



Impact of COVID-19 on School-based Vaccination Programs

Module 1, 2 & 3: Final report

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Executive summary

Background

The COVID-19 pandemic has impacted routine vaccination services and activities globally. To mitigate the impact of the pandemic, Australian governments implemented a suite of measures including border restrictions and physical distancing, ranging in stringency up to general ‘stay at home’ orders and jurisdiction-wide restrictions on school attendance, referred to hereafter as ‘school closures’. Remote learning was generally encouraged for those children able to, but vulnerable children and children of essential workers were able to attend classes in person. There is little information available regarding the impacts of these response measures on school-based vaccination programs in Australia.

Aims

- Evaluate the impact of the COVID-19 pandemic and associated response measures on school-based vaccination programs and adolescent vaccination uptake in Australia
- Identify measures taken to mitigate these impacts, and evaluate their effectiveness
- Identify barriers and facilitators of uptake of adolescent vaccines during the pandemic
- Make recommendations, including on monitoring and program enhancements

Methods

Module 1: Adolescent vaccination uptake

Adolescent vaccination (human papillomavirus [HPV], diphtheria-tetanus-pertussis [dTpa] and meningococcal ACWY [MenACWY]) uptake was assessed using Australian Immunisation Register (AIR) data as at 31 January 2022, comparing pre-pandemic (2018–2019) and pandemic (2020–2021) periods.

Module 2: Key stakeholder perspectives

Key stakeholders were interviewed to assess their perspectives on the impact of the COVID-19 pandemic on school-based vaccination programs and adolescent vaccination uptake, and the appropriateness and effectiveness of measures implemented to mitigate impacts.

Module 3: Online surveys and interviews

Online surveys

Online surveys aimed to assess broader perspectives on the impact of the pandemic on school-based vaccination programs and adolescent vaccination uptake, and measures

implemented to mitigate impacts. The surveys were tailored to specific groups, with a mix of open-ended and close-ended questions. A range of stakeholders involved in the school-based vaccination program and/or catch-up vaccination arrangements (i.e. school-based program nurse immunisers/coordinators, school staff and general practitioners [GPs]) were invited to complete an anonymous online survey.

Interviews

We interviewed a selection of respondents to the online survey who provided their contact details, to gain more in-depth insights on the issues raised in the quantitative survey, along with parents of adolescents eligible for vaccination in school-based programs in 2021 in New South Wales (NSW), Victoria and South Australia (SA).

Results

Module 1: Adolescent vaccination uptake

The number of first dose HPV vaccinations in 2020 and 2021 was 10–11% lower than in 2019, although the number of vaccinations in March and April 2020 was 24% and 84% lower, respectively, than the same months in 2019, reflecting school closures at the start of the pandemic. Following the staged reopening of schools and recommencement of school vaccination programs in May–June 2020, the monthly number of first dose HPV vaccinations in the second half of 2020 was substantially (75–303%) higher than in previous years. In contrast, the number of second dose HPV vaccinations administered in the same calendar year as the first dose was substantially lower in 2020 and 2021 than in 2019, with the monthly number 7–42% lower from August to November 2020 and 57–71% lower from August to October 2021. The number of adolescent dTpa and MenACWY vaccinations in 2020 and 2021 was slightly lower than in 2019, with the pattern of monthly uptake at the national level similar to that for the first dose of HPV vaccine.

The majority of adolescent vaccinations during the pandemic years 2020 and 2021 continued to be provided in a community health/local council setting, the provider type recorded for most school-based vaccinations. However, compared to pre-pandemic years, there was a slight increase in the proportion of adolescents receiving HPV and dTpa vaccinations in general practice settings, which was more noticeable in Indigenous adolescents. A much larger proportion of catch-up second dose HPV vaccinations (given in the year after the first dose) in 2021 were given in community health/local council settings.

Module 2: Key stakeholder perspectives

Twelve key stakeholders were interviewed, including jurisdictional immunisation program managers or other senior program staff, with all states and territories represented.

As well as the impact of lockdowns, school closures and other forms of movement control from early in the pandemic, the rollout of the COVID-19 vaccination program in 2021 also impacted school-based vaccination programs, including in jurisdictions where there were no lockdowns, with school-based program staff seconded to COVID-19 vaccination clinics. Once adolescents aged 12–15 years became eligible for COVID-19 vaccination in late 2021, the minimum intervals recommended between COVID-19 vaccine and other vaccines caused considerable issues. Flow-on effects of COVID-19 vaccination hesitancy to school-based vaccination in some communities were also reported; the specific concerns identified were the changing ATAGI (Australian Technical Advisory Group on Immunisation) advice on the interval between COVID-19 and school-based vaccinations (from 14 days to 7 and then 0), perceived frequent changes in ATAGI advice on COVID-19 vaccination more generally, and 'vaccine fatigue'. Lack of information in different languages for culturally and linguistically diverse (CALD) communities was reported as a barrier to addressing such issues.

Substantial decreases in HPV vaccination uptake were reported by key stakeholders in NSW, Victoria, Queensland, Tasmania, the Australian Capital Territory (ACT) and Western Australia (WA); a slight decrease was reported in SA and the Northern Territory (NT). Uptake of the second dose of HPV vaccine was reported to be affected more than the first dose. In some states (Victoria and Tasmania) the impact was reported to be more pronounced in 2020, while in others (WA and ACT) it was greater in 2021. A decrease in the uptake of dTpa vaccination was reported in all states and territories except SA and NT, but the impact was reported to be less than for HPV due to the single dose of dTpa involved. The impact on MenACWY vaccination uptake was reported to be minimal with a slight decrease, except in SA and ACT where an increase was reported.

Key stakeholders reported implementing a number of strategies to mitigate pandemic effects on school-based vaccination programs, including increased communication to immunisation providers and program/school staff; development of specific resources and guidance materials, for example, for services working with priority populations such as CALD groups; adaptation of service delivery models during lockdown periods, for example, using alternative venues; and innovative approaches to catch-up vaccination including weekend or after-hours clinics, and 'pop-up' clinics at places like shopping centres.

Module 3: Online survey and interviews

GP online survey

Six hundred and twenty-nine GPs participated in the online survey. The majority of them worked in metropolitan areas (69%), followed by regional (26%) and remote (5%) areas. The

highest proportion of GP respondents were from NSW (38%), followed by Victoria (28%). The majority of GP respondents were female (58%) and 61% were 55 years and older.

Approximately two-fifths of GPs believed there was no impact on uptake of school-based vaccination during the COVID-19 pandemic, one in eight thought there was a decrease in uptake, one in ten thought there was an increase, and one-third were unsure. Among GPs who believed there was a decrease in uptake, the most common reason given was school closure (50%), followed by parents' hesitancy (29%) and staff/student absenteeism (28%). Approximately half of GPs agreed that parents were hesitant to have their adolescent children vaccinated at school during the pandemic or experienced service access barriers influencing their ability to do so, and 38% believed that adolescents were hesitant to be vaccinated at school during the pandemic. When asked what strategies were adopted to improve school-based vaccination during the pandemic, the most common strategies mentioned were reminders (30%) and further health education for parents (27%). Strategies employed by GPs during the pandemic were generally similar to those used before the pandemic.

Online survey of school-based program immunisers/coordinators and school staff

There were 310 respondents to the online survey, including immunisation coordinators from the public health sector or local councils (35%), nurse immunisers giving vaccines onsite at schools (32%), school staff responsible for coordinating immunisation at schools (27%), and respondents with other roles (5%). The majority were female (92%), with respondents mainly based in Queensland (33%), NSW (22%), WA (17%) and Victoria (11%).

Approximately two-thirds of survey respondents believed uptake of school-based vaccines had decreased during the pandemic; the most common reasons identified were staff and student absenteeism (79%), consent forms not being returned (65%), and lockdowns/flexible learning from home (55%). Other reasons identified included concerns regarding issues such as physical distancing between students awaiting vaccination, and ongoing changes to guidelines, including the interval between vaccines, and 'vaccine fatigue'.

Reminder messages were the most commonly reported strategy to improve school-based vaccination coverage, with usage similar prior to (71%) and during (72%) the pandemic.

Fifty-six per cent of respondents agreed with the statement that parents of adolescents were hesitant to have their children vaccinated at school during the pandemic, and 58% agreed that adolescents were hesitant to receive their vaccines at school. Furthermore, 39% agreed that parents experienced service access barriers that influenced their ability to have their children vaccinated at school during the pandemic.

Interviews

School-based program immunisers/coordinators and school staff

We interviewed eight school-based program staff: three from NSW, two from Queensland, and one each from SA, Victoria and WA. Our findings from the in-depth interviews were broadly consistent with findings from the online survey. Respondents generally described modifying existing strategies to minimise the impact of the pandemic, rather than completely novel approaches. Most interviewees mentioned that the COVID-19 pandemic was a learning experience that had resulted in changing some work practices.

Parents

We interviewed 21 parents of children eligible for school-based vaccinations in 2021 from three states: NSW and Victoria (Year 7 students in 2021), and SA (Year 8 students in 2021). These parents represented a range of positions towards adolescent vaccination, being either accepting (15), hesitant (4) or refusing (2).

Parent interviews showed that the COVID-19 pandemic impacted families in different ways, and played a significant and diverse role in shaping parent decisions about both school-based vaccination and vaccination more broadly. The COVID-19 pandemic appears to have strengthened vaccination hesitancy among parents who had been hesitant prior to the pandemic. Parents' pre-existing vaccine hesitancy may have been exacerbated by personal negative experiences with COVID-19 vaccination, social influence from vaccine-hesitant people, and mistrust towards government communication about the pandemic COVID-19 vaccines. These parents often expressed mistrust towards government vaccination recommendations, and considered lockdowns and restrictions unnecessary and mandates unjustified. Some parents reported experiencing substantial pressure around COVID-19 vaccination from school, work, their doctor and peers, and negative social treatment when others found out they were unvaccinated. Examples included themselves or their children being barred from social and sporting events, refused health care, and losing friends over vaccination issues. These pressures and negative social repercussions exacerbated their negative feelings towards COVID-19 vaccination and, for some, routine adolescent vaccinations as well. Some hesitant and refusing parents reported making concerted efforts to reduce the time their children spent at school when vaccination sessions were scheduled.

In contrast, for parents who were supportive of vaccination, the pandemic has acted as a reminder of the importance of vaccinating; parents in this group referred to the COVID-19 pandemic 'raising awareness' of the value of vaccination. Many reported that for the first time during the pandemic, influenced by a recommendation from their GP or government messages, they decided to vaccinate their children against influenza. Parents often talked

about having a trusted GP who reminded the family about, encouraged and administered vaccinations if not given at school.

Vaccination was also made easier if it was accessible and convenient, and the school-based program was generally described as such. Pandemic-related disruptions (e.g. lockdowns) and difficulties in accessing health services or a GP to answer questions, or to arrange vaccination outside school, contributed to delays in vaccination. Most parents who did not object to vaccination reported that their adolescent obtained all school-based vaccinations in 2021 (either at school or with a GP, or combination thereof). Most parents reported learning about catch-up sessions from their school via newsletter, parent portal or email. Discussion of catch-up vaccination in the interviews with parents whose adolescents missed some vaccinations in 2021 were not straightforward, as many of these parents were not sure which vaccines their adolescent received and whether it was part of a single or multidose vaccine schedule. Many parents acknowledged gaps in their knowledge about the adolescent vaccination schedule, especially compared to the childhood schedule, and indicated this could be due to lack of an equivalent of the hand-held child health record. Some parents reported that school-based vaccination was not 'front of mind' for them during the pandemic, due to the dominance of COVID-19 vaccination messaging.

Limitations

Vaccine coverage estimates are likely to underestimate actual levels of coverage by a small but uncertain proportion, because of under-reporting. The experiences and perspectives of the people interviewed and surveyed may not be fully representative of the relevant groups. In particular, while we attempted to recruit parents from regional and rural areas, most of those interviewed were from metropolitan areas.

Conclusion

In conclusion, this evaluation found that COVID-19 had a variable impact on delivery of school-based vaccination programs in Australia. By strengthening and adjusting existing strategies, and use of some innovative approaches, school-based vaccination programs successfully mitigated many of the pandemic's impacts. The experience has enriched the understanding and skills of staff on how to run an effective immunisation program, even during a crisis situation. Finally, the pandemic has played a significant and diverse role in shaping parent decisions about both school-based vaccination and vaccination more broadly.

Recommendations

Mitigate immediate impacts of COVID-19 pandemic

Catch-up vaccination

- Optimise opportunities for catch-up vaccination and monitor vaccination coverage closely, including in priority groups, to ensure satisfactory levels are achieved in impacted cohorts.
- Develop targeted resources for priority populations, such as CALD communities, to facilitate catch-up vaccination.

Qualitative research and consultation

- Undertake further research to delineate impacts of the COVID-19 pandemic on parents' attitudes and behaviours in relation to school-based vaccination, and inform strategies to address relevant issues.
- Proceed cautiously if considering inclusion of COVID-19 within the school-based vaccination program; any decisions should be guided by research and consultation with parents on their perspectives.

Enhance support to immunisation providers on vaccination communication

- Equip immunisation providers with enhanced skills and resources to have conversations with vaccine-hesitant parents, for example, through the Sharing Knowledge About Immunisation (SKAI) platform, and resources to assist those conversations, such as decision aids and answers to frequently asked questions.

Incorporate lessons learnt to increase preparedness for future pandemics

Workforce planning

- Review workforce components of pandemic plans; consider ways to increase the pool of immunisation providers able to be seconded to pandemic vaccination programs without compromising school-based vaccination programs.
- Address the broader systemic issue of GP shortages, particularly in regional/rural areas, to facilitate access to catch-up vaccination.

Incorporate innovative models of catch-up vaccination into pandemic plans

- Incorporate innovative models for catch-up vaccination, such as 'pop-up' clinics at shopping centres, into pandemic plans (and potentially also into standard practice).

Electronic consent forms

- Expedite use of electronic consent forms.

Communication

- Enhance communication between the health sector (school-based program immunisation coordinators/providers) and the education sector.
- In public communications, use language that is respectful of parents' values and autonomy to make vaccination decisions for their children.
- Promote school-based vaccination through mainstream and social media.

Enhance information for parents and adolescents

- Investigate and address parents' and adolescents' information needs relating to adolescent vaccination.
- Consider providing all school-based vaccination information in a single place ('one-stop shop'), and/or via an app or incorporated into the school curriculum.

