

# Aboriginal and Torres Strait Islander peoples at higher risk of invasive meningococcal disease in NSW

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**Abstract:** *Objective:* To assess the completeness of data describing Aboriginal and Torres Strait Islander status in NSW invasive meningococcal disease notifications and determine the relative risk for invasive meningococcal disease among Aboriginal and Torres Strait Islander peoples in NSW.

*Methods:* Surveillance data from the NSW Notifiable Diseases Database was reviewed for 5-year periods between 1991 and 2005.

*Results:* Invalid and missing data on Aboriginal and Torres Strait Islander status decreased from 42% to 8% during the study period. Higher rates of disease were found in young children and significantly higher rates in Aboriginal and Torres Strait Islander children aged 0–4 years compared with their non-Aboriginal counterparts.

*Conclusion:* Aboriginal and Torres Strait Islander children in NSW experience higher rates of notified invasive meningococcal disease than non-Aboriginal children.

## Background

Invasive Meningococcal Disease (IMD) is a serious but uncommon bacterial infection. The disease usually presents as meningitis or septicaemia, or a combination of the two presentations, with a case fatality rate of approximately 10% despite appropriate antibiotic therapy.<sup>1</sup> Pneumonia, arthritis and conjunctivitis may also occur. Higher rates of disease occur in children aged less than one year, children aged 1–4 years and adolescents 15–19 years of age.<sup>1</sup> Reported risk factors for IMD include household crowding, chronic underlying illness, active and passive smoking, some immunosuppressive illnesses and anatomical or functional asplenia.<sup>2</sup>

Disease rates are higher among some population groups, such as African-Americans.<sup>3</sup> These higher disease rates have been attributed to other risk factors such as poverty and overcrowding, while higher mortality rates have been linked to limited access to health care services.<sup>3,4</sup> Living conditions, such as overcrowding, can result in a higher exposure to potential carriers of *Neisseria meningitidis*.<sup>4</sup>

There are little published data describing the risk of IMD among Aboriginal and Torres Strait Islander peoples. A north Queensland study found a 3-fold greater risk for Aboriginal and Torres Strait Islander peoples for the period 1995 to 1999.<sup>5</sup> The incidence of IMD in Aboriginal and Torres Strait Islander peoples in Western Australia was six times greater than that of the non-Aboriginal population for the period 1990–1995.<sup>6</sup> The Australian Institute of Health and Welfare reported notification rates between 7.4 and 11.3 per 100 000 in the years 2000, 2001, 2003 and 2004 in Aboriginal and Torres Strait Islander peoples but no comparisons with non-Aboriginal Australians were provided.<sup>7,8</sup> To date, the Australian Institute of Health and Welfare summary of health performance indicators has not included IMD notifications from NSW as the data has not demonstrated adequate completeness for Aboriginal and Torres Strait Islander status. In 2001, the NSW Public Health Network commenced a data quality improvement project for recording Aboriginal and/or Torres Strait Islander status for selected diseases, including IMD.

The aims of the study were to assess the completeness of data describing Aboriginal and/or Torres Strait Islander status in NSW invasive meningococcal disease data contained within the NSW Notifiable Diseases Database; and to describe the relative risk for Aboriginal and Torres Strait Islander peoples being notified with IMD in NSW compared with the non-Aboriginal population.

## Methods

Data on meningococcal disease is collected in NSW under the requirements of the *Public Health Act (1991)*, with all cases of meningococcal disease meeting the case definitions of the National Notifiable Diseases Surveillance System being notifiable by pathology laboratories, hospitals and doctors to public health units.<sup>9</sup> Case information is entered into the NSW Notifiable Diseases Database.

**Table 1. Trends in notification of invasive meningococcal disease in Aboriginal and Torres Strait Islander people and non-Aboriginal people, and the completeness of the recording of Aboriginal and Torres Strait Islander status, NSW 1991–2005**

Years	N	Non-Aboriginal	Aboriginal and Torres Strait Islander	Aboriginal and/or Torres Strait Islander status not recorded or invalid data	
		n	n	n	%
1991–1995	657	346	34	277	42
1996–2000	1036	720	50	266	26
2001–2005	935	806	55	74	8
Total	2628	1872	139	617	76

Source: NSW Notifiable Diseases Database.

NSW meningococcal disease notification data since the promulgation of the *Public Health Act* in 1991 were sourced from HOIST (Health Outcomes Information and Statistical Toolkit, NSW Health). Analysis was performed using Microsoft Excel 2003. Five-year study periods were defined (1991–1995, 1996–2000 and 2001–2005) with mid-term estimate population figures from the Australian Bureau of Statistics 1991, 1996 and 2001 censuses used as denominators.

The recording of Aboriginal and/or Torres Strait Islander status was assessed as complete if a valid response was recorded in the Aboriginal and/or Torres Strait Islander field in the Notifiable Diseases Database. A valid response was defined as 'yes' or 'no'.

