

IN FOCUS

Vaccination among COVID-19 cases in the NSW Delta outbreak

Reporting period: 16 June to 7 October 2021



Summary

This report describes the vaccination status of locally-acquired cases of COVID-19 with reported onset of infection from 16 June to 7 October 2021 in New South Wales (NSW) using NSW case surveillance data supplemented by data from the Australian Immunisation Register (AIR).

- Of 61,800 COVID-19 cases, the vast majority were unvaccinated; 6.1% of cases had two doses of vaccine, 9.2% had one dose, 63.1% reported having no vaccine. For 21.7% vaccination status was classified as not known because they did not match to a record in the AIR of COVID-19 vaccine receipt. The proportion of cases who were vaccinated increased with age. This likely reflects the targeted vaccine roll-out and patterns of vaccine coverage where older people were eligible earlier in the year for vaccination and have higher rates of uptake.
- There were 8,660 cases who were hospitalised, 1,015 admitted to ICU and 412 who died with COVID-19. Of these, 493 of the hospitalised, 30 of those admitted to ICU and 47 of those who died had received two doses of vaccine. Of the 47 cases who died with COVID-19 who had two doses of vaccine, their average age was 82 years; 29 (61.7%) were residents of aged care facilities and the other 18 had significant comorbidities. Of the 30 admitted to ICU, 26 (86.7%) had significant co-morbidities and 4 had no reported comorbid conditions.
- In the peak fortnight of the outbreak to date (25 August to 7 September), the COVID-19 case rate among 2-dose vaccinated people was 49.5 per 100,000 while in unvaccinated people it was 561 per 100,000, a more than 10-fold difference. The rates of COVID-19 ICU admissions or deaths peaked in the fortnight 8 September to 21 September at 0.9 per 100,000 in 2-dose vaccinated people compared to 15.6 per 100,000 in unvaccinated people, a greater than 16-fold difference.
- The effect of the vaccine was greatest against serious disease, but vaccination also protected against infection. Protection appeared greater in younger compared to older people. In the fortnight 8-21 September, the rates of infection in the 2-dose vaccinated population compared to the unvaccinated population was 21 versus 488 per 100,000 in those aged 12-19 years and 61 versus 193 per 100,000 in those aged 80+ years. The rates of COVID-19 related ICU and/or death in the 2-dose vaccinated population compared to the unvaccinated population was 0.0 versus 1.1 per 100,000 in those aged 12-19 years and 5 versus 50 per 100,000 in those aged 80+ years.
- Throughout the NSW outbreak, across all ages, people who have received 2 doses of vaccine have substantially lower rates of COVID-19 and severe COVID-19 than unvaccinated people. However, vaccination does not completely protect people from infection and other recommended public health measures should continue to be observed.
- Detailed methodology is described at end of this report

IN FOCUS**Vaccination among COVID-19 cases in the NSW Delta outbreak**
Reporting period: 16 June to 7 October 2021**COVID-19 vaccination status****Number and proportion of NSW COVID-19 cases with onset date from 16 June to 7 October 2021 by valid vaccine doses received**

Valid dose number*	Number of cases	Proportion of cases
None**	39,017	63.1%
One dose	5,668	9.2%
Two doses	3,736	6.1%
Unknown	13,379	21.7%
Total	61,800	100.0%

*COVID-19 vaccines administered in NSW during this period were either Vaxzevria (AstraZeneca) or Comirnaty (Pfizer).

**Of 39,017 cases categorised as having no doses received, 28,927 (74.1%) were reported as having no vaccine, while others had received vaccine dose/s but the interval from receipt to onset of disease was too short to be potentially effective.

Interpretation: The majority of people with COVID-19 had not received a single vaccine dose at least 21 days prior to disease onset (39,017; 63.1%) or vaccine receipt was classified as unknown (13,379; 21.7%). Where at least one valid vaccine dose had been received, this was more often a single dose (5,668; 9.2%) than two doses (3,736; 6.1%).

