NSW Health

NSW Notifiable Vaccine Preventable Diseases 2023 and 2024

Report

Health Protection NSW

Health Protection NSW acknowledges the traditional owners of the lands on which we work, live and play. We pay our respect to Elders past, present and emerging. This report was produced on the lands of the Cammeraygal People of New South Wales. The knowledge, resilience and strength of Aboriginal Peoples is key to reducing the burden of vaccine-preventable diseases in their communities.

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1 2023 & 2024 Snapshot

Bacterial infections

Pertussis		26,809 notifications In 2024 over 25,000 cases recorded in NSW - the highest total ever
Hib		4 notifications 1 in 2 cases were less than 12 months old
IMD		63 notifications 4 in 5 cases were due to serogroup B
IPD		1,477 notifications Increases in serotype 8 and serotype 4

Viral infections

COVID-19, Influenza & RSV		441,973 notifications for COVID-19, 265,780 notifications for Influenza and 120,134 notifications for RSV in this reporting period Respiratory viral infections cause great individual and health system burden
Measles		24 notifications 1 in 2 cases were in children under 5
Mumps		138 notifications 1 in 4 cases in children under 5 were unvaccinated
Rotavirus		7,079 notifications Almost 1 in 4 cases were less than 12 months old

Rare conditions

Diphtheria		4 notifications 3 in 4 cases were related to animal exposures
Tetanus		3 notifications All cases were females over 75, with no recent vaccine booster dose
Rubella		1 notification No cases of congenital rubella syndrome in NSW since 2007
Poliomyelitis		No cases of polio in Australia since 2007 NSW wastewater surveillance has detected oral polio vaccine shedding

2 Executive summary

This report provides an overview of selected vaccine preventable diseases (VPDs) in New South Wales during 2023 and 2024. It is part of a series of reports published by NSW Health in 2025, alongside the NSW Immunisation Strategy Progress Report 2024 and the NSW Immunisation Coverage in 2024 Report. Together, these three reports provide a comprehensive picture of vaccination activity, disease burden, and progress toward improving vaccine access, uptake, and equity across the state.

This report includes data on:

- **Bacterial infections:** Pertussis, invasive *Haemophilus influenzae* type b (Hib) disease, invasive meningococcal disease (IMD), and invasive pneumococcal disease (IPD).
- **Viral infections:** COVID-19, influenza, respiratory syncytial virus (RSV) infection, measles, mumps, and rotavirus enteritis.
- **Rare conditions:** diphtheria, tetanus, rubella (including congenital rubella syndrome), and poliomyelitis.

New inclusions in this report

NSW Health has published notifiable VPD surveillance reports since 2009. Rotavirus gastroenteritis is a vaccine preventable disease and is now included here, with other VPDs. COVID-19, influenza, and RSV infection are reported on weekly in the NSW respiratory surveillance report. Annual summaries of these infections are now also included in this report. Wastewater surveillance to support early detection of poliovirus in NSW is reported for the first time.

Key findings in 2023 and 2024

- Many VPDs remain well controlled in NSW, reflecting the long-term success and high coverage achieved in NSW's vaccination programs.
- Pertussis notifications in 2024 reached the highest annual total ever recorded in NSW, with a notable shift in age distribution to older children.
- IPD notifications were the highest recorded since becoming notifiable in 2000. Increases occurred in serotypes not contained within available vaccines and due to some serotypes for which vaccination provides sub-optimal protection.
- COVID-19 notifications declined, but the virus remains part of the "new normal", with ongoing transmission driven by emerging variants.
- Influenza notifications reached record highs in 2024 and were likely impacted by changes to testing behaviour and immunity following the COVID-19 pandemic.
- Rotavirus enteritis notifications in NSW increased reaching record highs since becoming notifiable, with infants most affected.
- The ability of the NSW wastewater surveillance program to identify oral polio vaccination events highlights the importance of surveillance in maintaining polio elimination status.

3 Introduction

Under the *NSW Public Health Act 2010*, certain diseases must be notified to public health authorities in New South Wales.[1] Notification allows for a coordinated public health response to limit disease transmission and to minimise risks to the community. Monitoring of vaccine preventable diseases (VPDs) allows an assessment of the need for, and effectiveness of, vaccine programs and can inform subsequent public health action.

This report is part of a series of annual surveillance reports examining the epidemiology of notifiable VPDs in NSW, published since 2009. It covers selected VPDs notified to NSW Health with a focus on 2023 and 2024. It focusses on diphtheria, invasive *Haemophilus influenzae* type b (Hib) disease, invasive meningococcal disease (IMD), invasive pneumococcal disease (IPD), measles, mumps, pertussis, poliomyelitis, rotavirus gastroenteritis, rubella, and tetanus. Annual activity for notifiable vaccine preventable respiratory virus infections, including COVID-19, influenza and respiratory syncytial virus (RSV), is also provided.

To support interpretation and comparison, diseases are grouped into three chapters based on their clinical and microbiological characteristics: bacterial infections (pertussis, Hib, IMD, IPD), viral infections (COVID-19, influenza, RSV, measles, mumps, rotavirus), and rare conditions (diphtheria, tetanus, rubella, poliomyelitis). Each chapter presents descriptive analyses of notifications, including trends over time, demographic patterns, and key outcomes.

To examine long term trends, data from 2010 onwards are also included where available. For almost all VPDs, notification patterns were impacted by the public health interventions implemented during the COVID-19 pandemic 2020-2022.

Information about vaccines including availability in Australia, funding under the National Immunisation Program (NIP), vaccine formulation, effectiveness and schedule recommendations is available in the Australian Immunisation Handbook.

3.1 Data sources

3.1.1 Notifications

Data were sourced from the Notifiable Conditions Records for Epidemiology and Surveillance (NCRES) dataset in August 2025, derived from the Notifiable Conditions Information Management System (NCIMS). Deaths and hospitalisations were recorded through enhanced surveillance or independently reported to NSW Public Health Units (PHUs), and entered into NCIMS.

Notifications likely capture most cases for rare conditions as they are more severe, more likely to require medical attention, and therefore more likely to be reported. For more common diseases, notifications generally do not represent all cases in the community; however, they provide valuable insights into disease trends and the impact of vaccination programs.

Deaths associated with certain notifiable conditions are reported in the sections of this report where data are available. Further detail on deaths reporting and its limitations is provided in Appendix 5: Supplementary methods.

3.1.2 Wastewater

Data are presented for Bondi, Liverpool, Quakers Hill and Burwood Beach wastewater catchments. Further details can be found at Section 6.4: Polio and Appendix 5: Supplementary methods.

4 Bacterial infections

4.1 Pertussis

4.1.1 The disease

Pertussis, also known as whooping cough, is a highly contagious respiratory infection caused by the *Bordetella pertussis* bacterium. Pertussis is one of the most common vaccine preventable diseases and can affect people of all ages, but infants under 6 months old are at the highest risk of severe illness and death.[2-5] It has been a notifiable condition in Australia since November 1991.

Pertussis is endemic in NSW, with epidemics typically occurring every 3–5 years.[6] Pertussis is highly infectious in unvaccinated individuals, with up to 90% of susceptible household contacts becoming infected.[7] Immunity from both natural infection and vaccination wanes over time and repeat infections can occur.[5,7]

4.1.2 The vaccine

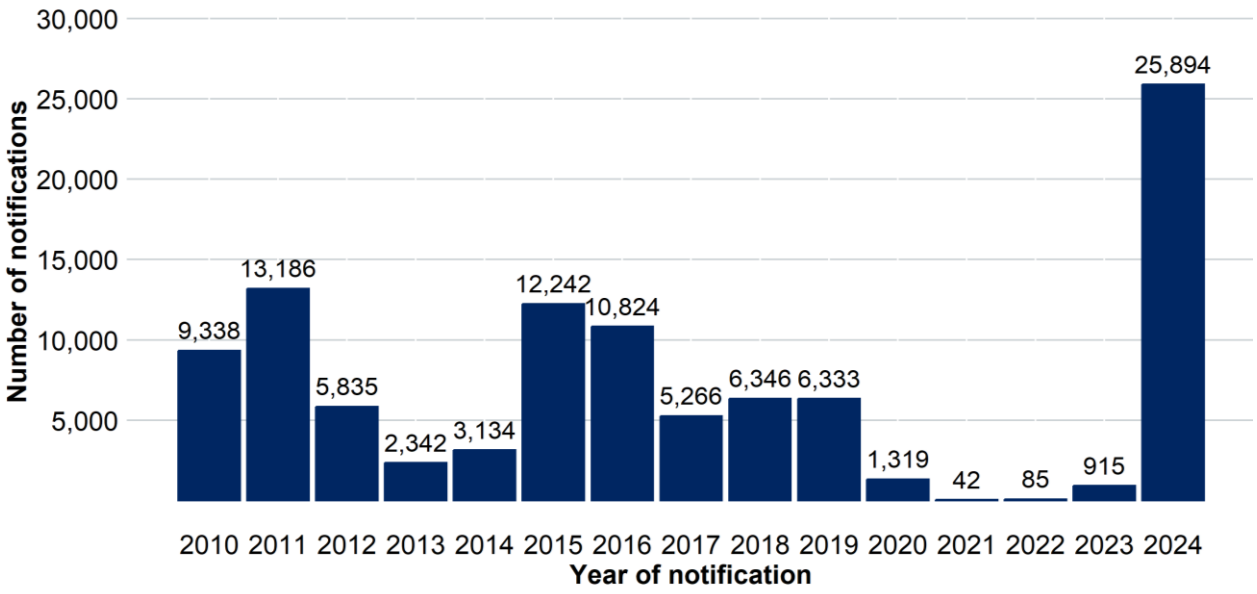
Pertussis vaccine is funded under the National Immunisation Program (NIP) and is recommended for infants and children in NSW at 6 weeks, 4 months, 6 months, 18 months, and 4 years of age, with a booster dose given in Year 7 of school through the NSW School Vaccination Program.[8] Pertussis vaccine is also funded under the NIP for pregnant women, and is recommended between 20 – 32 weeks gestation in every pregnancy. Vaccination is also recommended every 10 years for healthcare workers, early childhood educators, carers, and anyone who may have close contact with young infants.

Pertussis vaccines used in Australia are acellular vaccines given in combination with diphtheria and tetanus vaccines (commonly referred to as dTpa). They differ to previously used whole-cell pertussis vaccines which contained inactivated *B. pertussis* bacterial cells.[9] Acellular vaccines are associated with fewer side effects than whole-cell vaccines, they may, however, also generate a weaker antibody response.[5] Australia shifted from using whole-cell to acellular vaccines in the late 1990s.[5,10] Whole-cell vaccines are no longer available.

4.1.3 Epidemiology

Prior to the COVID-19 pandemic, pertussis was second to influenza as the most frequently notified VPD in Australia.[11,12] Immunity to pertussis, from both natural infection and vaccination, decreases over time which results in pertussis outbreaks occurring every 3-5 years.[13] This cyclical pattern of outbreaks was disrupted during the COVID-19 pandemic. From 2020, pertussis notifications declined and were at exceptionally low levels throughout 2021 and 2022 (Figure 1) potentially due to public health measures implemented in 2020 and 2021.

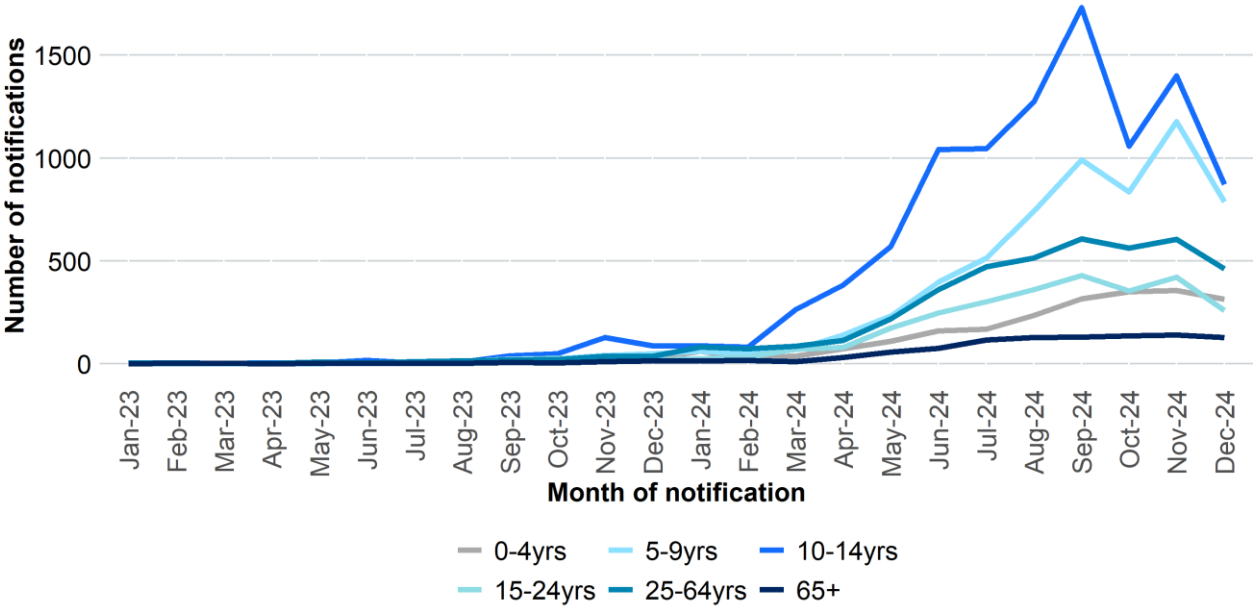
Figure 1 Pertussis notifications by year, NSW, 2010-2024



In 2023, notifications remained at very low levels from January to August, then increased from September 2023 (Figure 2) and further increased from early 2024. In 2024, NSW recorded the highest number of pertussis notifications (*n* = 25,894) since it became a notifiable condition, following years of very low cases during the COVID-19 pandemic (Figure 1).

There were no deaths due to pertussis notified in NSW in 2023 or 2024.

Figure 2 Pertussis notifications by month and age group, NSW, 2023-2024



Most pertussis cases notified in 2024 were in children aged 5–14 years (61%) with children aged 10-14 years old accounting for the highest proportion (38%), followed by children aged 5-9 years old (23%). The proportion of cases aged 10-14 years was higher than typically seen in NSW, at nearly twice the average from the previous five-years (2018-2022, Table 1). Increased testing behaviour and utilisation of multiplex tests following the COVID-19 pandemic possibly contributed to an increase in the overall numbers of notifications. The low levels of pertussis circulating in 2021 and 2022 is the likely driver of the magnitude and age profile of the 2024 pertussis epidemic in NSW, due to a reduction in infection-related immunity.[6]

Table 1 Pertussis notifications by age group and year, NSW, 2023-2024

	2023		2024		2018-2022 average	
Age group	n	%	n	%	n	%
0 yrs	35	3.8	508	2.0	90	3.2
1 yrs	17	1.9	514	2.0	78	2.8
2-4 yrs	32	3.5	1,187	4.6	223	7.9
5-9 yrs	154	16.8	5,992	23.1	747	26.4
10-14 yrs	347	37.9	9,805	37.9	537	19.0
15-24 yrs	117	12.8	2,754	10.6	259	9.2
25-64 yrs	162	17.7	4,157	16.1	736	26.1
65+ yrs	51	5.6	977	3.8	154	5.5
Total	**915**	**100.0**	**25,894**	**100.0**	**2,824**	**100.0**

4.1.3.1 Pertussis in infants less than 6 months old

Infants less than 6 months old have the highest risk of severe disease, complications, and death due to pertussis. Pertussis vaccination during pregnancy reduces the risk of infection in young infants.[14,15]

In 2023 and 2024, 250 notifications were recorded in infants less than 6 months old. Maternal vaccination status was recorded for 206 cases (82%). Of these, 135 mothers (66%) received a vaccine during pregnancy, and 71 (35%) did not. Maternal vaccination status was missing or unknown for 44 cases (18%).

Of the 250 infants less than 6 months old, 98 were hospitalised (39%) and 151 were not (60%). One infant case's hospitalisation status is unknown. In the infants with pertussis who were not hospitalised, 62% of mothers were vaccinated during pregnancy. In comparison, of the infants who were hospitalised, only 41% of mothers were vaccinated.

Maternal pertussis vaccination coverage in NSW is reported in the NSW Immunisation Coverage in 2024 Report.

