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## **Invasive Pneumococcal Disease Surveillance, 1 April to 30 June 2019**

Kate Pennington and the Enhanced Invasive Pneumococcal Disease Surveillance Working Group, for the Communicable Diseases Network Australia

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# Invasive Pneumococcal Disease Surveillance, 1 April to 30 June 2019<sup>i</sup>

Kate Pennington and the Enhanced Invasive Pneumococcal Disease Surveillance Working Group,  
for the Communicable Diseases Network Australia

## Summary

The number of notified cases of invasive pneumococcal disease (IPD) in the second quarter of 2019 was higher than the previous quarter as well as the second quarter of 2018. Following the July 2011 replacement of the 7-valent pneumococcal conjugate vaccine (7vPCV) in the childhood immunisation program with the 13-valent pneumococcal conjugate vaccine (13vPCV), there was an initial relatively rapid decline in disease due to the additional six serotypes covered by the 13vPCV across all age groups, however more recently this decline is no longer evident. Over this period the number of cases due to the eleven serotypes additionally covered by the 23-valent pneumococcal polysaccharide vaccine (23vPPV), and also those serotypes not covered by any available vaccine, has been increasing steadily across all age groups.

## Key points

IPD exhibits seasonal variations with incidence increasing over the winter months in temperate countries. In the second quarter of 2019, there were 596 cases of IPD reported to the National Notifiable Disease Surveillance System (NNDSS). Compared to the previous quarter (n = 280), this represented a substantial increase in the number of cases, but was only 14% higher than the number of cases reported in the same quarter in 2018 (n = 520) (Table 1, Figure 1). In the second quarter of 2019, the most common pneumococcal serotype causing IPD continued to be serotype 3 (17%; 104/596), followed equally by 19F (8%; 45/596) and 22F (8%; 45/596) (Table 2).

Among non-Indigenous Australians this quarter, cases continued to be highest among older adult age groups, especially those aged 60 years and older, and among children aged less than 5 years (Table 3). Among Indigenous Australians, notifications tended to be highest among adults

aged 50–54 years. The proportion of cases reported as Indigenous Australians this quarter (13%; 76/596) was slightly higher than the proportion in the previous quarter (11%; 32/280) and in the second quarter of 2018 (11%; 58/520) (Table 1).

Children aged less than 5 years comprised 17% (101/596) of all cases reported in this quarter, which was equivalent to the proportions reported in the first quarter of 2019 (17%; 47/280) and in the second quarter of 2018 (17%; 89/520). Serotype information was available for 76 (75%) of the cases aged less than 5 years this quarter. Just over half of these cases (55%; 42/76) had a serotype included in the 13vPCV, which was a lower proportion than in the previous quarter (62%; 21/34), but higher than in the second quarter of 2018 (48%; 32/67) (Figure 2). The most frequent serotypes among cases aged less than 5 years this quarter were serotypes 3 (30%; 23/76) and 19A (15%; 11/76), both of which are included in the 13vPCV. Of the 42 cases aged less than 5 years with 13vPCV serotypes,

<sup>i</sup> Based on data extracted from the National Notifiable Diseases Surveillance System (NNDSS) on 7 November 2019. Due to the dynamic nature of the NNDSS, data on 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.

19 cases were fully vaccinated and considered to be 13vPCV failures. These 13vPCV failures were due to serotypes 3 (n = 13), 19A (n = 3) and 19F (n = 3) (Table 4).

Among Indigenous Australians aged 50 years and over, there were 35 cases of IPD reported this quarter. Of those cases with a reported serotype (n = 31), 21 (68%) were due to a serotype included in the 23vPPV. Whilst there was no particular serotype dominant amongst this population group this quarter, for serotypes 3 and 22F there were four cases of each reported (Figure 3). The proportion of cases with a reported serotype that were due to a serotype included in the 23vPPV was substantially higher than in the last quarter (33%; 3/9), but lower than in the second quarter of 2018 (81%; 13/16).