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**Vaccination status by age group****Number and proportion of cases by age group and vaccine doses received (16 June to 7 October 2021)**

Age group (years)	None	1 dose	2 dose	Unknown†	Total
0-9 (n)	6,253	0	0	2,951	9,204
(%)	67.9	0.0	0.0	32.1	100.0
10-19 (n)	6,917	280	29	2,720	9,946
(%)	69.6	2.8	0.3	27.4	100.0
20-29 (n)	8,595	1,189	470	2,404	12,658
(%)	67.9	9.4	3.7	19.0	100.0
30-39 (n)	6,766	1,325	650	2,006	10,747
(%)	63.0	12.3	6.1	18.7	100.0
40-49 (n)	4,640	947	658	1,454	7,699
(%)	60.4	12.3	8.6	18.9	100.0
50-59 (n)	3,282	795	721	948	5,746
(%)	57.2	13.8	12.6	16.5	100.0
60-69 (n)	1,553	658	518	518	3,247
(%)	47.8	20.3	16.0	16.0	100.0
70-79 (n)	627	310	389	243	1,569
(%)	40.0	19.8	24.8	15.5	100.0
80-89 (n)	323	143	220	110	796
(%)	40.6	18.0	27.6	13.8	100.0
90+ (n)	61	21	81	25	188
(%)	32.5	11.2	43.1	13.3	100.0
Total (n)	39,017	5,668	3,736	13,379	61,800
(%)	63.1	9.2	6.1	21.7	100.0

Percentages may not add to 100% due to rounding.

† Those with unknown vaccination status were classified as such because they did not match to a record of COVID-19 vaccine receipt in the AIR but this is most likely because they were unvaccinated (see Methods p11).

Interpretation: The proportion of COVID-19 cases who were vaccinated with either one or two doses of vaccine was very small overall but increased with increasing age from 0% in those aged 0 to 9 years, 3.1% in 10-19 years to 45.6% in those 80-89 years and 54.3% in those aged 90+ years. This reflects vaccination coverage, which due to the nature of the rollout was substantially higher in older people earlier in the outbreak.

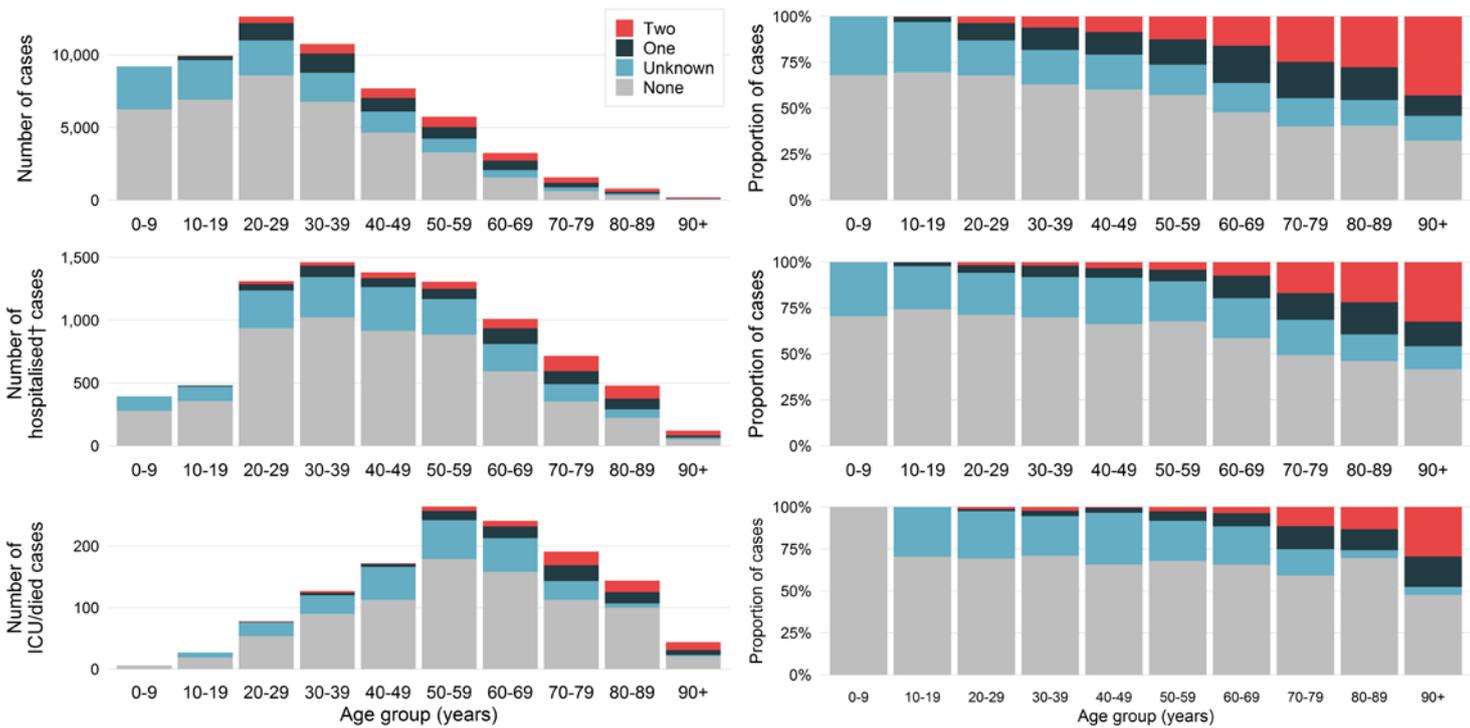
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COVID-19 vaccination status by disease severity and age group

