



Government of **Western Australia**
Department of **Health**

Review of Notifiable Infectious Diseases in Western Australia 2021

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Review of notifiable infectious diseases, 2021

There were 28,752 communicable disease notifications in Western Australia in 2021 (Figure 1) (Table 1). This was similar to 2020 (n=30,594), and a 27% decrease compared to the previous five-year average (2016-2020). This five-year average is influenced by the unusually high number of influenza notifications reported in 2019.

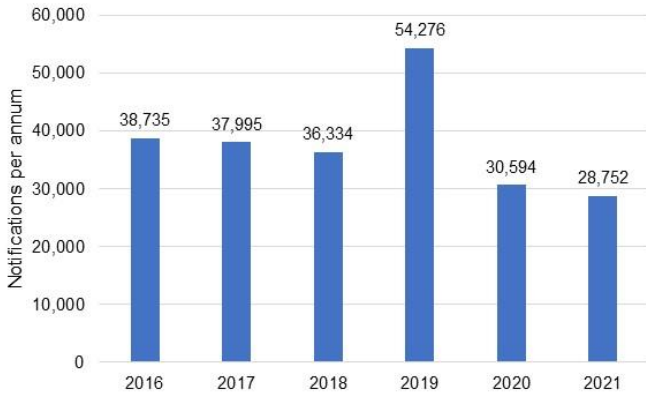


Figure 1 Notifications per year in WA, 2016 to 2021

In 2021, there were further declines in overseas acquired diseases compared to 2020, such as dengue virus infection, malaria and measles, but also reductions in diseases such as salmonellosis, pertussis, and mumps which are primarily locally acquired.

Over half of all notifications were sexually transmissible infections (52%) (Figure 2).

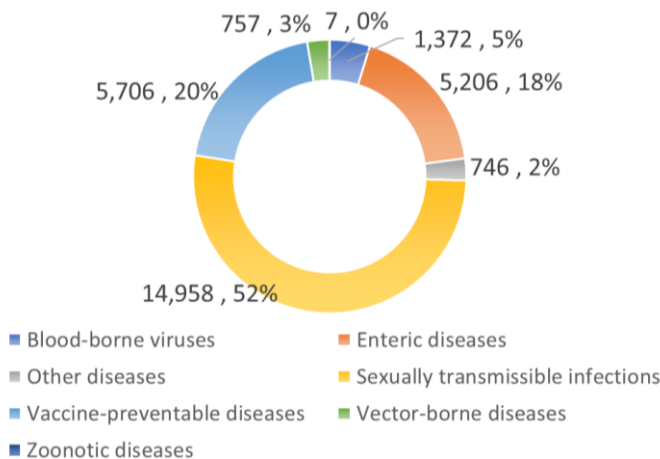


Figure 2 Notifiable infectious diseases in WA, 2021

The most frequently notified diseases in 2021 were chlamydial infection (n=10,913 cases), varicella zoster infection (n=5,133), campylobacteriosis (n=3,149 cases),

gonococcal infection (n=2,908 cases), and hepatitis C (n=945 cases).

Two new conditions were added notifiable diseases list in September 2021:

- Respiratory syncytial virus (RSV).
- Invasive group A streptococcal (iGAS) disease.

Notifications and rates by health region are presented in Table 2.

Public health measures

In 2021, a range of public health measures continued from 2020 to reduce importation and transmission of COVID-19 in WA, as many in the population were not fully vaccinated until later that year. The transmission of other notifiable infectious diseases was impacted by these measures that included closing of international and state borders, quarantine requirements for returned travellers, physical distancing measures, infection prevention and control recommendations such as mask use, strong public communications regarding hand hygiene, isolating if any respiratory symptoms, restricting social interactions and recommendations to work from home.

Enteric diseases

In 2021, there were 5,206 enteric disease notifications in WA, with a rate of 196.3 cases per 100,000 population, which is 21% lower than the historical 5-year average rate (248.5 cases per 100,000). Most notifiable enteric diseases in 2021 had lower or comparable rates to the previous five-year average. Notable increases were observed for rotavirus (n=714, 2.1-fold increase), yersiniosis (n=38, 2.3-fold increase) and *Vibrio parahaemolyticus* infection (n=39, 2.5-fold increase).

In 2021, the age group with the highest enteric disease rate was 0-4 years with 586 cases per 100,000 population, which is three-fold higher than the overall rate for WA. The notification rate for Aboriginal people was 63% higher compared with non-Aboriginal people. The greatest rate

difference was for shigellosis, with the rate for Aboriginal people 28-fold higher than non-Aboriginal people. The region with the highest rate was the Kimberley with 701 cases per 100,000 population.

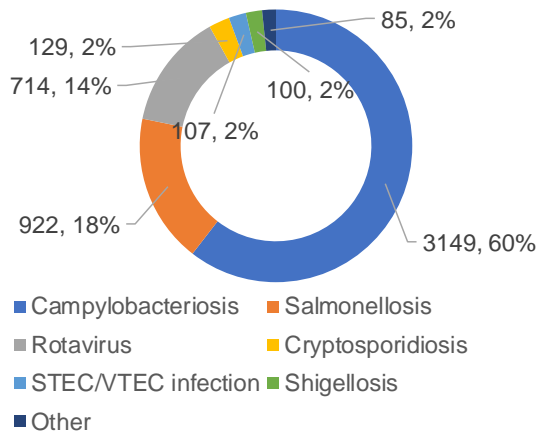


Figure 3 Notifiable enteric infectious diseases in WA, 2021

The decrease in enteric notifications in 2021 was largely the result of COVID-19 related public health measures, including travel restrictions. In 2021, of the people with a known place of acquisition, 99.5% reported acquiring their infection in WA, compared to the 2016-2020 period where average of 22% acquired their infection overseas.

For detailed descriptions of enteric disease notifications, see the [quarterly and yearly enteric disease reports](#).

As with previous years, **campylobacteriosis** was the most commonly notified enteric disease in 2021 (n=3,149; 60%); however, the notification rate was 7% lower than the previous five-year average.

Salmonellosis was the second most commonly notified enteric infection in 2021 with 922 cases and a rate of 34.8 cases per 100,000 population. The 2021 rate was 57% lower than the previous five-year average (80.6 cases per 100,000 population).

The most commonly notified *Salmonella* serotype in WA in 2021 was *S. Typhimurium* (54%), with 469 notifications. In 2021, apart from two cases who acquired their illness

interstate, all salmonellosis notifications acquired their illness in WA.

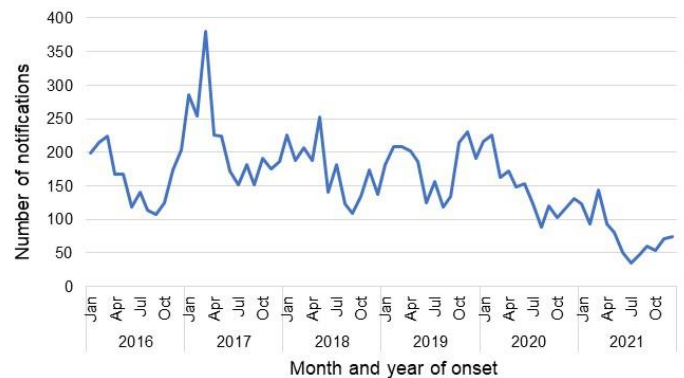


Figure 4 Salmonellosis notifications by year and month, WA, 2016 to 2021

The third most notifiable enteric disease in 2021 was **rotavirus infection** with 714 cases (26.9 cases per 100,000 population). The rate was 2.1-fold higher than the previous five-year average of 13.1 cases per 100,000 population. Historically, rotavirus notifications typically peak in the winter months, however cases in 2021 increased substantially from September to December with 571 notifications reported over that period.

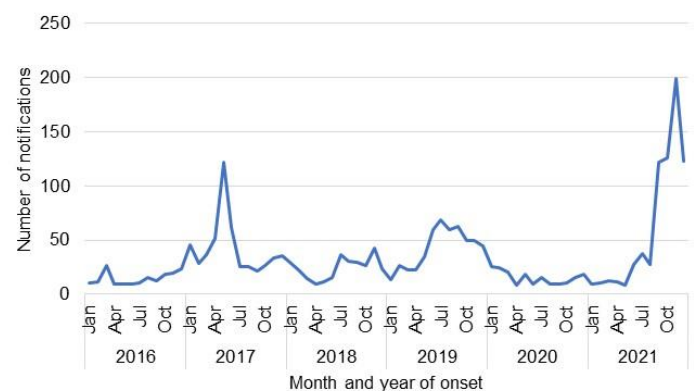


Figure 5 Rotavirus notifications by year and month, WA, 2016 to 2021

The regions with the highest rotavirus notification rates were the Kimberley and Pilbara (193.7 and 61.7 cases per 100,000 population, respectively). Overall, notification rates were 4-fold higher for Aboriginal people than for non-Aboriginal people (92.4 and 23.9 cases per 100,000

population, respectively). Where place of acquisition was known, 99% of cases acquired their illness in WA, with the remaining 1% of cases acquiring their illness interstate. There were 10 person-to-person outbreaks due to rotavirus in 2021 at residential care facilities (RCFs) (n=5), at childcare centres (CCCs) (n=3), at a school (n=1) and in an Aboriginal community (n=1).