Five-year mean notification rates were calculated for comparison purposes. The risk of being notified with meningococcal disease in the Aboriginal and Torres Strait Islander population was calculated and then compared with the risk for the non-Aboriginal population (relative risk). Age standardisation was performed using the direct method to control for the higher proportion of younger people in the Aboriginal and Torres Strait Islander population. The non-Aboriginal population in NSW was used as the standard. For ease of reference in reporting, 'Aboriginal' will be used to refer to both groups combined.

Controlling for socioeconomic status was not feasible with

the notification data available. There is no routine collection of a notified individual's socioeconomic status, and the small numbers of notifications would not support an ecological analysis.

## Results

During the period under study, there were 2628 notifications of invasive meningococcal disease in NSW residents. Of these notifications 139 were recorded as Aboriginal people (Table 1). In the period 1991–1995, 277/657 (42%) of notifications of IMD in NSW did not record Aboriginal status, or the data was invalid. In the most recent period, 2001–2005, 74/935 (8%) of notifications in NSW did not include valid data on Aboriginal status (Table 2).

IMD notification rates in non-Aboriginal people over the three study periods ranged from 2.11–3.17 per 100 000 population, while for Aboriginal people the rates ranged from 6.02–7.90 per 100 000 population. There was a statistically significant two- to three-fold increased risk of IMD across the three study periods for Aboriginal people in NSW (Table 2).

The highest notification rates for IMD in NSW during the period under review were seen in young children. In the period 2001–2005, non-Aboriginal children aged 0–4 years experienced an IMD rate of 12.37 per 100 000 population, while the rate was 40.99 per 100 000 population among Aboriginal children in this age group. After direct

**Table 2. Notification rates and relative risk of invasive meningococcal disease for Aboriginal and Torres Strait Islander peoples compared with non-Aboriginal people in New South Wales, 1991–2005**

Years	Notification rates/100 000 population		Relative risk	95% confidence intervals
	Non-Aboriginal	Aboriginal and Torres Strait Islander		
1991–1995	2.11	6.02	2.85	2.02 to 4.02
1996–2000	3.17	7.88	2.48	1.87 to 3.30
2001–2005	2.69	7.90	2.94	2.24 to 3.86

Source: NSW Notifiable Diseases Database.

**Table 3. Age standardised invasive meningococcal disease notification rates for non-Aboriginal people and Aboriginal and Torres Strait Islander peoples in NSW, and the relative risk of notification in Aboriginal and Torres Strait Islander peoples, NSW, 2001–2005**

Age group years	Notification rate/100 000 population		Relative risk	95% confidence intervals
	Non-Aboriginal	Aboriginal and Torres Strait Islander		
0–4	12.37	40.99	3.31	2.35 to 4.68
5–19	4.07	3.54	0.87	0.45 to 1.69
20+	1.49	2.56	1.72	0.89 to 3.33
<b>Total</b>	<b>2.69</b>	<b>7.90</b>	<b>2.94</b>	<b>2.24 to 3.86</b>

Source: NSW Notifiable Diseases Database.

age-standardisation for the period 2001–2005, the relative risk remained significantly higher for Aboriginal children aged 0–4 years of age (Table 3).

### Discussion

The recording of Aboriginal status in NSW has improved since 1990, with invalid data decreasing from 42% to 8%. This improvement in recording of status justifies the comparison of risk among Aboriginal and non-Aboriginal people in NSW.

The risk of IMD is not homogenous across the population of NSW. Our analysis confirms that young children are at increased risk, but importantly indicates that Aboriginal status is also associated with higher rates of disease. Other countries also have demonstrated heterogenous risk among different portions of their population. In the United Kingdom, IMD incidence and mortality are socially patterned, with IMD incidence in the most deprived quintile being twice that of the most affluent quintile.<sup>10</sup> In New Zealand, significantly higher rates of IMD have been reported in Maori (relative risk = 2.2) and Pacific Islander people (relative risk = 3.8) when compared with the European population.<sup>11</sup> Aboriginal people are the most disadvantaged group in Australia.<sup>12</sup> Two important risk factors associated with increased risk of IMD are more common among Aboriginal people, namely having a smoker among close contacts, including maternal smoking, and sharing a bedroom.<sup>13–15</sup> It is not possible to explore the causal interaction of these factors from notifiable disease data. Further research into these factors could lead to the development of more informed prevention strategies.

The early recognition and diagnosis of meningococcal infection can lead to reduced risk of complications.<sup>16</sup> In addition to clinicians being aware of a higher risk of IMD in young children, this analysis indicates an even higher risk in young Aboriginal children.

### Conclusions

The completeness of the data on Aboriginal and/or Torres Strait Islander status in notifications of invasive meningococcal

disease in NSW has improved sufficiently to warrant inclusion in the Australian Institute of Health and Welfare's Performance Indicators report. This will further the understanding of meningococcal disease across Australia.

In NSW, Aboriginal children 0–4 years of age have a significantly higher risk of invasive meningococcal disease when compared with non-Aboriginal children.

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