

## **NSW Annual Vaccine-Preventable Disease Report, 2011**

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**Abstract: Aims:** To describe the epidemiology of selected vaccine-preventable diseases in NSW for 2011. **Methods:** Data from the NSW Notifiable Conditions Information Management System were analysed by: local health district of residence, age, Aboriginality, vaccination status, and organism, where available. Risk factor and vaccination status data were collected by public health units following up case notifications. **Results:** Outbreaks of measles and pertussis were reported in 2011, associated with unimmunised groups for measles, and a variety of factors for pertussis. Notification rates for other selected vaccine-preventable diseases remained stable. **Conclusion:** Vaccine-preventable diseases are generally well controlled in NSW. However, pertussis remains an important public health issue. High population vaccination coverage including vaccination in risk groups is essential to prevent measles.

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The objectives of vaccine-preventable disease surveillance are, at an individual level, to identify events that may require immediate public health control measures, and at a population level, to identify risk factors for infection that will help inform better targeted immunisation efforts.

This report describes notifications of the following vaccine-preventable diseases: measles, pertussis, rubella, *Haemophilus influenzae* serotype b invasive infection, invasive meningococcal disease, mumps, tetanus, and invasive pneumococcal disease in New South Wales (NSW) in 2011 and provides comparison with recent trends.

### **Methods**

The reporting requirements for medical practitioners, hospital general managers and

laboratories under the state's public health legislation have been previously described.<sup>1</sup> Public health surveillance officers enter data gathered on notified cases into the NSW Notifiable Conditions Information Management System (NCIMS). Notified cases of vaccine-preventable disease were defined according to national criteria.<sup>2</sup>

Notification data from the NCIMS were extracted for cases of selected vaccine-preventable diseases with a date of onset in 2011. Rates were calculated using Australian Bureau of Statistics population estimates and are presented as annual rates per 100 000 total population or population in age groups. Risk factor and vaccination status data were collected for notified cases through public health unit follow-up with general practitioners (GPs) and other sources such as patients and parental or carer reports. Notified cases were analysed by geographic area of residence.

## **Results**

### ***Haemophilus influenzae* serotype b invasive infection**

In 2011, four cases of *H. influenzae* serotype b infection were notified; this was the lowest annual incidence within the last decade. Three cases were children aged less than 1 year and one case was a 2-year-old child. Three cases were male and there were no cases notified in Aboriginal people. All cases were reported in regional NSW. Of the four cases of *H. influenzae* serotype b infection notified in 2011, three were fully vaccinated for their age (range 9 months – 2 years old) and one 9 month old infant was partially vaccinated for age (2 doses).

### ***Measles***

In 2011, 90 cases of measles were notified in NSW, compared to 26 in 2010. The highest notification rates were reported among young people aged 0–4 years (21 cases, 4.4 per 100 000 population) of which 3 were too young to be vaccinated, and 10-14 years (17 cases, 3.7 per 100 000 population) (Table 1). Thirty-nine cases (43%) were male. Ten cases were notified in Aboriginal people at notification rates significantly higher than in non-Aboriginal people (6.0 and 1.1 per 100 000, respectively) (Figure 1). Ten local health districts (LHDs) reported measles cases,

the highest rate in the Greater Southern LHD (10 cases, 4.9 per 100 000 population) (Table 2).

Of the 90 cases, 50 (56%) were unvaccinated, 18 (20%) were vaccinated and 22 cases (24%) had missing vaccination status. Of the 18 vaccinated cases, five were fully vaccinated (all aged 15-35 years), three were partially vaccinated and 10 did not have information on the number of doses. Of the five fully vaccinated, one case's vaccination history was validated using the Australian Childhood Immunisation Register, two using a health record and two were based on self or parent recall. Of the nine cases that acquired their infection overseas, all were eligible for immunisation; however none had documented evidence of measles vaccination.