There were 129 **cryptosporidiosis** cases notified in 2021, making it the fourth most common notifiable enteric disease. The notification rate (4.9 cases per 100,000 population) was 48% lower than the previous five-year average (11.3 cases per 100,000 population). In 2021, there was a small increase in notifications in the late summer/autumn period which is a similar time period when large outbreaks occurred in 2017 and 2020. In 2021, there were two cases of cryptosporidiosis linked to the same farm, with no other outbreaks observed. The 0-4 years age group had the highest notification rate (24.6 cases per 100,000 population) and accounted for 33% of all cryptosporidiosis notifications. The notification rate for Aboriginal people was seven-fold higher than for non-Aboriginal people (27.1 and 3.7 cases per 100,000 population, respectively). The Kimberley region had the highest notification rate (109 cases per 100,000 population), followed by the Great Southern region (13 cases per 100,000 population). Of those cases with known place of acquisition, all were acquired in WA.

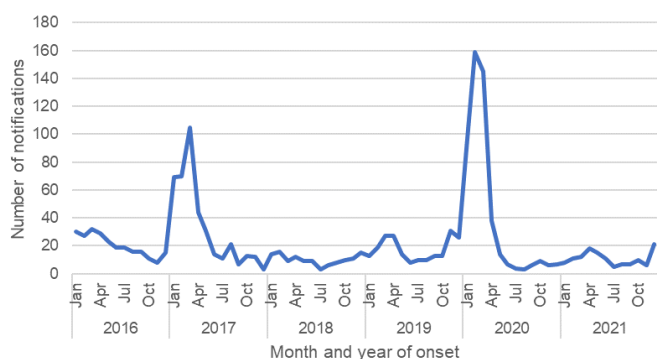


Figure 6 Cryptosporidiosis notifications by year and month, WA, 2016 to 2021

There was a single case of **hepatitis A** notified in 2021 in a returned traveler from

Pakistan, with a rate of 0.04 cases per 100,000 population compared to the average rate of the previous five years of 0.6 cases per 100,000 population.

In 2021, there was one case of **typhoid fever** (caused by *Salmonella Typhi*) notified, which was lower than the previous five-year average of 15 notifications. This case had recently returned from Papua New Guinea.

There were no cases of **paratyphoid fever** (caused by *Salmonella Paratyphi*) notified in WA in 2021. Typhoid and paratyphoid fever are generally acquired overseas and the decrease in 2021 was due to overseas travel restrictions.

There were 39 cases of **Vibrio parahaemolyticus** infection notified in 2021 with a rate of 1.5 cases per 100,000 population, which was 2.5-fold higher than the previous five-year average. This increase was primarily due to a multi-jurisdictional outbreak of associated with the consumption of oysters from South Australia (SA).

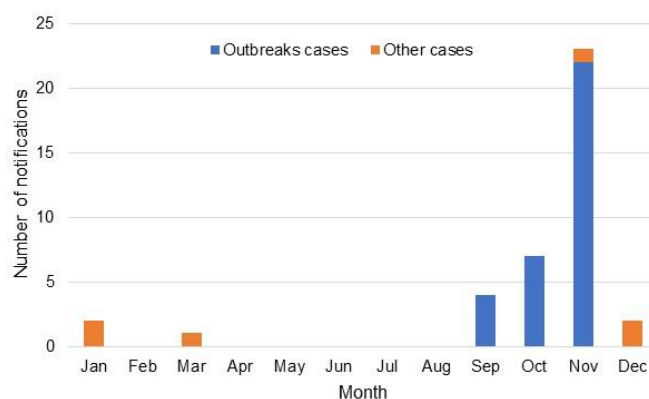


Figure 7 Vibrio parahaemolyticus notifications by month and oyster related outbreak, WA, 2021

Of the 39 cases in WA, 33 were associated with the outbreak due to oysters. Public health measures were taken in SA to help minimise contamination of oysters. Further details of the outbreak can be found in the [WA OzFoodNet 2021 4th quarter report](#). Of the remaining six cases, five were related to wound infections and one had unknown source.

There were 38 cases of **yersiniosis** infection notified in 2021, with a rate of 1.4 cases per 100,000 population, which is 2.3-fold higher than the average rate of the previous five years (0.6 cases per 100,000). Of those cases with known travel history, all had acquired their illness in WA. There were no clusters or outbreaks of yersiniosis investigated in 2021.

There were six cases of **listeriosis** notified in 2021 with a rate of 0.2 cases per 100,000 population, which was similar to the five-year average (0.3 cases per 100,000). All cases were non-pregnancy related, had immunocompromising illnesses and most reported eating foods considered to be a high risk for listeriosis. One death was reported.

There were 107 cases of **shiga-toxin producing *E. coli* (STEC)** reported in 2021 with a rate of 4.0 cases per 100,000 population, which was 18% higher than the five-year average. This increase was likely partially due to the introduction of STEC PCR tests by two pathology laboratories in 2016 and 2018. These two laboratories notified 86% of STEC cases in WA for 2021.

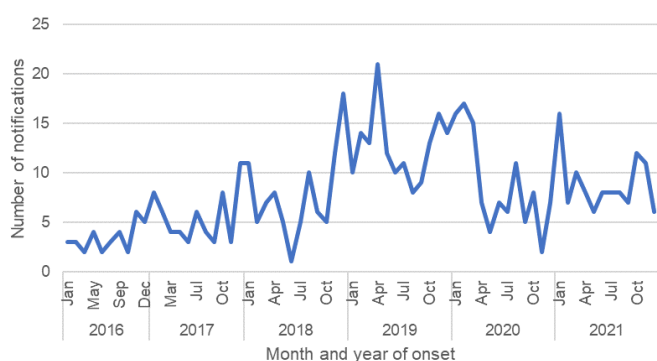


Figure 8 Shiga-toxin producing *E. coli* notifications by year and month, WA, 2016 to 2021

There were 100 cases of **shigellosis** notified in 2021, with a notification rate of 3.8 cases per 100,000 population. The notification rate was 58% lower than the previous five-year average. Unlike previous years, in 2021 there was no increase in notifications during the summer months.

Botulism is rare in WA, with the last case reported in 2015. **Cholera** is mainly seen in

people who have travelled overseas. The last case in WA was in 2017.

Gastrointestinal disease outbreaks

In 2021, there were 21 outbreaks of **foodborne disease** investigated.

Table 3 Foodborne outbreaks investigated in WA by aetiology, 2017-2021

Aetiological agent	Number of outbreaks				
	2017	2018	2019	2020	2021
<i>Salmonella</i>	37	32	25	16	14
<i>Campylobacter</i>	0	0	0	0	2
<i>Clostridium perfringens</i>	0	0	0	1	1
Norovirus	3	0	2	1	1
STEC*	0	0	0	0	1
<i>Vibrio parahaemolyticus</i>	0	0	0	0	1
Unknown	2	4	0	2	1
Total	42	36	27	20	21

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The number of foodborne outbreaks was below the five-year average (n=29.2) with a decrease reported each year since 2017 where the number of outbreaks investigated peaked at 42 (Table 3). The 21 foodborne outbreaks included at least 172 cases of gastroenteritis and 11 hospitalisations. A food vehicle was identified in 52% (n=11), with the most commonly implicated food raw or undercooked egg and egg-containing dishes (n=4, 19%).

Non-foodborne enteric disease outbreaks and outbreaks with an unknown mode of transmission are a major cause of illness, especially in institutions such as RCFs and CCCs. There were 262 non-foodborne outbreaks reported in 2021 which resulted in 3,812 ill people, 34 hospitalisations and one associated death. Most of these outbreaks were in RCFs and CCCs as a result of person-to-person transmission. There was a large increase in outbreaks at CCCs in 2021 (2.5 fold higher, n=159), with most reported in the fourth quarter in the Perth metropolitan region (Figure 5). Only a small number of CCC outbreaks had a diagnosis,

most (70%) were due to rotavirus.

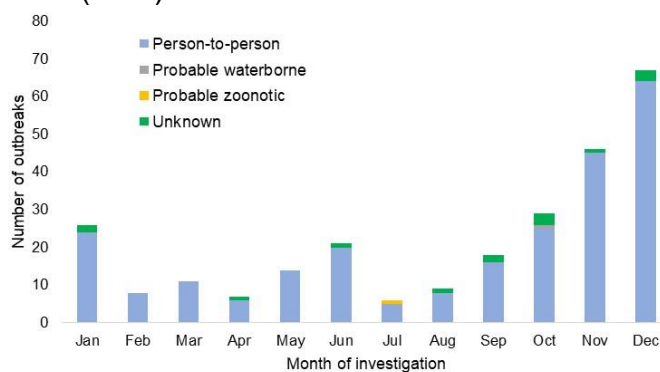


Figure 9 Number of non-foodborne gastroenteritis outbreaks by mode of transmission and month, 2021

→ See also: *OzFoodNet quarterly and annual reports (Enteric infection reports and publications (OzFoodNet) (health.wa.gov.au))*

Vaccine-preventable diseases

The range of public health measures implemented to help reduce the importation and transmission of COVID-19 in WA also reduced other vaccine preventable diseases.

