



## SUMMARY

- Nationally the number of invasive meningococcal disease (IMD) cases and overall risk remains low; however, since 2013, serogroup W (MenW) has emerged as a considerable cause of IMD.
- From 2002 to 2015 the predominant meningococcal serogroup in Australia was serogroup B (MenB). However, in 2016, MenW became the predominant meningococcal serogroup in Australia with a total of 109 cases reported to the National Notifiable Diseases Surveillance System (NNDSS).
- In 2017 year-to-date (YTD), a total of 271 cases of IMD have been reported to the NNDSS. Of these, 104 cases were due to MenB, 94 cases were due to MenW, 50 cases were due to serogroup Y (MenY), 8 cases were due to serogroup C (MenC) and the remaining 15 cases are yet to be classified.
- So far in 2017, MenW cases have been reported across all jurisdictions, except the Australian Capital Territory.
- In 2017 YTD, a total of 40 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples. Of these, 12 cases were due to MenB, 23 cases were due to MenW, 2 cases were due to MenY and 3 cases are yet to be classified.
- IMD follows a seasonal trend in Australia with notifications usually peaking in winter and early spring. However since 2016, notifications have peaked later, with 34 and 37 cases reported in August and October of 2016, and 42 and 59 cases reported in August and September of 2017.
- IMD notifications reported between December 2016 and September 2017 were high when compared to the same months in previous years.
- While cases of MenW are more common in adults, there has been an increase in cases in children aged less than 10 years since 2015.
- Many of the MenW cases belong to the hypervirulent sequence type (ST) 11, which is part of the ST 11 clonal complex (CC 11). ST 11 is associated with a higher risk of invasive disease and a higher case fatality rate. Nine deaths have occurred in 2017 YTD due to MenW.
- Also of interest is the increase in MenY notifications, which is accounting for a larger proportion of cases since from 2011. A total of 52 cases of MenY have been reported in 2017 YTD, accounting for 19% of notifications.