Measles is now rare in NSW, however outbreaks do occur from time to time involving under-immunised populations and international travellers. Of the 90 cases notified in 2011, 12 (13%) were acquired overseas, 11 (12%) were epidemiologically linked to these cases while 67 (74%) cases were thought to be locally acquired. Among clusters in metropolitan Sydney, repeat presentations to health settings prior to diagnosis (up to six in one LHD) were common. Source cases were retrospectively identified in emergency departments in several clusters, including two cases identified after 5 months. In one cluster, cases were reported in infants overdue for immunisation.<sup>3,4</sup>

In Western Sydney LHD, 26 cases (23 locally acquired) were reported from one Local Government Area. Twelve of these cases were among children from Pacific Islander communities and seven cases attended the same high school. In Southern NSW LHD, there were seven cases notified in an outbreak linked to cases in the Australian Capital Territory at a high school with low vaccination coverage.

Internationally, there are eight different clades and 24 subclades of measles viruses referred to as genotypes.<sup>5</sup> In 2011, 34 (38%) cases had measles genotyping results. Of these, five (15%) were measles genotype D8, seven (21%) were measles genotype D4 and 22 (65%) were measles genotype D9. Travel to France and Italy was associated with measles genotype D4 while travel to the Philippines was associated with measles genotype D9. In recent years, the measles virus D9 genotype has been identified in Europe and as endemic in selected countries of the

Asia-Pacific, while measles virus D4 and D8 genotypes have been identified more widely (1).

### ***Meningococcal disease (invasive)***

In 2011, 72 cases of invasive meningococcal disease were notified in NSW (62 confirmed and 10 probable), compared with 76 cases notified in 2010. Four deaths were notified in 2011 (all caused by serogroup B) across a wide age range, including: one less than 1 year old, one 45-49-year-old, one 70-75-year-old and one 80-85-year-old. This compares to five deaths in 2010 (three caused by serogroup B, one serogroup W135, and one with an unknown serogroup).

The highest notification rates of invasive meningococcal disease were among children aged less than 5 years at onset of illness (25 cases, 5.2 per 100 000 population) and young people aged 20–24 years (10 cases, 2.0 per 100 000 population) (Figure 3). Of the notifications among children aged less than 5 years, the highest rates were reported from children aged 13–24 months (eight cases, 8.3 per 100 000 population) and infants aged less than 12 months (eight cases, 8.3 per 100 000 population).

In 2011, 36 cases (50%) of invasive meningococcal disease were in males. Seven cases were notified in Aboriginal people at notification rates 4.6 times higher (95% CI 2.1, 10.0) than in non-Aboriginal people (4.2 and 0.9 per 100 000, respectively) (Figure 1). Geographically, the highest notification rates were from the Albury (4.0 per 100 000 population) and Greater West LHDs (2.2 per 100 000 population).

Of the 72 cases notified in NSW in 2011, serogroup information was recorded for 54 (75%). Of the cases with known serogroup information, 44 (81%) were caused by serogroup B (for which there is no vaccine, 32% of cases < 5yrs, 57% of cases >5and <65yrs, 11%of cases >65yrs), four (7%) were serogroup Y 75% aged <25yrs and 25% <80yrs), four (7%) were serogroup W135 (75% aged <2yrs and 25% aged <40yrs) and two (4%) were serogroup C (aged <30yrs). Of the 18 cases (25%) with unknown serogroup information, the serogroup could not be typed for two cases and eight cases were clinical diagnoses. Of the seven cases in Aboriginal people, four were due to serogroup B, two to W135 and one was due to serogroup Y. Information

describing vaccination status was complete for 54 cases (75%); there were no cases caused by serogroup C among persons previously vaccinated against serogroup C.

### ***Mumps***

In 2011, 65 cases of mumps were notified in NSW compared to 39 in 2010. The highest notification rates of mumps were among young adults aged 20–24 years at onset of illness (11 cases, 2.2 per 100 000 population). In 2011, 35 cases (54%) were male. There was an increase in mumps notifications in young adults in the metropolitan Sydney LHDs in 2011.

In NSW, notified cases of mumps are not routinely followed up by public health units. No outbreaks of mumps cases were reported in 2011.