In WA, there were 303 **COVID-19** notifications in 2021. A daily peak of 20 cases was reached on 24 August 2021, in seafarers from a maritime vessel.

Of the 303 notifications, 69% (n=209) acquired their infection overseas, 19% (n=57) acquired it at sea and 10% (n=30) acquired it in Australia. Of the 30 notifications that were locally acquired, all were a contact of a confirmed case(s) and/or in a known outbreak. Seven notifications had acquired their illness interstate.

In 2021, 75.6% of the notifications were metropolitan Perth residents, 23.8% were overseas or interstate residents and 0.7% were regional WA residents. The majority of cases were in non-Aboriginal people with two cases in Aboriginal people.

The median age of COVID-19 notifications was 34 years, with the highest rate occurring in 25-29 year-olds (29.3 cases per 100,000 population); 221 (73%) were male and 82 (27%) were female; 21 (7%) were admitted to hospital, six (2%) were admitted to an intensive care unit and one was

ventilated. There were no COVID-19 related deaths in WA in 2021.

In 2021, there were 11 outbreaks of COVID-19 reported, with 32% (n=98) of cases linked to outbreaks.

COVID-19 vaccinations in WA were first available in late February 2021 for high risk groups and progressively rolled out to the remaining population.

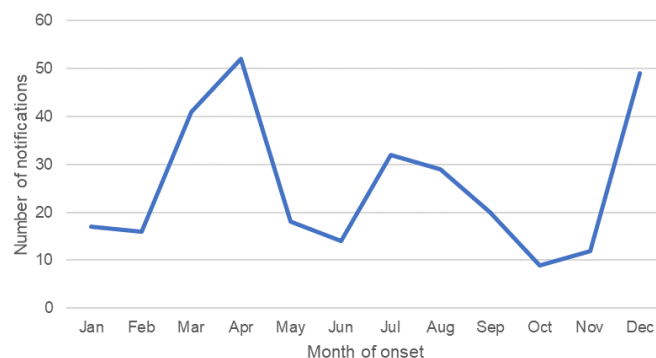


Figure 10 Number of COVID-19 notifications by month, 2021

In 2021, there were no notifications of **measles** in WA, resulting from COVID-19 overseas travel restrictions and no importations.

Three cases of **rubella** were notified in 2021, all of which were eye infections. Rubella can occur as a persistent infection in the eye (or reactivation of latent infection), rather than a recent acute rubella infection.

There was one notification of **mumps** in 2021, occurring in an adult.

There was one notification of **invasive Haemophilus influenzae type B** infection in 2021. In the 5-year period of 2016–2020, there were also low levels of notifications with seven cases reported in WA.

The number and rate of notifications of **invasive pneumococcal disease (IPD)** decreased from a peak of 247 cases (9.4 cases per 100,000 population) in 2019 to 184 cases (6.9 cases per 100,000) in 2021. This was mostly attributed to a 1.5-fold decrease in cases among non-Aboriginal people, from 178 (7.1 cases per 100,000) in 2019 to 118 cases (4.6 cases per 100,000) in 2020. Where serogroup information was

available, 40% (68/170) were non-vaccine preventable.

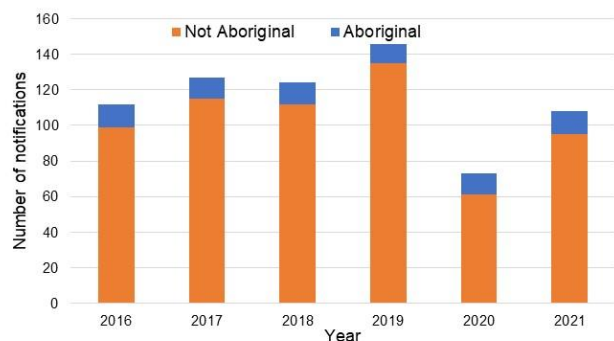


Figure 11 Annual invasive pneumococcal disease notifications in WA by Aboriginality, 2016 to 2021

There was a 97% decrease in **influenza** notifications in 2021 (n=33, 1.2 cases per 100,000), compared to 2020 (n=1,197). In 2019, there was 23,198 notifications, which was the highest number of notifications reported in WA. The low number of notifications in 2021 was due to the impact of COVID-19 related public health measures, including the restriction of new influenza strains being introduced from overseas. Of the 33 influenza cases notified, 94% were influenza A and 6% were influenza B.

In 2021, there were 47 notifications (1.8 cases per 100,000) of **pertussis**, compared to the previous five-year average of 734 cases. The number of notifications have decreased since a peak of 4,023 notifications in 2011. In 2021, the majority of cases (85%) were aged 30 years and above. The highest notification rate was recorded in the Midwest (3.3 cases per 100,000), which was almost 2-fold higher than the WA rate (1.8 cases per 100,000).

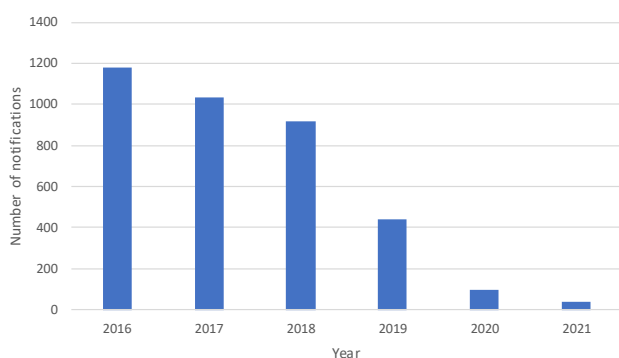


Figure 12 Annual pertussis notifications in WA, 2016 to 2021

Varicella zoster virus notifications increased by 19% in 2021 with 5,133 cases compared to the five-year average of 4,330 cases. The notifications in 2021 included 10% chickenpox cases, 53% shingles cases and 37% of unspecified cases. Typically, unspecified varicella zoster notifications lack the clinical information required to specify whether the case is either chickenpox or shingles.

There was one notification of **tetanus** in 2021 in an unvaccinated child relating to a wound.

Vector-borne diseases

Compared to the five-year average, in 2021, the number of **Ross River virus (RRV)** infection (n=702, 26.5 cases per 100,000) and **Barmah Forest virus (BFV)** infection (n=23, 0.9 cases per 100,000) notifications were 16% higher (n=702) and 12% lower (n=23), respectively.

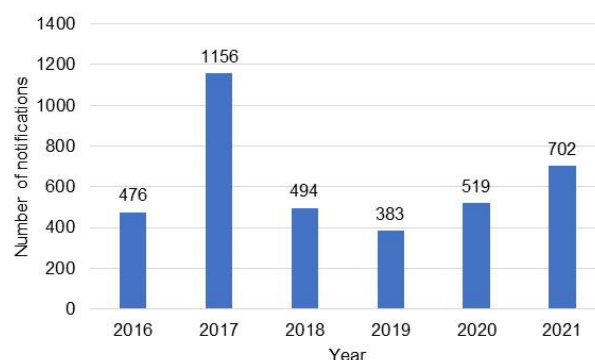


Figure 13 Annual RRV notifications in WA, 2016 to 2021

The Kimberley (17.1 cases per 100,000) and Midwest (6.5 cases per 100,000) regions recorded the highest notification rate for BFV in 2021.

The Great Southern (109.7 cases per 100,000) and Midwest (88.2 cases per 100,000) regions recorded the highest notification rate for RRV in 2021.

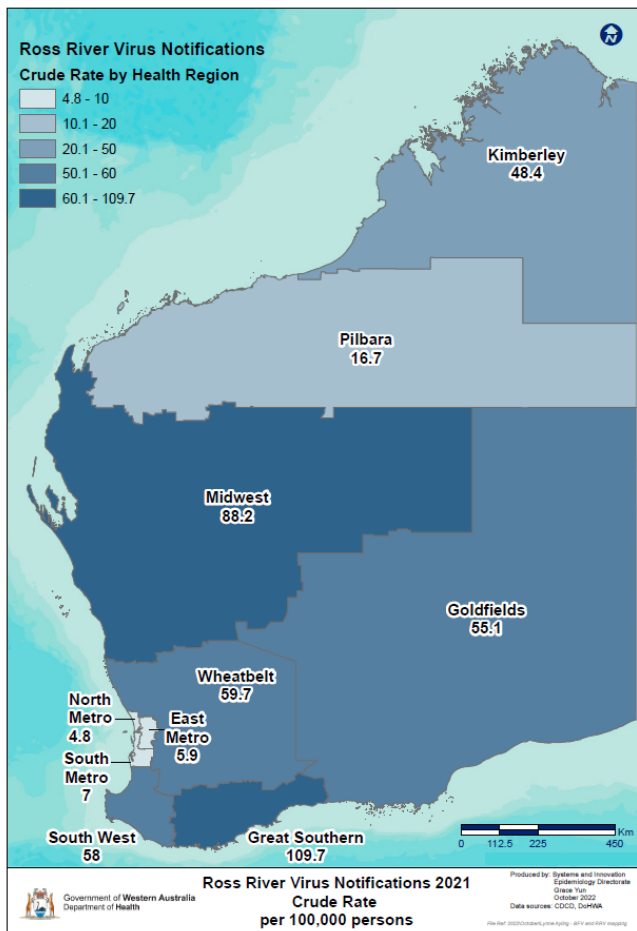


Figure 14 Map of Ross River virus infections in WA, 2021

No cases of **Murray Valley encephalitis virus** infection were reported in 2021; the last notification was in 2018.