Among non-Indigenous<sup>ii</sup> Australians aged 65 years and over, there were 209 cases of IPD reported this quarter. The number of notified cases of IPD in this population group was two and a half times the number of cases reported in the previous quarter (n = 85) and slightly higher than the number reported in the second quarter of 2018 (n = 195). Of those cases with a reported serotype (n = 201), 61% (123/201) were due to a serotype included in the 23vPPV (Figure 4). This was similar to the proportion in the previous quarter (61%; 50/82), but slightly lower than in the second quarter of 2018 (56%; 106/189). For this quarter, serotype 3 (n = 37) was the most common serotype reported for this population group, followed by serotypes 22F (n = 18) and 19F (n = 15). All of these serotypes are included in the 23vPPV.

During this quarter there were 33 deaths attributed to a variety of IPD serotypes. Eighteen (55%) of the cases had a serotype covered by currently available pneumococcal vaccines, 12 (36%) were due to a non-vaccine serotype, and three were reported as being untyped. Six of the reported deaths this quarter were among Indigenous

Australians. The median age of those cases reported to have died this quarter was 72 years (range 0 to 97 years).

## Notes

The data in this report are provisional and subject to change as laboratory results and additional case information become available. More detailed data analysis of IPD in Australia and surveillance methodology are described in the IPD annual report series published in *Communicable Diseases Intelligence*.

In Australia, pneumococcal vaccination is recommended as part of routine immunisation for children, individuals with specific underlying conditions associated with increased risk of IPD and older Australians. More information on the National Immunisation Program and pneumococcal vaccination recommendations can be found on the Australian Government Department of Health Immunisation [website](https://www.health.gov.au/health-topics/immunisation) (<https://www.health.gov.au/health-topics/immunisation>).

In this report, a 'vaccine failure' is reported when a child aged less than 5 years is diagnosed with IPD due to a serotype found in the 13vPCV and they have received 3 primary scheduled doses of 13vPCV at least 2 weeks prior to disease onset with at least 28 days between doses of vaccine.

There are currently two pneumococcal vaccines available in Australia via the National Immunisation Program, each targeting multiple serotypes (13vPCV and 23vPPV). Note, in this report serotype analysis is generally grouped according to vaccine composition, both historic and current (Table 5).

Follow-up of all notified cases of IPD is undertaken in all states and territories except New South Wales and Victoria who conduct targeted follow-up of notified cases aged under 5 years, and 50 years or over for enhanced data. Follow-up of notified cases of IPD in Queensland is undertaken in all areas except Metro South and Gold Coast Public Health Units who conduct targeted

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ii Non-Indigenous Australians includes cases reported with an Indigenous status of non-Indigenous, not stated, blank or unknown.

follow-up of notified cases for those aged under 5 years only. However, in these areas where targeted case follow-up is undertaken, some enhanced data may also be available outside these targeted age groups.

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**Table 1: Notified cases of invasive pneumococcal disease, Australia, 1 April to 30 June 2019, by Indigenous status, serotype completeness and state or territory**

Indigenous status	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total 2nd qtr 2019	Total 1st qtr 2019	Total 2nd qtr 2018
Indigenous	0	16	11	18	7	1	3	20	76	32	58
Non-Indigenous	12	139	4	78	43	8	133	52	469	231	420
Not stated / Unknown	0	25	0	0	0	0	25	1	51	17	42
<b>Total</b>	<b>12</b>	<b>180</b>	<b>15</b>	<b>96</b>	<b>50</b>	<b>9</b>	<b>161</b>	<b>73</b>	<b>596</b>	<b>280</b>	<b>520</b>
Indigenous status completeness <sup>a</sup> (%)	100	86	100	100	100	100	84	99	91	94	92
Indigenous status completeness in targeted groups <sup>a,b</sup> (%)	100	89	100	100	100	100	97	98	95	97	98
Serotype completeness <sup>c</sup> (%)	100	89	100	98	68	100	96	92	92	90	94

a Indigenous status completeness is defined as the reporting of a known Indigenous status, excluding the reporting of not stated or unknown Indigenous status.