Number and proportion of cases by age group, disease severity and vaccine doses received (16 June to 7 October 2021)



†Not all cases were hospitalised due to COVID-19 severity; in particular those at the extremes of age (ie elderly and children) may have been hospitalised for monitoring, infection control purposes, or social reasons.

Interpretation: The vast majority of COVID-19 cases, and cases with more severe disease (classified as those hospitalised, admitted to ICU or who died) were not vaccinated. Only 5.7% of cases who were hospitalised and 5.8% of those who were admitted to ICU or who died had received 2 doses of vaccine. The proportion of cases and serious cases who were vaccinated increased with age, but this likely relates to vaccination coverage, which due to the nature of the rollout was substantially higher in older people.

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**Description of COVID-19 cases with two vaccine doses with more serious disease**

Characteristics of people with COVID-19 who had 2 vaccine doses	Hospitalised (N=8,660)	Admitted to ICU (N=1,015)	Died (N=412)
Number	493	30	47
Mean age, years (SD)	67 (18.4)	64 (12.6)	82 (10.5)
% female (N)	45% (223)	23% (7)	31% (15)

Of the 47 cases who died with COVID-19 who had two doses of vaccine, 29 (61.7%) were residents of aged care facilities and the other 18 had significant comorbidities. Of the 30 admitted to ICU, 26 (86.7%) had significant comorbidities and 4 had no reported comorbid conditions.

Interpretation: The majority of cases with very serious COVID-19, that is they were admitted to ICU or died with COVID-19, and who had two doses of vaccine were elderly and in aged care facilities or had significant underlying comorbidities.

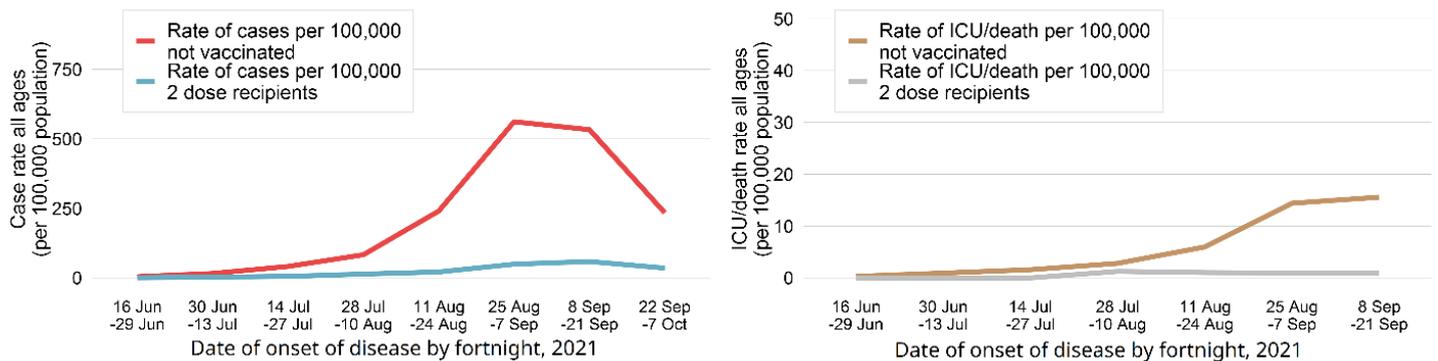
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COVID-19 case rates by vaccination status

Rate of COVID-19 cases and ICU admissions/deaths amongst two dose vaccine recipients and the population who had not received a vaccine by fortnight[†]



Notes: Population and cases restricted to 12 years and older resident in Greater Sydney.