4.2 Haemophilus influenzae type b

4.2.1 The disease

Haemophilus influenzae type b (Hib) disease is caused by bacteria that can be found in the nose and throat and can cause severe illness, particularly in young children. Hib is usually spread by contact with droplets from the nose and throat of an infected person, and can cause both invasive and non-invasive diseases.[16] The most serious infections are those causing sepsis, meningitis, epiglottitis and bacteraemic pneumonia.

Hib is mainly a childhood disease with over 80% of cases worldwide occurring in children aged less than 5 years old.[17] The incidence of invasive Hib in Australia and other countries with high vaccine coverage has declined by more than 90% since the introduction of the vaccine.[18]

4.2.2 The vaccine

Hib vaccine was first added to the NIP in Australia in 1993.[19] In NSW, the current schedule recommends 4 doses administered at 6 weeks, 4 months, 6 months, and 18 months of age. Protection gained from vaccination is considered long-lasting, particularly after the booster dose recommended at 18 months of age.[20]

After three doses, 90–99% of children develop protective antibodies.[21] The vaccine not only protects individuals but also reduces Hib carriage in the nose and throat, helping prevent transmission within the community.[22,23] Although rare, Hib disease can occur in vaccinated individuals. These cases are typically associated with underlying medical conditions, including immunoglobulin deficiencies.[24]

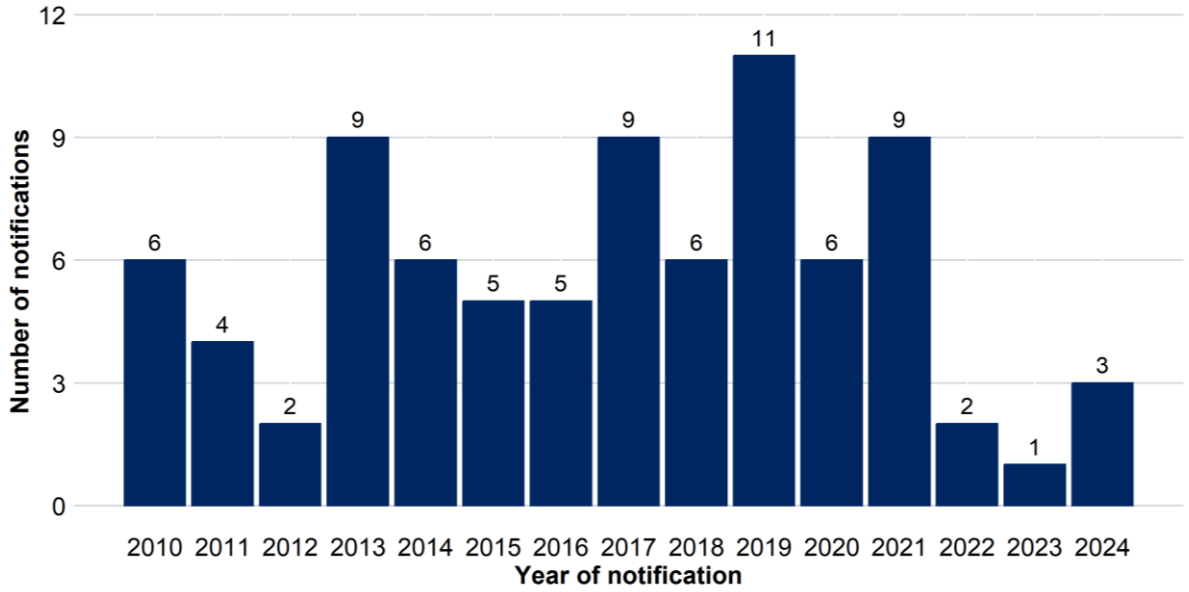
For more information on Hib vaccines, see the Australian Immunisation Handbook.

4.2.3 Epidemiology

Prior to the introduction of the Hib vaccine, Hib disease was a common and serious public health concern in NSW. In the early 1990s, annual case numbers were high, with 213 cases reported in NSW in 1991, and 217 in 1992.[25] The success of Hib vaccination in early childhood has resulted in the disease now being rare in NSW, with an average of 5.6 cases reported per year in the 15 years from 2010-2024.

Hib disease is one of the few notifiable respiratory diseases in NSW that did not decrease in 2020 or 2021 (Figure 3). Hib cases in NSW remained stable, with 6 cases reported in 2020 and 9 in 2021.

Figure 3 Hib notifications by year, NSW, 2010-2024



Between 1 January 2023 and 31 December 2024, 4 cases of Hib were notified in NSW, one case in 2023, and 3 cases in 2024. This is lower than the average per year (*n* = 7) notified in the previous 5-year period (2018-2022, Figure 3).

Of the 4 cases notified in 2023 and 2024, two were infants less than 12 months of age. One infant was reported as unvaccinated, and one infant was not yet eligible for vaccination (due to age). The remaining two cases were adults, both notified in 2024. One was in the 45-64 years age group and was unvaccinated, and one was in the 15-24 years age group and was fully vaccinated. Two of the 4 cases identified as Aboriginal.

All 4 cases required hospitalisation, with no deaths due to Hib notified in 2023 or 2024.

4.3 Invasive meningococcal disease

4.3.1 The disease

Invasive meningococcal disease (IMD) is a serious but rare illness caused by infection with the *Neisseria meningitidis* bacterium. Carriage of *N. meningitidis* in the nose or throat is common, particularly among adolescents and young adults.[26] Transmission of the bacterium from person-to-person through close contact (such as sharing a household or intimate kissing) usually results in carriage, but can rarely result in infection. *N. meningitidis* can cause conjunctival and urogenital infections, which typically do not progress to IMD.

The most common presentations of IMD are meningitis and sepsis. Less commonly, it can cause septic arthritis (infection of the synovial fluid surrounding the joints) and bacteraemic pneumonia (infection of the lungs with concurrent blood stream infection). Up to 10-15% of invasive infections result in death, even with appropriate antibiotic treatment, and up to 20% (one in 5) of those infected will suffer long-term complications including sight or hearing loss, neurological damage, loss of limbs or digits, or skin scarring.[26]

N. meningitidis is classified into serogroups based on the presence of a polysaccharide capsule, which increases the ability of the bacterium to cause invasive disease. There can be many different strains within a single meningococcal serogroup, with varying virulence and responsiveness to vaccines.

4.3.2 The vaccines

There are several meningococcal vaccines available in Australia. Some meningococcal vaccines, like meningococcal ACWY conjugate vaccine, target the polysaccharide capsule(s) specific to the serogroup(s). Others, like meningococcal B vaccines, target specific components of the bacterial membrane. Because meningococcal B vaccine does not target the serogroup-specific polysaccharide capsule, there are strains within the meningococcal B serogroup which are not covered by the currently available vaccines.

Meningococcal ACWY vaccine was funded under the NIP in 2023 and 2024 for children at 12 months of age, adolescents at 15-19 years of age, and people with certain medical conditions that increase the risk of meningococcal disease. Meningococcal B vaccine was funded for Aboriginal children at 6 weeks, 4 months, and 12 months of age, and for people with certain medical conditions that increase the risk of meningococcal disease.

Vaccination coverage data for adolescents (meningococcal ACWY vaccine) and Aboriginal infants (meningococcal B vaccine) in NSW can be found in the NSW Immunisation Coverage in 2024 Report.

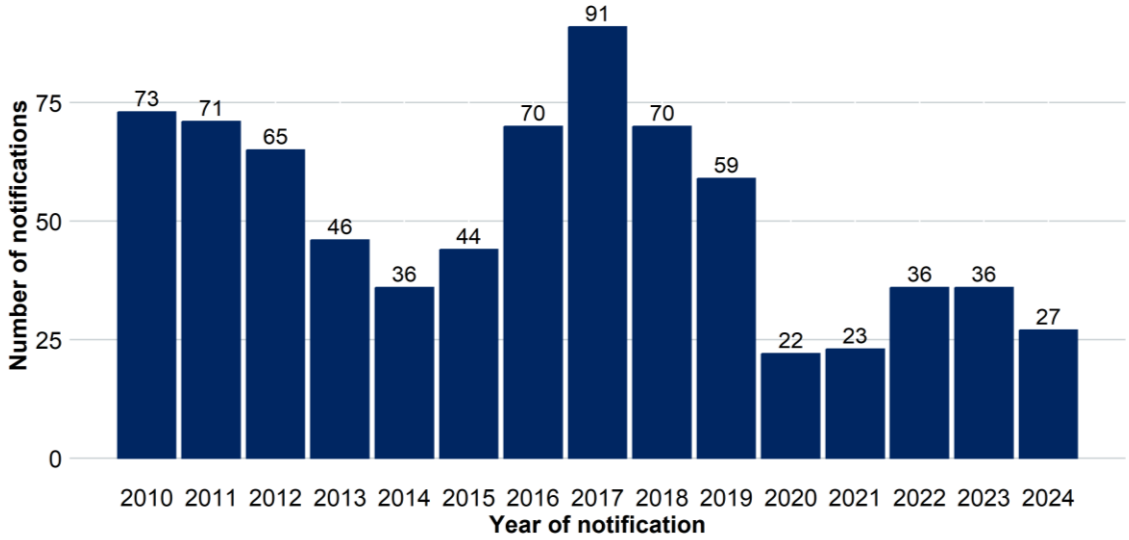
4.3.3 Epidemiology

Twelve meningococcal serogroups have been identified: A, B, C, E, H, I, K, L, W, X, Y and Z [27]. Globally, A, B, C, W and Y are responsible for the majority of cases.[27] In Australia, almost all IMD is caused by serogroups B, C, W and Y with serogroup B the most common.[28] The incidence and serogroup prevalence of IMD in NSW, and globally, has varied over time and is strongly impacted by the widespread use of serogroup-specific vaccines.[27]

While cases occur year-round, IMD has historically shown a degree of seasonality, with cases increasing in late winter and early spring, often following increased influenza activity. The impact of COVID-19 on IMD is less clear. Children under 5 years of age (particularly those under one) and adolescents and young adults (15-24 years of age) are at increased risk of IMD. For young children, this risk is associated with the naivety of their immune system,[29] while for adolescents and young

adults, it is more associated with increased carriage rates, and lifestyle and behavioural factors that can increase their exposure to the bacteria (such as living conditions, and increased social mixing, particularly that involving close or intimate contact).[30] Recently, an increased incidence has also been observed in older age groups, particularly people over the age of 65 years, with serogroups W and Y accounting for a greater proportion of cases in this age group.[28]

Figure 4 IMD notifications by year, NSW, 2010-2024



IMD notifications decreased from 2023 to 2024, with a 14% reduction in 2023 and a 36% reduction in 2024, compared to the average of 42 cases per year reported from 2018 to 2022 (Figure 4).

Excluding 2020 and 2021, notifications in 2024 were the lowest observed in NSW since 2014. In 2020 and 2021 notifications were unusually low, likely to be due to reduced social interactions and reduced influenza activity stemming from COVID-19 pandemic restrictions.

Table 2 IMD notifications and rates per 100,000 population by age group and year, NSW, 2023-2024

	2023		2024		2018-2022 average	
Age group	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***
0-4 yrs	8	1.7	7	1.5	11	2.3
0 yrs	*3*	*3.2*	*4*	*4.5*	*6*	*6.2*
1-4 yrs	*5*	*1.3*	*3*	*0.8*	*5*	*1.3*
5-14 yrs	4	0.4	2	0.2	2	0.2
15-24 yrs	7	0.7	6	0.6	12	1.2
25-64 yrs	10	0.2	7	0.2	10	0.2
65+ yrs	7	0.5	5	0.3	7	0.5
Total	**36**	**0.4**	**27**	**0.3**	**42**	**0.5**

*Crude rate per 100,000 population

The rate of disease among different age groups across the reporting period was consistent with recent epidemiology. The highest rates were observed in children under 5 years of age (particularly infants), followed by people aged 15-24 years. People over 65 years of age had the third highest rate of disease (Table 2).

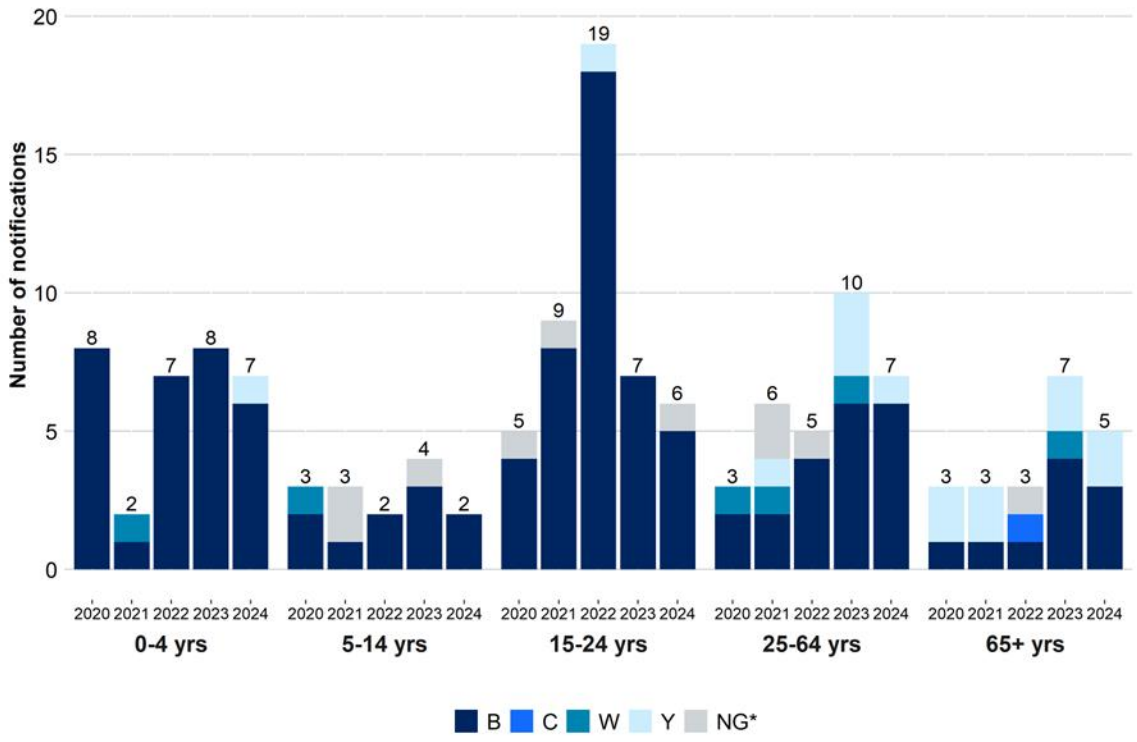
Table 3 IMD serogroup B notifications by year, NSW, 2023-2024

Year	n	% of total notifications	Rate*
2023	28	77.8	0.3
2024	22	81.5	0.3
Yearly average 2018-2022	26	61.0	0.3

*Crude rate per 100,000 population

The proportion of notifications attributed to serogroup B in each year has increased, however, this is likely because of the introduction of vaccination programs against serogroups W and Y (from 2018, via meningococcal ACWY vaccine), reducing the circulation and impact of these serogroups in the population. This is supported by the stability in the rate of IMD due to serogroup B at 0.3 notifications per 100,000 population (Table 3).

Figure 5 IMD notifications by age group, serogroup and year, NSW, 2010-2024



* NG refers to where serogrouping could not be performed AND where a serogroup was not present.

Among age groups eligible for NIP funded meningococcal ACWY vaccination, where serogroup data was available, in children under 5 years of age serogroup B accounted for 100% (*n* = 8) of cases notified in 2023, and 86% (*n* = 6) of cases notified in 2024. In adolescents and young adults aged 15-24 years serogroup B accounted for 100% cases notified in both years (2023, *n* = 7, 2024, *n* = 5) (Figure 5). Sixty-six percent (*n* = 6) of notified cases of serogroup Y and 100% (*n* = 2) of notified cases of serogroup W across 2023-2024 occurred in people aged over 50 years old. The remaining 3 notified cases of serogroup Y occurred in people in younger age groups, who were either too young or not otherwise eligible to receive a funded vaccine (*n* = 3; Figure 5).

Hospitalisation status was recorded for all IMD cases notified in 2023 and 2024. Outcome was reported in 94% of cases in 2023 and 100% of notified cases in 2024. In 2023, 97% (*n* = 35) of notified cases were hospitalised, with 26% (*n* = 9) of these reported as having been admitted to an intensive care or high dependency unit. In 2024, 100% of notified cases were hospitalised, with 33% (*n* = 9) of these reported as having been admitted to an intensive care or high dependency unit.