b Targeted groups for follow-up by almost all jurisdictions and public health units are cases aged less than 5 years and 50 years and over.

c Serotype completeness is the proportion of all cases of invasive pneumococcal disease that were reported with a serotype or reported as non-typable. Incomplete serotype data can occur in cases when (i) no isolate was available as diagnosis was by polymerase chain reaction and no molecular typing was attempted or was not possible due to insufficient genetic material; (ii) the isolate was not referred to the reference laboratory or was not viable; (iii) typing was pending at the time of reporting, or no serotype was reported by the notifying jurisdiction to the National Notifiable Diseases Surveillance System.

Table 2: Distribution of serotypes causing invasive pneumococcal disease in notified cases, Australia, 1 April to 30 June 2019, by age group

Vaccine type and serotype	Age groups			Serotype total <sup>a</sup>
	Under 5	5–64	65+	
<b>7vPCV</b>				
4	0	9	0	9
14	0	3	1	4
19F	7	22	16	45
<b>13vPCV non-7vPCV</b>				
3	23	43	38	104
19A	11	15	12	38
7F	1	11	2	14
<b>23vPPV non-13vPCV</b>				
8	0	18	2	20
10A	1	3	3	7
11A	3	7	9	19
12F	1	11	0	12
20	0	6	2	8
9N	0	12	13	25
22F	7	19	19	45
15B	0	5	1	6
17F	0	2	2	4
33F	2	6	8	16
<b>Non-vaccine type</b>				
15A	0	2	6	8
31	0	7	7	14

Vaccine type and serotype	Age groups			Serotype total <sup>a</sup>
	Under 5	5–64	65+	
38	2	2	7	11
34	0	2	1	3
13	0	2	0	2
23B	8	12	11	31
6C	1	7	13	21
23A	0	3	7	10
35B	1	4	8	13
15C	5	2	3	10
16F	0	4	9	13
18A	0	4	0	4
35F	0	1	4	5
<b>Other</b>				
Other serotypes <sup>a</sup>	3	13	6	22
Unknown <sup>b</sup>	25	19	9	53
<b>Total</b>	<b>101</b>	<b>276</b>	<b>219</b>	<b>596</b>

a Serotypes that only occur in less than 5 cases per quarter are grouped as 'Other' and include 'non-typable' isolates this quarter.

b 'Serotype unknown' includes those serotypes reported as 'no isolate', 'not referred', 'not viable', 'typing pending' and 'untyped'.

**Table 3: Notified cases of invasive pneumococcal disease, Australia, 1 April to 30 June 2019, by Indigenous status and age group**

Age group	Indigenous status			Total
	Indigenous	Non-Indigenous	Not reported <sup>a</sup>	
00–04	8	86	7	101
05–09	0	14	7	21
10–14	5	2	1	8
15–19	3	2	1	6
20–24	1	5	2	8
25–29	2	4	1	7
30–34	6	8	6	20
35–39	3	9	5	17
40–44	8	12	3	23
45–49	5	20	4	29
50–54	14	16	1	31
55–59	7	36	2	45
60–64	4	56	1	61
65–69	3	42	2	47
70–74	2	36	1	39
75–79	2	37	1	40
80–84	3	37	3	43
85+	0	47	3	50
<b>Total</b>	<b>76</b>	<b>469</b>	<b>51</b>	<b>596</b>

a Not reported is defined as not stated, blank or unknown Indigenous status.