## ANALYSIS

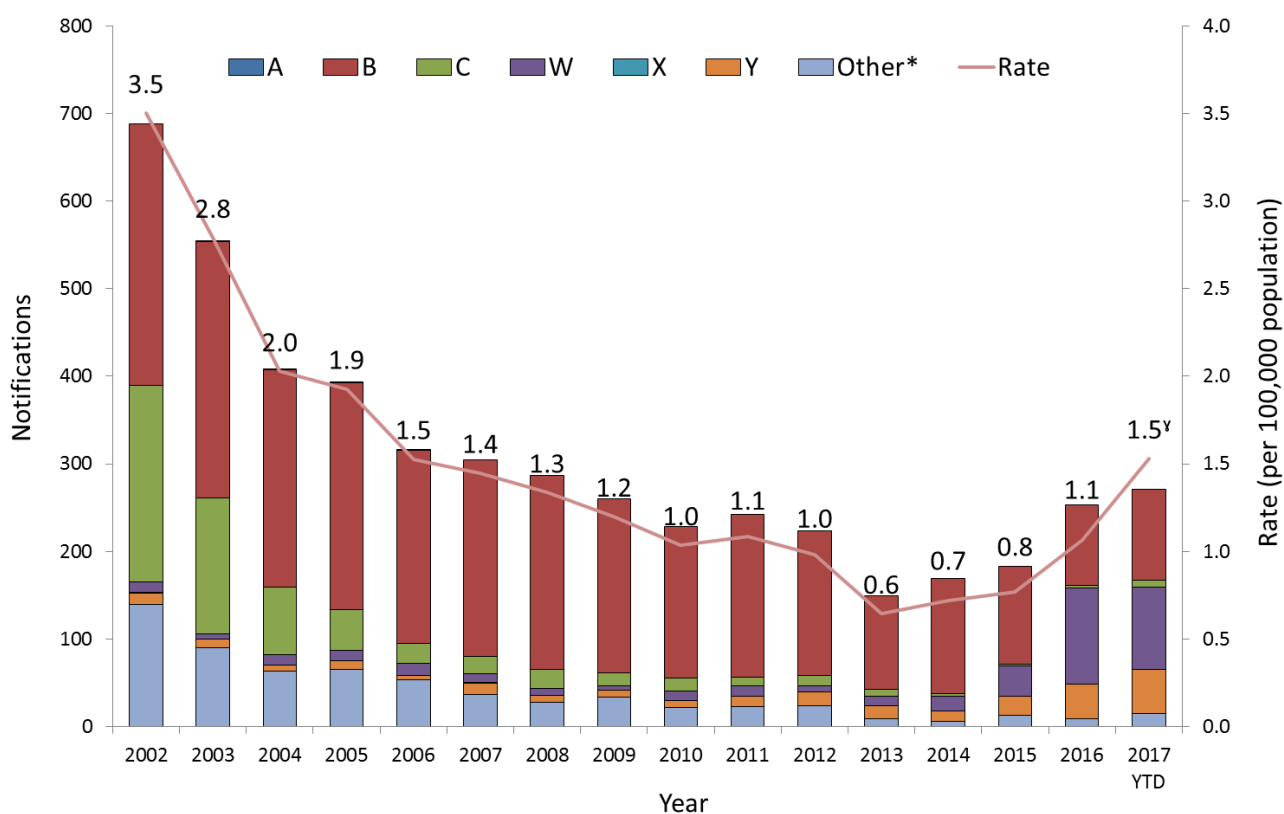
### ***Serogroup trends***

- Overall there has been a decline in IMD cases since the 2003 introduction of the MenC vaccine on the National Immunisation Program (NIP) with the overall rate of IMD decreasing 82% from 3.5 per 100,000 (688 cases) in 2002 to 0.6 per 100,000 (149 cases) in 2013. However, from 2014 the overall rate of IMD has increased. In 2017 YTD, there have been a total of 271 cases of IMD (1.1 per 100,000 (annualised rate 1.5 per 100,000) compared to 253 IMD cases in 2016 (1.1 per 100,000) (Figure 1).
  - From 2002 to 2015 the predominant meningococcal serogroup in Australia was MenB, accounting for between 43% and 78% of notifications annually. Over this time, MenB

notifications declined despite a targeted vaccine not being available on the NIP. So far in 2017, 38% of IMD cases (n=104) notified to the NNDSS are MenB.

- MenC, the target of a national immunisation programme since 2003, has dramatically declined from 225 notifications in 2002 to 3 notifications in 2016 (a 99% decline). So far in 2017, 8 MenC cases have been notified to the NNDSS.
- Notifications of MenW doubled from 2014 (17) to 2015 (34), then more than tripled in 2016 (109). In 2017 YTD, 35% of IMD cases (n=94) notified to the NNDSS are MenW.
- Annual notifications of MenY have ranged from 5 to 40 since 2002, with an increasing trend since 2011. In 2016, there were 40 notifications of MenY compared to 22 and 12 in 2015 and 2014, respectively. In 2017 YTD, 50 MenY cases have been notified to the NNDSS, accounting for 18% of notifications.
- Serogroup A (MenA) and serogroup X (MenX) are rare, with a total of only 4 and 2 notifications respectively since 2002. There have been no notifications of either MenA or MenX in 2017 YTD.