Death due to IMD was reported in 3 notified cases (8%) in 2023 (one each of serogroup B, W, and Y) and two notified cases (7%) in 2024 (both serogroup B). An additional notified case in each year was reported to have died, but the cause of death was not confirmed as being due to IMD.

Vaccination status was recorded for 100% of notified cases in 2023 and 2024. Thirty-five per cent of cases notified across 2023 and 2024 were reported as having received a meningococcal vaccine (*n* = 22). Of these, one notified case in 2023 had been fully vaccinated for their age against the serogroup causing their infection (serogroup B).

4.3.4 Invasive meningococcal disease in Aboriginal people

As a result of multiple, longstanding, complex, and interrelated factors, Aboriginal people have historically been, and continue to be disproportionately affected by IMD[31] particularly children under 15 years of age, and by disease due to serogroups B and W.[32] Aboriginal people represented 3.8% of the Australian population in 2021, but 17% of all IMD notifications in Australia between 2021 and 2023.[31] Across 2023 and 2024, Aboriginal people accounted for 19% of all IMD notifications in NSW, 18% of notifications due to serogroup B, and 43% of notifications among infants. Serogroup data was available for 92% (*n* = 11) of notifications among Aboriginal people in 2023 and 2024. Of these, serogroup B was identified as the cause of infection in 82% (*n* = 9) of notified cases.

Meningococcal B vaccine was added to the NIP for Aboriginal children at 6 weeks, 4 months, and 12 months[1] of age in 2020, with catch up for children under two years of age. Among the 9 Aboriginal people with IMD due to meningococcal B in 2023 and 2024, 5 notified cases occurred in children who would have been eligible for meningococcal B vaccine under the NIP. Four of these children had not received any meningococcal B vaccine doses prior to the onset of their illness. One child had received all meningococcal B vaccine doses as per the recommended schedule for their age. Further characterisation of the bacteria to determine whether it was a strain that can be prevented by the meningococcal B vaccine was not able to be undertaken.

A further case in an Aboriginal adult occurred in a person reported to meet eligibility criteria for meningococcal vaccination due to pre-existing medical conditions. This person had not received any meningococcal vaccines prior to the onset of their illness (due to serogroup Y).

There were no deaths confirmed as being due to IMD among cases in Aboriginal people.

4.4 Invasive pneumococcal disease

4.4.1 The disease

Invasive pneumococcal disease (IPD) is caused by the *Streptococcus pneumoniae* bacterium. *S. pneumoniae* is a common member of the bacterial flora colonising upper airways of healthy children and adults. There are over 100 serotypes of pneumococcal bacteria. Different serotypes vary in their likelihood to cause disease and influence the severity of disease. Carriage rates vary widely across populations.[33]

S. pneumoniae causes a range of diseases including conditions such as otitis media (middle ear infection) through to more serious conditions such as severe bacteraemic pneumonia, sepsis, meningitis and osteomyelitis.[33,34] IPD can occur at any time of year but typically increases in winter in temperate climates during periods of high respiratory virus activity.[35,36] Pneumococcal infections affect people of all ages but those most at risk of IPD include children under two years of age, older

[1] An additional dose is recommended and funded at 6 months for Aboriginal children with specified medical conditions.

adults, Aboriginal people, people with chronic diseases or immunosuppression, and those who smoke.[34]

4.4.2 The vaccines

Pneumococcal vaccines target the serotype-specific capsules of the bacteria. Vaccination protects individuals from IPD but can also reduce carriage rates of vaccine serotypes. This can lead to herd immunity as transmission of vaccine strains is reduced.

There are two types of pneumococcal vaccines currently in use in Australia, conjugate vaccines (13vPCV, 15vPCV, 20vPCV) and a polysaccharide vaccine (23vPPV).[37] Children, older adults and people with specific medical conditions that increase their risk of IPD are recommended and funded to receive pneumococcal vaccines. From 1 September 2025, 20vPCV replaced 13vPCV as the NIP-funded vaccine for children under 18 years old. Australia's pneumococcal vaccination program for adults is under review. 23vPPV does not induce an efficient immune response in infants, does not reduce pneumococcal carriage and is not registered for use in children less than two years old.[32]

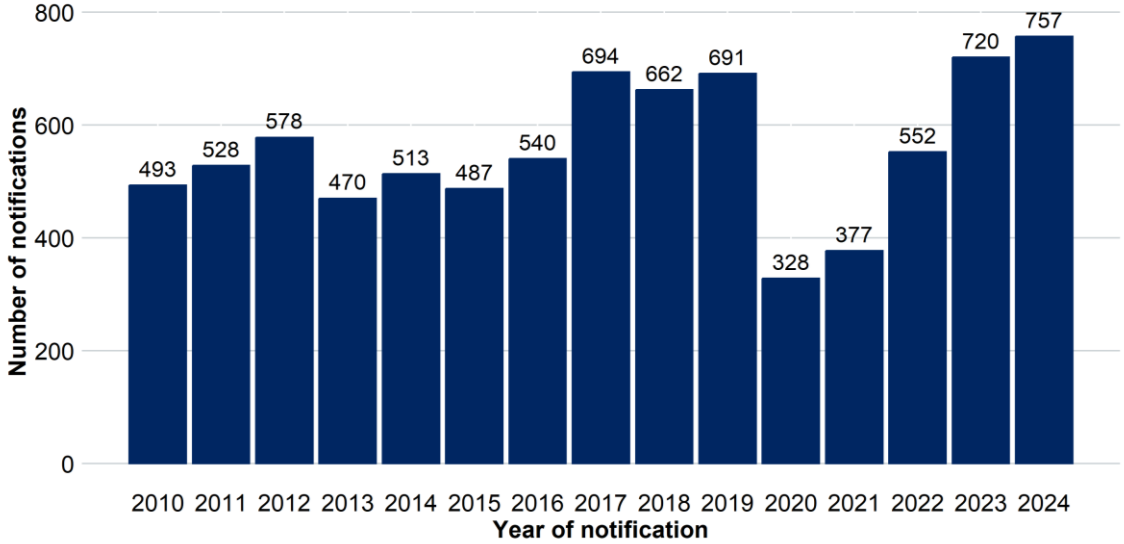
For more information on IPD vaccines, see the Australian Immunisation Handbook.

4.4.3 Epidemiology

Since the introduction of pneumococcal vaccines, disease due to serotypes targeted by the vaccines declined globally in regions with high vaccine coverage.[38] Burden of disease due to serotypes not targeted by vaccines remains substantial, as well as the persistence of certain serotypes that escape targeted vaccines.[39] Some serotypes contained in pneumococcal vaccines are less immunogenic than others, partially explaining the persistence of certain serotypes as important causes of disease.[38,40] Ongoing concern around serotype replacement remains.[41,42]

The COVID-19 pandemic was associated with a decline in IPD cases globally, largely attributed to the reduction of respiratory viruses, such as influenza, that increase the risk of IPD.[43-45] With the return of respiratory viruses in the post-pandemic period, the incidence of IPD has increased in NSW (Figure 6).

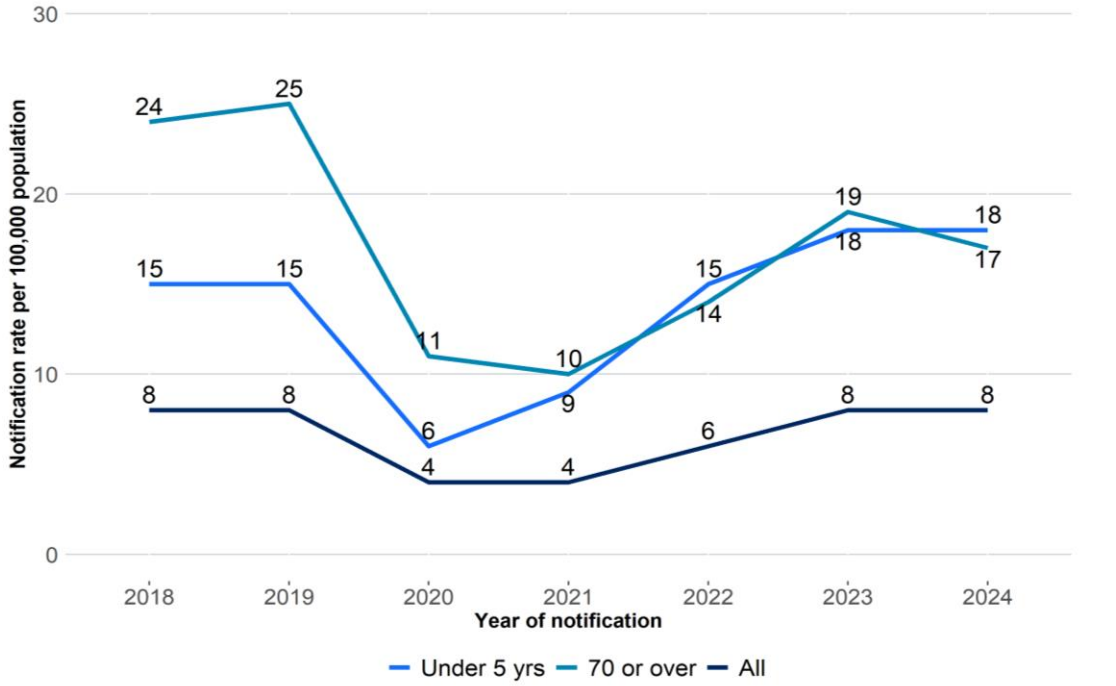
Figure 6 IPD notifications by year, NSW, 2010-2024



In 2023 to 2024, IPD notifications in NSW reached their highest levels since the disease became notifiable in 2002,[25] with 720 cases reported in 2023 and 757 in 2024 (Figure 6). The average rate between 2023 and 2024 was 8.8 cases per 100,000 population (Figure 7). This is slightly above the average rate between 2015 and 2019 (7.8 per 100,000 population) and reflects an increasing trend that commenced prior to the COVID-19 pandemic. Children under 5 years of age and people aged

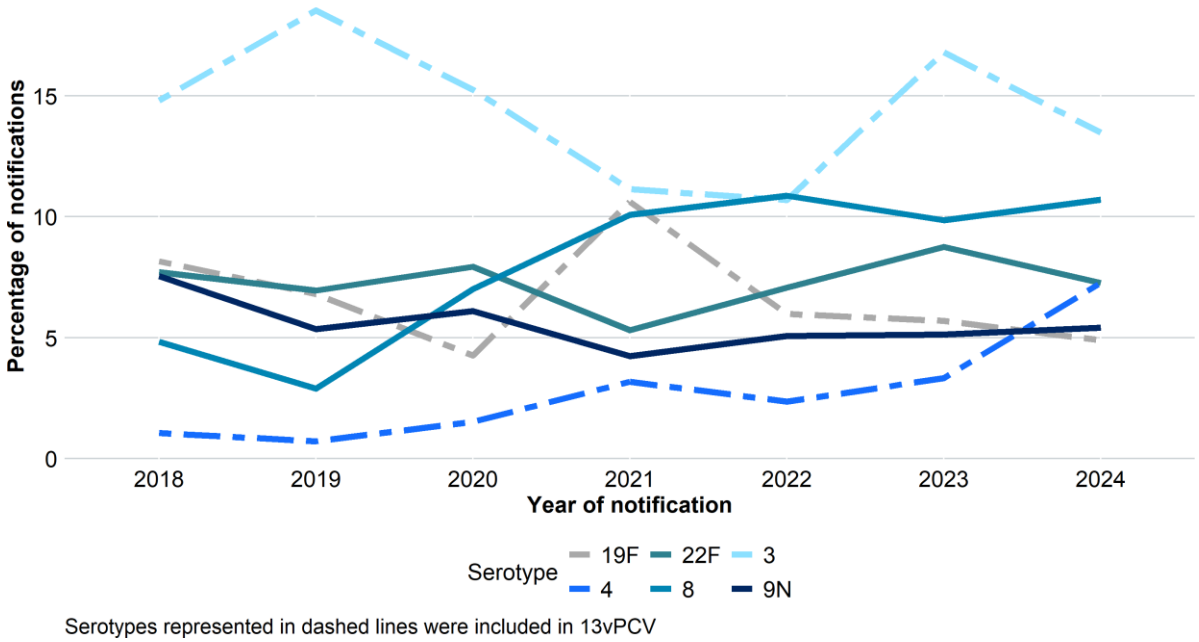
70 years and over had the highest average annual rates of IPD in NSW in 2023 and 2024 (18.5 and 18.6 per 100,000 population, respectively) (Figure 7).

Figure 7 IPD notification rates per 100,000 population in non-Aboriginal people, age group and year, NSW, 2018-2024



Serotype data was complete for all IPD notifications in 2023, and for 99.5% in 2024. The top 6 serotypes reported in this period were 3, 8, 22F, 4, 19F and 9N (Figure 8). Consistent with the pre-pandemic years, serotype 3 was the most reported of all IPD notifications (17% in 2023, and 14% in 2024). Serotype 8 was the second-most reported serotype (10% in 2023; 11% in 2024). Serotype 4 increased in 2023 and further in 2024 (Figure 8). Serotypes 3, 4 and 19F are covered by both 13vPCV and 23vPPV, and serotypes 8, 9N and 22F are covered by 23vPPV but not 13vPCV.

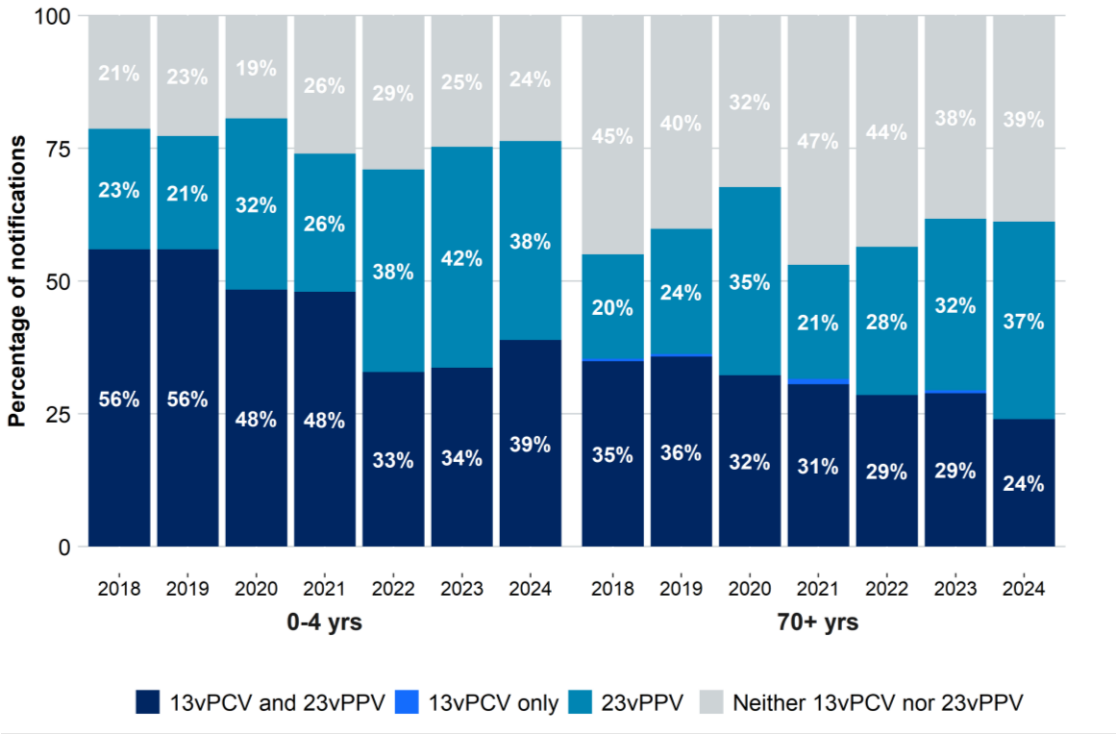
Figure 8 Distribution of the top six *S. pneumoniae* serotypes by year, NSW, 2018-2024



Children under 5 years of age, Aboriginal adults 50 years and older and non-Aboriginal adults 70 years and older are currently eligible for NIP-funded pneumococcal vaccine. 13vPCV and 23vPPV were the funded vaccines between 2018 and 2024.

In the current reporting period, among children under 5 years of age, around one in 4 IPD cases were due to serotypes not covered by 13vPCV or 23vPPV (25% in 2023 and 24% in 2024). In adults aged 70 years and over, this proportion was higher, with nearly 40% of cases attributed to serotypes not targeted by either of the available vaccines (38% in 2023 and 39% in 2024; Figure 9).