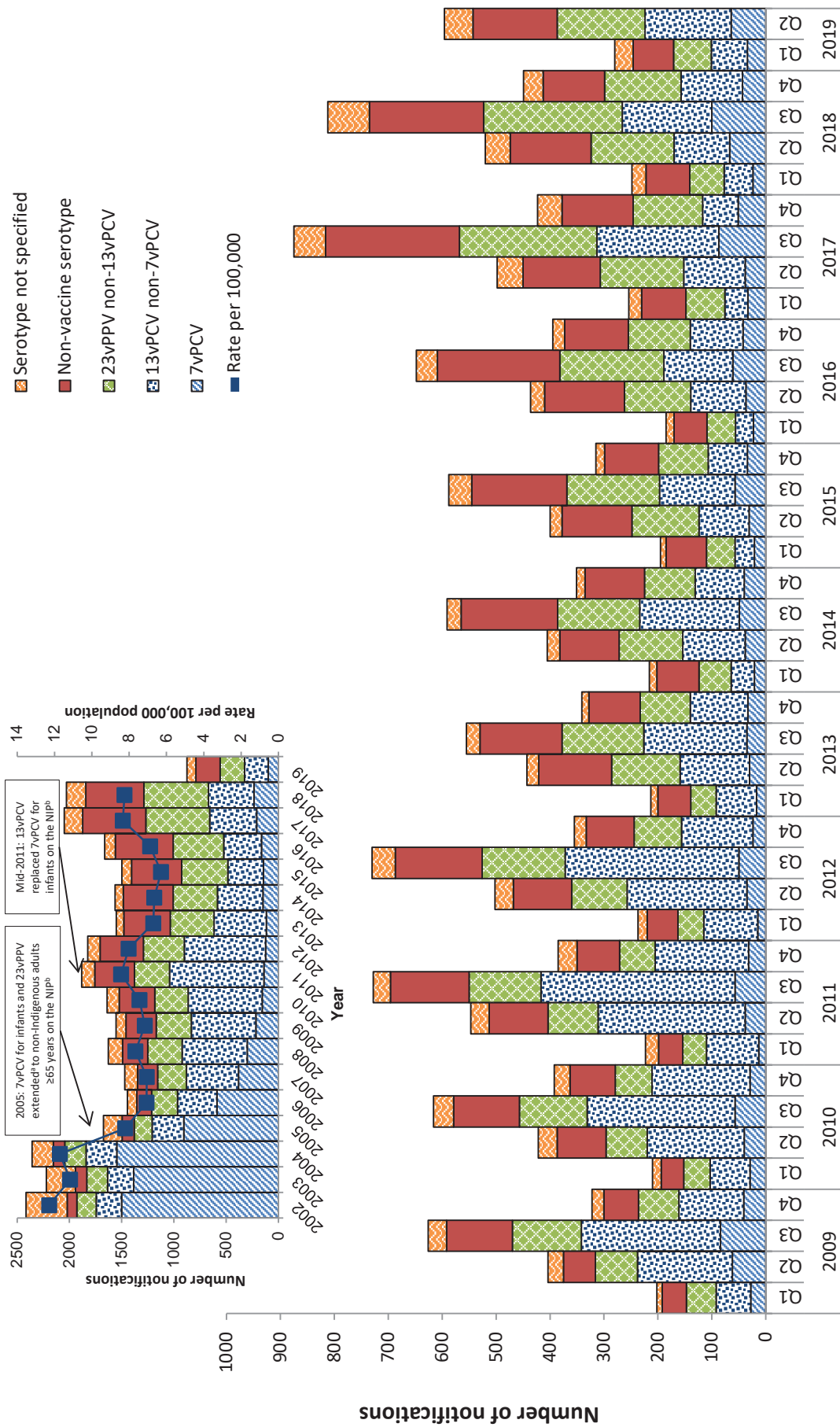
**Table 4: Characteristics of 13vPCV failures in children aged less than 5 years, Australia, 1 April to 30 June 2019**