**Figure 1. Notifications and rates of IMD, Australia, 2002 to 2017 YTD<sup>#</sup>, by serogroup**



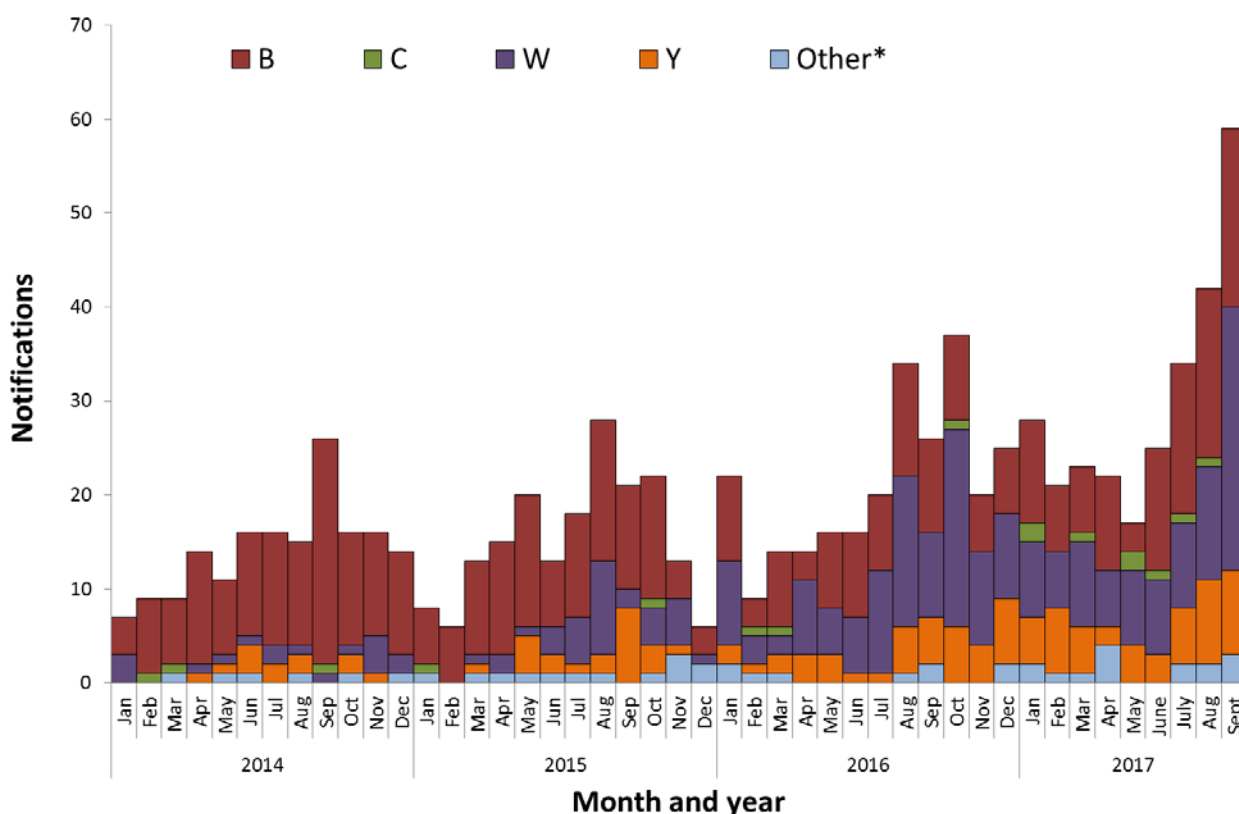
<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

<sup>y</sup> The rate for 2017 YTD has been annualised.

- IMD tends to follow a seasonal pattern in Australia, with disease activity increasing between June and September each year. In 2016, notifications peaked later, with 34 cases in August and 37 cases in October. IMD notifications in 2017 YTD were higher when compared to the same months in previous years, with the highest number of monthly cases (n= 59) reported in September 2017 (Figure 2).

**Figure 2. Notifications of IMD, Australia, 2014 to 2017 YTD<sup>#</sup>, by month and year of diagnosis and serogroup**



<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

**Geographical distribution**

- So far in 2017, IMD cases have been reported across all jurisdictions.
- MenW accounted for 35% (94 cases) of notifications of IMD reported in 2017 YTD. Across jurisdictions this ranged from 0% in the Australian Capital Territory (ACT) to 76% (n=16) in the Northern Territory (Table 1).

**Table 1. Notifications and rates of IMD, Australia, 2017 YTD<sup>#</sup> by state and territory and serogroup**

State or territory	Notifications								Rate (per 100,000 population)	Annualised Rate (per 100,000 population)
	A	B	C	W	X	Y	NG*	Total		
ACT	0	0	0	0	0	1	0	1	0.3	0.3
NSW	0	36	3	13	0	12	4	68	0.9	1.2
NT	0	1	0	16	0	2	2	21	8.6	11.4
QLD	0	20	0	11	0	16	4	51	1.1	1.4
SA	0	18	0	8	0	3	0	29	1.7	2.2
TAS	0	2	0	6	0	0	2	10	1.9	2.6
VIC	0	21	4	27	0	11	2	65	1.1	1.4
WA	0	6	1	13	0	5	1	26	1.0	1.3
<b>Australia</b>	0	104	8	94	0	50	15	271	1.1	1.5

<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

- The highest rate of IMD due to MenW in 2017 YTD has been reported in The Northern Territory with an annualised rate of 8.6 cases per 100,000 population (Table 2).