There were no **dengue virus** infection notifications in 2021, a significant reduction from 172 cases in 2017 and 327 cases in 2019. Dengue virus infection is not an endemic disease in WA and the majority of cases acquire their infection overseas.

There were no **Chikungunya virus** notifications in 2021. All notifications to date have been acquired overseas.

Malaria notifications in 2021 (n=10, 0.4 cases per 100,000 population) were almost five fold lower than the average notification rate for the previous 5 years (1.9 cases per 100,000 population), and was the lowest recorded since 2004.

Zoonotic diseases

Notifications for brucellosis, leptospirosis, psittacosis and Q fever continue to be

infrequent. No cases of **brucellosis** and **psittacosis** were reported in 2021. Four cases of **leptospirosis** were reported; one case worked on a dairy farm, one was a cattle truck driver, and two occurred in regional areas.

There were three notifications of **Q fever** (0.1 cases per 100,000) in 2021. All cases reported animal exposure; one case in a farm worker, one case in a regional vet nurse, and one case in a metropolitan outdoor worker with exposure to kangaroos and ticks.

Sexually transmissible infections

There were 10,913 notifications (411.5 cases per 100,000) of **chlamydial infection** in 2021, which was comparable to 2020, and 6% lower than the previous five-year average, reflecting relative stability in notifications over this period.

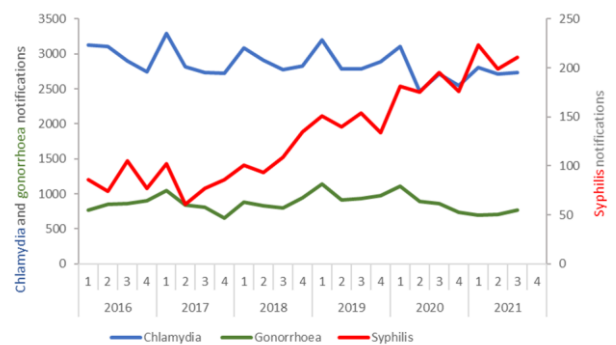


Figure 15 Trend in syphilis, chlamydial infection and gonococcal infection notifications, 2016 to 2021

In 2021, 73% of notified cases were in people aged 15 to 29 years, and females were more commonly notified than males in

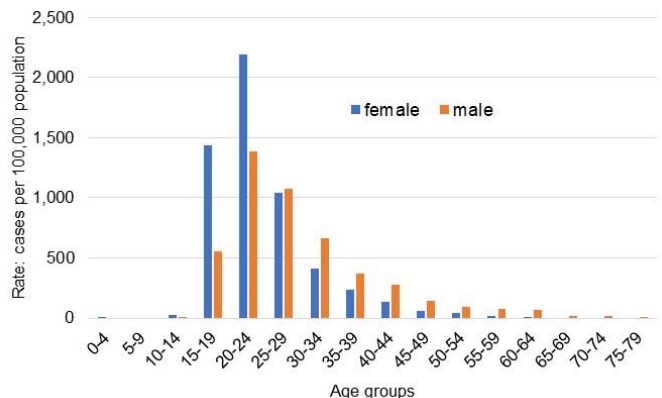


Figure 16 Rates of chlamydial infection notifications in 2021, WA, by age group and gender

those aged under 25 years, whereas the converse was observed in older individuals.

The notification rate for chlamydial infection was 3.8 fold higher in Aboriginal people compared to non-Aboriginal people. While rates declined or remained relatively stable in most regions, there was a 10% increase in the Pilbara region.

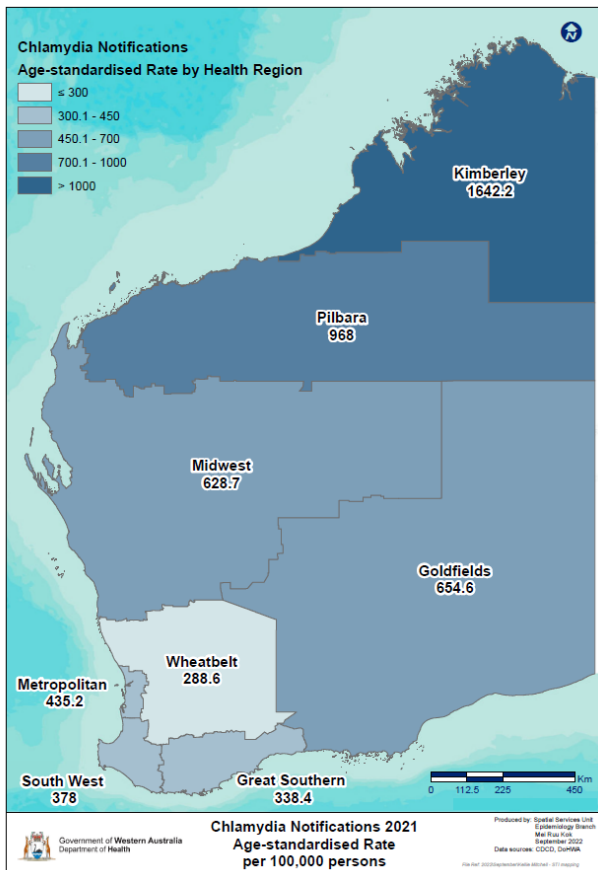


Figure 17 Map of chlamydial infections in WA, 2021

Gonococcal infection notifications in 2021 (n=2,908) increased by 23% compared to 2020 levels, but were 19% lower than the previous five-year average.

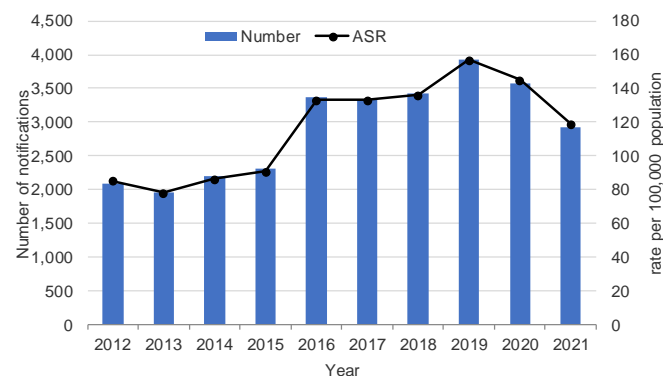


Figure 18 Notifications and age standardised rate of gonococcal infection notifications, WA, 2012 to 2021

In 2021, 55% of notified cases were in people aged under 30 years, and females were more commonly notified than males in those aged under 20 years, whereas the converse was true in older individuals.

The notification rate of gonococcal infection was 14-fold higher in Aboriginal people compared to non-Aboriginal people (1,012 cases and 70 cases per 100,000 population, respectively). Compared to the five-year average rate, 2021 trends in the gonococcal infection notification rate varied between regions. Most notable was the 25% increase in the Goldfields region and a 50% decrease in the South West region. Notification rates for gonococcal infection were highest in the Kimberley, Pilbara and Goldfields regions.

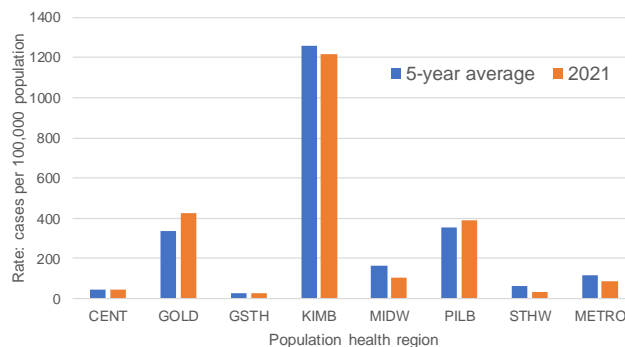


Figure 19 Rate of gonococcal infection notifications in 2021 and previous five year average, WA, by population health region

In 2021 four **congenital syphilis** cases were notified: one in a non-Aboriginal child and three in Aboriginal children. There was one case each in the metropolitan Goldfields, Kimberley and Pilbara regions.