Figure 9 IPD notifications by category of infecting serotype*, age group and year, NSW, 2018-2024



*Does not include dual type, not typed, untypeable

Table 4 summarises IPD notifications by vaccination status. In children under 5 years of age, 7% of cases were unvaccinated. Of these, 5% were not yet eligible for vaccination due to their age (younger than 6 weeks) while the remaining 2% were eligible but had not received a pneumococcal vaccine. By comparison, 44% of cases in adults 70 years and over were unvaccinated.

61% of cases in Aboriginal adults aged 50-69 years were unvaccinated.

Data completeness for vaccination status in 2023 and 2024 was 97% for children under 5 years of age and 88% for adults 70 years and older.

Table 4 IPD vaccination status by NIP-funded age group, NSW, 2023-2024

Age group	Fully vaccinated for age	Partially vaccinated for age	Unvaccinated at time of notification	Uncertain
0-4 yrs	169 (81.6%)	17 (8.2%)	15 (7.2%)	6 (2.9%)
Aboriginal adults 50-69 yrs	9 (18.4%)	5 (10.2%)	30 (61.2%)	5 (10.2%)
70+ yrs	115 (27.9%)	50 (12.1%)	181 (43.9%)	66 (16%)

*Uncertain: includes cases where vaccination status is incomplete or unknown.

Among IPD cases in fully vaccinated children under 5 years of age, serotype 3 was the most prevalent (76% in 2023; 64% in 2024). Studies suggest that the 13vPCV vaccine is less effective against serotypes 3, 19A and 19F than other serotypes, explaining the persistence even in vaccinated populations.[37,38,40] The persistence of such serotypes highlights the need for ongoing

surveillance. The introduction of new vaccines that cover additional serotypes may help reduce the incidence of IPD.

Among IPD cases in children under 5 years of age and adults aged 50 years and over, 97% of cases had a known outcome. There were 107 deaths in 2023 and 2024 in these age groups, and cause of death was unknown for 25 cases. Among all cases for which outcome was known and IPD was attributed as cause of death (*n* = 71), two children and 69 adults aged 50 years and over died due to IPD. Overall case fatality rate was 8% for adults 50 years and older, and 1% for children under 5 years of age.

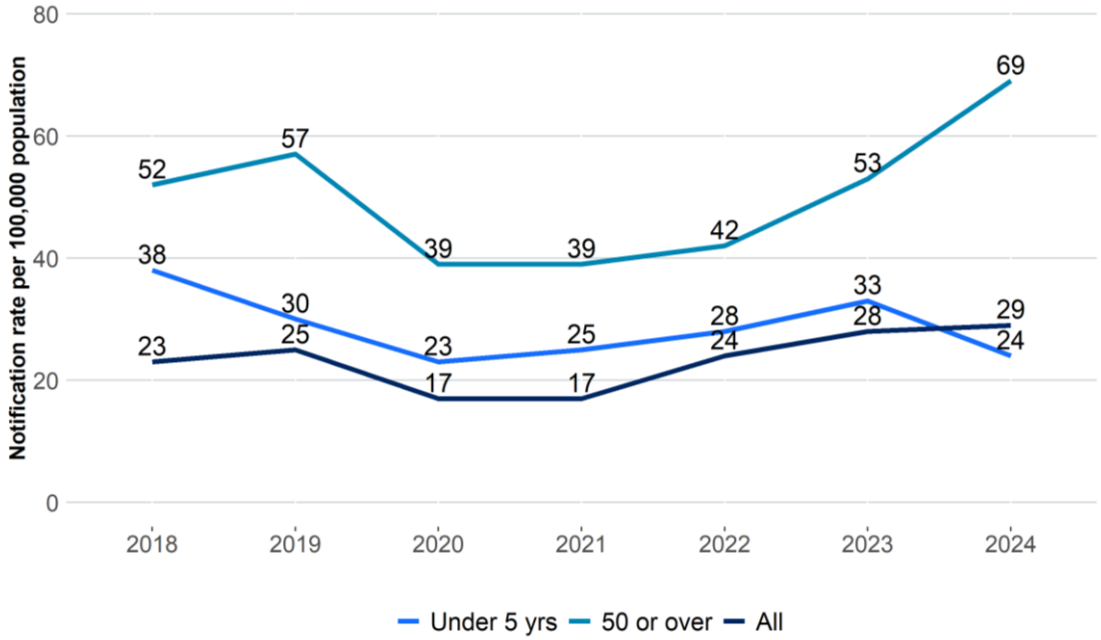
4.4.4 Invasive pneumococcal disease in Aboriginal people

Rates of IPD in Australia have historically been higher in Aboriginal people due to multiple, longstanding, complex, and interrelated factors and Aboriginal people continue to be disproportionately affected by IPD. Aboriginal people experience a range of pre-existing health risks and social disadvantage that increases their susceptibility to severe outcomes from pneumococcal infections. These chronic conditions are, in turn, linked to the broader social determinants of health, including systemic racism and socioeconomic factors that impact health outcomes .[46] In parts of Australia, pneumococcal carriage is high in Aboriginal people.[47]

The rate of IPD in all Aboriginal people in NSW increased slightly above pre-pandemic years (Figure 10). In Aboriginal children less than 5 years of age, the rate was 33 notifications per 100,000 population in 2023 and 24 notifications per 100,000 population in 2024. The rate of IPD in Aboriginal people aged 50 years and over in 2023 was similar to before the COVID-19 pandemic and increased in 2024 (Figure 10).

Data completeness for Aboriginality was 96% in 2023, and 98% in 2024.

Figure 10 IPD notification rates per 100,000 population in Aboriginal people by age group and year, NSW, 2018-2024



5 Viral infections

NSW Health publishes weekly respiratory surveillance reports, which include data on COVID-19, influenza and RSV notifications, hospitalisation trends, test positivity and, for COVID-19, genomic trends. These reports are available online at NSW Respiratory Reports. For context with other VPDs, overall annual trends are reported here.

5.1 COVID-19

5.1.1 The disease

Coronavirus disease (COVID-19) is caused by the severe acute respiratory coronavirus 2 (SARS-CoV-2), a single-stranded RNA virus first identified in December 2019. The virus affects people of all ages but older adults and individuals with certain medical conditions are at increased risk of severe disease or death from COVID-19.

SARS-CoV-2 is primarily spread via respiratory droplets or aerosols generated through breathing, talking or coughing.[48] Over time, SARS-CoV-2 has evolved new variants.[49] These variants have become dominant due to increased transmissibility or the ability to evade immunity acquired through previous infection or vaccination.

5.1.2 The vaccine

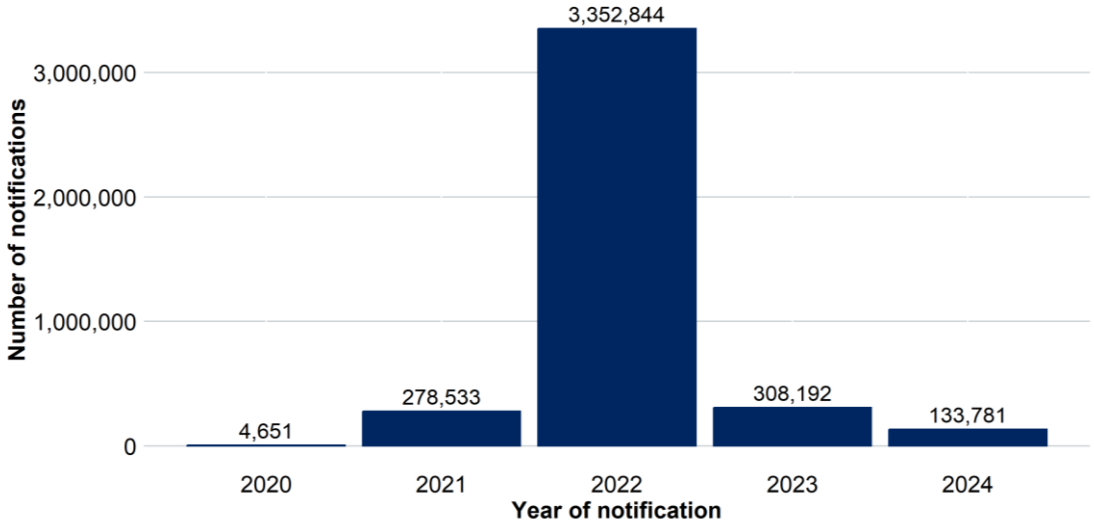
COVID-19 vaccines have significantly reduced the risk of severe illness, hospitalisation, and death. As of July 2024, mRNA vaccines are the only type of COVID-19 vaccines available in Australia. COVID-19 vaccinations are funded for all eligible individuals.

5.1.3 Epidemiology

Since the first confirmed case of COVID-19 in Australia on 25 January 2020, the public health response evolved over time, transitioning from emergency containment to long-term management. This included major changes in testing, reporting practices, surveillance, and vaccination strategies. From 2020 to 2022 free PCR testing was widely available and reporting of positive rapid antigen tests (RAT) was mandatory. In May 2023, free PCR testing without a referral was ceased in NSW, and in September 2023, reporting of RAT results was also ceased.

COVID-19 does not display a predictable seasonal pattern. Instead peaks in transmission continue to be driven by the emergence of new variants of SARS-CoV-2. In NSW, less than 5,000 cases were reported in 2020 (Figure 11). In 2021, NSW reported almost 300,000 cases, however with the emergence of the Omicron variant, NSW reported over 3 million cases in 2022.[50]

Figure 11 COVID-19 notifications by year, NSW, 2020-2024



NSW experienced multiple waves of COVID-19 transmission in 2023 and 2024, driven by a combination of emerging Omicron subvariants and waning hybrid immunity in the community. In 2023, notifications decreased to less than one-tenth the number of cases notified in 2022 (Figure 11). However, due in part to changes in testing and reporting practices in 2023, notifications likely represent only a fraction of true community transmission compared with 2022. In 2024 case numbers continued to decline, with 133,781 notified cases, a 57% reduction compared to 2023. Decreasing notifications may be due to widespread hybrid immunity from both vaccination and prior infection as well as changes in testing behaviours.

Across 2023 and 2024, COVID-19 notification rates were highest in people aged 65 years or over, likely due to higher case ascertainment from targeted testing strategies for populations at risk of severe disease or who live in a high risk setting such as a residential aged care facility, whilst the lowest rates were observed in children aged 5–14 years (Table 5).

Table 5 COVID-19 notifications and rates per 100,000 population by age group, NSW, 2023-2024

	2023		2024	
Age group	**n**	**Rate***	**n**	**Rate***
0-4 yrs	12,490	2,605.9	11,915	2,512.1
5-14 yrs	21,023	2,064.7	7,887	773.8
15-24 yrs	26,900	2,564.0	8,870	821.3
25-64 yrs	167,735	3,857.5	54,214	1,227.2
65+ yrs	79,989	5,473.4	50,816	3,383.6
Total	**308,192**	**3,688.1**	**133,781**	**1,575.2**

*Crude rate per 100,000 population

5.2 Influenza

5.2.1 The disease

Influenza is a highly contagious respiratory illness caused by influenza viruses. There are two main types of influenza viruses that affect humans: A and B. Influenza A is further differentiated into subtypes, of which A(H1N1) and A(H3N2) commonly circulate in humans. These types and subtypes can be associated with a greater or lesser burden of disease in different population subgroups. For

example, influenza A(H1N1) is typically associated with less severe illness in older adults compared to influenza A(H3N2) and influenza B is more common in children.[51] Depending on the susceptibility of the population, the virus that is circulating, and the match to the vaccine, the influenza season can be very different between years.

While influenza symptoms are often mild, the illness can be serious, even in otherwise healthy individuals. Older adults, babies and children under 5 years of age and people with certain underlying health conditions are at greater risk of severe complications, such as pneumonia, heart or brain inflammation, and sepsis.[52] In some cases, these complications can be life-threatening.

Influenza spreads mainly through droplets released when an infected person coughs or sneezes. The disease can also be spread by touching a surface or object that virus droplets have landed on from an infected person. People with influenza can be infectious both before symptoms appear and while they are unwell.

5.2.2 The vaccine

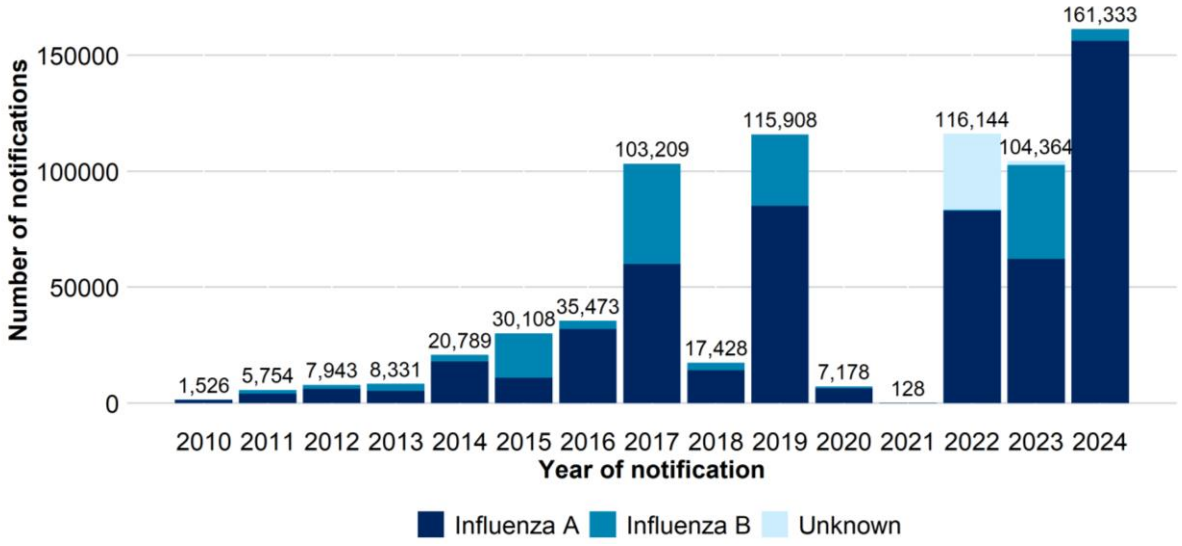
Annual flu vaccination is recommended for everyone aged 6 months and over. People at higher risk of severe illness may be eligible for a free influenza vaccine under the NIP. Vaccination is also recommended for those who are in close contact with vulnerable individuals, such as healthcare and aged care workers, to help protect those at greater risk.

The influenza virus strains change constantly, necessitating a new vaccine each year to target the strains predicted to circulate during the upcoming season. Immunity from vaccination also declines over time, which is why annual vaccination is necessary. Vaccination does not fully prevent infection but significantly lowers the risk of serious illness.

5.2.3 Epidemiology

Influenza can occur year-round but is most common in autumn and winter, with peak activity typically observed between May and October in Australia. Multiple strains often co-circulate during a single flu season. Influenza B typically circulates in large numbers every other year. Between 2010 and 2024, the number of influenza notifications in New South Wales varied, influenced by changes in circulating viral strains, public health interventions, and vaccination coverage (Figure 12). Both 2017 and 2019 had higher case numbers than earlier years and had co-circulation of influenza A and B.

Figure 12 Influenza notifications by serogroup* and year, NSW, 2010-2024



*Excludes dual infections

The introduction of COVID-19 public health measures in 2020 led to a dramatic reduction in influenza notifications and disrupted usual seasonal patterns. In 2021, NSW recorded only 131 influenza cases, marking a historic low. However, the relaxation of COVID-19 restrictions in 2022 resulted in a sharp rebound, with 116,144 notifications reported. The increase in cases was predominantly attributed to influenza A. In 2022, a testing laboratory used during this period employed a diagnostic test that did not differentiate between influenza A and B.

The 2023 influenza season in NSW was characterised by an early peak and longer duration with cocirculation of influenza A and B. A total of 104,430 influenza notifications were recorded, 62,144 cases of influenza A and 40,548 cases of influenza B (Table 6). Most influenza A notifications subtyped were H1N1. Influenza A accounted for the highest number of notifications across most age groups, however influenza B accounted for the highest number of notifications in children aged 5-14 years. The rate in 2023 was highest in children 5-14 years (3,209.8 per 100,000 population), with a slightly higher rate of B than A (1,650.4 compared to 1,507.8 per 100,000, Table 6).