- In September 2017, the Northern Territory confirmed an outbreak of MenW in Central Australia, Barkly and Katherine regions.<sup>1</sup> YTD in 2017, the majority of MenW cases occurred in Aboriginal children in these regions.

**Table 2. Notifications and rates of MenW, Australia, 2014 to 2017 YTD\*, by state and territory**

Year	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	<b>Notifications</b>								
2014	0	7	0	3	0	1	4	2	<b>17</b>
2015	0	8	0	4	0	1	17	4	<b>34</b>
2016	1	25	0	13	5	4	48	12	<b>108</b>
2017 YTD	0	13	16	11	8	6	27	13	<b>94</b>
	<b>Rate (per 100,000 population)</b>								
2014	-	0.1	-	0.1	-	0.2	0.1	0.1	<b>0.1</b>
2015	-	0.1	-	0.1	-	0.2	0.3	0.2	<b>0.1</b>
2016	0.2	0.3	-	0.3	0.3	0.8	0.8	0.5	<b>0.4</b>
2017	-	<b>0.2</b>	<b>6.5</b>	<b>0.2</b>	<b>0.5</b>	<b>1.2</b>	<b>0.4</b>	<b>0.5</b>	<b>0.4</b>
<b>2017 annualised rate</b>	-	<b>0.2</b>	<b>8.6</b>	<b>0.3</b>	<b>0.6</b>	<b>1.5</b>	<b>0.6</b>	<b>0.7</b>	<b>0.5</b>

\* Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

### Indigenous status

- Between 2014 and 2017 YTD, a total of 101 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples (Table 3). MenB accounted for 55% (56/101) of IMD cases reported in Aboriginal and Torres Strait Islander people, followed by MenW with 36%.
- Year to date (YTD) in 2017 there have been 40 IMD cases reported in Aboriginal and Torres Strait Islander peoples, of which 58%, (23/40) were due to MenW (Table 3). This is in contrast to IMD cases reported from 2014 to 2015, where MenB was the predominate serogroup (95%, 20/21 in 2014 and 73%, 12/15 in 2015). In 2016, there were 24 case of IMD reported in Aboriginal and Torres Strait Islander peoples. Of these 50% (12/24) were MenB and 42% (10/24) were MenW.

**Table 3. Notifications of IMD, Australia, 2014 to 2017 YTD<sup>#</sup> by Indigenous status and serogroup**

IMD serogroup	Year	Indigenous	Not Indigenous	Not stated	Total
<b>B</b>	2014	20	109	2	131
	2015	12	97	3	112
	2016	12	80	-	92
	2017 YTD	12	87	5	104
<b>C</b>	2014	-	3	-	3
	2015	-	2	-	2
	2016	-	3	-	3
	2017 YTD	-	8	-	8
<b>W</b>	2014	-	17	-	17
	2015	3	30	1	34
	2016	10	98	-	108
	2017	23	66	5	94
<b>Y</b>	2014	-	12	-	12
	2015	-	22	-	22
	2016	2	38	-	40
	2017 YTD	2	47	1	50
<b>NG*</b>	2014	1	4	-	5
	2015	-	11	-	12
	2016	-	9	-	9
	2017 YTD	3	12	-	15
<b>TOTAL</b>		<b>101</b>	<b>755</b>	<b>17</b>	<b>873</b>

<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

- In 2017 YTD, a total of 40 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples (annualised rate = 8.1 per 100,000 population), compared to 228 cases reported in non-Indigenous populations (annualised rate = 1.3 per 100,000). Of the 40 IMD cases reported in Aboriginal and Torres Strait Islander peoples, 12 cases were due to MenB, 23 cases were due to MenW, 2 cases were due to MenY and 3 cases are yet to be classified (Table 4).