Introduction

Routine childhood and adolescent vaccination services and activities have been impacted globally during the COVID-19 pandemic.¹ To mitigate the impact of the pandemic, the Australian federal government and state and territory governments implemented a broad suite of measures, including border restrictions and physical distancing, ranging in stringency up to general 'stay at home' orders and jurisdiction-wide restrictions on school attendance, referred to often hereafter as 'school closures'. Distance education was generally encouraged for those children able to, but vulnerable children and children of essential workers were able to attend classes in person.² While there was initial evidence of parents delaying routine childhood vaccination,³ subsequent analyses showed little impact on childhood vaccination uptake,^{4,5} but some impact on uptake of adolescent vaccines, particularly the second dose of human papillomavirus (HPV) vaccine.^{4,6} Impacts on adolescent vaccine uptake were mitigated through state and territory health departments' efforts to facilitate alternate service delivery methods and support catch-up vaccination.^{4,6} However, little information is available on such measures and their impact, particularly in relation to 2021 uptake and catch-up rates. This is particularly important given that an increase in HPV vaccination coverage for both girls and boys, relative to the baseline, is a performance benchmark under the National Partnership on Essential Vaccines (NPEV) agreement.⁷

Aims

- 1) Evaluate the impact of the COVID-19 pandemic and associated public health response measures on school-based vaccination uptake of diphtheria-tetanus-pertussis (dTpa), HPV and meningococcal ACWY (MenACWY) vaccination in Australia
- 2) Identify measures taken by jurisdictions to mitigate these impacts, and evaluate their effectiveness
- 3) Identify barriers and facilitators of uptake of dTpa, HPV and MenACWY vaccines during the pandemic from the perspective of jurisdictions, school-based program immunisation coordinators, general practice staff, education staff and parents
- 4) Make recommendations, including on ongoing monitoring and program enhancements

Specific objectives include assessment of:

- Trends in vaccination uptake and levels of catch-up vaccination by age group, sex, Indigenous status, provider type and jurisdiction of residence
- Stakeholder perspectives on the impact of the COVID-19 pandemic on school-based vaccination programs, and the appropriateness and effectiveness of measures implemented to mitigate these impacts
- Perspectives of school-based program immunisation coordinators, general practice staff, education staff and parents on barriers and facilitators of uptake of school-based vaccination programs during the COVID-19 pandemic.

Methods

Module 1: Adolescent vaccination uptake

Adolescent vaccination uptake was assessed using Australian Immunisation Register (AIR) data as at 31 January 2022 to compare baseline school-based vaccination uptake in the pre-pandemic period (2018–2019) with the pandemic period (2020–2021).

HPV and dTpa vaccination

HPV and dTpa vaccination in Australia is delivered routinely in early high school (Year 7 or 8, depending on jurisdiction). HPV vaccination is a two-dose schedule, with the second dose given at least 6 months after the first dose. The number of first dose HPV and dTpa vaccinations given to adolescents aged 11 to <15 years during each calendar year (2018–2021) was calculated by gender, Aboriginal and Torres Strait Islander (hereafter respectfully referred to as Indigenous) status, jurisdiction, provider type and month of administration. The proportion of adolescents completing the two-dose HPV vaccination schedule within a calendar year (i.e. receiving the second dose in the same calendar year as the first dose) was calculated to compare the level of HPV course completion between the pre-pandemic (2018–2019) and pandemic years (2020–2021). Of those not completing the two-dose schedule within a calendar year, the proportion receiving the second dose in the following year (i.e. catch-up vaccination) was also calculated, and the extent of catch-up vaccination compared between pre-pandemic and pandemic years.

MenACWY

Adolescent MenACWY vaccination is typically given in Year 10. The number of MenACWY vaccinations given to adolescents aged 14 to <18 years during each calendar year (2019–2021) was calculated by Indigenous status, jurisdiction, provider type and month of administration, with comparisons made between pre-pandemic and pandemic years. The

number of doses given in 2018 was not included in counts for the pre-pandemic period due to the varying nature of state-funded MenACWY vaccination programs in place prior to it being funded as part of the National Immunisation Program (NIP) in 2019.

Module 2: Key stakeholder perspectives

Key stakeholders were interviewed via Zoom or Teams (Microsoft) to assess their perceptions of the impact of COVID-19 on school-based vaccination programs, and the appropriateness and effectiveness of measures implemented to mitigate these impacts.

Invitations for interviews were emailed to jurisdictional immunisation program managers or their delegates. Interview participants were asked if there were other key stakeholders in their jurisdictions who could provide important additional perspectives (respondent-driven sampling). Consent for interview was obtained by return email. Participation in the interviews was voluntary with participants free to withdraw consent at any time. Interviews were audio-recorded with consent of the participant. Interview responses were professionally transcribed and transcripts returned to participants for review, with the opportunity to make any amendments or additions deemed necessary. Responses were analysed to identify common themes and summarise state and territory initiatives or strategies to mitigate the impact of the pandemic.

Module 3: Online surveys and interviews

Online surveys

Online surveys aimed to assess broader perspectives on the impact of COVID-19 on adolescent vaccination uptake and the appropriateness and effectiveness of measures implemented to mitigate the impact. These surveys were tailored to specific groups, with a mix of open-ended and close-ended questions, informed by findings from Module 2. A range of stakeholders involved in the school-based vaccination program (school-based program nurse immunisers/coordinators and school staff) and/or catch-up vaccination arrangements (general practitioners [GPs]) were invited to complete an anonymous online survey developed in SurveyMonkey®.

The online survey was distributed in the following ways:

- Emailed to GPs via the Healthed email distribution list (Healthed is a private provider of education services for GPs and other primary care staff nationally)
- Emailed to jurisdictional immunisation program managers for distribution to school-based program nurse immunisers/coordinators and school staff in their jurisdictions (with an option in the survey for participants to provide their contact details for a follow-up 30-minute virtual interview).

Interviews

We sampled and interviewed parents of adolescents eligible for participation in the school-based vaccination program, and school-based program nurse immunisers/coordinators, to gain further insights on the issues that were raised in the quantitative survey. GPs were not interviewed as their predominant role in adolescent vaccination is limited to catch-up.

Qualitative enquiry offers a richer, more in-depth exploration and understanding of issues affecting vaccination uptake, compared to quantitative surveys. Qualitative findings are not meant to be representative of the larger population but instead to represent views of participants within a particular context. We used purposive sampling to recruit participants with relevant insights; due to time and resource limitations, sampling based on specific criteria with an equity lens in mind (e.g. gender, Aboriginal and Torres Strait Islander status, culturally and linguistically diverse [CALD] group, disability) was not feasible.

Parents

Parents of adolescents who were eligible for school-based vaccinations in 2021 were invited to participate in 30-minute virtual or phone interviews (depending on participant preference) to explore their experiences accessing school-based vaccination, including HPV, dTpa and MenACWY, during the pandemic. Based on the analysis of 2021 coverage data in Module 1, we recruited participants from three states with larger populations: two (New South Wales [NSW] and Victoria) in which there was substantial impact of the pandemic on adolescent vaccination, and one (South Australia [SA]) in which there was little impact. We recruited participants from each of these states until no new perspectives were captured and theme saturation was reached, determined through the process of analysis.

We used a professional recruitment agency to recruit participants with a good command of spoken English (interviews were conducted in English). Participants were reimbursed A\$60 for their time. Participant consent for interview was obtained by return email or verbally prior to the start of each interview. Participation in the interview was voluntary, with participants free to withdraw consent at any time until the findings were analysed. Interviews were audio-recorded with consent of the participant. Recordings were professionally transcribed.

The interview guide was informed by findings from Module 2 interviews and preliminary findings from the Module 3 online survey, with the aim to further explore those findings. Questions included parents' experiences with the school-based vaccination program during the pandemic, barriers and facilitators to their child's vaccination, what resources or initiatives were helpful, and suggestions for improvements.

School-based program nurse immunisers/coordinators and school staff

We invited a selection of school-based program nurse immunisers/coordinators and school staff who had provided their contact details in the online survey to participate in a 30-minute virtual or phone interview (depending on participant preference) to explore their experiences delivering school-based vaccination programs (HPV, dTpa, MenACWY) during the pandemic. Questions included the strategies or initiatives that were helpful during the pandemic, and suggestions for improvements. The interview guide was developed based on findings from Module 2 interviews and the Module 3 online survey. We interviewed participants until no new perspectives were captured and theme saturation was reached, determined through the process of analysis. We offered a token of appreciation (A\$50) for participating in the interviews.

Analysis of interview data

Each transcript was read by at least two researchers and notes compared. Analysis was conducted both individually and through a group process, with ongoing discussion, revision and further development of categories and themes. Thematic data analysis involved grouping key words and concepts into preliminary categories, grouping categories into overarching themes, and organising themes to articulate a coherent understanding of factors influencing uptake of vaccination among school-aged children during the pandemic. De-identified participant quotes were used to illustrate key themes.

Results

Module 1: Adolescent vaccination uptake

HPV

Figure 1 shows the number of first dose (and second doses administered in same calendar year) HPV vaccinations administered to adolescents aged 11 to <15 years in Australia in 2018–2021. The number of first doses administered in 2020 and 2021 was 10% and 11% lower, respectively, compared to 2019, but 5% and 4% higher, respectively, than in 2018. The number of second dose HPV vaccinations administered in the same calendar year as the first dose was 23% and 40% lower, respectively, compared to 2019, and 10% and 30% lower, respectively, than in 2018. Similar patterns were observed in Indigenous adolescents (Figure 2).

Figure 1. Number of first and second dose (administered in same calendar year) HPV vaccinations, adolescents aged 11 to <15 years, Australia, 2018–2021

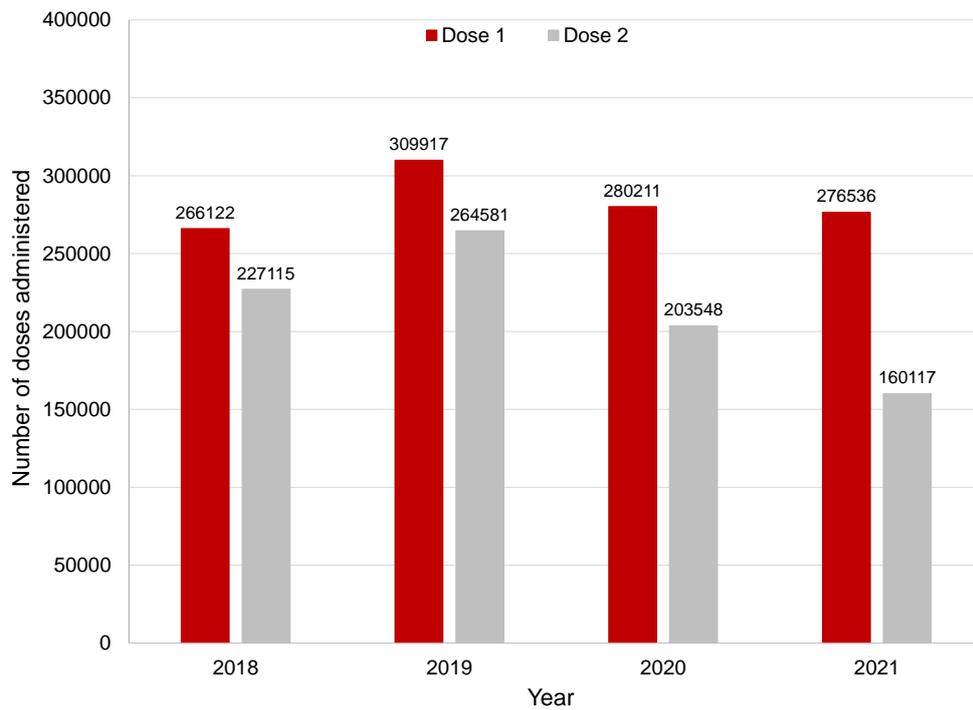
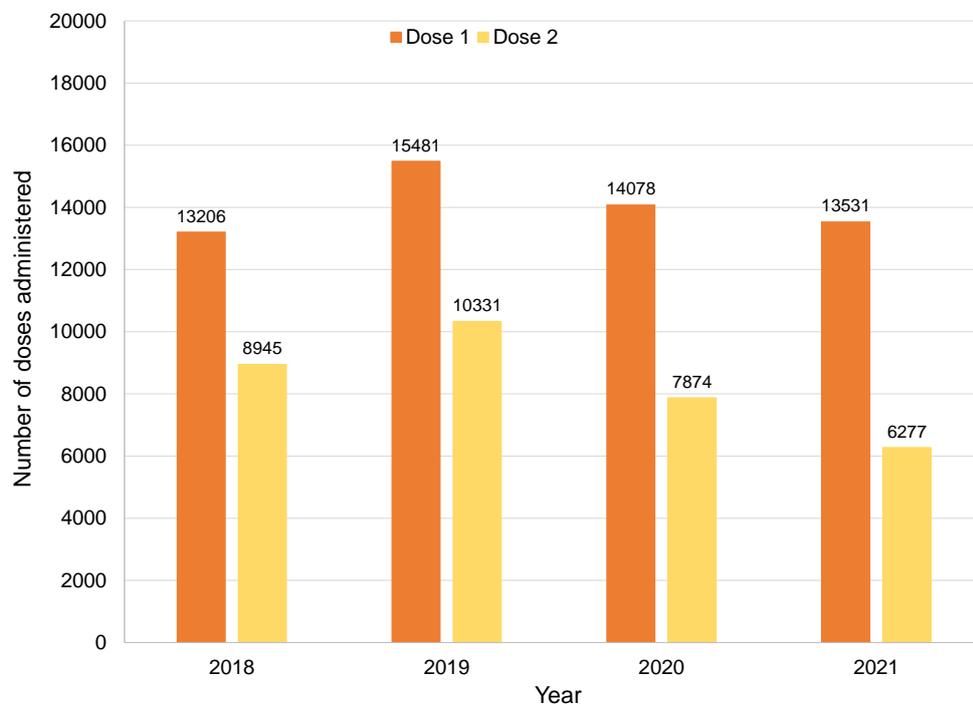


Figure 2. Number of first and second dose (administered in same calendar year) HPV vaccinations, Indigenous adolescents aged 11 to <15 years, Australia, 2018–2021



The number of first dose HPV vaccinations administered to adolescents aged 11 to <15 years in Australia in 2018–2021 is shown by month of vaccine administration in Figure 3. The number of first doses administered was highest each year in March, but was 14% and 24% lower in March 2020 than in March 2018 and 2019, respectively. In April 2020, 7,488 first doses were administered, 78% lower than in 2018 (34,687 doses) and 84% lower than in 2019 (46,306 doses). In June 2020, 27,822 first doses were administered, 545% higher than in 2018 (3,290 doses) and 746% higher than in 2019 (4,316 doses). Compared to 2018 and 2019, the number of first doses administered each month throughout July–December was 75–303% higher in 2020.