[†] Cases with an unknown vaccination status are categorised as unvaccinated. Cases who received a single dose of vaccine, regardless of when it was given, or two doses but it was less than 14 days since receipt at the time of onset, are not included in the rate analyses.

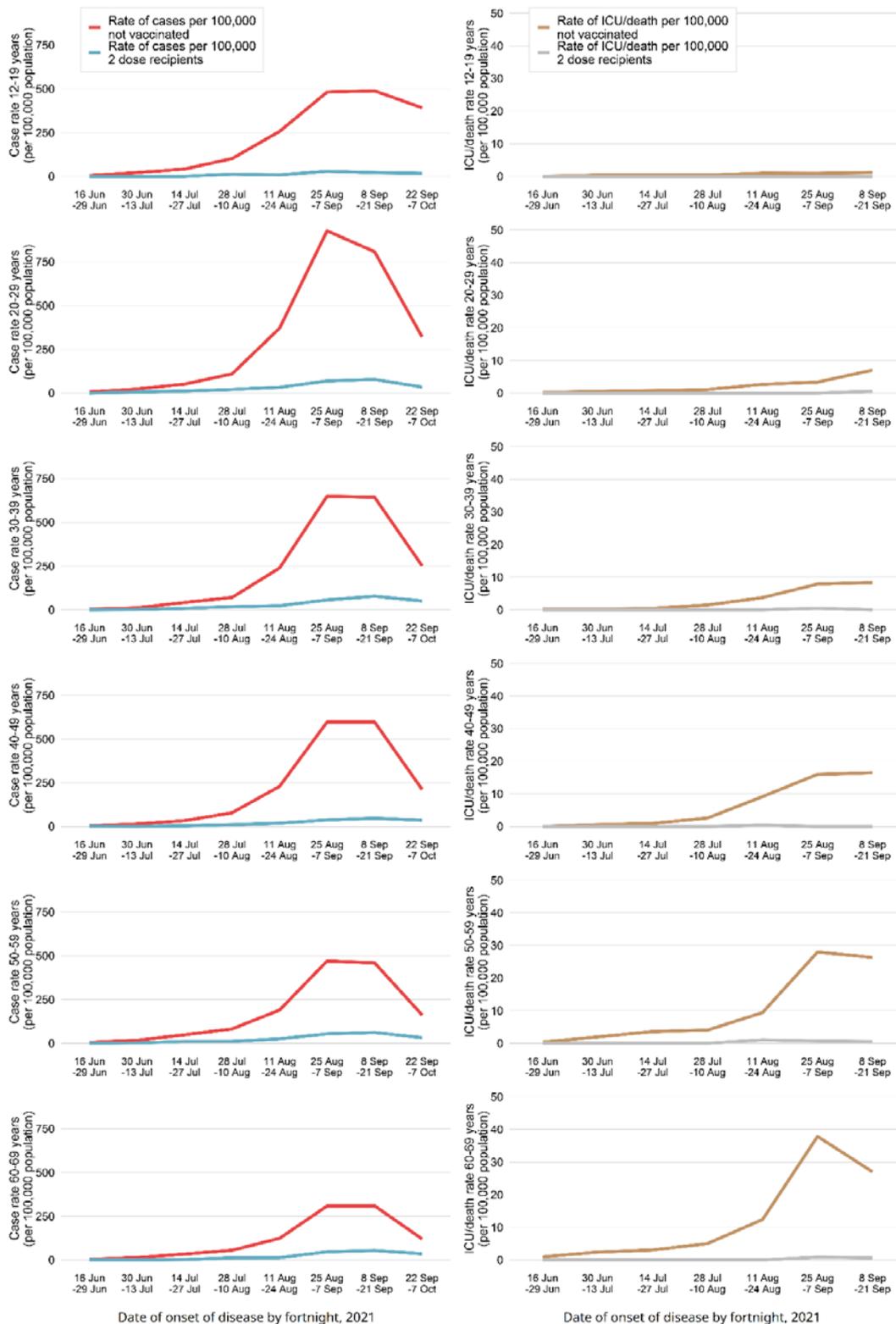
Interpretation: The rates of COVID-19 cases in Greater Sydney among people aged 12 years and older increased from the start of the outbreak in June 2021 and peaked in the fortnight 25 August to 7 September 2021. In the peak fortnight, the case rate among 2-dose vaccinated people was 49.5 per 100,000 whilst in unvaccinated people it was 561 per 100,000; a more than 10-fold difference. Rates of COVID-19 ICU or deaths peaked in the fortnight 8 September to 21 September 2021 at 0.9 per 100,000 in 2-dose vaccinated people compared to 15.6 per 100,000 in unvaccinated people; a greater than 16-fold difference. A description of how rates were estimated are detailed in the methods on page 9.