**Table 4. Notifications and rates of IMD, Australia, 2017 YTD<sup>#</sup> by Indigenous status and serogroup**

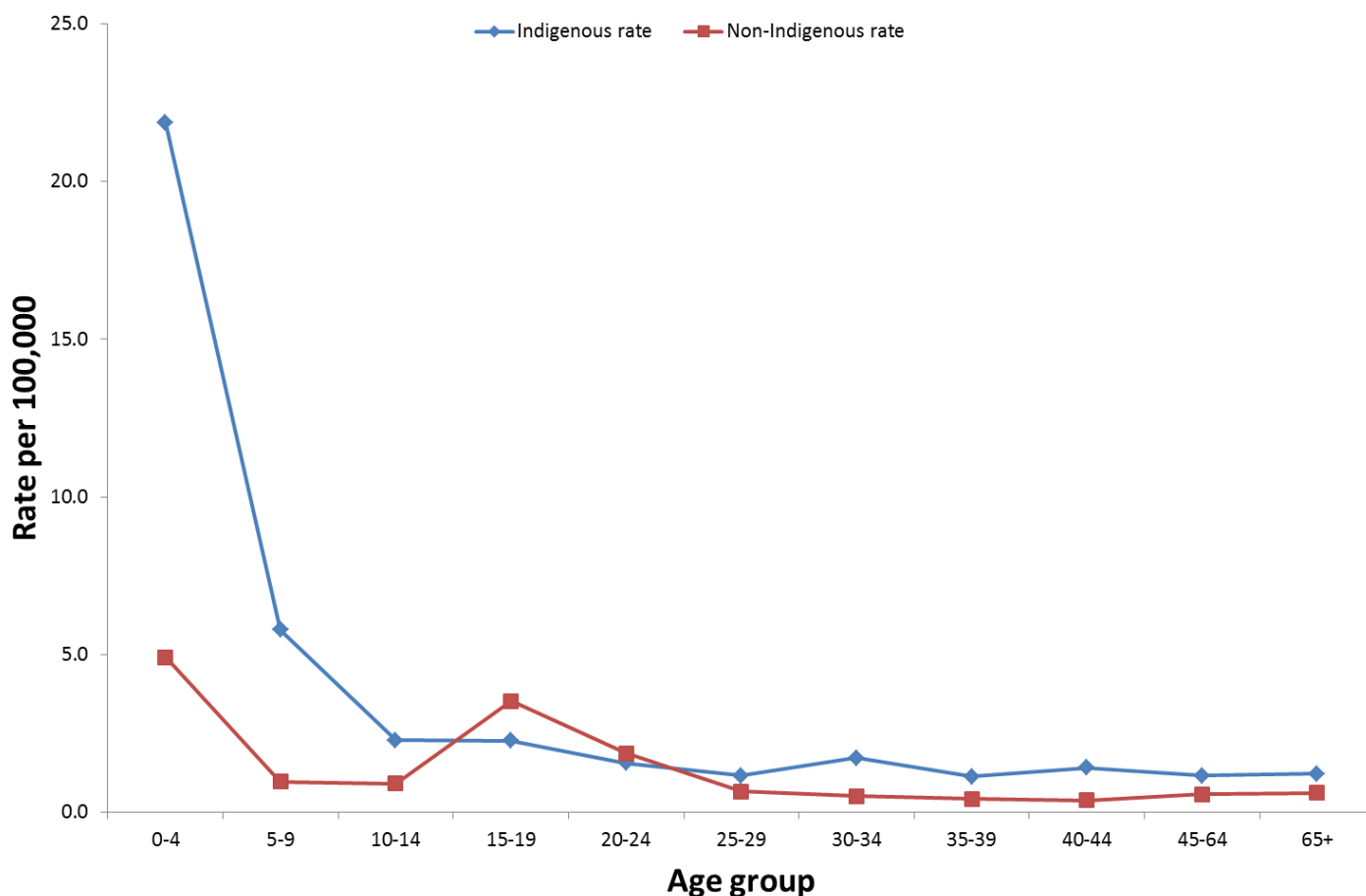
IMD serogroup	Indigenous			Non-Indigenous		
	Notifications	Rate	Annualised	Notifications	Rate	Annualised
		per 100,000	rate per 100,000		per 100,000	per 100,000
A	0	-	-	0	-	-
B	12	1.8	2.4	87	0.4	0.5
C	0	-	-	8	0.0	0.0
W	23	3.5	4.6	66	0.3	0.4
X	0	-	-	0	-	-
Y	2	0.3	0.4	47	0.2	0.3
NG*	3	0.5	0.6	12	0.1	0.1
<b>Total</b>	<b>40</b>	<b>6.1</b>	<b>8.1</b>	<b>220</b>	<b>0.9</b>	<b>1.2</b>

<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

- Since 2002, the notification rates of IMD have been higher in Aboriginal and Torres Strait Islander peoples aged 0-4 years (22.0 per 100,000) and 5-9 years (5.8 per 100,000) compared to those who reported as non-Indigenous; 4.9 per 100,000 and 1.0 per 100,000 respectively (Figure 3).