Figure 4 shows the number of second dose HPV vaccinations given to adolescents aged 11 to <15 years in Australia in the same calendar year as the first dose, by month of vaccine administration for 2018–2021. The number of doses administered was highest in October in 2018–2020 and in November in 2021. The peaks in October 2020 (61,598 doses) and November 2021 (71,330 doses) were 42% and 33% lower, respectively, than the peak in October 2019 (106,411 doses), and 30% and 19% lower, respectively, than October 2018 (87,847 doses). The number of second doses (in the same calendar year as the first dose) administered in December 2020 (20,611 doses) and December 2021 (17,359) were 205% and 157% higher, respectively, than the number administered in December 2019 (6,762 doses), and 350% and 279% higher, respectively, than December 2018 (4,580 doses).

The overall number of second dose HPV vaccinations given to adolescents aged 11 to <15 years in Australia in the year following the first dose (i.e. catch-up vaccination) was 11% higher in 2020 (23,678) than in 2019 (21,435) (Figure 5). In 2021, the number of catch-up vaccinations administered rose to 48,681, 106% higher than in 2020 and 127% higher than in 2019. The number of catch-up second doses administered was highest in March each year, with 10,909 doses administered in March 2021, 128% higher than March 2019 (4,790) and 165% higher than March 2020 (4,114).

Figure 3. Number of first dose HPV vaccinations, by month, adolescents aged 11 to <15 years, Australia, 2018–2021

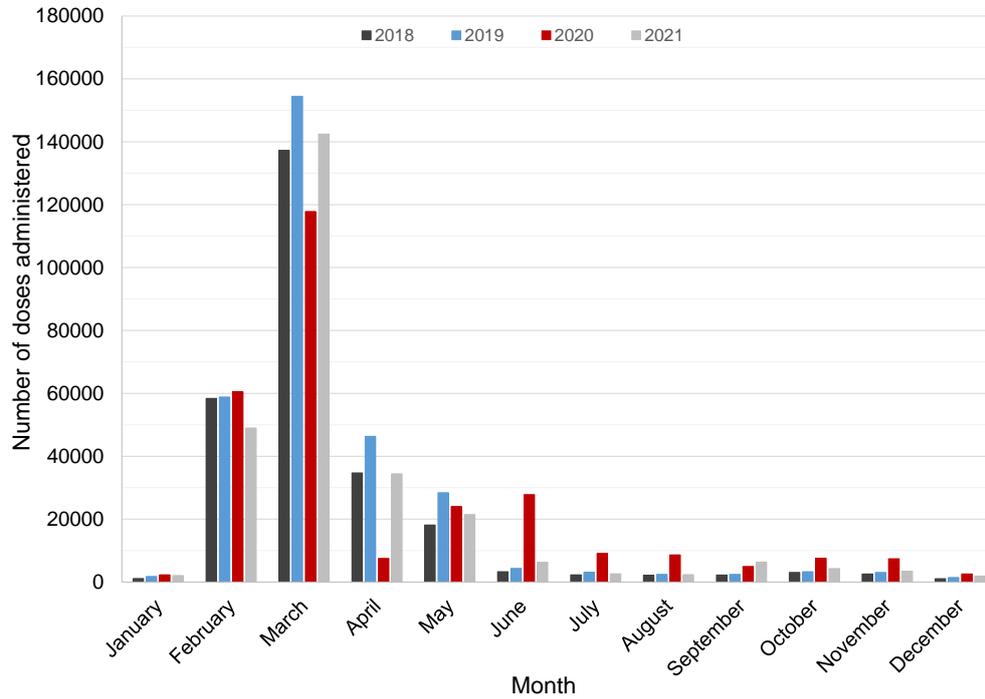


Figure 4. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Australia, 2018–2021

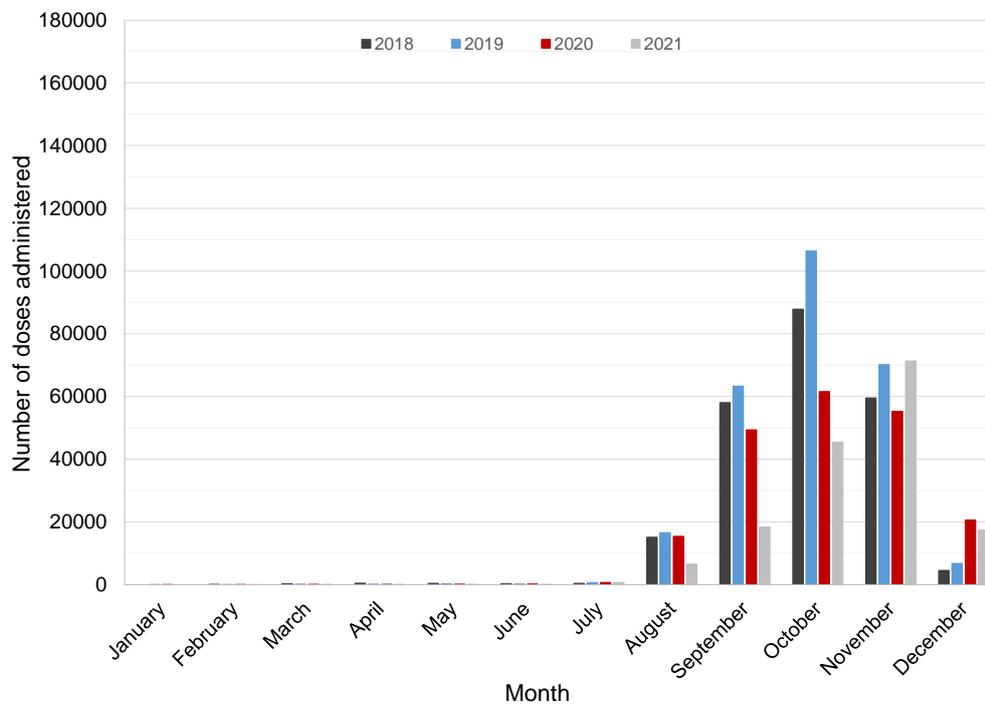
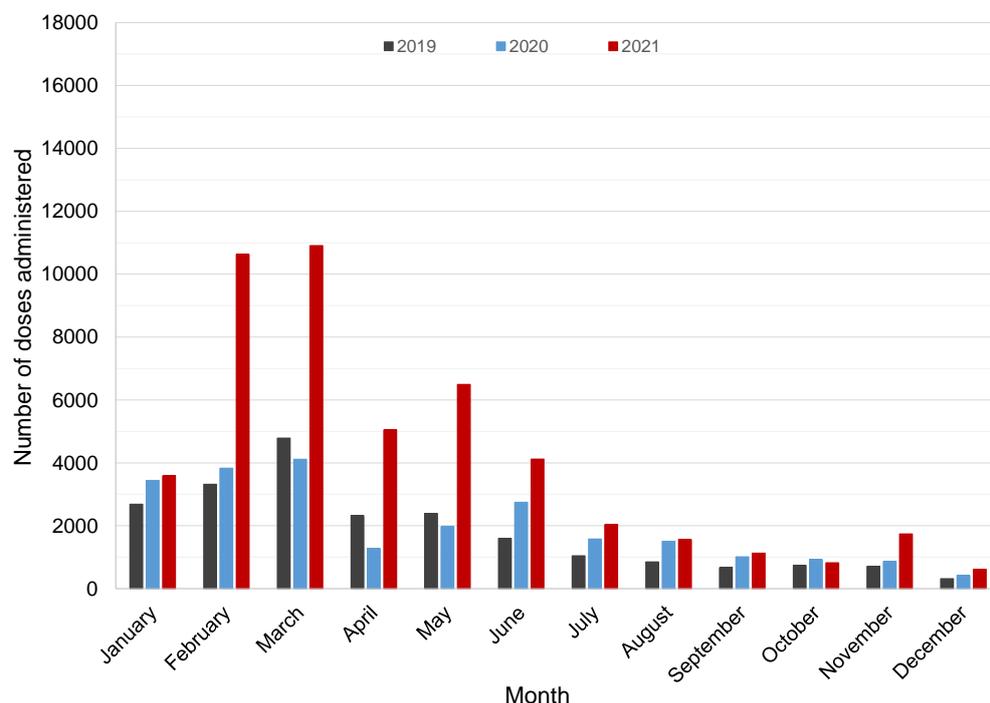


Figure 5. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Australia, 2019–2021



In 2018–2021, the majority of first and second dose HPV vaccinations given within the same calendar year to adolescents aged 11 to <15 years in Australia were administered in community health/council clinic settings (Table 1). While this was also the case for Indigenous adolescents, a larger proportion of the doses given each year to Indigenous adolescents were administered in general practice settings and ‘other’ settings, which includes Aboriginal Medical Services (AMS). A higher proportion of catch-up second doses (given in the year following the first dose) were given in general practice settings in both the pre-pandemic and pandemic years (Table 1). In 2019 and 2020, a similar proportion of catch-up second doses was administered within community health / council clinic settings and general practice settings, whereas in 2021, a higher proportion was given in community health / council clinic settings. A higher proportion of catch-up second doses given to Indigenous adolescents was administered in ‘other’ settings compared to first and second doses given in the same calendar year (Table 1).

Table 1. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years by provider type and Indigenous status, Australia, 2018 – 2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General Practice	10.4	11.2	13.0	12.6	14.9	15.3	17.8	19.0
Community Health / Council clinic	83.0	87.5	85.7	86.3	71.9	76.7	75.0	74.9
Other	6.6	1.2	1.3	1.1	13.2	8.0	7.2	6.1
	Dose 2 (given in same calendar year as Dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General Practice	7.6	7.7	10.0	15.0	10.4	10.1	12.5	17.0
Community Health / Council clinic	89.7	91.3	88.9	83.7	83.0	85.3	83.0	78.7
Other	2.8	1.0	1.1	1.3	6.6	4.6	4.4	4.3
	Dose 2 (given in calendar year following Dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	45.0	48.1	28.0		30.6	35.1	28.6	
Community health / council clinic	51.9	49.2	70.6		51.3	50.7	62.4	
Other	3.1	2.7	1.4		18.0	14.2	9.0	

Tables 2 and 3 show the number of girls and boys, respectively, who received a first dose of HPV vaccine in the years 2018–2021, by Indigenous status and jurisdiction. In all jurisdictions except Western Australia (WA), the number of first doses administered remained relatively stable across all years. The number of first doses at national level appears substantially lower in 2020 and 2021 than in 2019, but this is largely artefactual due to vaccination of a ‘double cohort’ in WA in 2019 when the school-based vaccination program transitioned from a Year 8 program to a Year 7 program, with students from both years vaccinated that year.

Table 2. Number of girls aged 11 to <15 years who received first dose of HPV vaccine, by Indigenous status and jurisdiction, Australia, 2018–2021

	All girls				Indigenous girls			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
ACT	2353	2395	2486	2432	77	50	56	52
NSW	42019	44356	43898	43215	2450	2527	2561	2479
VIC	32958	34565	34142	34233	453	422	441	416
QLD	28087	29700	29472	29350	2016	2157	2137	2156
SA	8206	8877	9017	9204	247	260	268	273
WA	13546	28517	15296	14250	739	1623	915	779
TAS	2845	2871	2693	2824	225	243	236	263
NT	1446	1482	1384	1222	642	616	517	448
AUS	131460	152763	138388	136730	6849	7898	7128	6866

Table 3. Number of boys aged 11 to <15 years who received first dose of HPV vaccine, by Indigenous status and jurisdiction, Australia, 2018–2021

	All boys				Indigenous boys			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
ACT	2318	2596	2513	2531	50	74	76	60
NSW	43128	45137	44911	43098	2301	2447	2420	2295
VIC	33592	35354	35366	35432	397	396	403	417
QLD	28694	30855	30209	30253	1853	1977	2094	2099
SA	8402	9245	8953	9496	211	297	291	287
WA	14210	29600	15896	14882	719	1521	915	792
TAS	2877	2882	2626	2829	218	213	229	277
NT	1441	1485	1349	1285	608	658	522	438
AUS	134662	157154	141823	139806	6357	7583	6950	6665

Tables 4 and 5 show the proportion of first dose adolescent recipients (girls and boys, respectively) who received a second dose of HPV vaccine in the years 2018–2021, either within the same calendar year as the first dose or in the following year (as catch-up), by Indigenous status and jurisdiction. The overall proportion of first dose recipient girls receiving a second dose in the same calendar year as their first was 12.6 percentage points lower in 2020 (73.7%) than in 2019 (86.3%), and a further 14.9 percentage points lower in 2021 (58.8%) (Table 4). For Indigenous girls, the proportion was 12.1 percentage points lower in 2020 (57.4%) than in 2019 (69.5%), and a further 10.2 percentage points lower in 2021 (47.2%) (Table 4). The proportion of first dose recipient girls receiving catch-up second dose vaccination in the calendar year after their first dose was 7.8% in 2019 and 7.3% in 2020, but 9.9 percentage points higher (17.2%) in 2021 (Table 4). A higher proportion of

Indigenous girls received catch-up vaccination across all years, 17.2% and 15.3% in 2019 and 2020, respectively, and 22.7% in 2021 (Table 4). For boys, the overall proportion of first dose recipients receiving a second dose in the same calendar year as their first was 12.8 percentage points lower in 2020 (71.5) than in 2019 (84.5%), and a further 14.6 percentage points lower in 2021 (57.1%) (Table 5). For Indigenous boys, the proportion was 9.4 percentage points lower in 2020 (54.4%) than in 2019 (63.8%), and a further 8.8 percentage points lower in 2021 (45.6%) (Table 5). The proportion of first dose recipient boys receiving catch-up second dose vaccination (Table 5) was 8.3%, 7.9% and 17.6% overall in 2019, 2020 and 2021, respectively, and 18.5%, 17.8% and 22.9%, respectively, in Indigenous boys.