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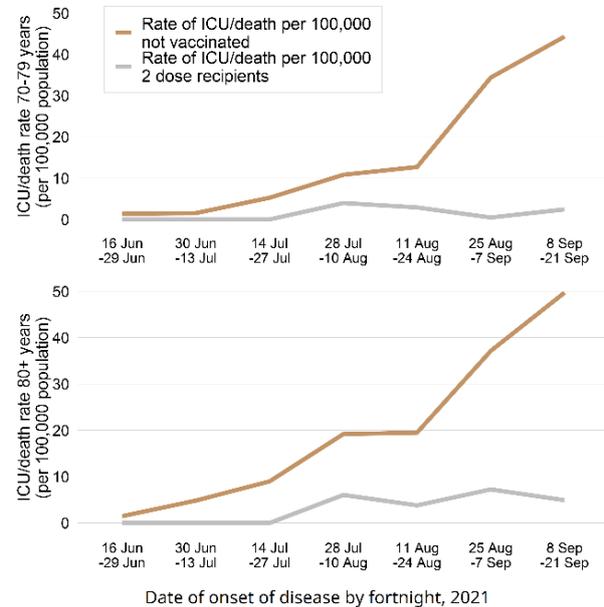
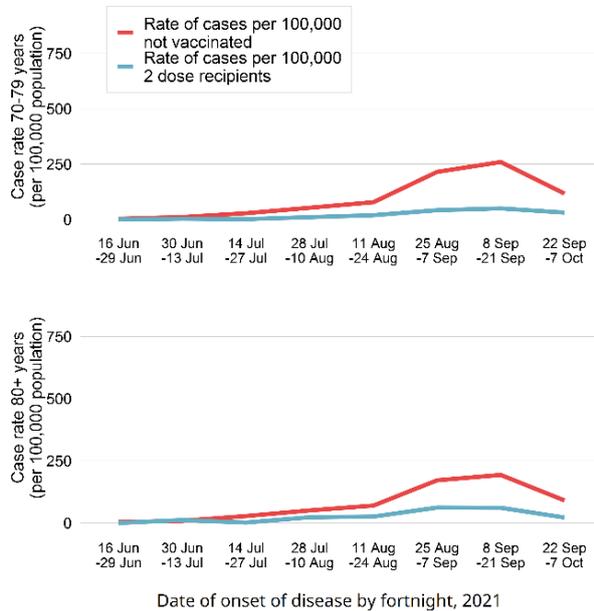


Rate of COVID-19 cases and ICU admissions/deaths amongst two dose vaccine recipients and the population who had not received a vaccine by age group and onset fortnight†



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Population and cases restricted to 12 years and older resident in Greater Sydney.

† Cases with unknown vaccination status are categorised as unvaccinated (see methods). Cases who received a single dose of vaccine, regardless of when it was given, or two doses but it was less than 14 days since receipt at the time of onset, are not included in the rate analyses.

Interpretation: The rate of COVID-19 cases and ICU admissions/deaths was consistently lower among the vaccinated population than the unvaccinated population across all age groups although differences were less pronounced in older age groups. For the fortnight 8-21 September, the ratio of rates comparing the 2-dose vaccinated population to unvaccinated populations ranged from 0.04 (21 versus 488 per 100,000) in those aged 12-19 years to 0.32 (61 versus 193 per 100,000) in those aged 80+ years. In the same fortnight, rate ratios for serious disease ranged from 0 (0.0 versus 1.1 per 100,000) in those aged 12-19 years to 0.10 (5 versus 50) in those aged 80+ years. Noting the limitations of these data described below, these numbers suggest that the vaccine is highly effective. Effectiveness appears greater against serious disease than infection alone and in younger people compared with older people, in line with published studies from overseas.