Table 6 Influenza notifications and rates per 100,000 population by age group and serogroup, NSW, 2023-2024

	Influenza A				Influenza B				All⁺			
	2023		2024		2023		2024		2023		2024	
Age	n	Rate*	n	Rate*	n	Rate*	n	Rate*	n	Rate*	n	Rate*
0-4 yrs	9,162	1,911.5	23,561	4,967.5	4,756	992.3	418	88.1	14,042	2,929.7	23,983	5,056.5
5-14 yrs	15,353	1,507.8	40,071	3,931.5	16,805	1,650.4	1,807	177.3	32,683	3,209.8	41,886	4,109.6
15-24 yrs	5,896	562.0	16,492	1,527.0	5,839	556.5	845	78.2	11,913	1,135.5	17,341	1,605.6
25-64 yrs	24,216	556.9	59,783	1,353.3	12,553	288.7	1,867	42.3	37,601	864.7	61,665	1,395.9
65+ yrs	7,484	512.1	16,317	1,086.5	586	40.1	138	9.2	8,149	557.6	16,465	1,096.3
Total	**62,144**	**743.7**	**156,234**	**1,839.6**	**40,548**	**485.2**	**5,075**	**59.8**	**104,430**	**1,249.7**	**161,350**	**1,899.8**

*Crude rate per 100,000 population

⁺All includes cases with dual infection or missing age, serogroup

In 2024, NSW experienced a rapid increase in notifications from late April to a single defined peak that occurred in mid-July. The state recorded its highest number of influenza notifications to date with a total of 161,350 cases, overwhelmingly driven by influenza A (97%). Most influenza A notifications subtyped were H3N2. The rate in 2024 was highest in children aged 0-4 years (5,056.5 per 100,000) due predominately to influenza A (4,967.5 per 100,000).

Across both years, notification rates were lowest among adults aged 65 years and over (557.6 per 100,000 in 2023 and 1,096.3 per 100,000 in 2024). These lower rates in older adults may be due to prior exposure and immunity as well as higher vaccination coverage in these age groups compared with younger ages (see the NSW Immunisation Coverage in 2024 Report).

5.3 Respiratory syncytial virus

5.3.1 The disease

Respiratory syncytial virus (RSV) is a single stranded RNA virus which causes respiratory infections, primarily in young children and older adults. It is divided into two subtypes, A and B, with both typically circulating simultaneously.[53] RSV usually causes mild, cold-like symptoms but can cause serious illness such as bronchiolitis and pneumonia, especially in young children.[54]

RSV is the leading cause of acute lower respiratory tract infection in children under 5 years of age globally.[55] Infants under 12 months old, particularly those less than 6 months old, have a higher risk of severe illness from RSV.[56]

RSV is also a significant cause of respiratory disease and hospitalisation in older people, Aboriginal adults, and people with conditions that increase their risk of severe RSV disease.[32] The full burden of RSV is likely underestimated, mostly due to undetected infections.[57]

5.3.2 The vaccines

RSV vaccines were first registered for use in Australia in January 2024. There are two vaccines available: Abrysvo® and Arexvy. Abrysvo® provides protection via maternal vaccination to the infant through passive immunisation, for up to 6 months from birth.[58] Abrysvo® is also approved for adults 60 years and over. Arexvy is approved in Australia for adults 60 years and older, and in those aged 50-59 with certain risk factors.

Nirsevimab is an immunisation product that protects babies from serious illness caused by RSV and has been registered for use in Australia since November 2023. It is a long-acting monoclonal antibody and is effective against both the A and B strains.[59]

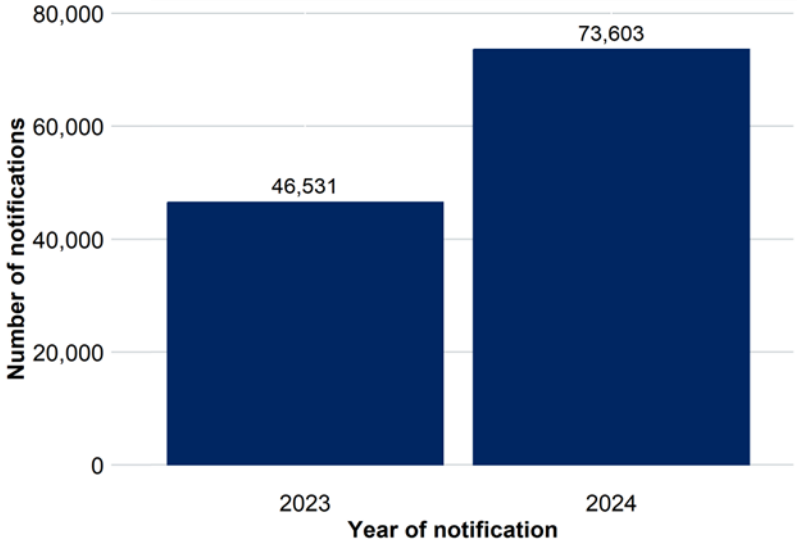
For more information on RSV vaccines see the Australian Immunisation Handbook. The NSW RSV immunisation program is outlined further in the NSW Immunisation Strategy Progress Report 2024.

5.3.3 Epidemiology

RSV first became notifiable in NSW on 1 September 2022. Prior to this, RSV burden was primarily assessed through hospitalisation data, which has limitations due to underdiagnosis in mild cases and inconsistent testing practices.

RSV is a leading cause of hospitalisation for respiratory illness in infants, with the highest incidence occurring in those aged one to 3 months.[60] In NSW between 2016 and 2023, there were more than 52,000 hospitalisations with an RSV diagnosis, of which approximately 41% were in children aged less than 12 months old.[61]

Figure 13 RSV notifications by year, NSW, 2023–2024



In 2023 and 2024, 120,134 cases of RSV were notified in NSW. Notifications increased from 46,531 in 2023 to 73,603 in 2024, a 58% rise (Figure 13).

RSV activity exhibits seasonality, with the highest number of cases reported in April and May in both 2023 and 2024. RSV does circulate year-round, monthly notifications ranged from a peak of 12,499 in May 2024 to a low of 1,654 in November 2024.

Children aged 0-4 years old accounted for the highest proportion of notifications in both years, representing 52% of all notifications across the two-year period. The highest rates of RSV were seen in infants in both years (Table 7).

Table 7 RSV notifications and rates per 100,000 population by age group, NSW, 2023-2024

	2023		2024	
Age group	n	Rate*	n	Rate*
00 yrs	8,561	9,258.6	11,156	12,412.2
01 yrs	7,665	7,663.6	11,480	12,361.8
02-04 yrs	8,501	2,963.8	15,360	5,268.2
05-14 yrs	3,737	367.0	9,951	976.3
15-24 yrs	1,721	164.0	2,774	256.8
25-64 yrs	8,704	200.2	12,953	293.2
65+ yrs	7,620	521.4	9,917	660.3
Total	**46,531**	**556.8**	**73,603**	**866.6**

*Crude rate per 100,000 population

5.4 Measles

5.4.1 The disease

Measles is one of the most contagious diseases affecting humans. It is spread through respiratory droplets from the nose and throat of an infected person and can remain in the air or on surfaces for up to two hours.[62] Measles can cause serious complications such as pneumonia and encephalitis (swelling of the brain). Up to one-third of people with measles will suffer complications, often requiring hospitalisation.[62] Prior to the introduction of measles vaccines in 1963, measles caused more than two million deaths globally each year.[63] Measles remains a common cause of death in children under 5 years in some parts of the world.

There are 24 known genotypes of measles virus, grouped into 8 clades (named A–H). Genotyping supports outbreak investigations and can help determine the source of infection. Since 2021, only genotypes B3 and D8 have been detected worldwide.[64,65]

5.4.2 The vaccine

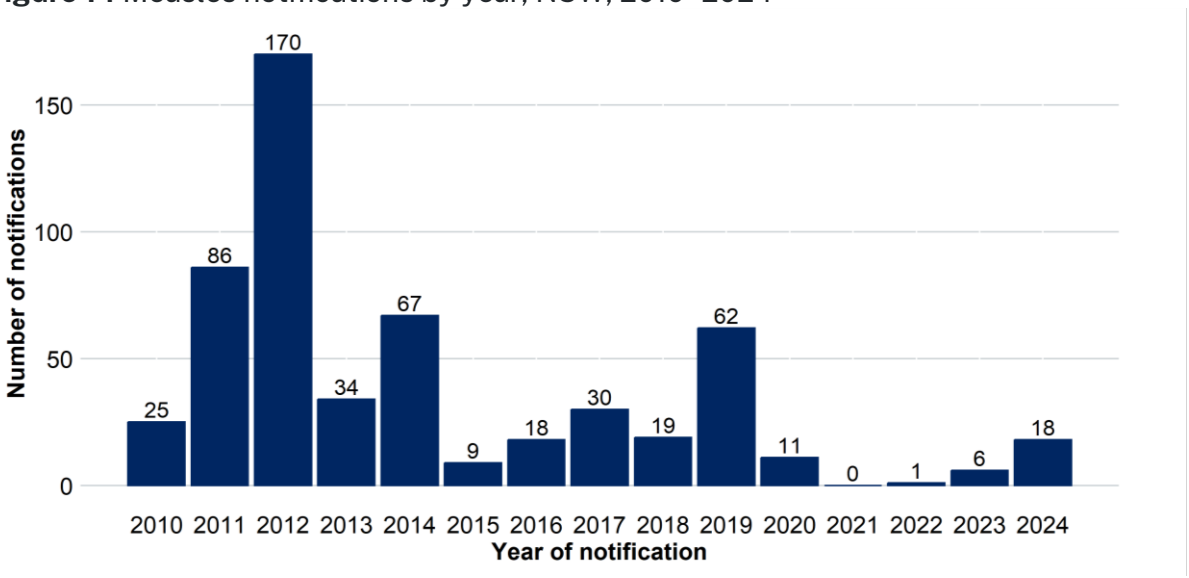
Measles vaccine is a live-attenuated vaccine; in Australia it is combined with other vaccines. There are two vaccines which provide protection against measles; MMR vaccine which also protects against mumps and rubella viruses, and MMRV vaccine which protects against measles, mumps, rubella, and varicella viruses. In Australia, two doses of MMR measles vaccine are funded under the NIP, with children receiving a dose of MMR at 12 months of age and a dose of MMRV at 18 months of age.[32]

5.4.3 Epidemiology

The international epidemiology of measles significantly impacts that of Australia. Australia was declared measles-free by the World Health Organization in 2014,[66] and now, most cases notified are related to international travel, either overseas visitors or returning residents. Maintaining measles elimination in Australia remains highly dependent on maintaining high vaccine coverage in the population.

During the COVID-19 pandemic, international border closures led to a sharp decline in measles notifications in NSW due to reduced opportunities for importation.[67] In 2021, no measles cases were reported in NSW (Figure 14). Following the reopening of borders in 2022, notifications started to increase. In 2024, NSW recorded 18 cases, comparable to the annual totals seen in 2016 and 2018.[67]

Figure 14 Measles notifications by year, NSW, 2010–2024



In 2023 and 2024, 24 cases of measles were notified in NSW. Of these, 6 cases occurred in 2023 and 18 in 2024, representing a threefold increase from the previous year.

Half of the cases (*n* = 12; 50%) were children under 5 years of age, including 6 infants (Table 8). Six cases required hospitalisation: two infants, one child aged 1-4 years and 3 adults aged 25-64 years. There were no deaths due to measles reported. Most cases were genotype D8 (*n* = 18; 75%).

Table 8 Measles cases by age group, place of acquisition and genotype, NSW, 2023-2024

Characteristic	2023		2024		2018-2022 average	
	n	%	n	%	n	%
Age group						
0 yrs	2	33.3	4	22.2	3	17.2
1-4 yrs	1	16.7	5	27.8	1	3.2
5-14 yrs	0	0.0	2	11.1	2	12.9
15-24 yrs	0	0.0	5	27.8	4	19.4
25-64 yrs	3	50.0	2	11.1	9	46.2
65+ yrs	0	0.0	0	0.0	0	1.1
Place of acquisition						
Acquired in NSW	1	16.7	7	38.9	8	43.0
Acquired in Australia outside NSW	0	0.0	0	0.0	0	1.1
Acquired outside Australia	5	83.3	11	61.1	10	54.8
Unknown	0	0.0	0	0.0	0	1.1
Genotype						
B3	1	16.7	5	27.8	6	31.2
D8	5	83.3	13	72.2	11	58.1
Unknown genotype	0	0.0	0	0.0	2	10.8

Most NSW cases acquired measles overseas (*n* = 16; 67%), slightly above the 5-year average of 55% (Table 8). Most of these cases (*n* = 10) were linked to travel in South and South-East Asia.

Eight of the 24 cases (33%) acquired measles in NSW. One case in 2023 had no known source, while all 7 cases in 2024 had a known source.

In 2023 and 2024, most measles cases were unvaccinated (*n* = 15; 63%). In 2023, two unvaccinated cases were infants. One of these infants was older than 6 months and was eligible for an early dose of MMR vaccine before overseas travel. The remaining 4 had unknown vaccination status due to factors such as being born overseas and/or lack of access to health records.

In 2024, two cases were reported as fully vaccinated. One had received age-appropriate vaccination overseas, 16 days before their symptom onset. The other case had received two doses of measles vaccine in childhood but experienced vaccine failure. Three measles cases had uncertain vaccination status.

One case in 2024 reported as unvaccinated had received a dose of measles vaccine post-exposure prophylaxis 6 days before developing symptoms, following their exposure to another measles case. For surveillance purposes, a person is considered "vaccinated" only if the measles vaccine was received at least 14 days before illness onset.

5.5 Mumps

5.5.1 The disease

Mumps is an acute illness caused by mumps virus (*Mumps orthorubulavirus*). Characteristic symptoms include swelling and tenderness of the salivary glands. Asymptomatic infection occurs in one-third of cases.[68] Complications are rare but can be serious including encephalitis and meningitis, orchitis (infection of the testes), spontaneous abortion and hearing loss.[69]

Humans are the only natural host of the mumps virus. The virus is transmitted through contact with respiratory secretions, usually from respiratory droplets through the airborne route but also through direct contact with the saliva of an infected person.[69] Natural mumps infection, whilst considered to offer long lasting protection against divergent strains of mumps virus, may not always produce lifelong immunity.[70-72]

5.5.2 The vaccines

Mumps vaccine is a live-attenuated vaccine. There are two combination vaccines which provide protection against mumps; MMR vaccine which also protects against measles and rubella viruses, and MMRV which protects against measles, mumps, rubella, and varicella viruses. In 2013, the recommendation for a second dose of MMR at 4 years of age was changed to 18 months.[73] The mumps component is not as immunogenic as the measles and rubella components of the MMR vaccine and protection offered may wane over time,[74] and is attribute to low persistence of neutralizing antibodies and poor B-cell memory.[70] This is particularly so for young adults who received the vaccination more than 10 years ago.[75-77]

5.5.3 Epidemiology

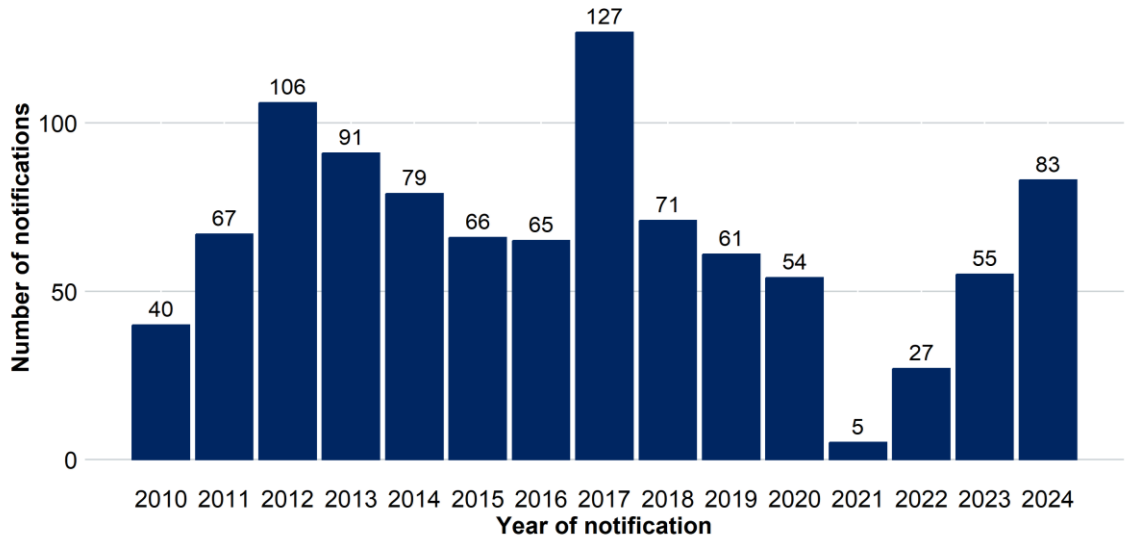
The introduction of the MMR vaccine led to large reductions in disease in countries with high vaccine coverage, including Australia. However sporadic outbreaks of mumps continue to occur in highly vaccinated populations, with increasing incidence being observed in adolescents and young adults particularly in culturally and linguistically diverse subpopulations.[78,79] The reasons for this pattern are not well understood, however waning immunity and the emergence of strains genetically different to those in the vaccine are potential factors.[79] In Australia, over the last 15 years outbreaks have occurred in Western Australia, Queensland and the Northern Territory.[12,80,81]

In NSW, there were 55 mumps notifications in 2023 and 83 mumps notifications in 2024, approaching pre-pandemic levels (Figure 15). Most notifications were reported in adults aged 25-44 years (27%) and in males (60%, which is similar to the previous 5-year average of 57%). Most cases acquired mumps in NSW (65%).