Notifications for **infectious syphilis** increased by 19% from 2020 (n=713, 27.1 cases per 100,000) to 2021 (n=845, 31.9 cases per 100,000). The number of syphilis notifications increased 2.6-fold between 2017 and 2021.

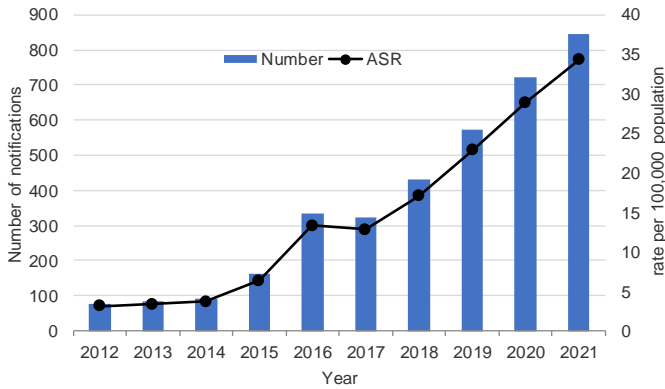


Figure 20 Notifications and age standardised rate of infectious syphilis notifications, WA, 2012 to 2021

The number of infectious syphilis notifications increased by 9% among males and 41% among females. Of the females of reproductive age, 13% (n=16/125) were pregnant at the time of diagnosis.

Those aged 20 to 34 years comprised 49% of infectious syphilis notifications and notifications among this age group increased by 8% compared to 2020. Notifications among those aged 15 to 19 years increased by 96%, predominantly among Aboriginal people in the non-metropolitan area.

The infectious syphilis notification rate increased by 26% among Aboriginal people (263.9 to 331.3 per 100,000 population) and by 8% among non-Aboriginal people (17.7 to 19.0 per 100,000 population), resulting in a rate ratio of 17.4 compared to the 2020 rate ratio of 14.9.

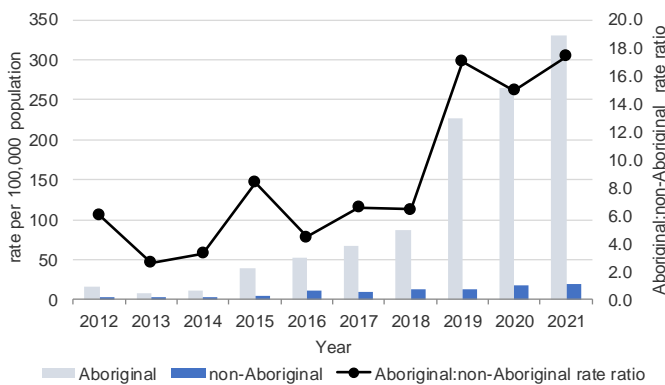


Figure 21 Age standardised rate of infectious syphilis notifications by Aboriginality, WA, 2012 to 2021

Notifications in the Kimberley, Pilbara and Goldfields regions increased as part of an

ongoing outbreak in northern Australia among Aboriginal people due to heterosexual transmission. Further information and response to the infectious syphilis outbreak affecting Aboriginal people living in northern Australia is available from: <http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-infectious-syphilis-outbreak.htm>.

In the Kimberley region an increase in infectious syphilis notifications began in 2014 and have subsequently increased each year. In 2021, the Kimberley region rate remained the highest in WA and increased by 48% compared to 2020.

Infectious syphilis notifications began to increase in the Pilbara region from February 2018 and have increased in each following year, with 147 notifications in 2021..

In the Goldfields region, an infectious syphilis outbreak was declared in January 2019, with 34, 27, and 27 cases reported in 2019, 2020 and 2021, respectively.

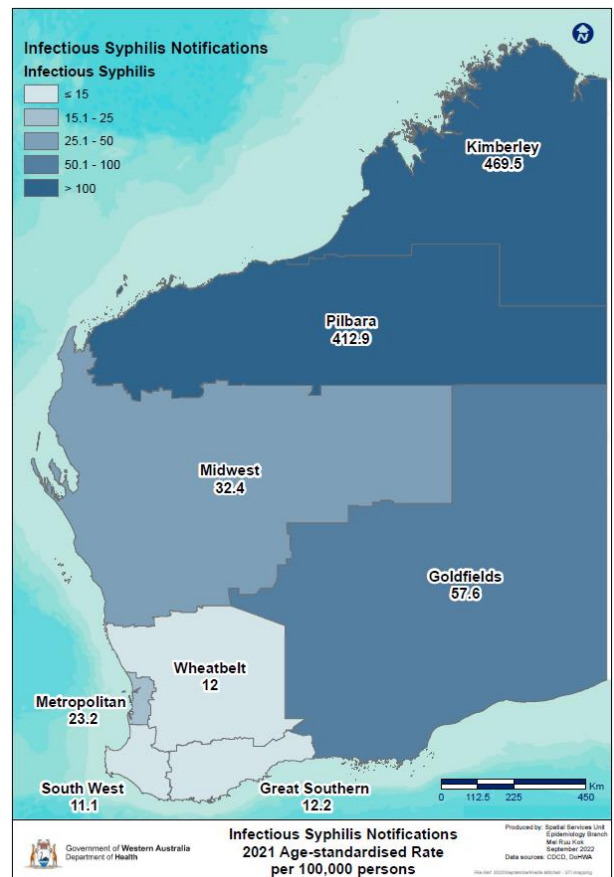


Figure 22 Map of infectious syphilis infections in WA, 2021

Historically, most syphilis cases in the Perth metropolitan area were among ‘men who have sex with men’ (MSM). However, in 2021 there were more cases with a heterosexual exposure (70%) than MSM (27%).

There were 231 notifications of **non-infectious syphilis** in 2021 (8.7 cases per 100,000 population), which was 36% higher than the previous five-year average of 170 notifications per year (6.5 cases per 100,000 population).

No cases of **donovanosis** have been notified in WA since 2014.

Chancroid infection is rare in WA, with the last case reported in 2009.

Newly diagnosed cases of **HIV** increased by 78% between 2018 (n=58) and 2019 (n=104) but decreased in both 2020 (annual decrease of 29% to 72 notifications) and in 2021 (decreased by 24% to 55 notifications). The rate of HIV in 2021 was 2.1 cases per 100,000 people, which was 18% lower than the 5-year average (3.3 cases per 100,000).

Compared to the period 2012 to 2016 with 500 newly diagnosed HIV case notifications, there was a decrease in the 2017 to 2021 period, with 368 notifications. This decrease was mainly in the number of notifications reporting MSM exposure (299 to 163 cases), while cases reporting heterosexual exposure decreased by 3% (183 to 178 cases). The decrease in MSM HIV notifications has coincided with the

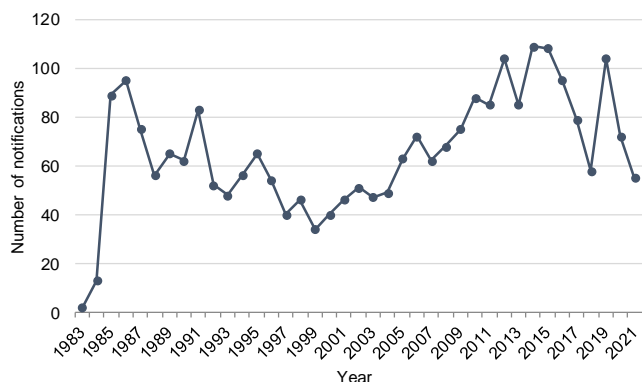


Figure 23 Number of HIV notifications, WA, 1983 to 2021 (excludes cases previously diagnosed outside WA)

availability of pre-exposure prophylaxis (PrEP) in WA since 2017.

Most HIV cases notified in 2021 lived in the Perth metropolitan area (78%), with 46 (84%) male cases (median age 40 years), and 9 (16%) female cases (median age 34 years). In the 2017 to 2021 period, approximately half of all male cases acquired their infection in Australia (n=154, 51%) and most of these cases (n=119, 77%) were MSM. For this period, the majority of male (n=92/135, 68%) and female (n=37/40, 93%) cases who acquired their infection overseas reported a heterosexual exposure. Of those males who acquired HIV overseas by heterosexual exposure, most acquired the infection in South-East Asia (73%; n=67), of whom the majority were Australian-born (66%; n=44), and 41% of whom had acquired HIV while on holiday (n=18). There was also a 2.2-fold increase in the number of female cases reporting acquisition in South-East Asia (12 to 26), and the majority were also born in that region (77%; n=20).

In 2021, there were five HIV cases notified in Aboriginal people. Between 2016 and 2020, there were 20 Aboriginal HIV notifications, ranging between two and five cases per year.