Data Limitations: ICU admission and death from COVID-19 can lag behind case numbers so the counts and rates presented for ICU/death in the most recent fortnight may not fully account for this lag. Population denominators are based on those reported in AIR at the midpoint of the fortnight in which cases are counted. As vaccination coverage has increased rapidly in NSW throughout the period of this analysis, the denominators are imprecise and this may lead to some under- or overestimation of rates. Denominators also do not take into account those who were past cases who may no longer be susceptible. While this group is small, their size has become more significant as the outbreak has progressed. Comprehensive information on other characteristics of the cases is limited. Therefore, the rates also do not account for the fact that those most at risk of acquisition of COVID-19 (e.g. healthcare workers and residents of aged care facilities) and of severe COVID-19 (e.g. aged care residents and those with comorbidities) are more likely to have received 2 doses of vaccine earlier in the outbreak.

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Methods

All individuals with locally-acquired confirmed SARS-CoV-2 infection, reported in the NSW Notifiable Conditions Information Management System (NCIMS) referred to here as 'COVID-19 cases' to 8pm on 7 October 2021 with a disease onset date from 16 June 2021 were extracted.

Vaccination status was initially determined based on what was reported in NCIMS (this information is collected at interview or on case review by the public health response teams). Vaccination data was then enhanced by matching to an extract of vaccination status from the Australian Immunisation Register (AIR). The AIR data was extracted on 7 October 2021 and included all people who were NSW residents and had any record of a COVID-19 vaccine. Individuals from the AIR extract were matched to NCIMS cases using an exact match on first name, last name and date of birth. If there were data on vaccination from both sources, AIR data was used as the source of information for analysis. Where data on vaccination existed in one system only, data from that system was used, if it was sufficiently complete. In the analyses, vaccination status was classified based on the following definitions:

- **None:** Reported as either: a) no vaccine record in NCIMS and unable to link to a record of any COVID-19 vaccination in AIR, or b) interval from receipt of first vaccine dose was too short to be effective (<21 days);
- **One:** One dose of vaccine at least 21 days prior to onset date;
- **Two:** Two doses of vaccine with the second dose at least 14 days prior to diagnosis and a minimum of 14 days between the two doses;
- **Unknown:** Information on vaccination (or vaccination date) unknown in NCIMS and unable to link to an AIR record of COVID-19 vaccination.

For analyses of rates of infections (described below) the group who had received one dose of vaccine, but the interval from vaccine receipt to case diagnosis was too short to be effective (<21 days), were classified separately from those not vaccinated.

The rate of infections amongst vaccinated and unvaccinated populations was estimated in fortnightly intervals since the outbreak began (to 30 June, 14 July, 28 July, 11 August, 25 August, 8 September, 22 September and 6 October) and by age group. For this estimate, the population was restricted to those aged 12 years and older and resident in the Greater Sydney region based on Statistical Local Area. Vaccination coverage data were extracted at the median date in each fortnightly interval. Rates of infection in the unvaccinated population were estimated by dividing the number of confirmed cases who had not received a COVID-19 vaccine, or who had unknown vaccination status, by the number of individuals in AIR reported with no doses in each interval. People with unknown vaccination status were included in the no vaccine category following a detailed review of the AIR records of a sample (see below). Rates of infection in those with 2 doses of COVID-19 vaccine were estimated in a similar manner although taking into account a 14-day interval since receipt of dose 2 of the vaccine for it to be effective.

To determine the presence of comorbidities or residence in aged care among COVID-19 cases who were admitted to ICU or died and had two doses of vaccine, health records were manually reviewed.

