunisation Register

APSGN: Acute post-streptococcal glomerulonephritis

CDCD: Communicable Disease Control Directorate

EMHS: East Metropolitan Health Service

DOR: Date of receipt

GAS: Group A streptococcus

GP: General Practitioner

HIV: Human Immunodeficiency Virus

ICU: Intensive Care Unit

iGAS: Invasive Group A Streptococcus

LGA: Local Government Area

MCDC: Metropolitan Communicable Disease Control

MMR: Measles, mumps, rubella vaccine

MSM: Men who have sex with men

NGO: Non-government organisations

NIP: National Immunisation Program

NMHS: North Metropolitan Health Service

NNDSS: National Notifiable Diseases Surveillance System

ODOO: Optimal date of onset of disease

PEP: Post-exposure prophylaxis

PHOps: Public Health Operations

RCF: Residential care facility

RPR: Rapid plasma reagin

RSV: Respiratory syncytial virus

SMHS: South Metropolitan Health Service

STI: Sexually transmitted infection

WA: Western Australian

WA DOH: Western Australian Department of Health

WANIDD: Western Australian Notifiable Infectious Diseases Database

WHO: World Health Organisation