In 2023 and 2024, a total of 27 cases were reported in children under 5 years of age, 7 of which (26%) were unvaccinated. One of these cases was too young to receive an MMR vaccine.

There were no mumps related deaths reported in 2023 and 2024.

Figure 15 Mumps notifications* by year, NSW, 2010-2024



*This includes both case confirmed and case probable.

5.6 Rotavirus

5.6.1 The disease

Rotavirus is a highly infectious virus and is the most common cause of diarrhoeal disease in babies and young children globally.[82] There are 11 distinct groups of rotavirus, including groups A, B, C, H and I that have been identified in humans. Rotavirus group A causes more than 90% of infections in humans.[83]

Rotavirus can cause gastroenteritis which can vary from mild, watery diarrhoea of limited duration to severe, dehydrating diarrhoea with vomiting, fever, and shock.[84] Severe dehydration from rotavirus infection can be life-threatening. Rotavirus spreads very easily, usually through contact with an infected person or contaminated fluids. Prior to the availability of rotavirus vaccines, infection in early childhood was universal in children by the age of 5 years.

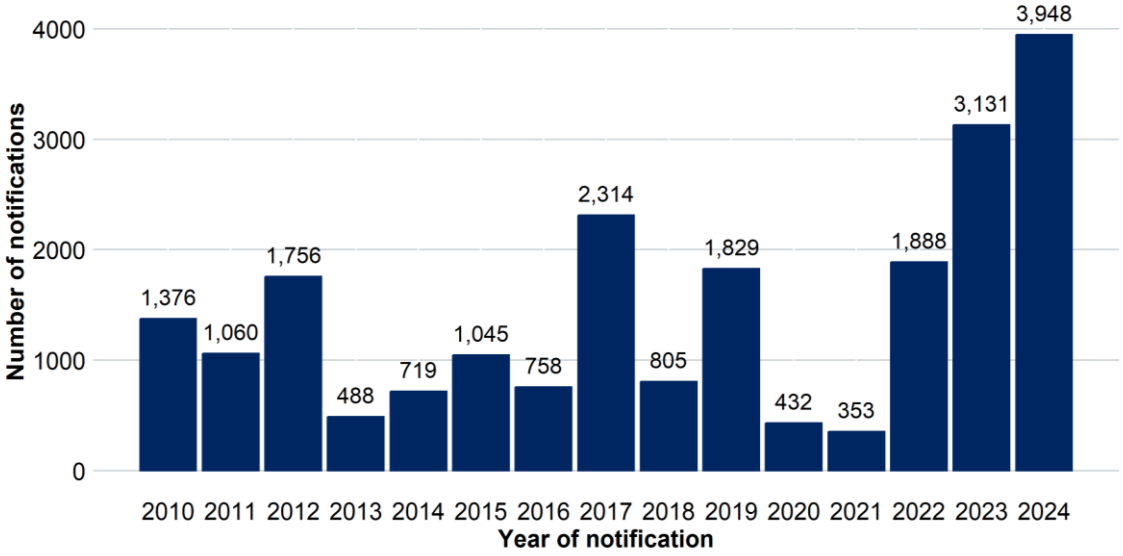
5.6.2 The vaccines

Two oral rotavirus vaccines are available in Australia, Rotarix and RotaTeq. Both are live attenuated vaccines, but the components and number of doses required differ.[32] Rotavirus vaccines were added to the NIP in 2007. All infants in Australia are recommended to receive a course of rotavirus vaccine before 6 months of age. In NSW, two doses of Rotarix is given, at 6 weeks and 4 months of age.[8] See the Australian Immunisation Handbook for more detail on rotavirus vaccines.

5.6.3 Epidemiology

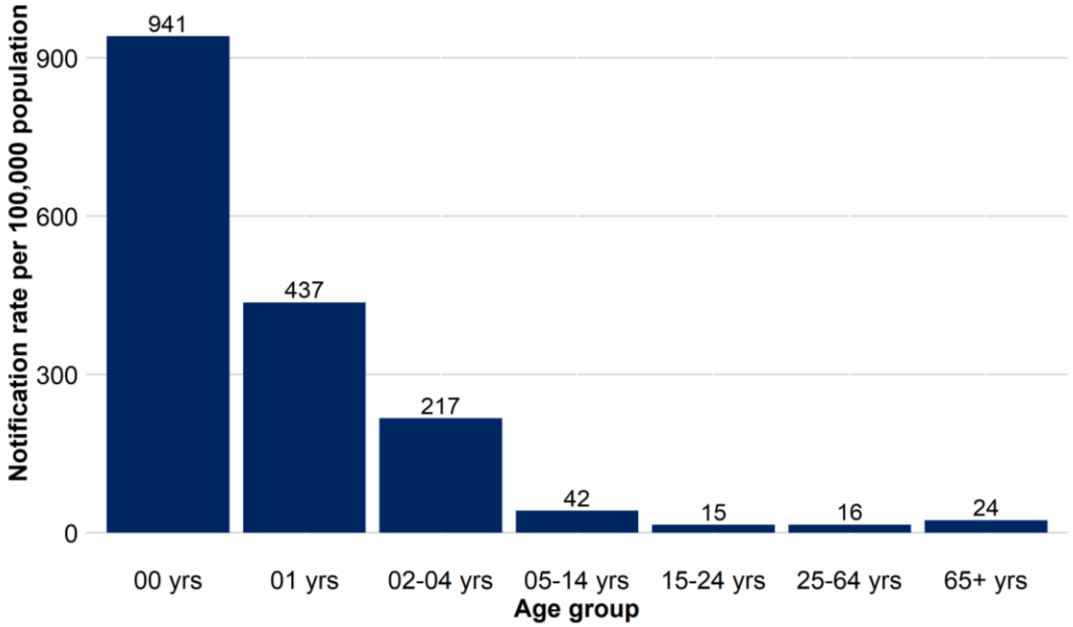
Rotavirus has been a notifiable disease in Australia since 2010. Before the introduction of rotavirus vaccine to the NIP, about 10,000 children under 5 years of age were hospitalised because of rotavirus each year in Australia.[85,86] Rotavirus infections follow a seasonal pattern in Australia and are most common in NSW during spring.[87] Notifications were low during 2020-2021 before increasing substantially in the following 3 years (Figure 16).

Figure 16 Rotavirus notifications by year, NSW, 2010-2024



In 2023 and 2024, rotavirus notifications reached the second highest and highest annual totals recorded in NSW, respectively. In both years, more than half of notifications were in children under 5 years of age with by far the highest rates in in children under one year (941 per 100,000 population) (Figure 17). While this reflects the higher burden of disease in young children, [88] it may also reflect lower testing rates in older age groups.

Figure 17 Rotavirus notification rate per 100,000 population by age group, NSW, 2023-2024



6 Rare conditions

6.1 Diphtheria

6.1.1 The disease

Diphtheria is a potentially life-threatening infection caused by toxin-producing strains of *Corynebacteria*, which infect the upper respiratory tract (nose and throat) or the skin. Both *Corynebacterium diphtheriae* (a commensal of the human respiratory tract and skin), and *Corynebacterium ulcerans* (a commensal of animals including domestic dogs, cats, and livestock) can produce the toxin which causes diphtheria.[89]

Toxigenic *Corynebacteria* infection of the respiratory tract (respiratory diphtheria) can lead to the formation of a membrane in the back of the throat which makes it hard to breathe and swallow. Swelling of the lymph glands in the neck may also result in a characteristic 'bull neck.' Infection of the skin (cutaneous diphtheria) can result in large non-healing ulcers, often starting as smaller lesions. These occur most commonly on the legs.

In a small number of cases the toxin may also enter the blood stream and result in damage to the heart (myocarditis) and nerves (neuropathy), which can be fatal.

C. diphtheriae can be spread from person to person, including asymptomatically. Conclusive person-to-person transmission of *C. ulcerans* has not been documented. Infection with *C. ulcerans* usually occurs following contact with animals, or ingestion of unpasteurised animal milk products.

6.1.2 The vaccine

The diphtheria vaccine protects against the toxin produced by the bacterium, rather than infection or carriage.[90] This means that people who are vaccinated against diphtheria may still acquire the bacteria and develop carriage or infection. However, they are less likely to experience the symptoms associated with the toxin. Immunity can wane over time, so recommended booster doses are important.

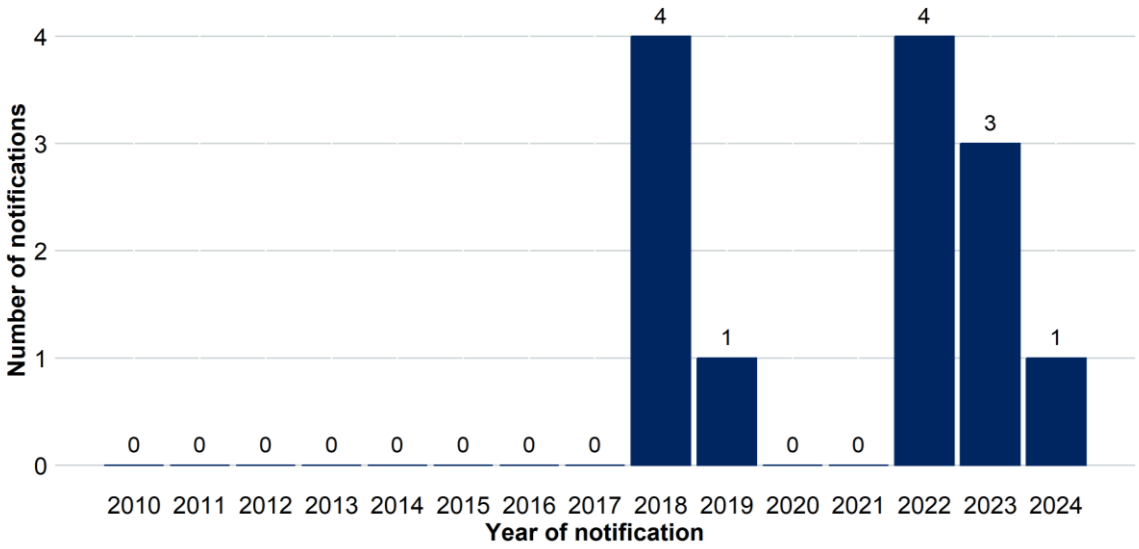
Diphtheria toxoid is a component of the combined DTP vaccine and the schedule matches that of tetanus and pertussis. Infants and children receive funded DTP vaccine at 6 weeks, 4, 6 and 18 months and at 4 years of age and in Year 7 of school. Adults aged 50 years and 65 years and older are recommended to receive DTP vaccine if their last dose was more than 10 years ago.

6.1.3 Epidemiology

Prior to the development of effective interventions in the early 20th century, respiratory diphtheria was a common cause of death among children under 5 years old. Widespread increases in coverage of the 3-dose series of DTP vaccines in the early 1970s led to diphtheria becoming rare in countries with high vaccine coverage, like Australia.[91] Globally, it remains an important cause of infection and death among children under 5 in countries with low vaccination rates. Large outbreaks still occur, often associated with displaced populations and infrastructure failures during periods of civil unrest, war, and natural disasters.[91] The proportion of cases associated with *C. ulcerans* has increased in several countries over the past decade,[91] particularly among older people and in settings in which booster doses of vaccine in adults are not recommended. Reduced vaccine uptake globally provides potential for increases in diphtheria cases to occur.

Locally, cases of toxigenic diphtheria are rare, with most cases notified the cutaneous form associated with injuries sustained during overseas travel, usually to tropical locations with low vaccination rates. In recent years, an increase in locally acquired diphtheria infections due to toxigenic *C. diphtheriae* has been observed, with several cases, including at least two respiratory infections in NSW residents (in 2022, Figure 18), linked to an ongoing outbreak in Queensland.

Figure 18 Diphtheria notifications by year, NSW, 2010-2024[2]

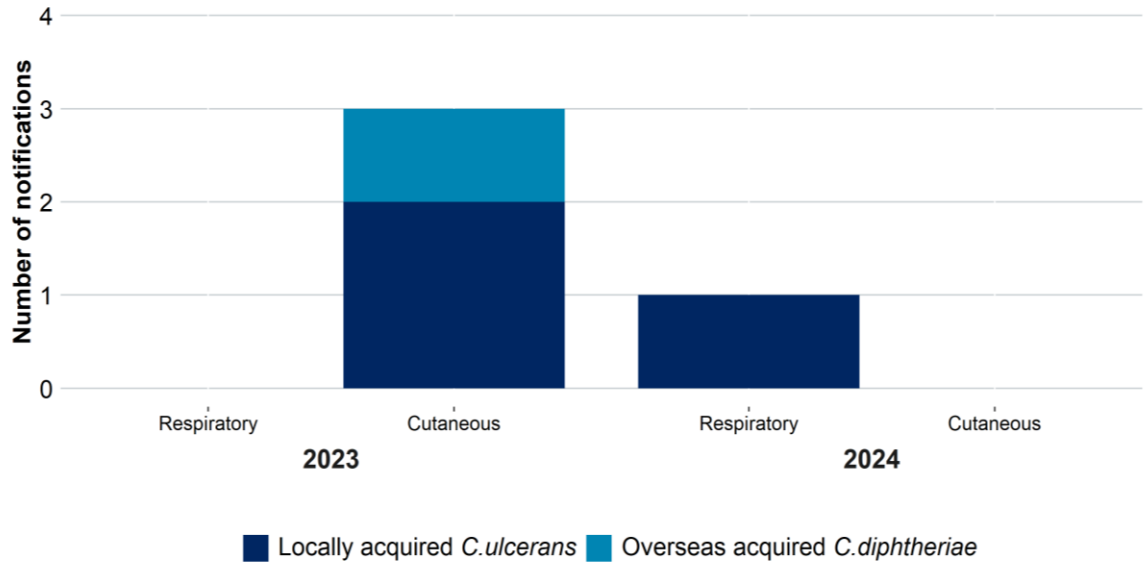


In 2023, 3 cases of cutaneous diphtheria were notified in adults in NSW. Two cases were caused by *C. ulcerans*, and one by *C. diphtheriae* (Figure 19). The two unrelated cases caused by *C. ulcerans* were locally acquired and linked to domestic dogs. The case caused by *C. diphtheriae* occurred in a wound sustained in Indonesia. In 2024, a single case of mild respiratory diphtheria due to *C. ulcerans* was notified in an adult. The case involved pseudomembrane formation without systemic symptoms, and the person did not require treatment with antitoxin. This person's infection is likely to be associated with contact with domestic animals or livestock.

There were no deaths due to diphtheria in NSW in 2023 or 2024.

[2] In 2017, the national surveillance case definition for diphtheria changed, clarifying the criteria for notifying cutaneous cases of toxigenic *C. diphtheriae* or *C. ulcerans*. Confirmed cases required both laboratory definitive evidence and clinical evidence of an upper respiratory tract infection or skin lesion. Simultaneous implementation of advances in laboratory processes may also have led to improvements in detection of toxin producing *Corynebacterium* species. Prior to 2018, diphtheria was last notified in NSW in 1991.