Blood-borne viruses

Newly acquired hepatitis B notifications reached a ten-year high in 2013 (n=39) and the number of notifications in 2021 (n=7) was 68% lower than the previous five-year

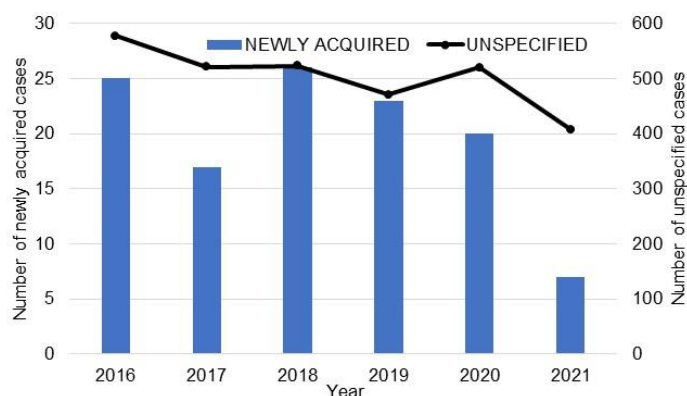


Figure 24 Number of hepatitis B notifications, WA, 2016 to 2021

average (22 notifications per year). All seven cases in 2021 resided in metropolitan Perth.

The number of **unspecified hepatitis B** notifications (n=408) decreased by 24% in 2021 compared to 2020. The number of total hepatitis B notifications decreased by 17% among males and 33% among females, resulting in a slightly lower male to female rate ratio compared to 2020 (1.1:1 versus 0.9:1). The largest proportion of total hepatitis B notifications was among those aged 60 years or older (n=84, 21%), and notifications among this age group decreased by 16% compared to 2020.

In 2021, the highest hepatitis B rates (newly acquired and unspecified) were reported in the Pilbara (31.8 cases per 100,000 population) and Kimberley regions (31.6 cases per 100,000 population).

In 2021, 7% of unspecified hepatitis B notifications were reported in Aboriginal people, 88% in non-Aboriginal people and 5% of notifications were of unknown Aboriginal status. Over the previous ten-year period, the Aboriginal to non-Aboriginal rate ratio fluctuated and was 2.6:1 in 2021.

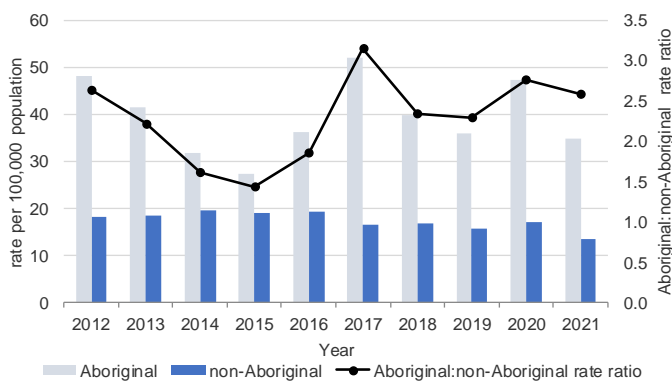


Figure 25 Age standardised rate of unspecified hepatitis B notifications by Aboriginality, WA, 2012 to 2021

Among hepatitis B notifications that had place of acquisition recorded, 75% (compared with 56% in 2020) of newly acquired infections were reported as acquired in WA and 23% (compared with 84% in 2020) of unspecified infections were reported as acquired overseas.

The number of **newly acquired hepatitis C** notifications (n=79) in 2021 decreased by 33% while the number of **unspecified hepatitis C** notifications (n=866) remained stable compared to 2020. Newly acquired hepatitis C data should be interpreted with caution as laboratory information used to determine if a case had a documented seroconversion within the past two years has not been routinely available since September 2020.

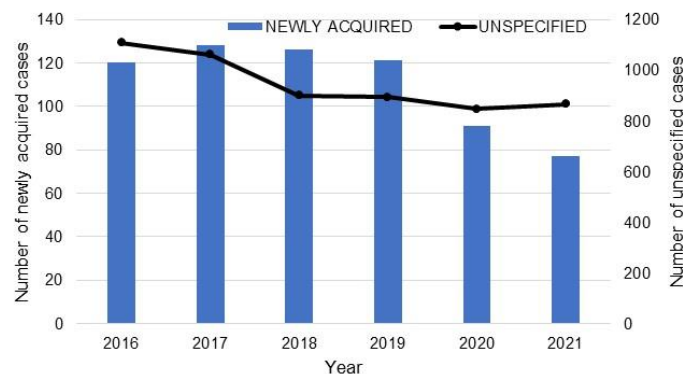


Figure 26 Number of hepatitis C notifications, WA, 2016 to 2021

The largest proportion of total hepatitis C notifications was among people aged 50 years or older (25%), and the number of notifications among this age group remained stable compared to 2020. Notifications among those aged 15 to 19 years decreased by 42% compared to 2020.

The total hepatitis C notification rate increased in 2021 by 10% among Aboriginal people and remained stable among non-Aboriginal people, resulting in a higher Aboriginal to non-Aboriginal rate ratio of 12.7:1 compared to 2020 (rate ratio 11.6:1).

Total hepatitis C notification rates decreased or remained stable in most regions compared to previous years. Most notable was a 38% decrease in the South West region, primarily among Aboriginal people. The notification rate was highest in the Kimberley region and increased by 66%, primarily among non-Aboriginal people. The second highest rate was in the Midwest region (68.0 cases per 100,000 population).

Among hepatitis C notifications that had place of acquisition recorded, 100% of newly acquired infections and 72% of unspecified infections were acquired in WA.

In 2021, enhanced surveillance forms were sent to the diagnosing doctors of all newly acquired hepatitis C infections and a randomly selected one-third of unspecified hepatitis C infections in WA. Forms were completed for 62% (n=48/77) of newly acquired infections and 47% (n=111/234) of applicable unspecified infections.

Overall, having a history of risk factors (for example injecting drug use or imprisonment) was the most common reason for hepatitis C testing among both Aboriginal and non-Aboriginal people. A greater proportion of Aboriginal people were diagnosed with hepatitis C as part of voluntary prison entry testing while a greater proportion of non-Aboriginal people were diagnosed as a result of an abnormal liver test. Injecting drug use was the most common hepatitis C risk factor for both Aboriginal (75%, n=48/64) and non-Aboriginal (59%, n=55/93) people.

Needle and syringe programs are an integral evidence-based public health strategy to reduce the transmission of blood-borne viruses. In 2021, over 5.1 million needles and syringes were distributed in WA. A campaign specific to Aboriginal people, titled 'Look After Your Blood', continued in 2021 on regional TV and radio, metropolitan radio, social media, outdoor, print and online.

→ See also: *STI and BBV annual and quarterly reports (Epidemiology of STIs and BBVs in Western Australia (health.wa.gov.au))*

Other diseases

Invasive meningococcal disease notifications declined to 10 cases in 2021, 35 fewer than in 2017, and far below the peak of 86 cases recorded in 1999 and 2000. This decrease has been attributed to the introduction of meningococcal vaccines in the [WA vaccination schedule](#) and the COVID-19 related public health measures that restricted interaction of people. The

cases reported in 2021 included 3 serogroup B; 3 serogroup W135, 2 serogroup Y, and 1 untypeable, and 1 'other'. Of these cases, 40% were aged less than 5 years, and 20% were aged 5-24 years, reflecting the usual age-related peaks observed with this disease. There were no deaths in 2021, compared with the average 9% mortality rate for WA over the 10-year period 2012-2021.

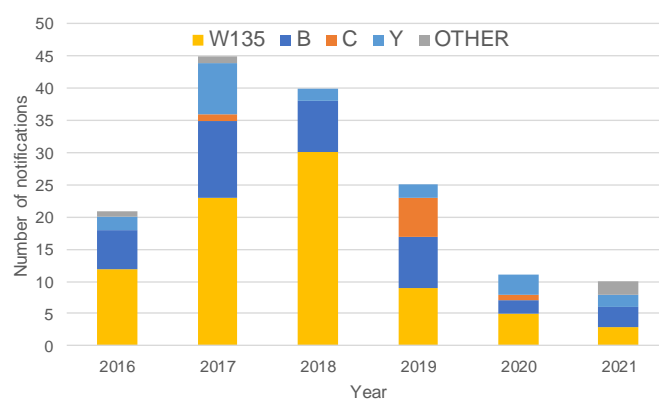


Figure 27 Number of invasive meningococcal disease notifications by serogroup, WA, 2016 to 2021

In the previous five years the number of **legionellosis** notifications peaked in 2020 with 80 cases and decreased to 71 cases in 2021 (2.7 cases per 100,000). As is typical for WA, the majority of infections in 2021 were due to *Legionella longbeachae* (71%), which is associated with exposure to gardening soils and potting mixes. The remainder were caused by *L. pneumophila* infection, associated with spray mists from warm water sources such as air conditioning cooling towers, spas, fountains and hot water systems.