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**Vaccination status – data quality****Table. Proportion of cases with unknown vaccination status by onset date (16 June to 7 October 2021)**

Date range	Cases with unknown vaccination status	Total cases	Proportion with unknown vaccination status [†]
16 Jun - 29 Jun	1	235	0.4%
30 Jun - 13 Jul	3	824	0.4%
14 Jul - 27 Jul	61	2,064	3.0%
28 Jul - 10 Aug	274	4,075	6.7%
11 Aug - 24 Aug	867	9,974	8.7%
25 Aug - 7 Sept	4,613	17,784	25.9%
8 Sept - 21 Sept	5,591	16,666	33.6%
22 Sept – 7 Oct*	1,969	10,178	19.3%
Total	13,379	61,800	21.7%

*Note this fortnight includes extra days (6 and 7 October)

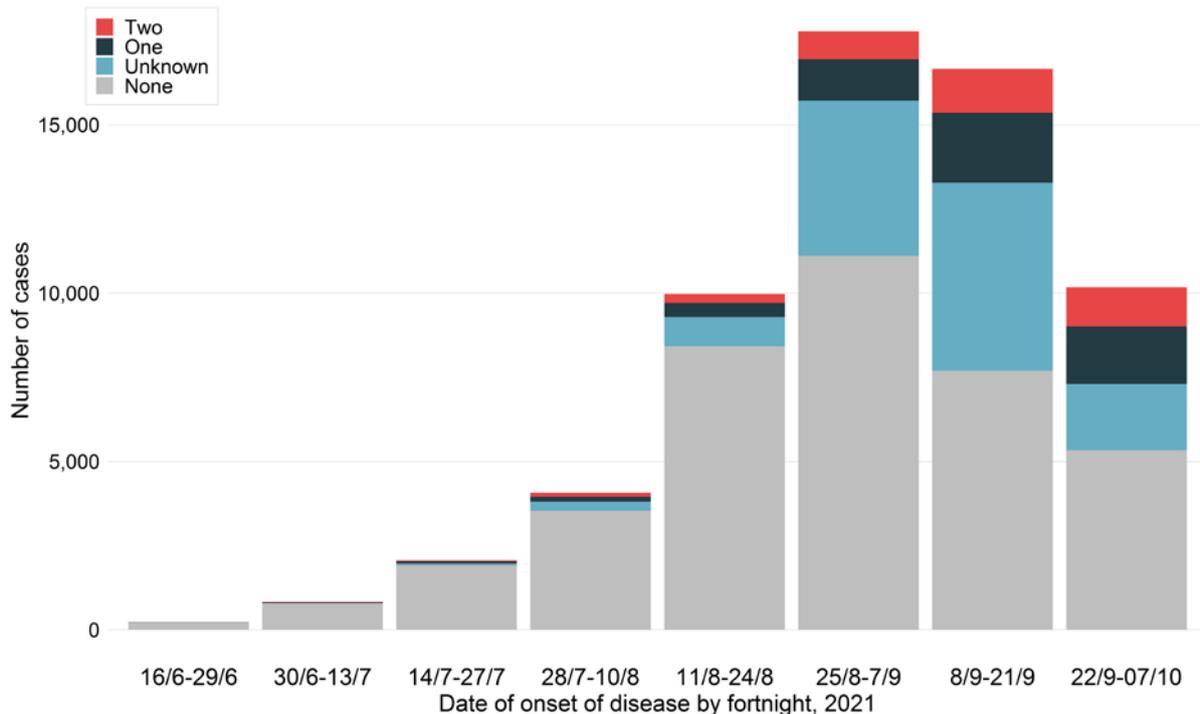
† Unknowns were classified if they had unknown vaccination status in NCIMS and did not match to an AIR record of vaccination

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Number of COVID-19 cases in NSW by valid vaccine doses received and fortnight of start of infection (16 June to 7 October 2021)



Interpretation: The vaccination status of cases was more likely to be unknown for the period 25 August to 21 September, when the greatest numbers of cases were diagnosed. Direct detailed manual review in the AIR of a random sample of cases (n=50) with unknown vaccination status found that 82% did not have a COVID-19 vaccine. This suggests that the majority of the cases classified with unknown vaccination are likely to be unvaccinated.

Contributors: Bette Liu, Victoria Pye, Zhisheng Sa (NSW Public Health Response Branch); Kaitlyn Vette, Helen Quinn, Alex Hendry, Heather Gidding, Kristine Macartney (National Centre for Immunisation Research and Surveillance).