Figure 19 Diphtheria notifications by place of acquisition and organism, NSW, 2023-2024



6.2 Tetanus

6.2.1 The disease

Tetanus is caused by the bacterium *Clostridium tetani*, an organism which is commonly found in soil, dust, and animal faeces. Disease occurs when the organism enters the body through a break in the skin (such as a puncture wound); it is not transmitted between people.[92] Toxin produced by the bacterium attacks the central nervous system causing muscle rigidity with painful spasms, including the characteristic muscle spasms of the jaw ("lock jaw"). Tetanus can be life-threatening and even with treatment up to one in 10 people with tetanus will die.[93] Since 1990, the number of deaths globally from tetanus has fallen by 88%.[93]

6.2.2 The vaccine

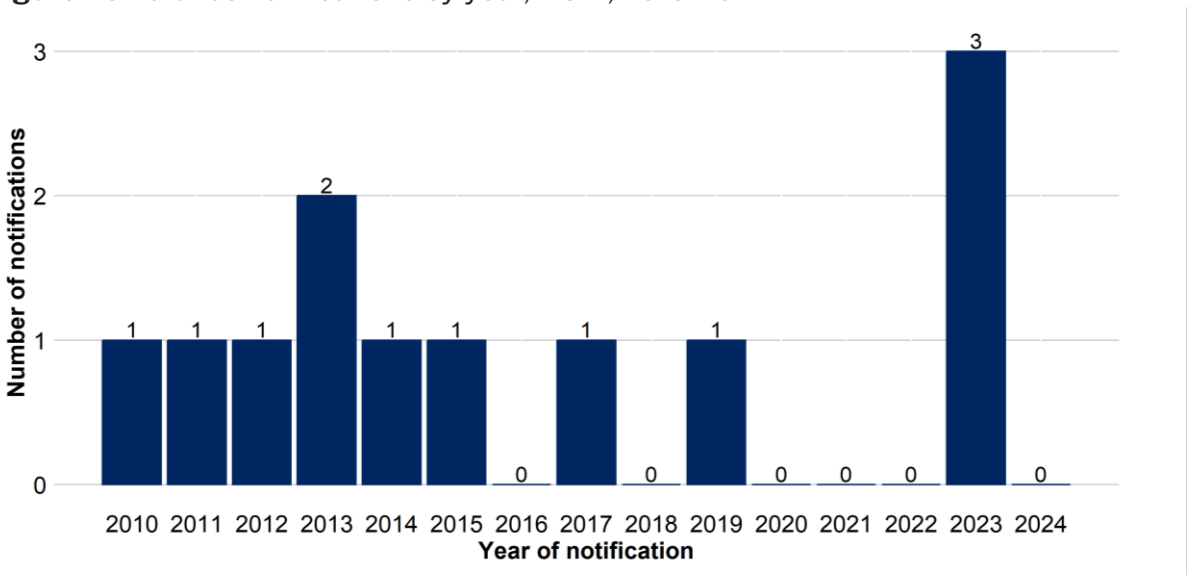
Tetanus vaccine protects against the toxin produced by the bacteria, rather than infection itself. People can get a tetanus vaccine after an injury that is high risk for tetanus, to prevent the illness from developing. Receiving a primary course of tetanus vaccination in childhood provides protection through adulthood, however, immunity tends to begin waning with increasing age. Boosters are recommended every 10 years for adults from 50 years of age to maintain protection.[32] Assessing the tetanus vaccination status for older persons at other vaccination milestones and at routine health checks in primary care is important to prevent disease in this age group.

Tetanus toxoid is a component of the combined DTP vaccine and the schedule matches that of diphtheria and pertussis. Infants and children receive funded vaccine at 6 weeks, 4, 6 and 18 months and at 4 years of age and in Year 7 of school. Adults aged 50 years and 65 years and older are recommended to receive tetanus vaccine if their last dose was more than 10 years ago.

6.2.3 Epidemiology

Given high uptake of tetanus vaccines following its introduction in Australia from 1953, tetanus is a rare disease in Australia.[92] It now predominantly affects older adults, particularly females.[94]

Figure 20 Tetanus notifications by year, NSW, 2010-2024



There were 3 notifications of tetanus in NSW in 2023 (Figure 20); all were female adults aged 75 years or older. Sadly, one person died from their infection. Two of the 3 wounds preceding the infection were sustained while gardening. The source of the third wound was unknown. None of the 3 cases had a record of having received a tetanus vaccine within the preceding 10 years.

There were no cases of tetanus notified in NSW in 2024 (Figure 20).

6.3 Rubella and congenital rubella syndrome

6.3.1 The disease

Rubella (also known as German measles) is an acute viral disease caused by the rubella virus. Rubella virus is transmitted via direct contact with respiratory droplets usually spread by infected persons coughing or sneezing. Humans are the only source of infection.[95]

Up to 50% of rubella infections are asymptomatic or subclinical. Adults are more likely than children to display symptoms. People with asymptomatic or subclinical rubella infection can spread the virus to others.[95]

Rubella infection during pregnancy may lead to foetal infection which can result in miscarriage, still birth, or congenital rubella syndrome (CRS).[96] Congenital infection after maternal rubella can be as high as 80% during the first 12 weeks of pregnancy, 54% at 13-14 weeks, and 25% at the end of the second trimester.[96]

CRS is characterised by several abnormalities in the foetus and/or infant including intellectual disabilities, cataracts, deafness, heart abnormalities, intrauterine growth restriction, and inflammatory lesions of the brain, liver, lungs, and bone marrow.

6.3.2 The vaccine

Rubella vaccine is a live attenuated vaccine. There are two combination vaccines which provide protection against rubella; MMR vaccine which also protects against measles and mumps viruses, and MMRV which protects against measles, mumps, rubella, and varicella viruses.

The protection provided by the rubella component of the vaccine can wane over time. Pregnant women are routinely screened for rubella protection during pregnancy due to the risk of CRS if they are exposed while pregnant. If they are found to be non-immune a booster dose is recommended

after delivery of the baby (as live vaccines cannot be given during pregnancy) to reduce the risk of CRS in subsequent pregnancies. MMR vaccine is also recommended for women planning a pregnancy who are identified to be non-immune.

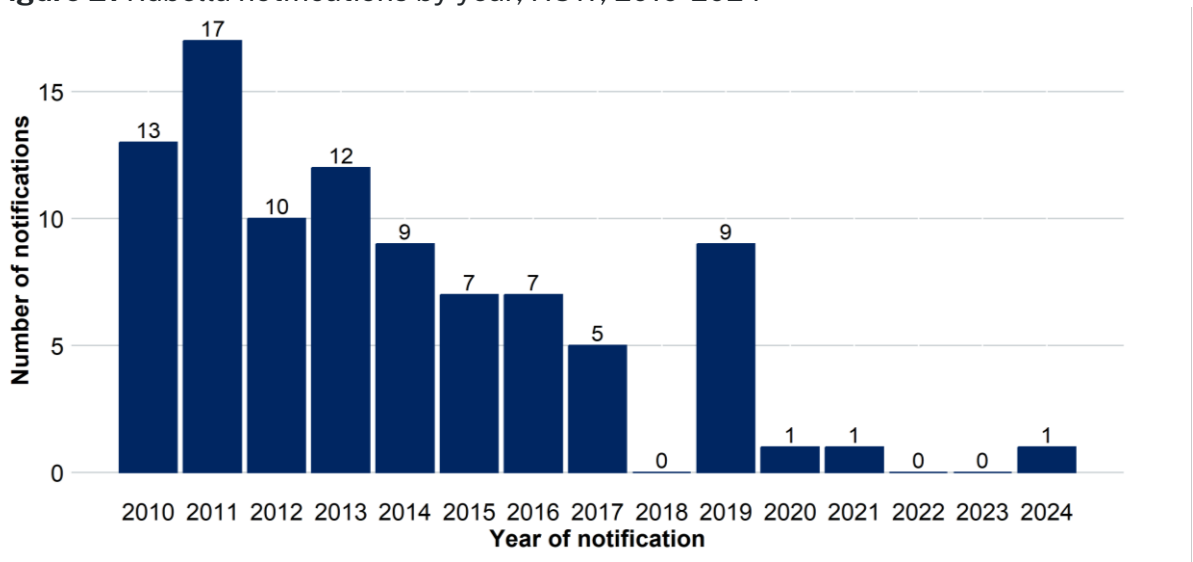
Rubella vaccine is delivered to infants under the NIP at 12 months of age (as MMR) and 18 months of age (as MMRV).

6.3.3 Epidemiology

Rubella vaccine was added to the Australian vaccination schedule for adolescent girls in the early seventies before being funded for all infants in the late 80s (as MMR). A second dose of MMR was added in the early 1990s.[73] Rubella notifications progressively declined following the introduction of the first and second doses of the vaccine, however, the most substantial declines occurred in the late 1990's after the age at which the second dose of MMR was administered was moved from 10-14 years of age to 4-5 years of age. Rubella notifications in in Australia have remained at or below one case per 100,000 population since the early 2000's.

In 2018, the WHO declared Australia had eliminated endemic rubella virus (and CRS).[97] This was mainly due to achieving and maintaining high rates of vaccination. Rubella elimination has been maintained in Australia each year since this declaration.

Figure 21 Rubella notifications by year, NSW, 2010-2024



There were no cases of rubella or CRS notified in NSW in 2023 (Figure 21).

In 2024 a single case of rubella was diagnosed in an adult male (20-24 yrs), who was confirmed to have been fully vaccinated as a child.

There were no cases of CRS notified in NSW in 2024 (Figure 21).

6.4 Polio

6.4.1 The disease

Poliomyelitis (polio) is a highly infectious disease caused by the poliovirus, a type of human enterovirus that infects the gastrointestinal tract. There are 3 distinct serotypes of poliovirus: type 1, type 2, and type 3. Immunity to one does not provide immunity to the others.

Poliovirus is primarily spread from person to person through the faecal-oral route and mostly affects children under 5 years of age. Most infections do not cause symptoms, and those with mild

symptoms usually recover fully. However, in rare cases, polio can lead to permanent paralysis, and in some instances, it can be fatal.

A vaccine-derived poliovirus (VDPV) is poliovirus that is related to the weakened live poliovirus contained in oral polio vaccine (OPV). In some rare instances, the live poliovirus in the vaccine can mutate and lead to people developing the infection and being able to spread it from person to person. This is uncommon but can occur in a setting with poor hygiene and sanitation, and low vaccination coverage. If a VDPV begins to spread within a population, it is classed as a circulating VPDV (cVDPV). Paralytic polio caused by cVDPV is clinically no different to that caused by wild poliovirus.

6.4.2 The vaccines

There are two main types of vaccines used to protect against poliovirus: oral polio vaccine (OPV) and inactivated polio vaccine (IPV).

Oral polio vaccines contain live, attenuated (weakened) poliovirus strains developed by Dr Albert Sabin. These strains target the three poliovirus serotypes and are commonly referred to as Sabin-1, Sabin-2, and Sabin-3. Sabin strains are shed in the faeces of recently vaccinated people. OPV strains, though weakened, can genetically revert to a more harmful form capable of causing paralysis. In extremely rare circumstances Sabin strains can cause vaccine-associated paralytic polio (VAPV).

Historically, trivalent OPV (tOPV), which includes all three Sabin strains, was used globally and helped in eradicating polioviruses because it stops the spread of the virus by inducing immunity in the gut. In response to increasing detections of cVDPV type 2 (cVDPV2), a global switch was made in 2016 from tOPV to bivalent OPV (bOPV), which includes only Sabin-1 and Sabin-3. To reduce the risk of type 2 reversion, a novel OPV type 2 (nOPV2) is now being used in some settings overseas. The bOPV continues to be used in many low-resource settings for routine vaccination and outbreak response.

Australia discontinued the use of OPVs in 2005, transitioning to IPVs. IPVs contain inactivated (killed) poliovirus strains and stimulates the immune system to produce antibodies in the blood against all three poliovirus types.

In Australia, IPV is provided free under the NIP for children, all people under 20 years of age who have missed vaccines in childhood, and refugees and humanitarian entrants of any age.

6.4.3 Epidemiology

Polio is now rare in most parts of the world. Since 1988, global vaccination efforts have decreased wild poliovirus (WPV) cases by over 99%.[98] Of the 3 WPV strains, type 2 and type 3 have been certified as globally eradicated, while type 1 remains endemic only in Afghanistan and Pakistan.[98]

Despite this progress, the number of WPV1 cases increased in 2024 after several years of decline. In 2024 Pakistan reported 74 cases and Afghanistan 25 cases, up from just 6 cases in each country in 2023.[99] Additionally, outbreaks of VDPV have occurred in various countries, particularly in areas with low vaccination coverage.[99] Global conflicts continue to pose significant challenges to eradication efforts by disrupting routine childhood vaccination programs and damaging water and sanitation infrastructure.

The most prevalent form of VDPV is cVDPV2. In 2023 and 2024, there were 13 reported cases in Indonesia. Globally, there were also wastewater detections in Gaza, as well as in 16 cities across 5 European countries, linked to a strain originating in Nigeria.[100] No human cases were reported in association with the wastewater detections.

Australia's last locally acquired polio case occurred in 1972, and the country was declared polio-free in 2000.[101] Due to high vaccination coverage, Australia remains at low risk for polio transmission, but polio could be imported and spread amongst unimmunised populations.

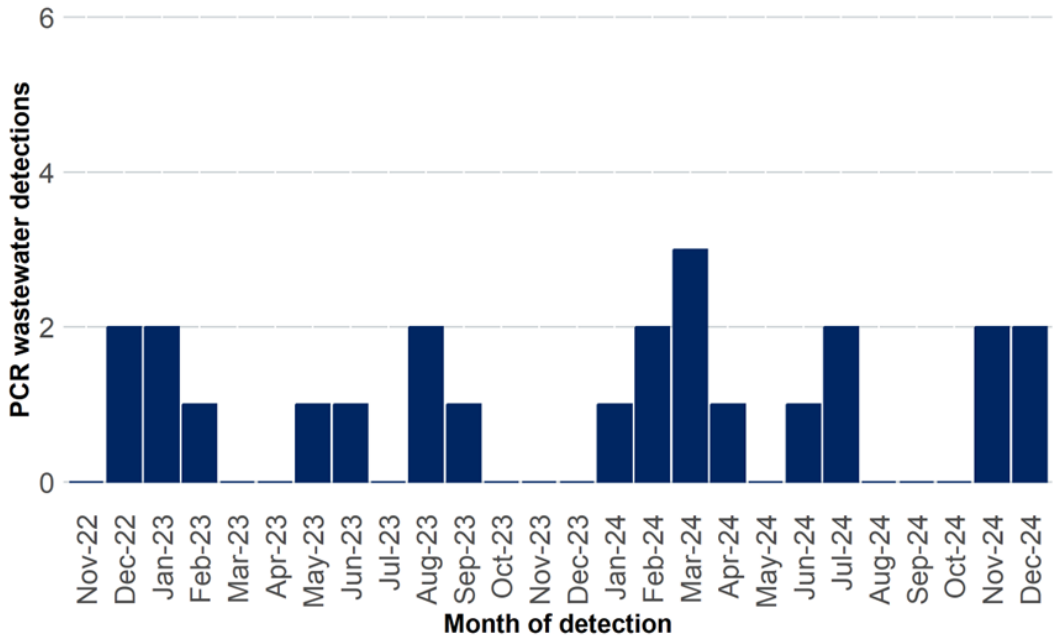
Prevention requires both ongoing vaccination and robust surveillance for WPV and cVDPV. Australia's poliovirus surveillance system includes acute flaccid paralysis surveillance,[102] which detects symptomatic cases, as well as virological surveillance to monitor un-typed enterovirus from clinical specimens and environmental surveillance, wastewater, for poliovirus.

There have been no cases of polio in Australia since an imported case in 2007.[103] On 2 December 2024, a VDPV2 was detected in pre-treated sewage from the Western Treatment Plant in Melbourne.[104] Investigation including sequencing of the virus showed that it was likely linked to an individual who received OPV overseas and had continued to shed the virus for many years.

In November 2022, NSW Health commenced poliovirus wastewater surveillance. The NSW Wastewater Surveillance Program tests untreated wastewater to detect fragments of poliovirus. The program tests wastewater samples collected at sewage treatment plants within Sydney (Bondi, Liverpool, and Quakers Hill) and the Hunter Region (Burwood Beach). Samples are tested for WPV, Sabin poliovirus types 1, 2 and 3 and enterovirus RNA.