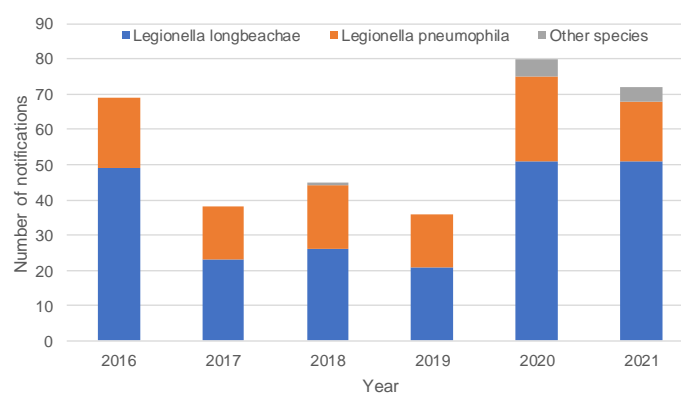


Figure 28 Number of legionellosis notifications by species, WA, 2016 to 2021

There were 132 **tuberculosis (TB)** notifications in 2021, which was similar to notification levels in 2020 (n=134). In 2021, three cases were relapses. The majority (92%) of cases were born overseas and of the 12 Australian-born cases, two were Aboriginal people. Almost all cases acquired their infection overseas (n=108, 81%), with the most common countries of exposure India (18%), the Philippines (16%), Bhutan (11%) and China (7%). Two cases had multi-drug resistant TB.

Two cases of **haemolytic uraemic syndrome (HUS)** were notified in 2021 which is the same as the five-year historic average. The cases were male and aged between 2 and 3 years. One case had acute gastroenteritis, was diagnosed with STEC and had reported visiting their grandparent's farm. The other case was diagnosed with IPD.

Seven cases of **melioidosis** were notified in 2021 (0.3 cases per 100,000), with an age range of 21 to 69 years. One case most likely acquired their infection in the Northern Territory, and all other cases either resided in, or travelled to the Kimberley region.

There were three **leprosy** notifications in 2021 (0.1 cases per 100,000), two in immigrants from Bhutan and Myanmar. One case had worked at the Derby leprosarium in the Kimberley in the 1980s.

Five cases of **Creutzfeldt-Jakob disease** (0.2 cases per 100,000) were notified in 2021, with an age range of 54 to 76 years. Between 2017-2021, there was an average of seven notifications per year.

iGAS became notifiable in September 2021 and there was incomplete reporting by laboratories until the beginning of 2022. There were 19 notifications of iGAS in 2021. Four (24%) notifications were in children aged 0-9 years, and nine notifications were in people aged over 60 years (53%). The metropolitan region had the highest number of notifications (n=10), followed by the Kimberley (n=4).

Since it became notifiable in September 2021, 485 cases of **RSV** were reported in WA. The majority of cases (n=308, 64%) were aged 0-4 years, with slightly more male cases (52%) than female cases (48%). The metropolitan region had the highest number of notifications (n=330, 68%).

Table 1 Number of notifications in WA by year, 2016 to 2021 (see Appendix for notes)

Disease Category/Disease	Notifications						Rate		Rate ratio
	2016	2017	2018	2019	2020	2021	5-year	2021	
Blood-borne viruses	1,832	1,736	1,586	1,516	1,476	1,372	62.9	51.7	0.8
Hepatitis B	604	539	552	495	537	415	21.0	15.6	0.7
Hepatitis C	1,227	1,194	1,026	1,011	936	945	41.6	35.6	0.9
Hepatitis D	1	3	8	10	3	12	0.2	0.5	2.4
Enteric diseases	5,968	7,199	6,338	7,035	5,689	5,206	248.5	196.3	0.8
Campylobacteriosis	3,391	3,373	3,444	3,526	2,884	3,149	128.2	118.7	0.9
Cholera	0	1	0	0	0	0	0.0	-	0.0
Cryptosporidiosis	244	400	122	211	491	129	11.3	4.9	0.4
Hepatitis A	16	12	12	23	6	1	0.5	0.0	0.1
Hepatitis E	3	4	2	4	3	0	0.1	-	0.0
Listeriosis	6	6	8	7	7	6	0.3	0.2	0.9
Paratyphoid fever	12	4	9	9	0	0	0.3	-	0.0
Rotavirus	179	519	297	518	187	714	13.1	26.9	2.1
Salmonellosis	1,944	2,566	2,050	2,140	1,755	922	80.6	34.8	0.4
Shigellosis	92	198	263	388	225	100	9.0	3.8	0.4
Shiga toxin (verotoxin)-producing E. colic STEC/VTEC	33	60	93	150	105	107	3.4	4.0	1.2
Typhoid	9	21	13	19	7	1	0.5	0.0	0.1
Vibrio parahaemolyticus	24	20	14	16	3	39	0.6	1.5	2.5
Yersiniosis	15	15	11	24	16	38	0.6	1.4	2.3
Other diseases	252	239	254	227	247	746	12.6	28.1	2.2
Acute post-streptococcal glomerulonephritis (APSGN)	NN	5	24	10	5	10	0.3	0.4	1.1
Amoebic meningitis	NN	0	0	0	0	1	0.0	0.0	-
Creutzfeldt-Jakob disease	6	6	7	11	7	5	0.3	0.2	0.7
Haemolytic Uraemic Syndrome	3	3	1	1	4	2	0.1	0.1	1.0
Invasive Group A Streptococcal (iGAS) Disease	NN	NN	NN	NN	NN	19	0.0	0.7	-
Legionellosis	69	38	43	36	80	71	2.0	2.7	1.3
Leprosy	8	1	2	3	3	3	0.1	0.1	0.9
Melioidosis	3	7	5	3	5	7	0.2	0.3	1.5
Meningococcal infection	21	45	40	23	9	10	1.1	0.4	0.4
Respiratory Syncytial Virus (RSV)	NN	NN	NN	NN	NN	486	0.0	18.3	-
Tuberculosis	142	134	132	140	134	132	5.3	5.0	0.9
Sexually transmissible infections	15,600	15,347	15,595	16,340	15,295	14,956	596.1	562.0	0.9
Chlamydia (genital)	11,767	11,450	11,487	11,544	10,744	10,913	439.5	411.5	0.9
Gonorrhoea	3,348	3,331	3,404	3,914	3,559	2,908	135.3	109.7	0.8
HIV	95	79	58	104	72	55	3.0	2.1	0.7
Syphilis - Infectious	331	324	427	569	713	845	18.2	31.9	1.8
Syphilis - Non-infectious	59	163	218	208	203	231	6.5	8.7	1.3
Syphilis (congenital)	0	0	1	1	4	4	0.0	0.2	4.9
Vaccine-preventable diseases	13,897	11,992	11,811	28,326	7,228	5,706	505.3	215.2	0.4
COVID-19	NN	NN	NN	NN	871	303	-	11.4	-
Diphtheria	0	1	0	0	0	0	0.0	-	0.0
H. influenzae type b	1	0	1	2	3	1	0.1	0.0	0.7
Influenza	7,817	5,994	5,839	23,198	1,197	33	339.3	1.2	0.0
Measles	11	17	36	52	4	0	0.9	-	0.0
Mumps	481	23	18	32	10	1	4.4	0.0	0.0
Pertussis	1,521	1,507	1,312	550	125	47	38.9	1.8	0.0
Pneumococcal infection	200	197	206	247	178	184	7.9	6.9	0.9
Rubella (non-congenital)	1	2	1	1	1	3	0.0	0.1	2.4
Tetanus	1	0	1	0	1	1	0.0	0.0	1.6
Varicella (chicken pox)	615	692	667	624	648	530	25.0	20.0	0.8
Varicella (shingles)	1,727	2,000	2,218	2,240	2,554	2,711	82.7	102.2	1.2
Varicella (unspecified)	1,522	1,559	1,512	1,380	1,690	1,892	59.1	71.3	1.2
Vector-borne diseases	1,166	1,467	732	821	651	757	37.4	28.5	0.8
Barmah Forest virus	13	47	36	14	21	23	1.0	0.9	0.9
Chikungunya	15	11	3	9	7	0	0.3	-	0.0
Dengue fever	553	172	132	327	59	0	9.6	-	0.0
Malaria	55	57	48	59	24	10	1.9	0.4	0.2
Murray Valley Encephalitis	NN	0	1	0	0	0	-	-	-
Ross River virus	476	1,156	494	383	519	702	23.4	26.5	1.1
Typhus	39	19	18	29	21	22	1.0	0.8	0.9
West Nile virus/Kunjin virus	0	4	0	0	0	0	0.0	-	0.0
Zika virus	15	1	1	0	0	0	0.1	-	0.0
Zoonotic diseases	20	15	18	11	8	7	0.6	0.3	0.5
Brucellosis	2	0	0	0	0	0	0.0	-	0.0
Leptospirosis	6	3	5	4	3	4	0.2	0.2	0.9
Psittacosis	0	3	0	0	0	0	0.0	-	0.0
Q Fever	12	9	13	7	5	3	0.4	0.1	0.3
Grand Total	38,735	37,995	36,334	54,276	30,594	28,750	1450.8	1084.2	0.7

Table 2 Number of notifications in WA by health region, 2021 (see Appendix for notes)