The proportion of first dose adolescent recipients receiving a second dose of HPV vaccine within the same calendar year as the first dose varied by jurisdiction (Tables 4 and 5). In 2019, this ranged from 65.7% and 60.0% in the Northern Territory (NT) to 88.7% and 88.1% in WA for girls and boys, respectively. Compared to 2019, the proportion of first dose recipients receiving both the first and second dose of HPV vaccine in 2020 was lower in all jurisdictions, except the Australian Capital Territory (ACT; girls) and the NT (boys). The largest differential was in Tasmania for girls (18.7 percentage points lower in 2020 compared to 2019, 63.8% versus 82.5%, respectively) and in NSW for boys (17.9 percentage points lower in 2020 compared to 2019, 65.0% versus 82.9%, respectively). Lower proportions were again observed in 2021 in all jurisdictions except Victoria (girls and boys) and Tasmania (girls only), with the lowest proportion of first dose recipients receiving both doses of HPV vaccine in 2021 observed in the ACT (3.7% in girls and 4.5% in boys) and NSW (31.8% in girls and 30.3% in boys).

Catch-up second dose vaccination in the year after the first dose also varied by jurisdiction (Tables 4 and 5). In 2019, the proportion of first dose recipients receiving a catch-up dose ranged from 4.9% in SA to 21.6% in the NT for all girls, and from 9.5% in Victoria to 38.9% in the NT for Indigenous girls. There were only minor fluctuations in these proportions in 2020, but in 2021 a substantially higher proportion of girls (both overall and Indigenous) received a catch-up second dose in NSW, Victoria, WA and Tasmania. The proportion of first dose recipients receiving a catch-up dose in 2019 ranged from 4.6% in SA to 21.1% in the NT for all boys, and from 10.0% in SA to 38.7% in the NT for Indigenous boys. Similarly to girls, there were minor fluctuations in these proportions in 2020 and then substantially higher proportions of first dose recipients who received a catch-up second dose in 2021 in NSW, Victoria, WA and Tasmania.

More detailed HPV vaccination uptake data for each jurisdiction are presented in the appendices at the end of this report.

Table 4. Percentage of first dose HPV-vaccinated girls aged 11 to <15 years who received a second dose, by Indigenous status and jurisdiction, Australia, 2018–2021

	% Received dose 2 in same calendar year as dose 1							
	All girls				Indigenous girls			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
ACT	84.8	86.1	86.0	3.7	75.3	70.0	69.6	5.8
NSW	86.1	85.5	67.6	31.8	75.3	74.0	56.5	35.1
VIC	88.4	88.1	72.1	75.4	76.4	75.4	58.7	57.2
QLD	84.4	84.4	79.6	75.8	71.5	70.7	61.6	61.4
SA	87.1	86.9	83.3	80.1	65.6	63.1	62.3	59.7
WA	87.6	88.7	78.3	59.3	61.6	69.6	59.3	43.5
TAS	79.1	82.5	63.8	67.2	72.0	79.0	58.5	60.1
NT	64.5	65.7	60.3	59.1	42.7	41.9	35.0	32.4
AUS	86.1	86.3	73.7	58.8	69.2	69.5	57.4	47.2
	% Received dose 2 as catch-up in calendar year following dose 1							
	All girls				Indigenous girls			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
ACT	8.8	7.7	8.0		10.4	12.0	10.7	
NSW	10.0	10.1	25.5		15.8	15.6	28.0	
VIC	5.2	4.7	17.1		9.5	7.3	21.1	
QLD	7.8	7.4	10.0		12.8	12.6	17.1	
SA	4.9	5.4	7.1		13.8	12.7	10.8	
WA	7.0	6.2	13.8		21.4	14.9	20.7	
TAS	9.8	7.2	20.9		16.4	7.4	22.5	
NT	21.6	19.8	16.9		38.9	35.1	31.7	
AUS	7.8	7.3	17.2		17.2	15.3	22.7	

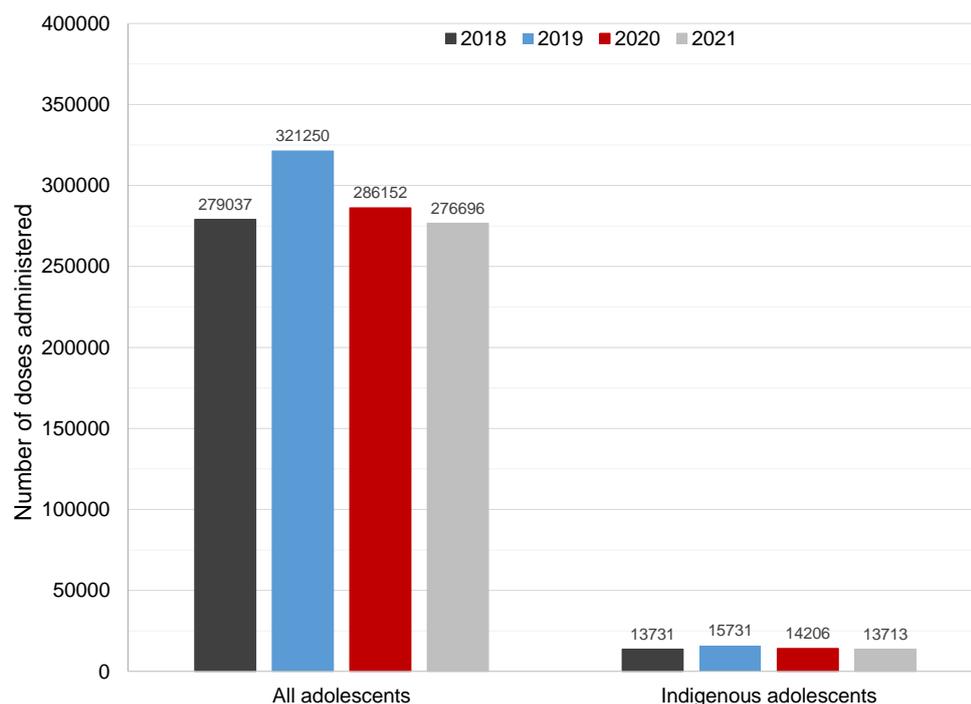
Table 5. Percentage of first dose HPV-vaccinated boys aged 11 to <15 years who received a second dose, by Indigenous status and jurisdiction, Australia, 2018–2021

	% Received dose 2 in same calendar year as dose 1							
	All boys				Indigenous boys			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
ACT	84.8	84.1	83.3	4.5	66.0	71.6	65.8	11.7
NSW	83.7	82.9	65.0	30.3	72.1	66.8	53.6	32.5
VIC	86.9	86.5	70.5	72.8	72.0	67.7	52.4	58.3
QLD	83.1	82.1	76.9	73.6	68.8	65.9	60.0	58.3
SA	86.1	85.3	81.3	78.4	67.8	62.6	59.8	56.1
WA	87.8	88.1	77.6	57.5	60.6	65.4	52.9	47.3
TAS	77.1	81.6	67.4	64.6	70.2	77.5	57.6	57.0
NT	61.3	60.0	60.0	53.4	36.0	35.9	34.5	28.3
AUS	84.6	84.5	71.5	57.1	66.1	63.8	54.4	45.6
	% Received dose 2 as catch-up in calendar year following dose 1							
	All boys				Indigenous boys			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
ACT	6.9	7.4	8.3		12.0	10.8	13.2	
NSW	11.9	11.5	27.3		18.1	19.1	30.1	
VIC	5.2	5.1	16.6		10.1	10.4	20.6	
QLD	7.7	7.7	10.5		14.4	15.1	17.0	
SA	4.6	5.5	7.2		10.0	13.5	10.3	
WA	6.9	6.5	13.4		22.0	17.8	21.6	
TAS	10.2	6.5	17.1		14.2	8.0	22.3	
NT	21.1	18.7	15.0		38.7	31.5	25.1	
AUS	8.3	7.9	17.6		18.5	17.8	22.9	

dTpa

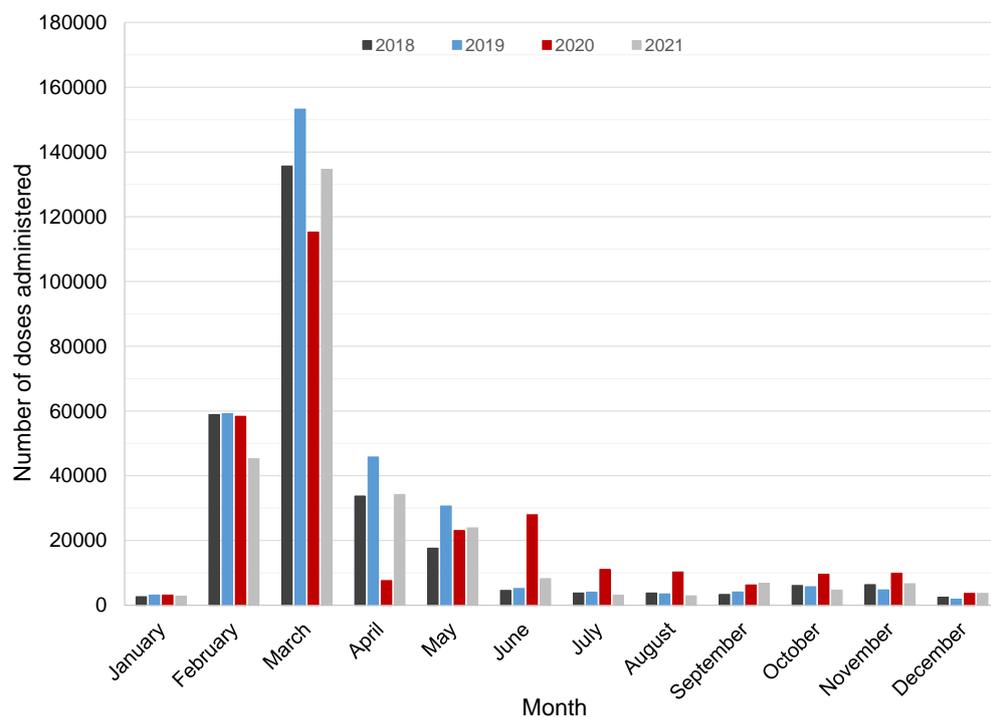
Figure 6 shows the number of dTpa vaccinations administered to adolescents aged 11 to <15 years in Australia in the years 2018–2021, by Indigenous status. Compared to 2019, the number of doses administered overall was 11% lower in 2020 and 14% lower in 2021, with a similar pattern observed in Indigenous adolescents.

Figure 6. Number of dTpa vaccinations, adolescents aged 11 to <15 years, by Indigenous status, Australia, 2018–2021



The number of dTpa vaccinations administered to adolescents aged 11 to <15 years in Australia in the years 2018–2021 is shown by month of vaccine administration in Figure 7. The number of doses administered was highest each year in March. However, the 115,259 doses administered in March 2020 was 15% lower than the number administered in March 2018 (135,668 doses) and 25% lower than in March 2019 (153,242 doses). In April 2020, only 7,634 doses were administered, 77% lower than in 2018 (33,721 doses) and 83% lower than in 2019 (45,806 doses). In June 2020, 27,934 doses of dTpa vaccines were administered, 437% higher than in 2018 (4,565 doses) and 512% higher than in 2019 (5,201 doses). The number of dTpa vaccines administered each month from July to December was 48–192% higher in 2020 than in 2018 and 2019. The monthly number of dTpa doses administered in 2021 followed a similar pattern to that of 2018 and 2019, except in February 2021 when it was 22–24% lower than in previous years.

Figure 7. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Australia, 2018–2021



In the years 2018–2021, the majority of dTpa vaccinations given to adolescents aged 11 to <15 years were administered in community health/council clinic settings (Table 6). While this was also the case for Indigenous adolescents, larger proportions of doses given to Indigenous adolescents were administered in general practice settings and ‘other’ settings, which includes AMSs, compared to all adolescents.

Table 6. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	13.3	12.9	13.8	14.1	16.3	15.8	18.0	20.3
Community health / council clinic	85.4	85.8	84.8	84.5	74.4	76.0	74.7	73.1
Other	1.3	1.4	1.5	1.4	9.3	8.2	7.4	6.6

Table 7 shows the number of adolescents aged 11 to <15 years who received a dose of dTpa vaccine in the years 2018–2021, by Indigenous status and jurisdiction. Compared to 2019, the number of dTpa vaccines administered in 2020 was lower in all jurisdictions. The

number of doses administered in 2020 appears substantially lower than in 2019, but this is largely artefactual due to vaccination of a 'double cohort' in WA in 2019 when the school-based vaccination program transitioned from a Year 8 program to a Year 7 program, with students from both years vaccinated that year. Compared to 2020, the number of dTpa vaccines administered in 2021 was 85% lower in the ACT, 7% lower in NSW and the NT, and 6% lower in WA, but higher in all other jurisdictions.

More detailed dTpa vaccination uptake data for each jurisdiction is presented in the appendices at the end of this report.