### ***Pertussis***

In 2011, 13 053 cases of pertussis were notified in NSW (the highest level on record) compared with 9332 in 2010. The highest age-specific pertussis notification rates were in children aged 5–9 years (4120 cases, 923.1 per 100 000 population) and 10–14 years (2334 cases, 514.7 per 100 000 population), an increase from the notification rates in 2010 (2744 cases, 620.0 per 100 000 population and 1627 cases, 359.4 per 100 000 population respectively) (Figure 4). The rate of increase was highest for children aged 6 years at onset of illness (958.0 per 100 000 population in 2011 compared to 604.0 per 100 000 population in 2010) and children aged 7 years (1041.8 per 100 000 population in 2011 compared to 683.9 per 100 000 population in 2010). Of the cases aged less than 5 years, the highest notification rates were in children aged 3 years (588 cases, 601.8 per 100 000 population) and 2 years (529 cases, 554.1 per 100 000 population). One death was reported in a month old infant, too young to be vaccinated.

In 2011, 5939 cases (45%) were male. Of the 2403 cases aged 0–4 years (who are followed up by public health units), 132 (5%) were notified in Aboriginal children. Geographically, the highest notification rates were reported in the Albury (460.3 per 100 000 population), Murrumbidgee (436.0 per 100 000 population) and Nepean (332.7 per 100 000 population) LHDs.

In total, 520 cases were notified in infants aged less than 12 months. Of these, 309 (59%) were infants too young to have received three doses of vaccine. Of the 1885 cases of pertussis notified in children aged 1–4 years, 247 (7%) were not immunised, 31 (2%) had less than three doses of vaccine recorded, and 1618 (86%) had three or more doses recorded with the remainder missing data (5%).

### ***Pneumococcal disease (invasive)***

In 2011, 524 cases of invasive pneumococcal disease were notified compared to 500 in 2010. Fifty-seven deaths were identified in 2011: one fully vaccinated child aged less than 2 years (due to disease caused by serotype not included in the vaccine), 15 in people aged 85 and over, and nine people aged 80–84 years.

The highest notification rates of invasive pneumococcal disease were in adults aged older than 85 years (55 cases, 37.9 per 100 000 population), 80–85 years (40 cases, 26.3 per 100 000 population) and children aged less than 5 years (70 cases, 14.7 per 100 000 population) (Table 1). Of the cases aged less than 5 years, the highest notification rates were in children aged less than 12 months (21 cases, 21.8 per 100 000 population) and infants aged 12–23 months (20 cases, 20.8 per 100 000 population).

Fifty-two percent of cases were male. Of the 383 cases aged 0–4 years or older than 5 years (who are followed up by public health units), 12 (3%) were notified in Aboriginal people. Geographically, the highest notification rates were reported in Western NSW (41 cases, 15.3 per 100 000 population), Nepean Blue Mountains (36 cases, 10.4 per 100 000 population) and Illawarra Shoalhaven (35 cases, 9.0 per 100 000 population) LHDs (Table 2).

From 1 July 2011, 13-valent conjugate pneumococcal vaccine (PCV-13) replaced 7-valent conjugate pneumococcal vaccine (PCV-7) on the NSW immunisation schedule. The PCV-13 vaccine includes protection for additional serotypes 1, 3, 5, 6A, 7F and 19A. The rate of disease in children under the age of 5 years in NSW after the introduction of PCV-13 declined from 19.0 per 100 000 pre-vaccine to 14.7 per 100 000.

## **Rubella**

In 2011, 17 cases of rubella were notified in NSW compared to 13 in 2010. All cases were notified in persons aged 15–60 years. Seven cases (41%) were male.

Geographically, the highest notification rates were in the Sydney LHD (0.5 per 100 000 population). Notifications have not changed over the previous 5 years.

There were no congenital rubella case notifications.

## **Tetanus**

In 2011, one case of tetanus was notified in NSW. The Sydney LHD case was an 18-year-old male with unknown vaccination history. The number of notified cases of tetanus has remained relatively stable over the past 5 years, ranging from one to two cases annually. Most tetanus cases occur in older adults who are not adequately immunised. This was the youngest case notified in the last decade in NSW.

## **Discussion**

Vaccine-preventable disease epidemiology is constantly evolving in NSW.

Vaccination remains the cornerstone of prevention to protect those at greatest risk of infection and severe disease. Notifications of some vaccine-preventable diseases (such as *H. influenzae* serotype b, invasive meningococcal disease, pneumococcal disease, mumps and rubella) have remained stable or declined over recent years.