Disease	Region																				
	North Metro		South Metro		East Metro		Kimberley		Pilbara		Wheatbelt		MidWest		Great Southern		Goldfields		South West		
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	
Blood-borne viruses																					
Hepatitis B	90	4.27	90	4.27	151	7.17	13	37.03	19	31.7	15	19.9	12	19.6	6	9.8	5	9.5	15	8.3	
Hepatitis C	134	6.36	279	13.25	320	15.2	27	76.91	20	33.3	25	33.2	41	66.9	34	55.7	18	34.2	47	26	
Hepatitis D	6	0.28	0	0	3	0.14	1	2.85	1	1.7	0	0	0	0	0	0	0	0	1	0.6	
Enteric diseases																					
Campylobacteriosis	851	40.42	726	34.48	860	40.85	33	94	70	116.7	101	134	67	109.4	107	175.2	53	100.6	281	155.2	
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cryptosporidiosis	12	0.27	22	1.04	19	0.9	38	108.24	4	6.7	2	2.7	3	4.9	8	13.1	2	3.8	19	10.5	
Hepatitis A	0	0	0	0	1	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hepatitis E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Listeriosis	1	0.05	2	1.1	3	0.14	0	0	0	0	0	0	0	0	0	0	0	0	2	1.1	
Paratyphoid fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Rotavirus	178	8.45	131	6.22	222	10.54	68	193.7	37	61.7	10	13.3	22	35.9	5	8.2	13	24.7	28	15.5	
Salmonellosis	221	10.5	187	8.88	231	10.97	74	210.79	60	100	28	37.2	20	32.7	14	22.9	21	39.9	66	36.4	
Shigellosis	13	0.62	13	0.62	12	0.57	30	85.46	10	16.7	2	2.7	11	18	2	3.3	6	11.4	1	0.6	
Shiga toxin (verotoxin)-producing E. coli (STEC)/VTEC	25	1.19	22	1.04	36	1.71	1	2.85	1	1.7	3	4	5	8.2	1	1.6	3	5.7	10	5.5	
Typhoid	1	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Vibrioparae haemolyticus	16	0.76	10	0.47	7	0.33	0	0	0	0	2	2.7	0	0	1	1.6	1	1.9	2	1.1	
Yersiniosis	11	0.52	1	0.55	8	0.38	0	0	2	3.3	1	1.3	0	0	1	1.6	1	1.9	1	0.6	
Other diseases																					
Acute post-streptococcal glomerulonephritis (APSGN)	2	0.09	0	0	2	0.09	5	14.24	0	0	0	0	0	0	0	0	1	1.9	0	0	
Amoebic meningitis	0	0	0	0	0	0	1	2.85	0	0	0	0	0	0	0	0	0	0	0	0	
Creutzfeldt-Jakob disease	2	0.09	1	0.05	2	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Haemolytic Uraemic Syndrome	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Invasive Group A Streptococcal (IGAS) Disease	8	0.38	2	0.09	2	0.09	4	11.39	0	0	0	0	1	1.6	1	1.6	0	0	1	0.6	
Legionellosis	21	1	10	0.47	16	0.76	2	5.7	1	1.7	2	2.7	4	6.5	1	1.6	1	1.9	13	7.2	
Leprosy	0	0	0	0	2	0.09	0	0	0	0	0	0	0	0	1	1.6	0	0	0	0	
Melioidosis	1	0.05	0	0	1	0.05	3	8.55	1	1.7	1	1.3	0	0	0	0	0	0	1	0.6	
Meningococcal infection	0	0	1	0.05	4	0.19	1	2.85	1	1.7	1	1.3	0	0	0	0	0	0	1	0.6	
Respiratory Syncytial Virus (RSV)	90	4.27	114	5.41	126	5.98	4	11.39	76	126.7	6	8	21	34.3	7	11.5	5	9.5	37	20.4	
Tuberculosis	36	1.71	30	1.42	55	2.61	0	0	2	3.3	0	0	2	3.3	2	3.3	2	3.8	3	1.7	
Sexually transmissible infections																					
Chlamydia (genital)	2623	124.58	2624	124.63	3472	164.9	517	1472.68	332	553.4	141	187.1	278	453.9	145	237.4	287	544.8	494	272.8	
Gonorrhoea	519	24.65	494	23.46	854	40.56	423	1204.92	232	386.7	32	42.5	62	101.2	15	24.6	220	417.6	57	31.5	
Syphilis - Infectious	112	5.32	147	6.98	218	10.35	148	421.58	146	243.4	7	9.3	14	22.9	6	9.8	28	53.2	16	8.8	
Syphilis - Non-infectious	39	1.85	39	1.85	76	3.61	7	19.94	21	35	9	11.9	11	18	1	1.6	23	43.7	5	2.8	
Syphilis (congenital)	0	0	0	0	1	0.05	1	2.85	1	1.7	0	0	0	0	0	0	1	1.9	0	0	
Vaccine-preventable diseases																					
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
H. influenzae type b	0	0	0	0	0	0	1	2.85	0	0	0	0	0	0	0	0	0	0	0	0	
Influenza	9	0.43	5	0.24	5	0.24	3	8.55	1	1.7	2	2.7	0	0	3	4.9	1	1.9	4	2.2	
Measles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pertussis	13	0.62	14	0.66	13	0.62	0	0	0	0	0	0	2	3.3	1	1.6	0	0	4	2.2	
Pneumococcal infection	32	1.52	33	1.57	43	2.04	23	65.52	18	30	9	11.9	9	14.7	2	3.3	9	17.1	6	3.3	
Rubella (non-congenital)	2	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	
Tetanus	0	0	0	0	1	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Varicella (chicken pox)	121	5.75	164	7.79	125	5.94	9	25.64	6	10	8	10.6	16	26.1	14	22.9	22	41.8	45	24.8	
Varicella (shingles)	693	32.91	660	31.35	563	26.74	60	170.91	56	93.3	92	122.1	41	66.9	148	242.3	73	138.6	325	179.5	
Varicella (unspecified)	640	30.4	664	31.54	519	24.65	5	14.24	0	0	15	19.9	40	65.3	7	11.5	2	3.8	0	0	
Vector-borne diseases																					
Barmah Forest virus	0	0	4	0.19	0	0	6	17.09	1	1.7	1	1.3	4	6.5	1	1.6	1	1.9	5	2.8	
Chikungunya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dengue fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Malaria	2	0.09	1	0.05	6	0.28	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	
Ross River virus	102	4.84	148	7.03	125	5.94	17	48.42	10	16.7	45	59.7	54	88.2	67	109.7	29	55.1	105	58	
Typhus	4	0.19	2	0.09	1	0.05	0	0	3	5	2	2.7	1	1.6	5	8.2	1	1.9	2	1.1	
West Nile virus/Kunjin virus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Zika virus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Zoonotic diseases																					
Bruceellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Leptospirosis	0	0	0	0	0	0	1	2.85	0	0	1	1.3	1	1.6	0	0	0	0	1	0.6	
Pittacosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Q Fever	1	0.05	0	0	0	0	0	0	0	0	2	2.7	0	0	0	0	0	0	0	0	

Appendix: Data notes

1. Data was extracted from the WA Notifiable Diseases Database (WANIDD) on 15 May 2022. Data are subject to change.

2. "Date of Onset" is a composite of the "true" date of onset provided by the notifying doctor, the date of the specimen collection for laboratory notified cases, and when neither of these dates are available, the date of notification by the doctor or laboratory, or the date of receipt of the notification, whichever is earliest. Most notifiable diseases are analysed by date of onset. For blood-borne viruses (whether newly acquired or unspecified), leprosy, syphilis (non-infectious) and tuberculosis, data are analysed by date of receipt at the PHU/CDCD. Unspecified hepatitis C is analysed by specimen date. COVID-19 is based on date of notification or date of confirmed case.

3. Unless specified, crude rates per 100,000 population were used and calculated using the Rates Calculator Version 9.5.5 (Department of Health). Age-standardised and age-specific rates were included for comparisons between regions.

4. "Total" in Table 1 excludes cases with interstate or overseas residential addresses, or where no postcode was specified.

5. 5-year rate is average rate/year of the 5-year period preceding the reporting year.

6. Rate ratio is the ratio of the 5-year crude notification rate to the notification rate in the reporting year.

7. NN = not notifiable.

8. HIV notifications include WA residents and overseas students living in WA, but exclude overseas visitors, interstate residents and cases that have been previously notified in other States/Territories. HIV data is described within the

report, and not presented per region in Table 2.

10. Foodborne outbreaks includes both foodborne and probable foodborne.

Infectious disease notification

Under the *Health Act 1911*, doctors whose patients are diagnosed with a notifiable disease are required by law to notify these cases to the Department of Health. In mid-2006, the *Health Amendment Act 2006* was passed, which further specified what case details are to be notified. The 2006 Act also specified that mandated notification was required by

- Nurse practitioners whose patients are diagnosed with a notifiable disease.
- Pathology laboratories that have diagnosed a notifiable disease.

Dual notification allows the systematic reporting of notifiable diseases by laboratories and the capture of additional demographic and risk factor information from doctors.

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