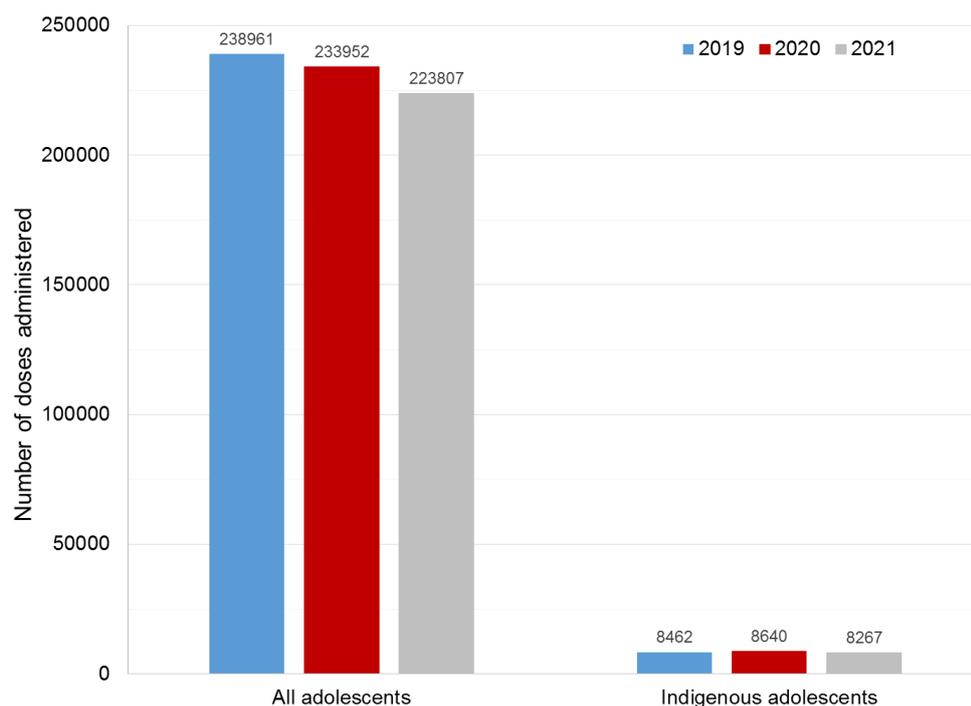
Table 7. Number of dTpa vaccinations given to adolescents aged 11 to <15 years, by Indigenous status and jurisdiction, Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
ACT	4610	5148	4817	704	115	129	115	32
NSW	89562	92700	90751	85614	4885	5067	5036	4813
VIC	68885	72362	70268	71359	859	833	848	843
QLD	59597	62767	61216	61304	3979	4187	4316	4362
SA	17575	18902	18679	19315	493	557	563	579
WA	30001	60447	32225	30227	1555	3171	1823	1622
TAS	5646	5884	5404	5587	437	474	466	528
NT	3161	3040	2792	2586	1408	1313	1039	934
AUS	279037	321250	286152	276696	13731	15731	14206	13713

Meningococcal ACWY

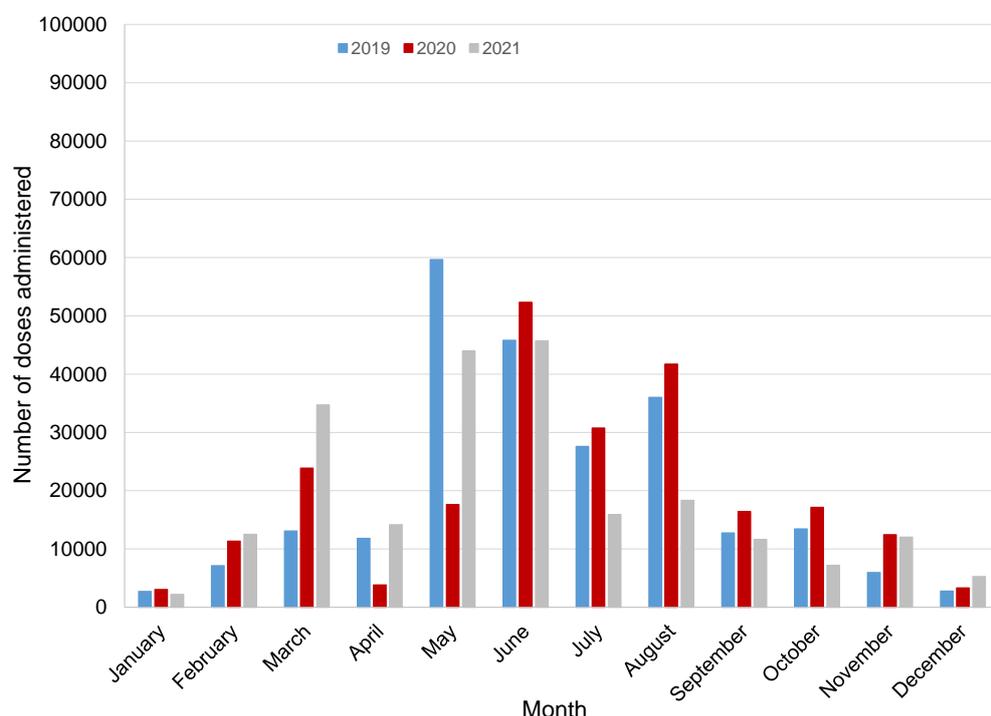
Figure 8 shows the number of MenACWY vaccinations administered to adolescents aged 14 to <18 years in Australia in the years 2019–2021, by Indigenous status. Compared to 2019, the number of doses administered overall in 2020 and 2021 was 2% and 6% lower, respectively, and 2% higher and 2% lower, respectively, in Indigenous adolescents.

Figure 8. Number of meningococcal ACWY vaccinations, adolescents aged 14 to <18 years, by Indigenous status, Australia, 2019–2021



The monthly number of MenACWY vaccinations administered to adolescents aged 14 to <18 years in the years 2019–2021 is shown in Figure 9. In 2019, the highest number/proportion of doses was administered in May (59,666 doses, 25%). In contrast, only 17,634 (8%) 2020 doses were administered in May, but the monthly number of doses administered between June and December 2020 was 11–109% higher than in 2019. In 2021, 43,981 and 45,743 doses were administered in May and June, respectively, but between July and October, the number of monthly doses was 9–58% lower than in 2019 and 2020.

Figure 9. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Australia, 2019–2021



In each of the years 2019–2021, the majority of MenACWY vaccinations in adolescents aged 14 to <18 years in Australia were administered in community health/council clinic settings (Table 8). While this was also the case for Indigenous adolescents, larger proportions of doses in Indigenous adolescents were administered in general practice settings and ‘other’ settings, which include AMSs, compared to all adolescents.

Table 8. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Australia, 2019–2021

	All			Indigenous		
	Pre-pandemic	Pandemic		Pre-pandemic	Pandemic	
	2019	2020	2021	2019	2020	2021
General practice	14.8	14.9	14.7	21.1	20.8	21.7
Community health / council clinic	84.1	83.9	84.0	72.9	74.0	73.5
Other	1.1	1.2	1.3	6.0	5.2	4.8

Table 9 shows the number of adolescents aged 14 to <18 years who received a dose of MenACWY vaccine in the years 2019–2021, by Indigenous status and jurisdiction. In all jurisdictions except the ACT and NSW, the number of MenACWY vaccines administered in 2020 was lower than in 2019, ranging from 1% lower in WA to 20% lower in the NT. Compared to 2020, the number of MenACWY vaccines administered in 2021 was stable or higher in all jurisdictions except NSW and the NT, where it was 16% and 15% lower, respectively (Table 9).

More detailed MenACWY vaccination uptake data for each jurisdiction is presented in the appendices at the end of this report.

Table 9. Number of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by Indigenous status and jurisdiction, Australia, 2019–2021

	All			Indigenous		
	Pre-pandemic	Pandemic		Pre-pandemic	Pandemic	
	2019	2020	2021	2019	2020	2021
ACT	4310	4336	4603	107	107	92
NSW	75291	75945	63773	2967	3336	2885
VIC	58813	56199	59530	596	617	615
QLD	52081	50769	50362	2539	2765	2827
SA	19004	17915	17365	383	396	395
WA	26624	26350	25844	1282	1005	1095
TAS	1208	1141	1227	118	114	107
NT	1630	1297	1103	470	300	251
AUS	238961	233952	223807	8462	8640	8267

Module 2: Key stakeholder perspectives

Virtual semi-structured interviews of key stakeholders were conducted from 23 March to 11 April 2022. All eight state and territory immunisation program managers either agreed to participate or nominated a delegate to attend the interview. A total of 12 stakeholders were interviewed in eight interview sessions, with four interviews attended by an additional colleague directly involved with school immunisation programs. Four stakeholders sent written responses in addition to the verbal information provided through the interviews.

The stakeholders identified themselves as immunisation managers (n=5), managers of the school health team (n=2), senior policy officers responsible for school health vaccination (n=2), nurse consultant/coordinator of the immunisation team (n=2), and nurse director (n=1).

Delivery of school-based vaccination program

Immunisation units based in state and territory government health departments oversee delivery of school-based vaccination programs, including ensuring funding, supply and delivery of vaccines, and provide resources to support program implementation, such as immunisation fact sheets and consent forms. The program is delivered by local councils in Victoria, Tasmania and SA; by public health units and community health centres in NSW; by the Child and Adolescent Health Service, WA Country Health Service and two local government authorities in WA; by school nurses employed by NT Health in the NT; by a mix of providers (including councils and contracted private providers) in Queensland; and by a dedicated school health team from the health department in the ACT.

Of the three nationally scheduled vaccinations provided at school (HPV, dTpa and MenACWY), HPV and dTpa are offered in Year 7 across Australia, except in SA where they are given in Year 8, and MenACWY is offered in Year 10 in all jurisdictions except the NT where it is administered in Year 9. The first dose of HPV vaccine is typically given towards the start of the school year, so that the second dose can be given in the second half of the school year with the recommended minimum 6-month interval between the two doses. School-based program vaccination data are entered into the AIR, either by the vaccine providers or other program staff.

Across all states and territories, the process for collecting consent for vaccination is still predominantly paper-based. NSW, Victoria and WA are currently building a new electronic consent system, which is likely to be available in coming years, and other states and territories are also considering an electronic system. Some councils in Victoria, one Hospital and Health Service in Queensland, and at least one private school in the NT are already using electronic consent forms. Telephone consent (when parents are called by the school-based program team to ask if they agree for their child to be vaccinated when a signed consent is not available) is also practised in all jurisdictions except Tasmania. In Queensland, only the vaccine service provider may call parents and this is not part of routine practice. In NSW, telephone consent is accepted in exceptional circumstances only, as specified in operational protocols, with appropriate verification and documentation. In Victoria, use of telephone consent varies depending on individual council requirements. Data are not available on whether the COVID-19 pandemic has had an impact on the frequency of telephone consent in relevant jurisdictions.

Impact of 'lockdowns' and other forms of movement control

Disruption to school-based vaccination programs occurred during the pandemic due to 'lockdowns' and other forms of movement control associated with stay at home orders and

requirements for schools to deliver flexible learning remotely to students at home rather than onsite. In the second quarter of 2020, there were lockdowns lasting approximately 6 weeks in all states (NSW, Victoria, Queensland, WA, SA, Tasmania) and the ACT, but only short periods of lockdown in the NT coinciding with holidays (e.g. Easter). There was a further extended period of lockdown in Melbourne in the second half of 2020 lasting approximately 16 weeks. In NSW, WA, Queensland, SA, Tasmania and the ACT, there were shorter lockdowns in late 2020 lasting a few days to several weeks. In 2021, there were prolonged lockdowns in NSW (late June to mid-October), Victoria (early August to late October) and the ACT (mid-August to mid-October). In other states and territories, there were few or no significant lockdowns in 2021.

Impact of COVID-19 vaccination program

In 2021, issues relating to the COVID-19 vaccination program impacted school-based vaccination programs, including in jurisdictions where there were no lockdowns. This included secondment of staff to the COVID-19 vaccination program rollout from early 2021.

“In the first term of 2021, our major provider ... about 70% of vaccinations are given by this one provider, but all of their staff were pulled off to work [on COVID-19 vaccination].”

— Interviewee from WA

Then, once COVID-19 vaccines became available for 12–15-year-olds in late 2021, the minimum intervals recommended between COVID-19 vaccine and other vaccines caused considerable issues.

“But then in 2021 we really didn’t have COVID cases in Tassie. ... I think probably what happened towards the end of 2021 was the COVID vaccine coming out and it was actually the two-week interval that was needed between school-based vaccines and the COVID vaccine that disrupted the school program more than lockdowns ... that was really difficult to manage and councils needed to rethink their dates and do extra catch-up programs ... and some councils chose to catch children up the following year.”

— Interviewee from Tasmania

“We did have some issues in term 4 with the [COVID-19 vaccination expansion to younger adolescents] ... we had parents giving kids COVID vaccines potentially even at a clinic on a weekend before the school visits.”

— Interviewee from SA

“Parents were very concerned [about the interval] – they would write in bold marker [on the consent form], do not give my child COVID vaccination. So what I believe happened is a lot of parents said no to the school vaccination and then took the kids to the GP which they felt was something that they were more in control of or had oversight of.”

— Interviewee from Queensland

Flow-on effects of COVID-19 vaccination hesitancy to school-based vaccination in some communities were also reported, with specific concerns around changing ATAGI (Australian Technical Advisory Group on Immunisation) advice on the interval between COVID-19 and school-based vaccinations (from 14 days to 7 and then 0), perceived frequent changes in ATAGI advice on COVID-19 vaccination more generally, and ‘vaccine fatigue’. Lack of availability of information in different languages for CALD communities was reported as a barrier to addressing such issues.

Specific impacts on HPV vaccination

In most jurisdictions, HPV vaccine dose 1 is usually given in the first or second term of the school year, and dose 2 in the third or fourth term. Substantial decreases in HPV vaccination uptake were reported by interviewees in NSW, Victoria, Queensland, Tasmania, the ACT and WA; a slight decrease was reported in SA and the NT. Uptake of the second dose of HPV vaccine was reported to be affected more than the first dose. In some states (Victoria and Tasmania), the impact was more pronounced in 2020, while in others (e.g. WA and ACT) it was greater in 2021, and in Queensland, the impact was reported as similar in both years.

Specific impacts on dTpa vaccination

dTpa is usually administered with HPV vaccine dose 1, except in the ACT where it is usually administered with dose 2. In Queensland, the vaccine may be given with HPV dose 1 or dose 2 at the discretion of councils, while in Tasmania some councils administer dTpa with HPV vaccines and some administer dTpa separately. A decrease in the uptake of dTpa was reported in all states and territories except SA and the NT, but the impact was reported to be less than for HPV vaccine due to the single dose of dTpa involved.

Specific impacts on MenACWY vaccination

MenACWY vaccine is offered in Year 10, except in the NT where it is administered in Year 9. The timing of vaccination is variable: in SA, the NT and the ACT, the vaccine is scheduled in the first half of the school year (terms 1 and 2), while in NSW, Queensland and Tasmania, it is scheduled in the second half (terms 3 and 4). In WA it is administered in term 2, and in

Victoria in terms 2 and 3. The impact on MenACWY uptake was reported to be minimal with a slight decrease, except in SA and the ACT where an increase was reported.

Impact on vaccination of priority populations

All interviewees (except for those in the ACT) reported a probable impact of the pandemic on vaccine coverage among priority populations, including Aboriginal and Torres Strait Islander people, refugees, CALD populations and remote communities. Most were, however, unsure of the magnitude of impact due to lack of granular data. In WA, vaccination uptake among Aboriginal students was reported to be lower than in non-Aboriginal students.

“Yeah, they have and they’ve certainly been affected more. So, the decrease is greater for Aboriginal students than for non-Aboriginal between – so, we’ve had decline in rates between 2019, 2020 and 2021 and the decline has been greater for Aboriginal students and I think attendance probably is the biggest issue for Aboriginal students.”