Age	Indigenous status	Serotype	Clinical category	Risk factor(s)
2 years	Non-Indigenous	3	Pneumonia (pleural effusion)	Childcare attendee
2 years	Non-Indigenous	3	Pneumonia	No risk factor identified
2 years	Non-Indigenous	19A	Pneumonia	–
2 years	Non-Indigenous	3	Pneumonia	No risk factor identified
2 years	Non-Indigenous	3	Pneumonia	No risk factor identified
2 years	Non-Indigenous	19F	Bacteraemia	Chronic illness
3 years	Non-Indigenous	3	Pneumonia	No risk factor identified
3 years	Non-Indigenous	19F	Pneumonia	Other
3 years	Non-Indigenous	3	Pneumonia	No risk factor identified
3 years	Non-Indigenous	3	Pneumonia (pleural empyema)	–
3 years	Non-Indigenous	3	Pneumonia	No risk factor identified
3 years	Non-Indigenous	3	Pneumonia	No risk factor identified
3 years	Non-Indigenous	3	Pneumonia	No risk factor identified
4 years	Non-Indigenous	19F	Pneumonia	No risk factor identified
4 years	Non-Indigenous	19A	Pneumonia	Childcare attendee
4 years	Non-Indigenous	3	Pneumonia	–
4 years	Non-Indigenous	19A	No data provided	–
4 years	Non-Indigenous	3	Pneumonia	No risk factor identified
4 years	Non-Indigenous	3	Pneumonia	No risk factor identified

Table 5: *Streptococcus pneumoniae* serotypes targeted by pneumococcal vaccines

Serotypes	7-valent pneumococcal conjugate vaccine (7vPCV)	10-valent pneumococcal conjugate vaccine (10vPCV)	13-valent pneumococcal conjugate vaccine (13vPCV)	23-valent pneumococcal polysaccharide vaccine (23vPPV)
1		✓	✓	✓
2				✓
3			✓	✓
4	✓	✓	✓	✓
5		✓	✓	✓
6A			✓	
6B	✓	✓	✓	✓
7F		✓	✓	✓
8				✓
9N				✓
9V	✓	✓	✓	✓
10A				✓
11A				✓
12F				✓
14	✓	✓	✓	✓
15B				✓
17F				✓
18C	✓	✓	✓	✓
19A			✓	✓
19F	✓	✓	✓	✓
20				✓
22F				✓
23F	✓	✓	✓	✓
33F				✓