While there are limitations to the data,<sup>1</sup> vaccine preventable disease surveillance in NSW enables the implementation of timely public health measures, permits a better understanding of disease trends and helps inform policy.

Very few cases of *H. influenzae* serotype B are seen, of the four cases notified, all cases had received up to two doses of vaccine, with two of the four cases having received three doses and one case had completed the schedule. At least two doses are required to confer substantial protection.

Outbreaks of measles continue to occur as a result of people who are unvaccinated or have incomplete vaccination travelling to countries where measles transmission is occurring and returning home whilst infectious. 2011 saw the highest number of measles notifications since 1999. A number of measles cases notified in 2011 were retrospectively identified in emergency departments through contact tracing by public

health units and were reported to have multiple presentations to health care settings prior to diagnosis. In addition, there were 67 cases (including 11 clusters affecting 32 people) with no links to overseas travel – thought to be locally acquired – illustrating that not all cases are diagnosed and notified. This highlights the challenges to identification and notification where many clinicians may not have previously diagnosed measles.

Pertussis remains an important public health problem in NSW. Despite the increased pertussis notification rates across many age groups, and the highest number of cases on record, there were no deaths reported in 2011. Public health activities have focused on prevention of severe disease for pertussis (which frequently occurs in young infants) and death which mostly occurs in children less than 2 months of age. The Australian Immunisation Handbook recommends vaccination for new parents, grandparents and adult carers of infants.<sup>1</sup> While vaccine-induced selection pressure on pertussis strains in Australia has been reported as a possible explanation for the significant increases in notifications in recent years,<sup>7</sup> the greater contribution is likely to have been increased testing for pertussis.<sup>8</sup> Vaccination remains the key prevention and control tool against pertussis, especially in the prevention of severe pertussis and death.

The number of notified cases of invasive meningococcal disease has declined significantly since the National Meningococcal C Immunisation Program commenced in 2003. The greatest reduction in notified cases of meningococcal disease has been for serogroup C, from 45 cases (29% of those with known serogroup) in 2003, to less than 10 cases annually over the last 5 years, and two cases (4% of those with known serogroup) in 2011. The number of cases of meningococcal disease associated with serogroup B has also decreased over time, but remains the most commonly identified serotype. The notifications of other serogroups (W135 and Y) have remained relatively stable over time.

Vaccine-related invasive pneumococcal disease (IPD) has diminished greatly since the introduction of the 7-valent conjugate pneumococcal vaccine (PCV-7) in 2005, whilst serotypes not covered by the PCV-7 have been steadily increasing. Serotypes 1, 3, 6A, 7F and 19A have been responsible for up to 59% (predominantly serotype 19A: 36%) of IPD in children less than 5 years since 2005. Following the introduction



of the 13-valent pneumococcal vaccine (PCV-13) in 2011, reduction in disease has been noted in children, however it is too early to determine the full impact of the vaccine on IPD especially in people aged > 5 years in NSW and the risk of replacement by non-vaccine serotypes.

## **Conclusion**

Vaccine-preventable diseases remain generally well controlled in NSW, with the exception of pertussis. However challenges remain to ensure ongoing population health protection. Individuals planning international travel who are susceptible to measles or other vaccine-preventable diseases should be encouraged to receive relevant vaccinations prior to their departure. In addition, high vaccination coverage and timely vaccination for infants and children is important to maintain low rates of disease. As cases of some diseases become rare, it will be increasingly important to raise awareness among clinicians of the importance of early diagnosis to prevent transmission in the community. Improving vaccination coverage among people from culturally and linguistically diverse communities as well as Aboriginal and Torres Strait Islander communities is crucial for successful disease prevention strategies.