— Interviewee from WA

Strategies to mitigate pandemic impacts

Interviewees reported undertaking a number of strategies to improve school-based vaccination programs during the pandemic (Table 10). Overall themes included increased communication with and support to stakeholders, including on how to adapt the service delivery model to deal with lockdowns and other forms of movement control; development of specific resources and guidance materials; and tailoring initiatives in response to requests/feedback from stakeholders.

Several jurisdictions reported initiatives to provide vaccination at alternative venues when schools were in remote learning mode, and some (SA, Queensland) mentioned innovative approaches to catch-up vaccination, including weekend or after-hours clinics and drop-in catch-up clinics at places like shopping centres.

“One of our council providers was extremely proactive and contacted parents to arrange an appointment at a weekend or after-hours immunisation clinic.”

— Interviewee from SA

Another key overarching theme was the importance of building on pre-existing strong working relationships with stakeholders, including education authorities, public health units and community health centres in regional areas, and pre-existing strategies to improve uptake. Three states (NSW, WA and Tasmania) mentioned their ongoing collaborative research work with the Kirby Institute, focused on improving HPV vaccination course initiation and completion. Other key strengths perceived by interviewees in terms of

mitigating pandemic impacts included the well-established service delivery model, with excellent communication with providers complemented by primary care services; the strong sense of rapport and collaboration between nurses, students, families and school staff generated by the pandemic response; enhancement of strategic partnerships between jurisdictional health departments and the educational sector; and the capacity of general practice to step up and play a greater role in catch-up vaccination.

Stakeholder recommendations

In terms of lessons learnt from the pandemic experience, several jurisdictions highlighted progress with online consent in relation to COVID-19 vaccination, and identified a need to build on this to expedite the move to electronic consent in school-based vaccination programs. Similarly, stakeholders considered that greater capacity for use of electronic (e.g. SMS) reminders would facilitate communication with parents. Stakeholders also identified a need to enhance the capacity of the AIR to provide reports on school-based vaccination uptake for key program stakeholders, in order to optimise feedback and efforts to address low coverage, and to establish a suite of initiatives to facilitate catch-up vaccination.

Table 10. Strategies undertaken by states and territories to mitigate pandemic impacts and optimise school-based program uptake in 2020 and 2021

State/Territory	Strategies	Strategies for priority populations
New South Wales	<p><u>Pandemic-specific</u></p> <p>Developed additional measures relating to COVID-19 vaccination, hand hygiene, screening, environmental cleaning and physical distancing, based on expert clinical advice, to reduce likelihood of COVID-19 transmission in the school setting and provide confidence to parents, schools and the broader community.</p> <p>Supporting catch-up vaccination opportunities for the broad Year 7 and Year 10 cohorts to maximise uptake.</p> <p>Engaging with schools and parents through targeted communications.</p> <p><u>General</u></p> <p>Collaborating with research programs (The Kirby Institute at UNSW) and other jurisdictions (Western Australia and Tasmania) to improve HPV vaccination course initiation and completion.</p> <p>Currently developing a statewide online consent and program management platform to replace the current physical consent form and remote scanning arrangements.</p>	<p><u>General</u></p> <p>Dedicated Aboriginal Immunisation Health Worker Program that supports vaccine uptake by Aboriginal students.</p> <p>Working with researchers to develop strategies to improve vaccine uptake by students with disabilities.</p>

State/Territory	Strategies	Strategies for priority populations
Victoria	<p><u>Pandemic-specific</u></p> <p>Dedicated project officer appointed centrally (Department of Health and Human Services [DHHS]) to support school-based vaccination program delivery.</p> <p>Increased DHHS contact with local councils; information shared on a fortnightly basis.</p> <p>DHHS supported local councils with regular emails, meetings and resources/strategies to promote immunisation services throughout the pandemic, including vaccination at alternate venues; additional vaccination sessions; and regularly updated frequently asked questions.</p> <p>Chief Health Officer letter sent to local councils and education sectors to remind them that vaccination is an essential health service during the pandemic that must be maintained.</p> <p>Initiatives tailored in response to direct requests/feedback from councils.</p>	<p><u>General</u></p> <p>Program for Refugee Immunisation, Monitoring and Education (PRIME) – Victorian Government initiative funded from 2016 to 2021 for eligible local councils to deliver a targeted immunisation program supporting catch-up immunisation in refugee and asylum seeker communities.</p> <p>Strengthening collaboration with other government departments – e.g. to promote messaging for at-risk children in out-of-home care.</p>
Queensland	<p><u>Pandemic-specific</u></p> <p>More frequent meetings with school-based program immunisation coordinators.</p> <p>Letter from Chief Health Officer allaying parental concerns/fears and emphasising importance of the program and ATAGI advice on co-administration of COVID-19 vaccine with school-based vaccinations.</p> <p>Identifying those who missed vaccines in the previous year and exploring options to encourage catch-up vaccinations.</p> <p>Monitoring and working with immunisation providers to further support the program – e.g. covering travel allowance to specific locations to ensure providers would deliver vaccination clinics in certain rural areas.</p>	<p><u>Pandemic-specific</u></p> <p>Department of Health increased travel allowances to specific rural locations within a few Hospital and Health Services to support rural and remote areas that had challenges getting providers to deliver vaccination clinics.</p>

State/Territory	Strategies	Strategies for priority populations
Western Australia	<p><u>Pandemic-specific</u></p> <p>Increased capacity of the school immunisation team for the metropolitan area, increased GP involvement, and expanded scope of pharmacists so that they could also offer catch-up for adolescent vaccinations.</p> <p>Department of Health enhanced communication with WA Primary Health Alliance (WAPHA) to send information on catch-up vaccination to general practice through WAPHA newsletters. (About a third of adolescents who missed vaccination at schools were caught up at GPs.)</p> <p>VaccinateWA (the electronic consent system for COVID-19 vaccines) is being expanded to include school-based program vaccines.</p>	<p><u>General</u></p> <p>Availability of existing multilingual information packs, brochures for vaccinations.</p>
South Australia	<p><u>Pandemic-specific</u></p> <p>Enhanced teamwork between departments of health and education, including coordination with schools.</p> <p>Coordination of school program schedule around COVID-19 vaccination program (particularly the interval between school-based and COVID-19 vaccines) and school activities.</p> <p><u>General</u></p> <p>Highlighting Australian Government education videos to promote awareness.</p> <p>Arrangement of appointments at weekends or after-hours immunisation clinics.</p>	<p><u>General</u></p> <p>Some councils coordinate with the existing Newly Arrived Refugee and Immunisation program – providing routine immunisation and catch-ups.</p> <p>Availability of translated resources used for culturally and linguistically diverse communities.</p>

State/Territory	Strategies	Strategies for priority populations
Northern Territory	<p><u>Pandemic-specific</u> (little COVID-19 impact on school program)</p> <p>Incorporating COVID-19 vaccines with school-based catch-up vaccines, particularly in remote areas.</p> <p><u>General</u></p> <p>Use of due and overdue lists to identify adolescents who have missed school-based vaccinations, and to track individual students in remote areas.</p> <p>Availability of talking books in schools and school-based vaccination program.</p> <p>Sending missed dose letters to parents.</p>	<p><u>General</u></p> <p>Outreach services for children who have missed doses: school nurses arrange driver to take students to community clinic for vaccinations.</p> <p>Home visits by Aboriginal health services for children who missed vaccinations.</p> <p>Meeting culturally and linguistically diverse communities in their gathering places (e.g. churches) and meeting with their community leaders.</p>
Tasmania	<p><u>Pandemic-specific</u></p> <p>Some councils ran extra childhood clinic sessions with extra staff so that parents could bring their Year 7 adolescents in for vaccination.</p>	<p>Some councils conducted novel activities such as a school barbeque where the nurse immunisers presented information about the vaccines and tried to engage with those kids, and encouraged them to come along and return their consent forms.</p>
Australian Capital Territory	<p><u>Pandemic-specific</u></p> <p>Strong relationship with ACT Education Directorate – increased frequency of meetings around communications and planning to deliver the programs.</p> <p><u>General</u></p> <p>Dedicated existing School Health Team to manage the school-based vaccination program.</p>	<p><u>General</u></p> <p>In 2020–2021, ACT Health conducted a quality improvement project targeting Aboriginal and Torres Strait Islander students to improve HPV vaccination completion rates.</p>

Module 3: Online surveys and interviews

Online GP survey

A total of 629 GPs participated in the survey. Not all respondents answered all questions and hence denominators presented vary across questions. The majority of GP respondents were female (57.6%). Sixty-one per cent were aged ≥ 55 years (Figure 10). The highest proportion of GP respondents were from NSW (38.0%), followed by Victoria (28.3%) (Figure 11). The majority worked in metropolitan areas (69.5%), followed by regional (25.9%) and remote (4.6%) areas.

Figure 10. Proportion of GP respondents by age group (n=629)

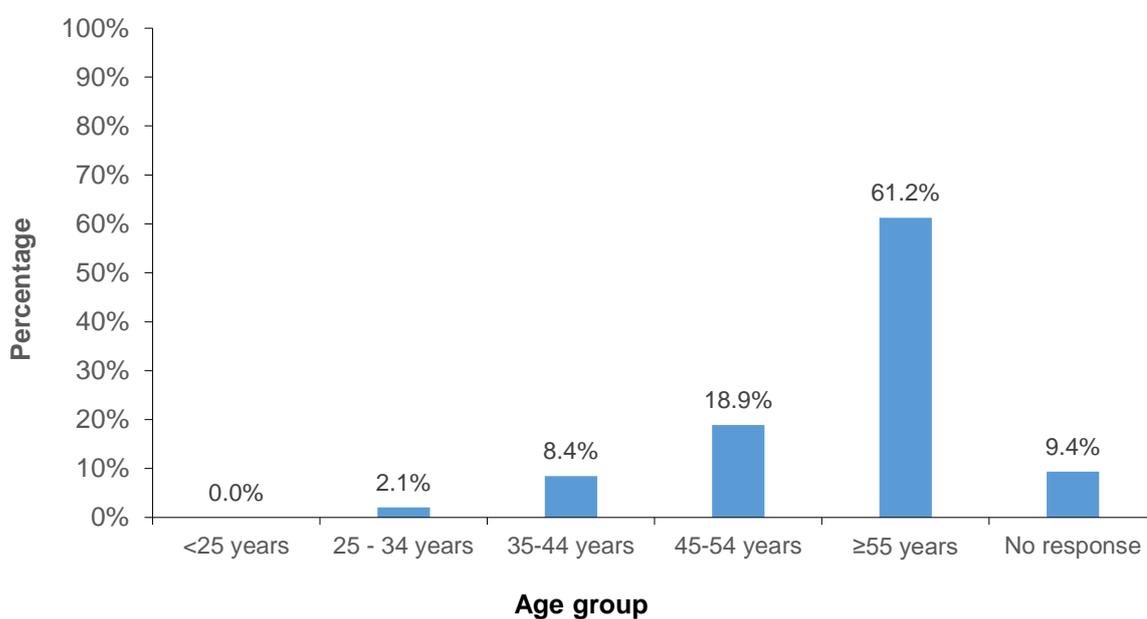
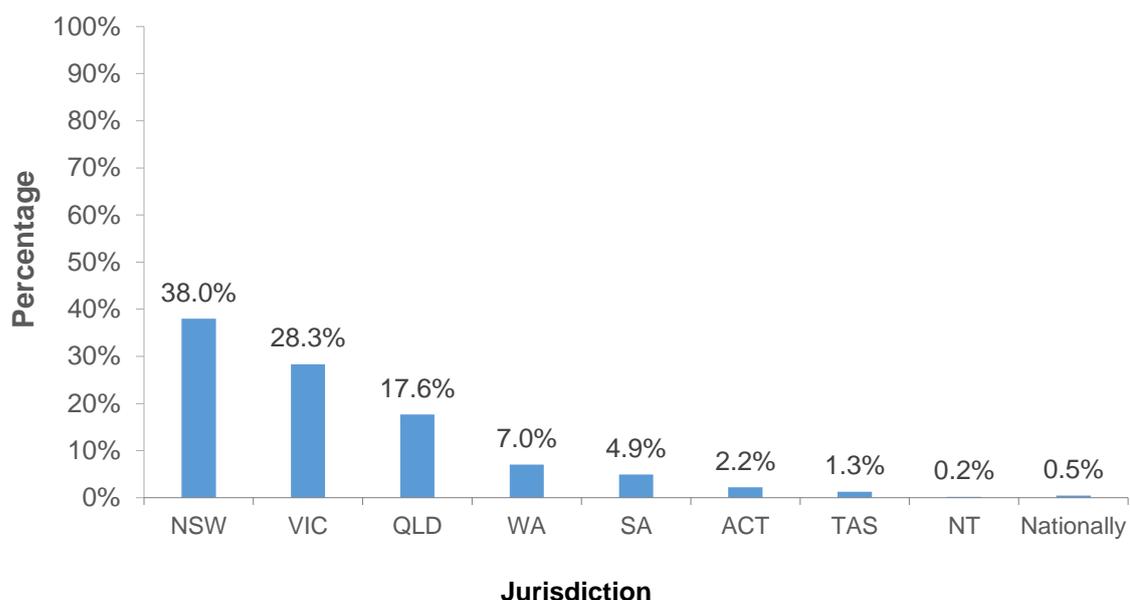


Figure 11. Proportion of GP respondents by jurisdiction (n=629)



ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia; Nationally = Australia

Impact of COVID-19 pandemic on uptake of school-based vaccinations

GPs' opinions about the impact of the COVID-19 pandemic on the uptake of school-based vaccinations are shown in Table 11. Of GPs who answered the question, 40–43% believed there was no impact on uptake of school-based vaccination during the pandemic, 14–17% that there was a decrease, and 9–14% that there was an increase, with approximately one-third unsure.