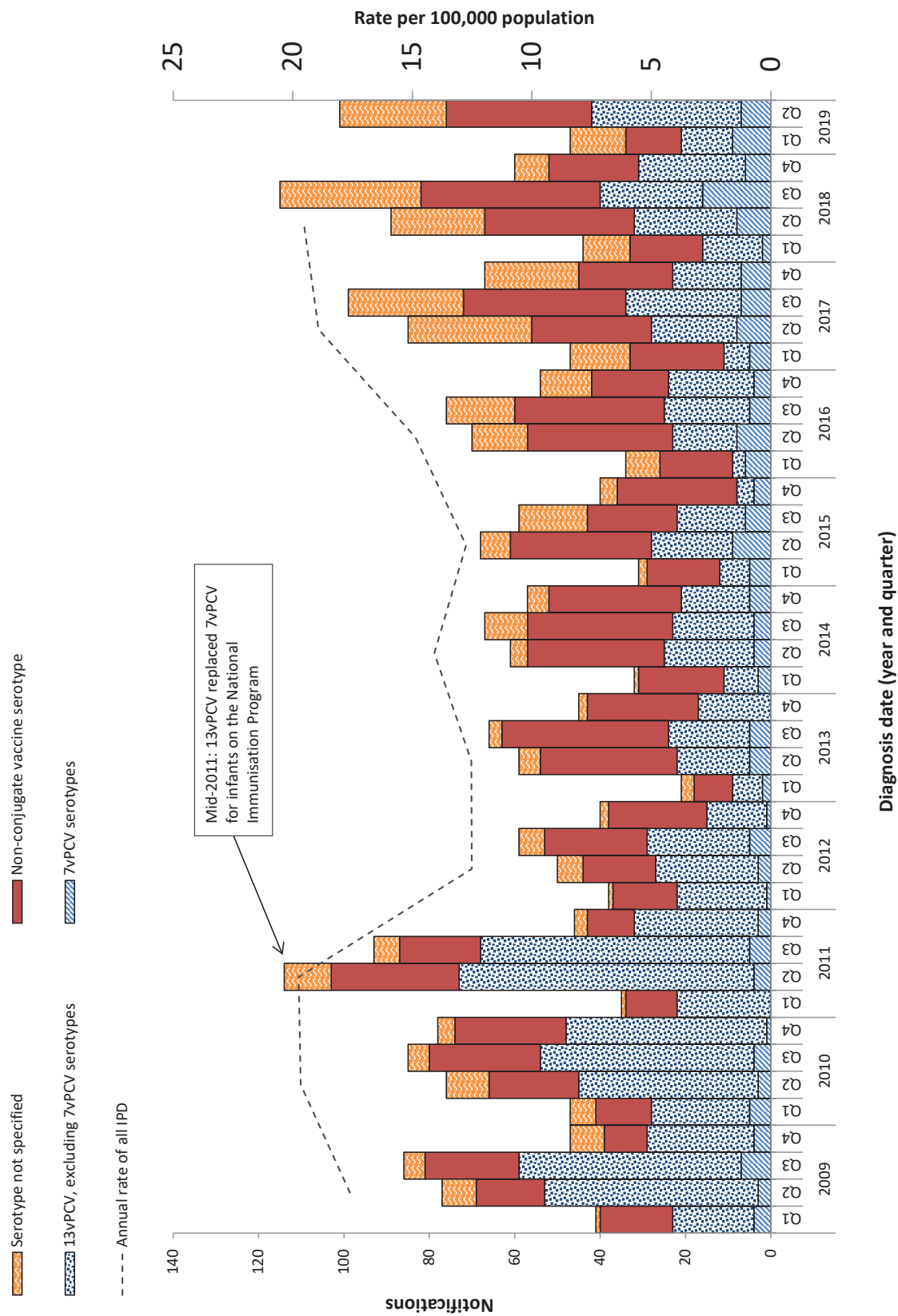
Figure 1: Notifications of invasive pneumococcal disease, Australia, 1 January 2002 to 30 June 2019, by vaccine serotype group