**Figure 3. Notification rates of IMD, Australia, 2002 to 2017 YTD<sup>#</sup>, by Indigenous status and age group**

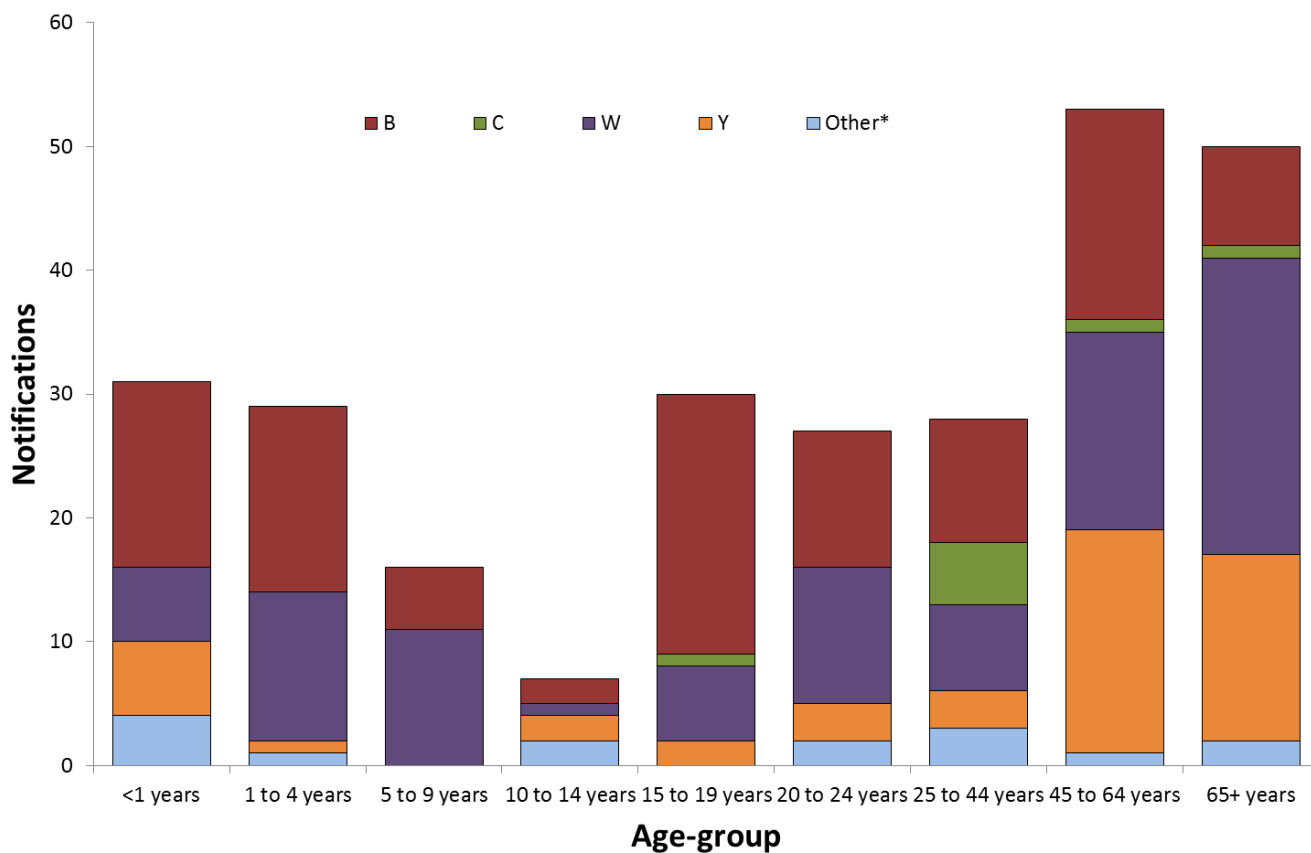


<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

### Age distribution

- So far in 2017, MenW has been reported in all age groups. This includes 6 cases for infants less than 1 year, 12 cases in the 1-4 years age group, 11 cases in the 5-9 years age group, 1 case in the 10-14 years age group, 6 cases in the 15-19 years age group, 11 cases in the 20-24 years age group, 7 cases in the 25-44 years age group, 16 cases in the 45-64 age group and 24 cases in the 65 and older age group (Figure 4).
- In 2017 YTD, 57% (54/94) of MenW notifications were aged less than 45 years. Of these 54 cases, 67% (36/54) were aged less than 20 years. This is similar to age distribution