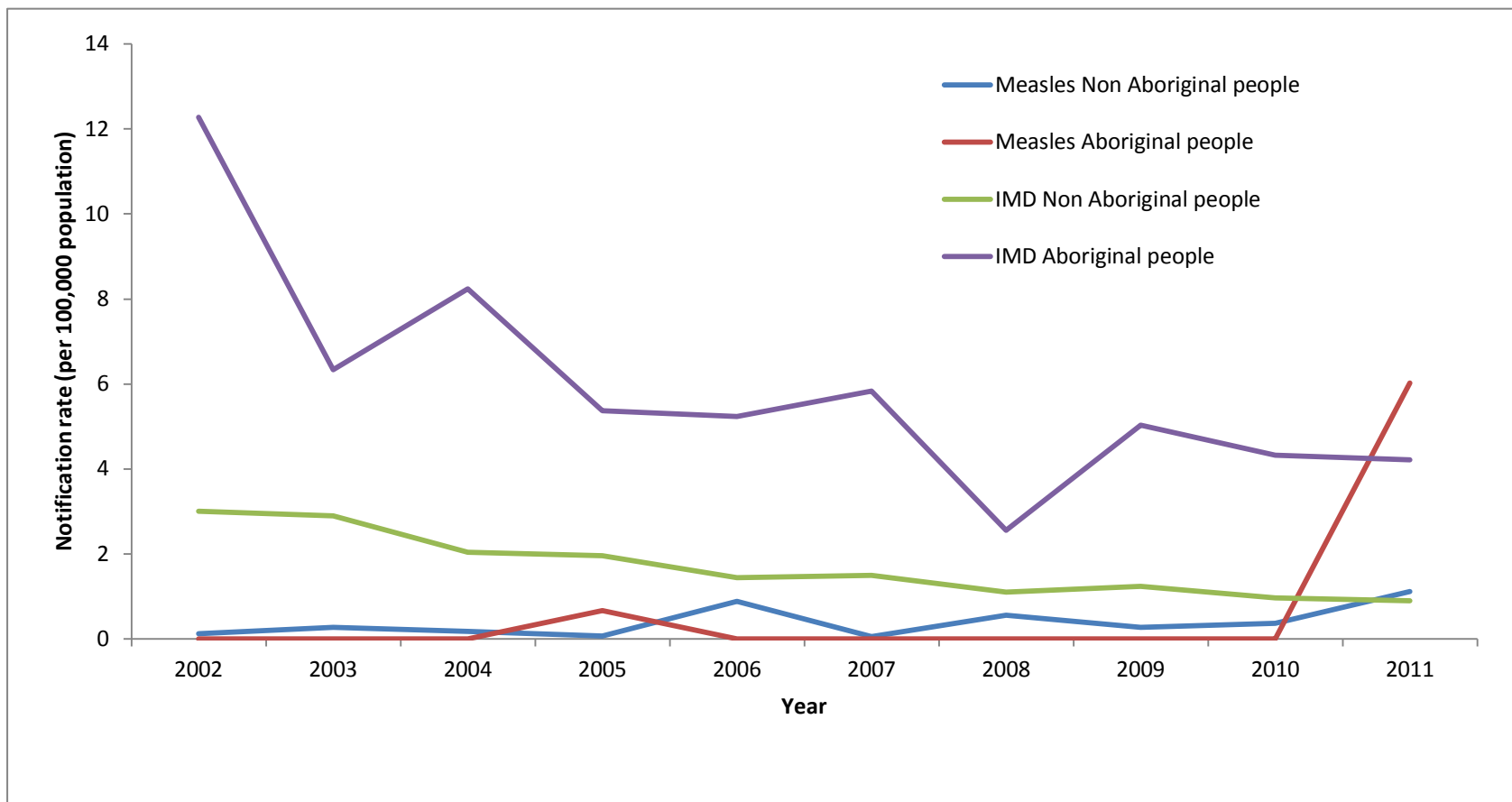
## **Acknowledgments**

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## References

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Figure 1. Measles and invasive meningococcal disease notification per 100 000 population, by Aboriginality, NSW, 2002-11