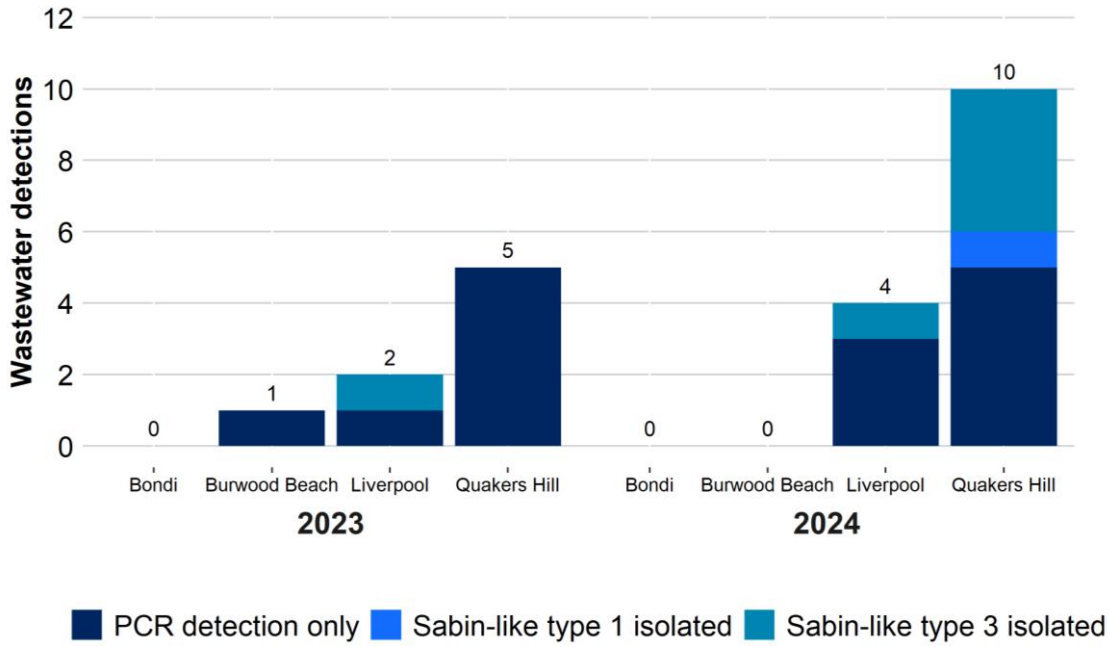
Since the commencement of the NSW poliovirus wastewater surveillance program in November 2022, no WPV or cVDPV have been detected. However, between November 2022 and December 2024, there were 24 sporadic detections of Sabin-like poliovirus types 1 and/or 3 — the strains used in bOPV. These detections were identified through PCR testing and occurred across 3 of the 4 NSW surveillance sites: Quakers Hill (17 detections), Liverpool (6 detections), and Burwood Beach (1 detection). These findings are summarised in Figure 22.

Figure 22 Sabin 1 and/or 3 poliovirus wastewater PCR detections, NSW, November 2022-December 2024



In 2023 and 2024, all poliovirus PCR-positive wastewater samples (*n* = 22) were referred to the National Enterovirus Reference Laboratory (NERL) for confirmation and further characterisation using virus culture.[102] Of these, 7 samples (31.8%) yielded Sabin-like polioviruses, including 6 isolates of Sabin-like type 3 and one isolate of Sabin-like type 1 (Figure 23).

Figure 23 Sabin 1 and/or 3 poliovirus wastewater detections, by detection type, NSW, 2023-2024



In all 7 culture-positive cases, sequencing of the VP1 region revealed 99.8% to 100% nucleotide identity with the prototype Sabin vaccine strain. This high degree of similarity is consistent with the virus originating from a recent bOPV administration, likely in a returned traveller or visitor from a country where bOPV is still in use.

Poliovirus was not isolated in the other 15 samples sent to NERL. PCR testing is more sensitive than virus culture for detecting poliovirus in wastewater. Virus isolation may fail due to low viral loads or limited susceptibility of the virus to cell culture conditions. Several of the PCR detections were near the assay's limit of detection, suggesting that the viral load was insufficient to initiate infection in cultured cells.

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Appendix 1: Glossary of terms

Term	Definition
Antibody	A protein that recognises and attaches to foreign substances like viruses and bacteria so that the immune system can destroy them.
Antigen	Any substance that causes the immune system to produce antibodies against it. Vaccines contain antigens that stimulate the body to produce antibodies that protect against the disease. Foreign substances such as viruses, bacteria, chemicals, toxins, and pollens are also types of antigens.
Asymptomatic	Not showing any signs or symptoms of illness or infection.
Booster dose	An additional dose of vaccine given after the primary course to strengthen or 'boost' protection. Boosters are recommended for vaccines where vaccine-induced immunity is known to decrease over time.
Bacteraemia	Presence of bacteria in the blood.
Carriage	When a person carries an organism that can cause disease and can spread that organism to other people, even if they do not get unwell.
Colonisation	Organisms (e.g. bacteria or viruses) living in the body without causing illness.
Conjugate (vaccine)	A type of vaccine that is made by chemically linking (conjugating) a protein to a sugar from the bacteria's surface. This improves the immune response to the vaccine.
Elimination (of disease)	Where a disease no longer circulates within a defined region because of efforts to prevent the disease (such as universal vaccination programs).
Endemic	A disease that is always present in a specific population or place.
Enhanced surveillance	Collecting detailed information about important diseases, usually combining data from a range of sources. It may involve data collected from clinicians, laboratories and directly from the case.
Epidemic	A sudden increase in the number of cases of a disease above what is normally expected in a population or area
Eradication (of disease)	The global absence of a disease (or strain of disease), achieved as a direct result of efforts to prevent the disease. Once eradication of disease has been achieved, efforts to control the disease are no longer required.
Herd immunity	Herd immunity occurs when a large proportion of a community becomes immune to a disease, making it difficult for the disease to spread.
Immunogenic	The ability of a foreign substance, such as an antigen, to trigger an immune response in the body of a human or other animal.

Term	Definition
Immunisation	The process of both getting a vaccine and becoming immune to the disease following vaccination.
Incidence	The number of new cases of a disease occurring in a population, within a defined time period (often expressed as a rate).
Infant	A child under 12 months of age.
Infection	The invasion and growth of germs in the body. The germs may be bacteria, viruses, or other organisms. An infection can be asymptomatic or result in symptoms like fever or other health problems.
Live attenuated vaccine	Contains a version of the living virus that has been weakened so that it does not cause serious disease in people with healthy immune systems. Live attenuated vaccines usually stimulate a strong and long-lasting immune response.
Meningitis	Infection and inflammation of the fluid surrounding the brain and spinal cord.
Monoclonal antibody	Artificial proteins that act like human antibodies in the immune system.
Nasopharynx	The back of the nose and throat.
Neonate	A child in the first 12 weeks of life.
Prevalence	Total number of cases of a disease (new and pre-existing) within a population at a point in time, or across a period.
Primary course (of vaccine)	The initial series of vaccine doses required to build protection. This may differ depending on the age at which a person receives the vaccine.
Sepsis	A serious and potentially life-threatening reaction of the body to infection.
Serotype/serogroup	A way to classify bacteria based on features like their outer coating, which can affect how severe the illness is.
Subclinical (infection)	Infection resulting in few, or no noticeable signs or symptoms.
Vaccination	The term used for getting a vaccine by having an injection or taking an oral vaccine dose.
Virulence	The degree or severity of illness caused by a pathogen (e.g. bacteria or virus)
Waning immunity	Reduction, over time, in the ability of the immune system to mount a response. Protection against a disease, following infection or vaccination, may decrease over time.

Appendix 2: List of acronyms

Acronym	Definition
bOPV	Bivalent oral poliovirus vaccine
cVDPV	Circulating vaccine-derived poliovirus
cVDPV2	Circulating vaccine-derived poliovirus type 2
COVID-19	Coronavirus disease caused by SARS-CoV-2 virus
CRS	Congenital rubella syndrome
DTPa/dTpa	Diphtheria-tetanus-pertussis acellular vaccine
Hib	*Haemophilus influenzae* type b
IMD	Invasive meningococcal disease
IPD	Invasive pneumococcal disease
IPV	Inactivated polio vaccine
mRNA	Messenger ribonucleic acid
MenB	Meningococcal serogroup B vaccine
MenACWY	Meningococcal serogroups ACWY vaccine
MMR	Measles mumps rubella
MMRV	Measles mumps rubella varicella
NERL	National Enterovirus Reference Laboratory
NCRES	Notifiable Conditions Records for Epidemiology and Surveillance
NIP	National Immunisation Program
nOPV2	Novel oral poliovirus vaccine type 2
OPV	Oral polio vaccine
PCR	Polymerase chain reaction
RAT	Rapid antigen test
RNA	Ribonucleic acid
RSV	Respiratory syncytial virus
RT-PCR	Reverse transcriptase polymerase chain reaction
tOPV	Trivalent oral poliovirus vaccine
13vPCV	13-valent pneumococcal conjugate vaccine
15vPCV	15-valent pneumococcal conjugate vaccine
20vPCV	20-valent pneumococcal conjugate vaccine
23vPPV	23-valent pneumococcal polysaccharide vaccine
VAPV	Vaccine-associated paralytic polio
VDPV	Vaccine-derived poliovirus
VIDRL	Victorian Infectious Diseases Reference Laboratory
WGS	Whole genomic sequencing
WPV	Wild poliovirus

Appendix 3: List of figures

Appendix 4: List of tables

Appendix 5: Supplementary methods

Notification process

Public health management of notifiable conditions in NSW is carried out at the local level by 17 PHUs across 15 Local Health Districts, coordinated centrally by Health Protection NSW. The Justice and Forensic Mental Health Network has responsibility for persons in contact with the NSW criminal justice and forensic mental health systems across the state.

Most notifications originate from laboratories following a positive test result. For certain high-risk conditions, notifications may also be made based on clinical suspicion or by schools and childcare centres.

Enhanced surveillance

Enhanced surveillance involves active follow-up of selected cases to collect additional data to support public health decision-making. This may include detail on clinical history and outcomes, vaccination status, travel history, risk factors and comorbidities, and other investigations. Outcomes such as death are also recorded where known. Enhanced surveillance is generally limited to priority conditions or age-groups (Table A5.1).

Table A5.1 Summary of the enhanced surveillance for VPDs included in this report

Condition	Enhanced surveillance in place
Diphtheria	All cases
Haemophilus influenzae type b	All cases
Invasive meningococcal disease	All cases
Invasive pneumococcal disease	Children less than 10 years of age Adults 50 years of age and older
Measles	All cases
Mumps	Cases for which there is no PCR result
Pertussis	Children less than 5 years of age
Rubella	All cases
Tetanus	All cases

Inclusion criteria

Notifications were included in this report if they:

- Met the national surveillance case definition for a confirmed or probable case at the time of notification.[105]
- Had an onset date between 1 January 2023 and 31 December 2024. Onset dates were calculated as the earliest date of specimen date, report date or reported clinical onset date.

- Had a residential address in NSW. Cases involving overseas residents diagnosed and managed in NSW are discussed separately where relevant.

Historical data (2010– 2022) were included for analyses of notifications over time.

Analyses

Descriptive analyses were conducted by onset year, age, sex, and Aboriginality (when relevant). Crude notification rates per 100,000 population by year and age-group were calculated using annual estimated resident population data from the NSW Department of Planning and Environment, based on the 2021 Census.[106,107]

Case-fatality rates were calculated from known deaths in NCIMS. For conditions without comprehensive enhanced surveillance, case-fatality rates were limited to the groups where data was collected.

Wastewater

In November 2022, NSW Health commenced poliovirus wastewater surveillance. The NSW Wastewater Surveillance Program tests untreated wastewater to detect fragments of the poliovirus, the virus that causes polio. Detections are influenced by many factors including virus shedding by people (which varies individually and over the course of the infection), dilution of virus within wastewater (greater dilution during periods of heavy rainfall), the time at which the wastewater sample is collected, and the presence of chemicals and microorganisms in the wastewater that affect how well the testing can detect viral fragments.

The program tests untreated wastewater samples collected at four sewage treatment plants within Sydney (Bondi, Liverpool, and Quakers Hill) and the Hunter Region (Burwood Beach). Samples are tested for WPV, Sabin poliovirus types 1, 2 and 3 and enterovirus RNA using an in-house RT-qPCR assay by Sydney Water. Positive samples are sent to the National Enterovirus Reference Laboratory, Victorian Infectious Diseases Reference Laboratory (VIDRL) for confirmatory testing via virus culture testing and RT-PCR (according to WHO protocols). NERL is the WHO-accredited polio reference laboratory for Australia.

Caveats and limitations

NSW Health preferences the use of the term ‘Aboriginal’ to collectively refer to Aboriginal and/or Torres Strait Islander peoples in the state, in recognition of Aboriginal peoples being the original inhabitants of NSW.[108] The completeness and accuracy of Aboriginality for cases notified by laboratories and for which no additional follow-up occurs is limited, as not all laboratories collect this information.

Notifications underestimate the true incidence of disease as they depend on a person seeking healthcare if unwell, having a test performed, and that test result being reported to public health authorities. Several VPDs, particularly respiratory infections, have similar symptom profiles and, if the illness is mild, testing is less likely to occur. Cases of asymptomatic disease are rarely reported.

Data presented in this report may differ from counts on NSW Health’s Infectious Diseases A–Z webpages, which exclude cases with unknown age or sex.[25]

Changes in case definitions can affect trends over time. Notifications prior to a change in the case definition are not adjusted retrospectively to account for the new definition. Where relevant, changes are reported in each section.

Analyses and interpretation of vaccination data from NCIMS can be complicated by changes in the immunisation schedule over time, NCIMS data quality, and the timing between the last dose of vaccine received and disease onset. The latter is important as sufficient time post-vaccination is required to generate enough antibodies to protect against disease). Vaccination status in this report is based on data entered into NCIMS which is usually obtained directly from cases or from the notifying physician.

The accuracy of deaths data may be affected by the duration from onset of disease to time of death. For example, if the death occurred several weeks or months after initial notification, and the follow-up for that notification has been completed, it may not be reflected in NCIMS. Confirmation of a specific disease as the primary or contributing cause can be complicated and classification may be missing or unknown in NCIMS for many cases.

Appendix 6: Data table

Table A6.1 Notification counts and rates per 100,000 population, selected VPDs, NSW, 2015-2024

	Diphtheria		*H. influenzae* type b		Influenza		Invasive meningococcal disease		Invasive pneumococcal disease		Measles		Mumps		Pertussis		Rotavirus		Rubella		Tetanus	
Year	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***	**N**	**Rate***
2015	0	0.00	5	0.07	30,217	396.75	44	0.58	487	6.39	9	0.12	66	0.87	12,242	160.74	1,045	13.72	7	0.09	1	0.01
2016	0	0.00	5	0.06	35,522	459.36	70	0.91	540	6.98	18	0.23	65	0.84	10,824	139.97	758	9.80	7	0.09	0	0.00
2017	0	0.00	9	0.11	103,707	1,320.21	91	1.16	694	8.83	30	0.38	127	1.62	5,266	67.04	2,314	29.46	5	0.06	1	0.01
2018	4	0.05	6	0.08	17,458	219.47	70	0.88	662	8.32	19	0.24	71	0.89	6,346	79.78	805	10.12	0	0.00	0	0.00
2019	1	0.01	11	0.14	116,305	1,445.37	59	0.73	691	8.59	62	0.77	61	0.76	6,333	78.70	1,829	22.73	9	0.11	1	0.01
2020	0	0.00	6	0.07	7,188	88.62	22	0.27	328	4.04	11	0.14	54	0.67	1,319	16.26	432	5.33	1	0.01	0	0.00
2021	0	0.00	9	0.11	131	1.62	23	0.28	377	4.66	0	0.00	5	0.06	42	0.52	353	4.36	1	0.01	0	0.00
2022	4	0.05	2	0.02	116,153	1,419.60	36	0.44	552	6.75	1	0.01	27	0.33	85	1.04	1,888	23.07	0	0.00	0	0.00
2023	3	0.04	1	0.01	104,430	1,249.70	36	0.43	720	8.62	6	0.07	55	0.66	915	10.95	3,131	37.47	0	0.00	3	0.04
2024	1	0.01	3	0.04	161,350	1,899.81	27	0.32	757	8.91	18	0.21	83	0.98	25,894	304.89	3,948	46.49	1	0.01	0	0.00

*Crude rate per 100,000 population calculated with denominator as the NSW total estimated resident population for each year.
Source: Notifiable Conditions Records for Epidemiology and Surveillance, NSW Health.

NSW Notifiable Vaccine Preventable Diseases 2023 and 2024

Health Protection NSW
Locked Mail Bag 2030
St Leonards NSW 1590

E: MOH-HealthProtection@health.nsw.gov.au
W: www.health.nsw.gov.au/about/ministry/Pages/hpnsw.aspx

NSW GOVERNMENT