seen in 2016, with 54% of MenW notifications aged less than 45 years, but in contrast to 2015, with 59% of MenW notifications aged 45 years and older.
- For MenY notifications 66% (33/50) have been in people aged 45 years or older, which is consistent with 2015 (77%, 17/22) and 2016 (63%, 25/40).

**Figure 4. Notifications of IMD, Australia, 2017 YTD<sup>#</sup>, by specified age group and serogroup**

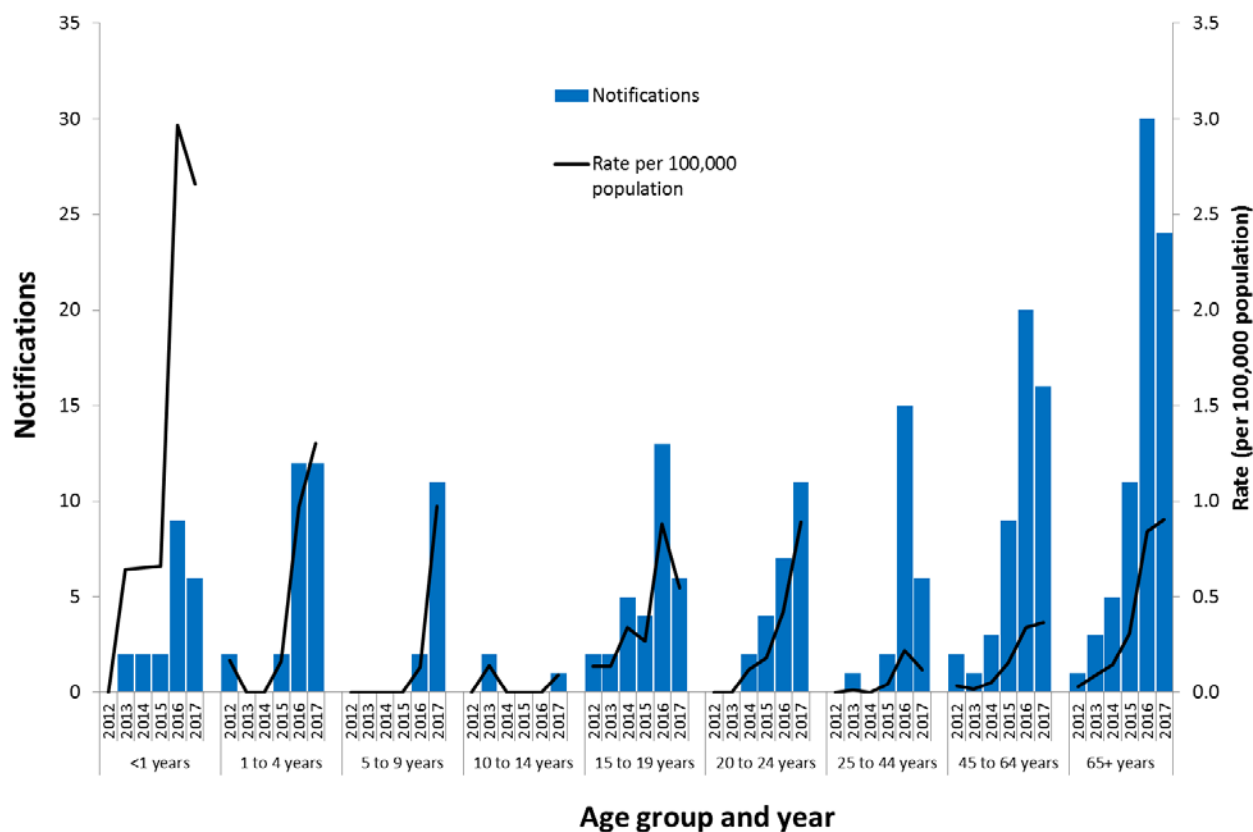


<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

\*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

- Age-specific rates of MenW, while remaining low, have increased in most age groups since 2012. The 2017 annualised notification rates for IMD are exceeding the 2016 rates in all age groups except the less than 12 months of age, 15-19 years and 25-44 years age groups (Figure 5).