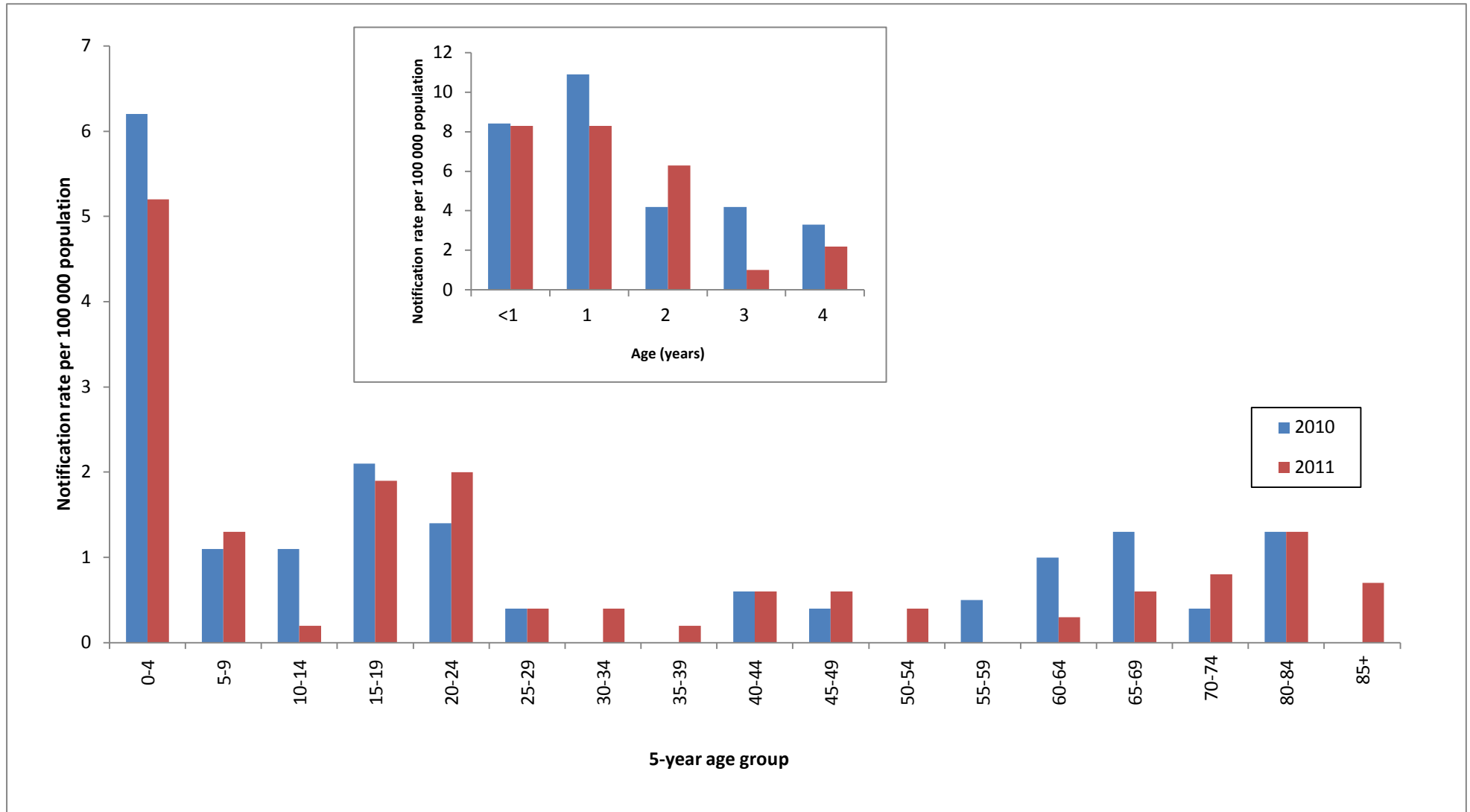
**Table 1. Number and rate per 100 000 population of selected vaccine-preventable disease notifications, by age group, NSW, 2011**