Year and quarter

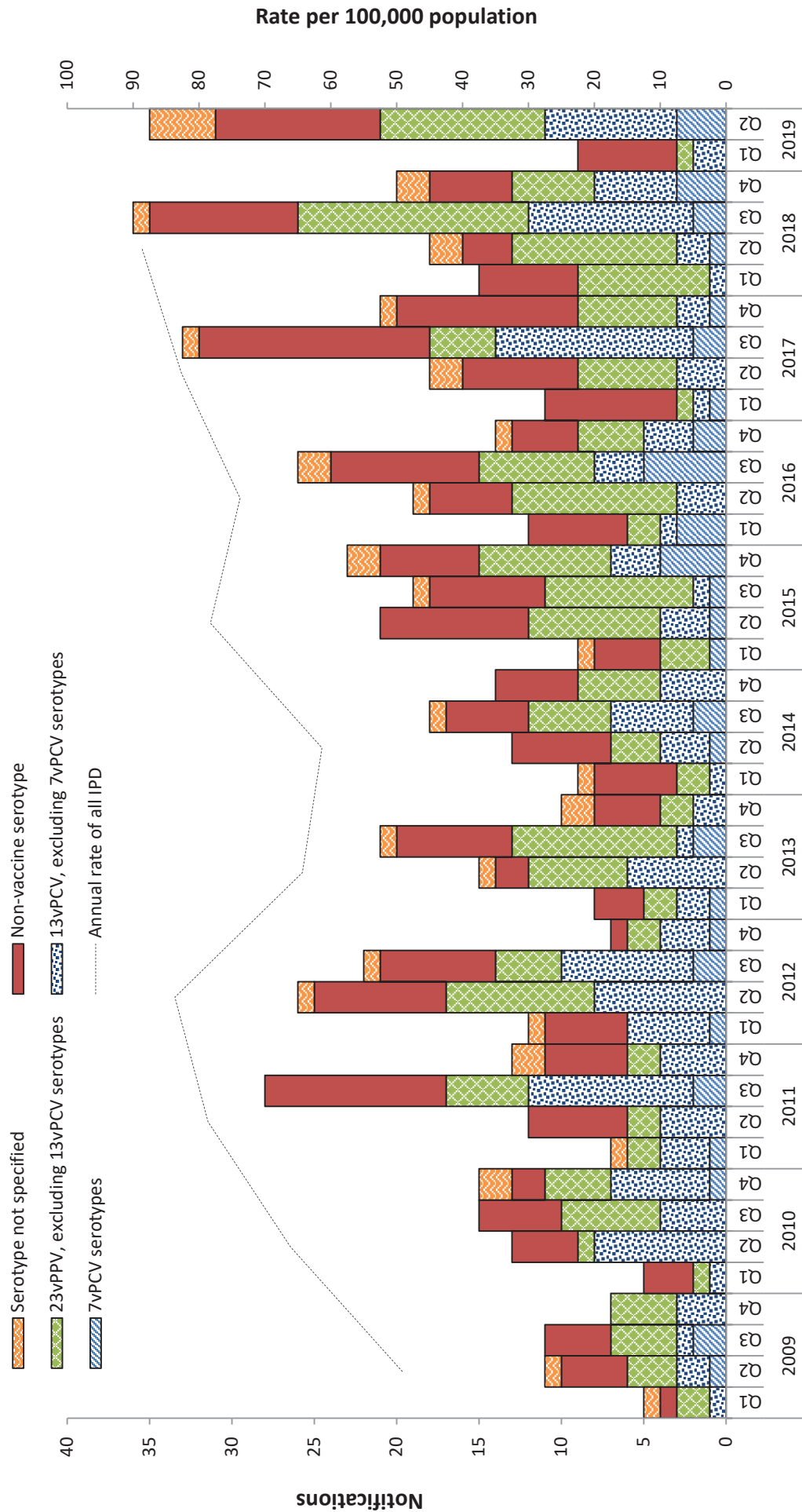
a In 1999, the 23vPPV was funded for all Indigenous Australians aged 50 years and over, as well as younger Indigenous Australian adults with risk factors.  
 b NIP - National Immunisation Program.

**Figure 2: Notifications and annual rates<sup>a</sup> of invasive pneumococcal disease in children aged less than 5 years, Australia, 1 January 2009 to 30 June 2019, by vaccine serotype group**



<sup>a</sup> Annual rates are shown on quarter 2, excluding 2019.