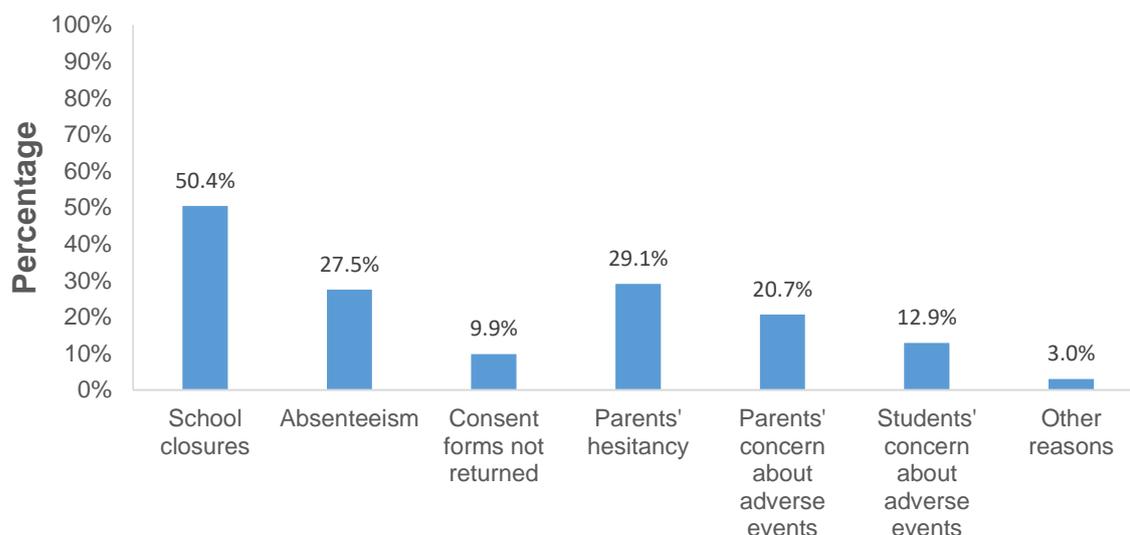
Table 11. GPs' opinions about the impact of COVID-19 pandemic on the uptake of school-based vaccinations

Vaccine	Increase n (%)	No change n (%)	Decrease n (%)	Don't know n (%)	Total responses
HPV 1	51 (9.2)	237 (42.9)	88 (15.9)	176 (31.9)	552
HPV 2	51 (9.3)	233 (42.4)	94 (17.1)	172 (31.3)	550
dTpa	77 (13.9)	229 (41.3)	79 (14.3)	169 (30.5)	554
MenACWY	77 (14.0)	218 (39.6)	84 (15.2)	172 (31.2)	551

Reasons for decreased uptake

Half (50.4%) of the GPs who believed there was a decrease in uptake of school-based vaccinations during the pandemic gave school closure as the reason for the decrease. Other reasons put forward included parents' hesitancy (29.1%) and student/staff absenteeism (27.5%) (Figure 12).

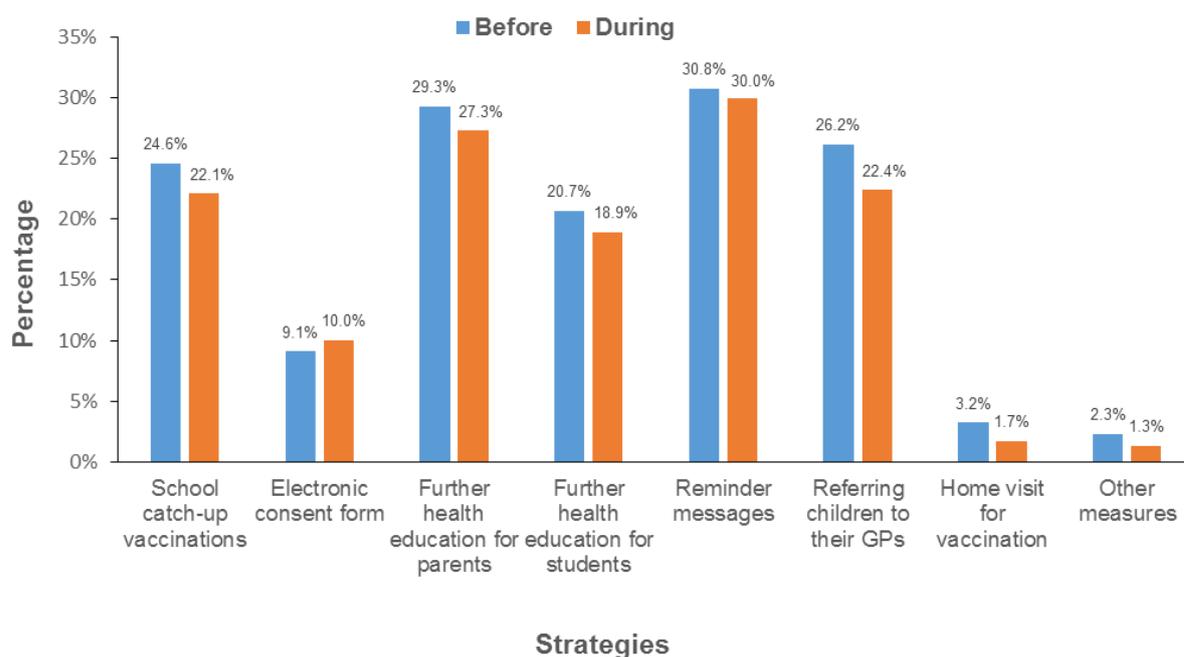
Figure 12. Reasons reported by GPs for negative impact of COVID-19 pandemic on uptake of school-based vaccinations (n=577)



Strategies that have been used or seen by GPs to improve school-based vaccination

The most commonly reported strategies to improve school-based vaccination during the COVID-19 pandemic were reminders (30%) and further health education for parents (27%) (Figure 13). The proportion of GPs reporting using or seeing these strategies to improve school-based vaccination was 1–4 percentage points lower during the pandemic than before, except for use of electronic consent forms (Figure 13).

Figure 13. Strategies used or seen by GPs to improve school-based vaccination coverage before and during the pandemic



When asked if they planned to schedule catch-up vaccination sessions for adolescents who missed their school-based vaccinations during the pandemic, 43.9% (276/497) of GPs responded that they did and 25.9% (163/497) that they did not.

Vaccine hesitancy and access barriers

Approximately half of GPs considered that parents were hesitant about having their children vaccinated at school during the COVID-19 pandemic and/or experienced service access barriers influencing their ability to get their children vaccinated at school during the pandemic, while 38.1% thought that adolescents were hesitant to receive their vaccines at school during the pandemic (Table 12).

Table 12. GPs' opinions on vaccine hesitancy among students and parents, and parents' experience of access barriers

Statements	Agree n (%)	Neutral n (%)	Disagree n (%)	Total
Parents were hesitant to vaccinate their children at school during COVID-19 pandemic	239 (48.4)	200 (40.5)	55 (11.1)	494
Parents experienced service access barriers influencing ability to vaccinate their children at school during COVID-19 pandemic	250 (51.0)	189 (38.6)	51 (10.4)	490

Adolescents were hesitant to receive their vaccines at school during COVID-19 pandemic	186 (38.1)	237 (48.6)	65 (13.3)	488
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Vaccine supply, storage and recording issues

A small proportion of GPs reported vaccine supply (5.2%, 27/519) and vaccine storage (3.1%, 16/511) issues. Most GPs (96.8%, 453/468) reported recording vaccination in the AIR.

Suggested strategies to improve school-based vaccinations

Eighty-three respondents suggested potential strategies to improve school-based vaccinations, as summarised below.

Educating parents and adolescents

Of 83 GPs who provided a response, 35 (42.2%) recommended more education of parents and adolescents (e.g. discussing vaccination, mailing information to parents, educational campaigns on safety of vaccines, facilitating education by teacher leadership team).

Catch-up vaccination

Of the 83 GPs, 12 (14.5%) emphasised having regular scheduling of adolescent catch-up vaccinations (e.g. on a monthly basis).

Reminders

Nine (10.5%) respondents highlighted the importance of sending reminders, including electronic reminders/messages and letters to parents to take their children to their GPs to get their missed scheduled vaccines.

Miscellaneous

Twenty-six (31.3%) GPs had further suggestions, including use of electronic consent forms, making AIR data easily downloadable to see vaccination status of adolescents at the practice level, encouraging practice nurses to check AIR vaccination records, and opportunistic questioning of parents and adolescents about vaccination status at their regular health visits.

Advertisement

Six GPs (7.2%) suggested advertising of adolescent vaccinations on buses, TV, radio, social media, and in GP clinics and schools.

Online survey of school-based program nurse immunisers/coordinators and school staff

There were 310 respondents to this online survey (Table 13), comprising immunisation coordinators from organisations responsible for delivering school-based vaccination programs (36.8%), nurse immunisers vaccinating adolescents in school-based programs (34.4%) and school staff responsible for coordinating vaccination programs on behalf of the school (28.8%). Respondents were predominantly female (91.9%), with 68.4% aged ≥45 years, and were based in Queensland (32.9%), NSW (22.3%), WA (16.5%) and Victoria (11.0%).

Table 13. Demographic characteristics of school-based program nurse immunisers/coordinators and school staff who participated in the online survey (n=310)

Characteristic	Number	Percentage
Gender (n=309)		
Female	284	91.9%
Male	25	8.1%
Age group (n=307)		
<25 years	4	1.3%
25–34 years	24	7.8%
35–44 years	69	22.5%
45–54 years	92	30.0%
≥55 years	118	38.4%
State/territory (n=310)		
NSW	69	22.3%
QLD	102	32.9%
VIC	34	11.0%
WA	51	16.5%
SA	32	10.3%
NT	1	0.3%
TAS	19	6.1%
ACT	2	0.7%
Occupation (n=310)*		
Nurse immuniser (delivering vaccines onsite in schools)	111	34.4%
Immunisation coordinator (public health unit/state department of health/local council/other – person responsible for delivering school-based vaccination program)	119	36.8%
School immunisation coordinator (school staff responsible for coordinating vaccination programs on behalf of the school)	93	28.8%

* Some respondents ticked more than one.

Impact on schools

The majority of respondents reported that they observed decreases in the uptake of school-based vaccines during the pandemic, including for dTpa (63.3%, 169/267), HPV dose 1 (66.8%, 179/268) and dose 2 (63.7%, 167/262), and MenACWY (62.2%, 168/270). However, 5.7–8.1% of respondents reported increases in uptake and 6.7–9.5% were unsure. For those respondents who reported a negative impact of the pandemic on uptake, the most common reasons reported were student absenteeism (78.9%, 195/247), consent forms not being returned (64.8%, 160/247), lockdowns/flexible learning from home (55.1%, 136/247) and parental hesitancy (49.0%, 121/247). Approximately 26% (65/247) provided other reasons including concerns regarding operational issues such as spacing between students, vaccine fatigue, school site restrictions, and ongoing changes to guidelines and intervals between vaccines administered.

In addition, over 97% of respondents reported that absenteeism of students was contributed to by both illness and being a close contact of a COVID-19 case. About 11% of respondents said that absenteeism of immunisation staff contributed to a negative impact on uptake of school-based vaccines.

When asked to what extent the uptake of school-based vaccines by priority population/adolescents changed during the pandemic from pre-pandemic, approximately 40% of respondents suggested that they didn't know. This was observed for all categories of priority groups, comprising Aboriginal and Torres Strait Islander adolescents, CALD adolescents, adolescents with a disability, and other marginalised populations of adolescents. Twenty-nine survey respondents (11.2%, 29/260) suggested a number of reasons why specific priority populations of adolescents may have been impacted. These included school lockdowns; student absenteeism; consent forms not being returned; geographic location of services; some parents withdrawing/refusing consent for school-based vaccinations due to confusion, uncertainty, or mistrust or misconceptions of COVID-19 vaccinations.

Reminder messages were the most commonly used strategy to improve school-based vaccination coverage, both prior to (71.3%, 171/240) and during the pandemic (71.6%, 169/236).

When asked whether respondents planned to schedule catch-up vaccination sessions for adolescents who missed their school-based vaccination during the pandemic period, 60.9% (153/251) said 'yes', while 25.9% (65/251) did not plan to. For those that did not plan to schedule catch-ups, 4.7% cited human resourcing as the cause. Those that did plan to schedule catch-up vaccination sessions indicated that they would offer additional

appointments for those interested at a variety of venues, including schools, GPs, additional clinics and through community outreach, and during school holidays.

Of all respondents, 56.3% (143/254) somewhat agreed or strongly agreed with the statement that parents of adolescents were hesitant to vaccinate their children at school during the COVID-19 pandemic. Similarly, 57.9% (147/254) of respondents reported that adolescents were hesitant to receive their vaccines at school during the pandemic. Of note, 38.9% (n=99/254) of respondents agreed or strongly agreed that parents experienced service access barriers that influenced their ability to vaccinate their children at school during the COVID-19 pandemic.

Vaccine supply, storage and recording issues

Seventy-seven per cent (194/252) of respondents did not have any supply issues with adolescent vaccines during the pandemic. For the small proportion (3.6%, 9/252) who reported supply issues, operational issues (e.g. longer delivery times), and receiving single doses rather than 10-packs of doses were key issues cited.

Storage of school-based vaccines was not seen as an issue for a large majority (74.3%, 188/253) of respondents. However, for the 4.4% (11/252) of respondents who reported issues with vaccine storage, limited refrigerator space was the commonly cited reason.

Most (98.4%, 241/245) respondents indicated that they reported all school-based vaccinations to the AIR.

Suggested strategies to improve school-based vaccinations

One hundred and thirty-four respondents suggested potential strategies to improve uptake of school-based vaccinations, as summarised below:

- Use of electronic consent forms
- More communication/education about the vaccines for parents from CALD communities, in their own languages, and simplified educational aids for those working with CALD communities or vaccine-hesitant people
- Increased staffing/human resources
- Media campaign to promote school-based vaccinations
- Clearer communication between jurisdiction education departments and families and school staff around immunisation and why students are offered vaccination
- More options of available times and locations for parents to access catch-up vaccination clinics

School-based program and school staff interviews

We interviewed eight online survey respondents who provided their contact details: three from NSW, two from Queensland, and one each from SA, Victoria and WA. All eight were 'Health' staff and not from the 'Education' sector. Five of the interviewees were school-based program immunisation coordinators, two were immunisation administration officers, and the other was a school-based youth health nurse. They were responsible for between four and 145 schools (Table 14).