**Figure 5. Age-specific notifications and rates<sup>y</sup> of MenW, Australia, 2012 to 2017 YTD<sup>#</sup>**



<sup>y</sup>2017 rates are annualised.

<sup>#</sup>Data from the National Notifiable Diseases Surveillance System as of 30 September 2017.

### **Clinical presentation and severity**

- In 2017 YTD, there have been 17 deaths reported; 5 due to MenB, 9 due to MenW, 2 due to MenY and 1 due to MenC.
- 14 of the 23 deaths due to IMD in Australia in 2015 and 2016 were due to MenW. The average case fatality rate (CFR) for MenW between 2007 and 2016 (6.5%) is greater than the CFR due to MenB and MenY (3.3%) In 2017 YTD, the CFR for MenW is 10% (9/94).
- It is important to note that mortality reporting against each notification of IMD is not complete, but has improved over time.
- Many MenW strains identified in Australia belong to the hypervirulent sequence type ST 11, which is part of the ST 11 clonal complex (CC 11). This was verified by the enhanced data collected in January 2017 for 237 of the 259 IMD cases reported in 2016. Of the 110 cases of MenW reported in 2016, 69 isolates had sufficient fine typing information. The majority of the MenW CC 11 isolates were ST 11 (35 of 69 isolates).
- Of the 46 MenW case reported in the first and second quarters of 2017 (1 January to 30 June), 38 isolates had sufficient typing information. The majority of the MenW C11 isolates were ST 11 (30 of 38 isolates).
- ST 11 strains are associated with a high case fatality and atypical clinical presentation, making early diagnosis challenging.<sup>2</sup>
- Non-specific presentation is not uncommon for IMD, which can also make early diagnosis challenging.

### **Background**

- Invasive Meningococcal Disease (IMD), manifests as meningitis, sepsis or bacteraemia and mainly affects children aged less than 5 years and adolescents (15-19 years) with a seasonal peak of cases in winter and early spring.

- The clinical manifestations of meningococcal septicaemia and meningitis may be non-specific and can include sudden onset of fever, rash (petechial, purpuric or maculopapular), headache, neck stiffness, photophobia, altered consciousness, muscle ache, cold hands, thirst, joint pain, nausea and vomiting.
- Meningococcal infections can progress rapidly to serious disease or death in previously healthy persons. A number of medical conditions are known to increase the risk of an individual developing IMD. People who survive infection can develop permanent sequelae, including limb deformity, skin scarring, deafness and neurologic deficits.
- The bacteria causing this disease, *Neisseria meningitidis*, is carried by a proportion of the population without developing disease. The prevalence and duration of asymptomatic nasopharyngeal carriage of meningococci vary over time and in different population and age groups. Adolescents have the highest carriage rates, peaking in 19-year olds, and so play an important role in transmission.<sup>3</sup>
- Vaccination against meningococcal disease in Australia has been targeted at MenC and is given to children at 12 months of age.

### Source

- Data extracted from the NNDSS on 04 October 2017.
- Line-listed de-identified enhanced data on 490 IMD cases from 1 January 2016 to 30 June 2017 were collected by excel spreadsheet from all states and territories. Enhanced fields included fine typing information.
- Due to the dynamic nature of the NNDSS, data in this extract is subject to retrospective revision and may vary from data reported in published NNDSS reports and reports of notification data by states and territories.
- Data extracted by diagnosis date.

### REFERENCES

- <sup>1</sup> Northern Territory Government, 2017. Health Alert: Meningococcal outbreak in Central Australia. available at: <http://mediareleases.nt.gov.au/mediaRelease/23733>
- <sup>2</sup> Mustapha, M. M. et al. 2016. Global epidemiology of capsular group W meningococcal disease(1970–2015): Multifocal emergence and persistence of hypervirulent sequence type (ST)-11 clonal complex. *Vaccine* 34 (13): 1515-1523.
- <sup>3</sup> Christensen H. et al. 2010. Meningococcal carriage by age: a systematic review and meta-analysis. *Lancet Infectious Diseases Dec 2010: 853-61.*