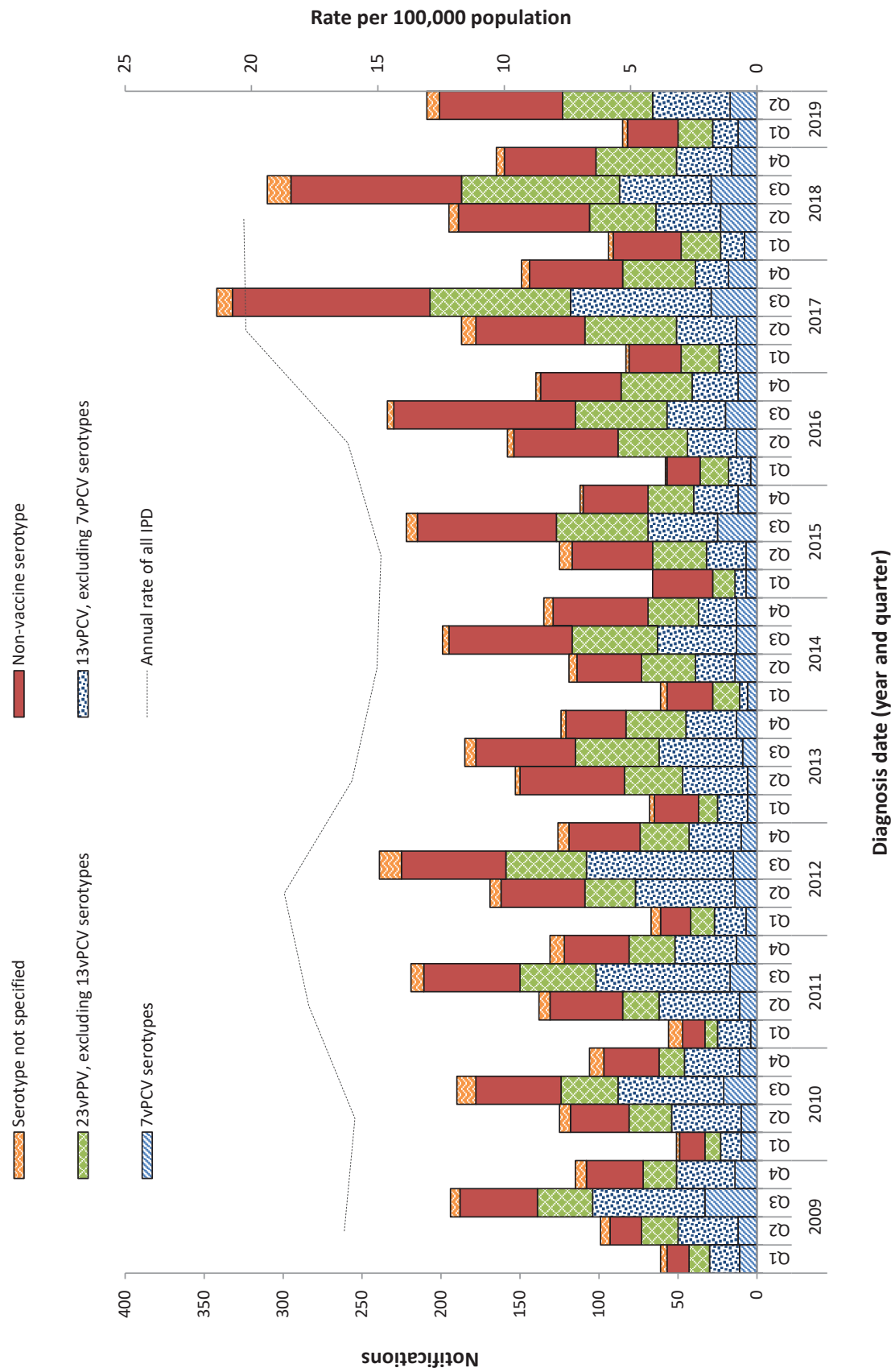
**Figure 3: Notifications and annual rates<sup>a</sup> of all invasive pneumococcal disease in Indigenous Australians aged 50 years or over, Australia, 1 January 2009 to 30 June 2019, by vaccine serotype group**



**Diagnosis date (year and quarter)**

<sup>a</sup> Annual rates are shown on quarter 2, excluding 2019.

**Figure 4: Notifications and annual rates<sup>a</sup> of all invasive pneumococcal disease in non-Indigenous Australians<sup>b</sup> aged 65 years or over, Australia, 1 January 2009 to 30 June 2019, by vaccine serotype group**



a Annual rates are shown on quarter 2, excluding 2019.

b Non-Indigenous Australians includes cases reported with as non-Indigenous, not stated, blank or unknown.