Age group (yrs)	<i>Haemophilus influenzae b</i>		Measles		Meningococcal disease (Invasive)		Mumps		Pertussis		Pneumococcal disease (Invasive)		Rubella		Tetanus	
	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
0-4	4	0.8	21	4.4	25	5.2	1	0.2	2403	503.8	70	14.7	0	0	0	0
5-9	0	0	2	0.4	6	1.3	3	0.7	4120	923.1	14	3.1	0	0	0	0
10-14	0	0	17	3.7	1	0.2	1	0.2	2334	514.7	8	1.8	0	0	0	0
15-19	0	0	16	3.4	9	1.9	6	1.3	351	74	9	1.9	1	0.2	1	0.2
20-24	0	0	6	1.2	10	2	11	2.2	203	40.7	10	2	4	0.8	0	0
25-29	0	0	8	1.6	2	0.4	9	1.8	252	50.1	11	2.2	5	1	0	0
30-34	0	0	12	2.4	2	0.4	10	2	365	74.1	19	3.9	3	0.6	0	0
35-39	0	0	6	1.2	1	0.2	9	1.8	575	112.3	18	3.5	2	0.4	0	0
40-44	0	0	2	0.4	3	0.6	2	0.4	609	122.4	19	3.8	1	0.2	0	0
45-49	0	0	0	0	3	0.6	3	0.6	450	90.4	33	6.6	0	0	0	0
50-54	0	0	0	0	2	0.4	4	0.8	301	62.7	28	5.8	0	0	0	0
55-59	0	0	0	0	0	0	2	0.5	271	62.6	42	9.7	1	0.2	0	0
60-64	0	0	0	0	1	0.3	3	0.8	251	62.8	56	14	0	0	0	0
65-69	0	0	0	0	2	0.6	1	0.3	196	62.7	40	12.8	0	0	0	0
70-74	0	0	0	0	2	0.8	0	0	168	69	29	11.9	0	0	0	0
75-79	0	0	0	0	0	0	0	0	93	49.1	23	12.1	0	0	0	0
80-84	0	0	0	0	2	1.3	0	0	54	35.5	40	26.3	0	0	0	0
85+	0	0	0	0	1	0.7	0	0	49	33.7	55	37.9	0	0	0	0

**Table 2. Number and rate per 100 000 population of selected vaccine-preventable disease notifications, by local health district, NSW, 2011**

Local Health District	<i>Haemophilus influenzae b</i>		Measles		Meningococcal disease (Invasive)		Mumps		Pertussis		Pneumococcal disease (Invasive)		Rubella		Tetanus	
	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
Sydney	0	0	9	1.6	6	1	10	1.7	585	101.2	38	6.6	3	0.5	1	0.2
South Western Sydney	0	0	11	1.3	7	0.8	5	0.6	1231	139.9	51	5.8	2	0.2	0	0
South Eastern Sydney	0	0	12	1.4	5	0.6	16	1.9	1316	157	71	8.5	4	0.5	0	0
Illawarra Shoalhaven	0	0	12	3.1	6	1.5	1	0.3	1071	275.7	35	9	0	0	0	0
Western Sydney	0	0	26	3.1	7	0.8	12	1.4	1507	181	40	4.8	3	0.4	0	0
Nepean Blue Mountains	0	0	0	0	4	1.2	3	0.9	1150	332.7	36	10.4	0	0	0	0
Northern Sydney	0	0	2	0.2	9	1.1	9	1.1	1554	185.1	51	6.1	3	0.4	0	0
Central Coast	0	0	3	0.9	2	0.6	0	0	347	109	25	7.9	1	0.3	0	0
Hunter New England	2	0.2	2	0.2	15	1.7	0	0	776	88.2	70	8	1	0.1	0	0
Northern NSW	2	0.7	3	1	1	0.3	4	1.3	698	234.3	19	6.4	0	0	0	0
Mid North Coast	0	0	0	0	0	0	1	0.5	316	147.8	9	4.2	0	0	0	0
Southern NSW	0	0	10	4.9	1	0.5	2	1	435	214.7	16	7.9	0	0	0	0
Murrumbidgee (including Albury LHD)	0	0	0	0	3	1	1	0.3	1286	440.2	18	6.2	0	0	0	0
Western NSW	0	0	0	0	6	2.2	0	0	707	263.2	41	15.3	0	0	0	0
Far West	0	0	0	0	0	0	0	0	53	170.1	2	6.4	0	0	0	0

**Figure 3. Annual notification rates of invasive meningococcal disease by 5-year age groups, NSW, 2010 and 2011. Inset: Annual notification rates for children aged below 5 years for 2010 and 2011 for each year of age.**



**Figure 4. Annual notification rates of pertussis by 5-year age groups, NSW, 2010 and 2011. Inset: Annual notification rates for children aged 5 to 9 years for 2009 and 2010 for each year of age.**