Table 14. Description of school-based program staff interviewed (n=8)

Participant	Location	Role	Number of schools	School type
1	Northern NSW	School-based program immunisation coordinator	145	Government, independent, Catholic, special needs schools
2	Southern NSW	School-based program immunisation coordinator	>100	Government, independent, Catholic, special needs schools
3	Western Sydney, NSW	School-based program immunisation coordinator	110	Government, independent, Catholic, special needs schools
4	Victoria	Team leader of administration, school-based vaccination program	17	11 state, 3 independent, 3 Catholic schools
5	North Queensland	School-based program immunisation coordinator	6	3 state, 3 Catholic schools
6	Far North Queensland	School-based program immunisation coordinator	5	3 state, 1 Catholic, 1 independent school
7	SA	Administration officer, school-based vaccination program	10	4 state, 2 Catholic, 1 independent, 1 special needs, 1 Aboriginal, 1 community school
8	WA	School health nurse	4	1 public, 1 special needs, 2 independent schools

We identified three themes from interview responses:

- Theme 1 – The COVID-19 pandemic impacted school-based vaccinations in both 2020 and 2021; the impact was variable and mainly on uptake of HPV dose 2.
- Theme 2 – Modifications of existing strategies were used to mitigate pandemic impacts (there were no completely novel strategies).
- Theme 3 – The COVID-19 pandemic was a learning experience for most stakeholders that resulted in changing some work practices with the evolving pandemic situation.

Theme 1. The COVID-19 pandemic impacted school-based vaccinations in both 2020 and 2021; the impact was variable and mainly on uptake of HPV dose 2.

The interviewees reported that the impact of the COVID-19 pandemic on delivery of school-based vaccinations varied by jurisdiction.

In 2020, the main causes of disruption were lockdowns and other forms of movement control, with resultant school closures, remote learning and staff/student absenteeism when not in lockdown.

“2020 was pretty poor as far as student attendance, and school closures were ad hoc everywhere, so that was really difficult. So, you would have your clinics already booked, but for whatever reason, the schools were shut, then they would open, then they’d shut, then they were open. So, there was no continuity, it was very difficult to catch up.”

— School-based program immunisation coordinator from Northern NSW

In 2021, the COVID-19 vaccination program also disrupted school-based vaccination as children who received COVID-19 vaccine had to wait 1–4 weeks before school-based vaccinations (depending on ATAGI guidance that changed over time), while in some places school-based program staff were seconded to COVID-19 vaccination clinics.

“Now, at the beginning of 2021, a lot of our team were deployed to the COVID vaccination hubs because at that stage they could only provide vaccines from staff who were authorised as immunisers. And all of my staff were authorised immunisers.”

— School-based program immunisation coordinator from NSW

Impact on HPV dose 2

During the pandemic, HPV dose 2 was moved to the next year in some states and territories. In some regions (e.g. Northern NSW), the school visit scheduled for HPV dose 2 was cancelled for the year causing significant disruption.

“The program was cancelled for the last round of HPV ... So, that was a huge disruption for us, because we had a lot of catch-ups still from 2020 to do, and we only had half the opportunities to get those children done in 2021. So, between school closures – and even when there weren’t any school closures, student attendance has been very ad hoc and very poor.”

— School-based program immunisation coordinator from NSW

Impact on other vaccines/doses (HPV dose 1, dTpa and MenACWY)

Interviewees reported that the pandemic had relatively little impact on uptake of HPV dose 1 and dTpa vaccination (usually given at the same time), although the vaccinations were often delayed to the second half of the relevant year. They also reported that the pandemic impacted MenACWY vaccination programs as this vaccine would usually be given on the same visit to the school as HPV dose 2.

Theme 2. Modifications of existing strategies were used to mitigate pandemic impacts (there were no completely novel strategies).

When asked if they had implemented novel strategies to improve vaccination, all interviewees reported strengthening or modifying existing strategies, but no completely new strategies were implemented.

The modified strategies used included vaccinating fewer children in batches, making extra staff available for delivering programs (in case of staff absenteeism), running more catch-up clinics, modifying reminder messages, and working closely with schools to reschedule visits on suitable days. Immunisation coordinators and school staff worked very hard and used every available opportunity to keep the school-based vaccination program operational. They reported vaccinating children during weekends and running vaccination sessions at the COVID-19 vaccine hubs.

Interviewees reported using various communication modalities to reach out to schools, parents and adolescents; these included phone calls, text messages, Facebook posts, messages in school newsletters, emails and printed consent forms for students. They reported that there was little change in communication methods during the pandemic,

although some modifications were made to messages to account for the pandemic and recommended intervals in relation to COVID-19 vaccination.

We really just went through the same process, and I guess the only thing that changed was putting in the SMS or in the letter saying, 'Be aware of the seven days between the COVID vaccine'.

— Immunisation administration officer from SA

Strategies for priority populations

Stakeholders reported using existing measures to improve school-based vaccination among Aboriginal and Torres Strait Islander populations, including involvement of Aboriginal education workers, communication with school liaison officers, opportunistic vaccination during emergency department attendance, and outreach visits.

To target other priority populations (e.g. CALD communities, refugees) the interviewees reported using existing measures, including asking school-based program immunisation coordinators to go and see community liaison officers to identify children from their communities; outreach visits targeting homeless youth; vaccinating special needs school students who missed vaccinations; and working closely with colleagues in Refugee Health to make sure refugee children were vaccinated.

Theme 3. The COVID-19 pandemic was a learning experience for most stakeholders that resulted in changing some work practices with the evolving pandemic situation.

The interviewees reported that the COVID-19 pandemic was a great learning experience for them that resulted in changing some work practices. These included adjustments to administrative processes and staffing with the evolving pandemic situation; enhanced communication and engagement with schools; delivery of school-based vaccinations while maintaining social distancing; and alignment with other services.

Parent interviews

Semi-structured interviews with parents were conducted virtually between 26 June and 15 July 2022. Twenty-one parents of children eligible for school-based vaccinations in 2021 participated, from three states: NSW (Year 7 students in 2021), Victoria (Year 7 students in 2021) and SA (Year 8 students in 2021) (Table 15). Participants represented a range of positions towards vaccination, being either accepting (15), hesitant (4) or refusing vaccination (2).

Table 15. Parent characteristics

	Metro	Regional	Rural	Total	
Location	NSW	4	3	1	8
	Victoria	4	4	0	8
	SA	3	1	1	5
	Total	11	8	2	21
Number of children in family	1 child	1 participant			
	2–3 children	17 participants			
	4 children	3 participants			
Parental position towards vaccination	Accepting	15 participants			
	Hesitant	4 participants			
	Refusing	2 participants			

When asked about their child’s school-based vaccination, most participants admitted not knowing which vaccinations were due in which year and could not recall or name the relevant vaccines, although some were sure their child was up-to-date for all vaccinations. Thirteen parents indicated their child received all eligible vaccinations in 2021 (no need for catch-up); five indicated their child received some vaccinations in 2021 (with plans for catch-up) and three that their child did not receive any vaccinations in 2021 (with no plans for catch-up). We identified four themes from interview responses:

- Theme 1 – The COVID-19 pandemic has impacted families’ lives in different ways, and played a significant and diverse role in shaping participants’ decisions about regular and school-based vaccination.
- Theme 2 – Parents reported a variety of factors that influenced (either facilitated or prevented) vaccination of their school-aged children in 2021.
- Theme 3 – Some parents reported organising catch-up vaccination; various factors made this either easier or more difficult.
- Theme 4 – Parents discussed various strengths of school-based vaccination and ways in which it could be improved, both in general and during times of service disruption (such as the pandemic).

Theme 1. The COVID-19 pandemic has impacted on families' lives in different ways, and played a significant and diverse role in shaping participants' decisions about regular and school-based vaccination.

The COVID-19 pandemic has played a significant and diverse role in shaping participants' decisions about school-based vaccination. Overall, participants reported moderate to significant impacts of the pandemic, including on their family's health, employment or finances; the need for remote and flexible study or work, and psychosocial impacts related to remote learning or working and the variable level of support received from school or employer to do so; inability for children to participate in social or sporting activities; and discomfort with government management of the pandemic and information sharing. Participants living in regional areas suggested that impacts were less for them compared to urban areas, and attributed this to lower infection rates in their towns and easier access to open spaces.

The COVID-19 pandemic appears to have strengthened vaccination hesitancy among participants who had been hesitant prior to the pandemic. Participants' pre-existing vaccine hesitancy seems to have been exacerbated by personal negative experiences with COVID-19 vaccination, social influence from people who were vaccine hesitant, or mistrust towards government communication about COVID-19 vaccines. For example, some participants with pre-existing hesitancy reported friends or relatives experiencing negative effects of COVID-19 vaccination, including loss of pregnancy and severe reactions among people with underlying health conditions. Most hesitant participants reported their hesitancy was strengthened by the way in which information about the pandemic and COVID-19 vaccination was communicated by the government. These participants expressed mistrust towards government vaccination recommendations, and viewed lockdowns and other restrictions as unnecessary and vaccine mandates as unjustified.

“My partner lost his job because he didn't get the COVID vaccination ... He's had nine months at home. That forcing them and mandating the vaccines for work in Victoria has really had more of a negative impact ... having it mandated and forced upon you than having that choice and freedom to choose.”

— Mother of 3 from regional Victoria

Some participants with pre-existing hesitancy reported experiencing substantial pressure around COVID-19 vaccination from school, work, their doctor and peers, and negative social treatment when others found out they were unvaccinated. Examples included themselves or their children being barred from social and sporting events, refused health care, and losing friends over vaccination issues.

“When we went to the hospital about something else, because my kids do injure themselves ... they wouldn’t even see my son because he wasn’t vaccinated. They’re like, ‘Oh, he can’t go in because he’s not vaccinated.’ It was actually really weird. I’ve had some really bad experiences.”

— Mother of 3 from regional NSW

These pressures and negative social repercussions of the decision not to vaccinate exacerbated negative feelings towards COVID-19 vaccination among parents with pre-existing hesitancy. For some, this extended to other vaccinations as well.

“I think it’s reinforced my views. Even more, especially with watching what’s happened with the COVID vaccine. I feel that some of the decisions have been made have been very reckless of our authorities. It is validating that I feel I’ve made the right decision to stop vaccinating because if they’re prepared to do this with the COVID vaccine, it really does show to me that they’ve been prepared to cut corners.”

— Mother of 2 from metropolitan SA

Some hesitant and refusing participants reported making concerted efforts to reduce the time their children spent at school during times in which vaccinations were offered.

“The second time it came around, I just kept xx home that day because they were also doing it with the COVID shots, and so any other day that they had that going on in the bus there, I kept him home because I didn’t want him there in that environment at the time.”

— Mother of 3 from regional SA

That meant that lockdowns, combined with parental efforts to shield children from what they perceived as ‘COVID-19 propaganda’, may have contributed to some adolescents missing school-based vaccinations.

In contrast, for participants who were supportive of vaccination, the COVID-19 pandemic has acted as a reminder of the importance of vaccinating; participants in this group referred to the pandemic as ‘raising awareness’ of the value of vaccination.

“I guess just the greater awareness. Maybe it’s the value of vaccinations as well as a bit of a buzzword, I guess. Maybe that message about that all levels of vaccinations are probably important to your health. Maybe that’s something that we’re just more aware of.”

— Mother of 3 from rural NSW

Many parents supportive of vaccination reported that, for the first time ever, they decided to vaccinate their children against influenza during the pandemic, influenced by a recommendation from their GP or government messages. Most participants in this group reported wanting to protect their children against respiratory illnesses during the pandemic, and understood that vaccination would help do that. Some said free influenza vaccination was a facilitator in their decision. Some reported plans to continue vaccinating their children annually against influenza, something they had not considered prior to the pandemic.

“Actually, I think I would’ve because of the free program – I ended up – because he was done and I’d gotten mine, I made my husband and my other son go up to the pharmacy and take advantage of that free pharmacist flu vaccination thing. Interestingly I guess just the avoidance of getting sick and sickness affecting our lives anymore, I’ve actually got them a vaccination. I would not normally have given them if COVID hadn’t been around.”

— Mother of 2 from metropolitan NSW

Among participants who were generally supportive of vaccination, there was a subgroup of parents who differentiated between routine school-based vaccination and COVID-19 vaccination. These parents reported understanding the value and safety of ‘traditional vaccines’ but questioned the value and safety of COVID-19 vaccination for children and adolescents.

“If there are traditional vaccines, I have no issue, but I certainly wouldn’t look at the COVID again, for any boosters or anything like that.”

— Father of 3 from metropolitan Victoria

While two participants suggested including influenza and COVID-19 vaccination as part of the school-based vaccination program in the future, our findings suggest that further social research is needed to better understand parents’ perceptions of and attitudes towards COVID-19 and influenza vaccination for children and adolescents, and parental thoughts on where and how such vaccinations should be made available.

Theme 2. Parents reported a variety of factors that influenced (either facilitated or prevented) vaccination of their school-aged children in 2021.

In addition to the COVID-19 pandemic, participants reported various other factors that influenced school-based vaccination in 2021. These included personal beliefs about vaccination; social norms and influences from others; and access issues including convenience, geographic location and knowledge of/information about when vaccinations were offered. Key factors are summarised below (Table 16) and categorised as either

facilitators or barriers to receiving school-based vaccination in 2021. Vaccinating participants expressed strong and positive beliefs about the value of vaccinations. Participants also reflected on the role of adolescents in vaccination decisions. Some discussed their children making an active decision on vaccinations (school-based and COVID-19), while others reflected on difficulties with engaging adolescents in relation to school-based vaccinations due to different priorities.

“I suppose the 14-year-old kids, that information is not going to help them at all because he’s not going to sit there and think. I think it’s that age group as well that don’t care and all that ...”

— *Father of 4 from metropolitan SA*

In terms of positive social influences, vaccinating participants often talked about having a trusted GP who reminded the family about, encouraged and administered vaccinations if not given at school. Vaccination was also made easier if it was accessible and convenient, and the school-based vaccination program was generally described as such. Pandemic-related disruptions (e.g. lockdowns), and difficulties accessing health services or GPs to answer questions or arrange vaccinations outside school, contributed to delays in vaccination. One participant described how GP shortages in her rural area of NSW, which she referred to as ‘*crisis point*’, directly impacted access to health services, including adolescent vaccinations.

“We have a health services at a bit of a breaking point, crisis point, I guess. That probably impacts on people’s access to it.”

— *Mother of 3 from rural NSW*

Finally, many participants acknowledged gaps in knowledge about the adolescent vaccination schedule, especially when compared to their knowledge of the childhood schedule, and suggested this may be due to the lack of an equivalent of the hand-held child health record (what some [NSW] participants referred to as ‘*the blue book*’) for adolescents.

“When they’re young, they get the blue book and it goes up until, like, 5 or 6 years. It is an immunisation that you need to do. This is the time, this is what you need to do and how you need to do it. It’s funny, as soon as they hit school, they don’t necessarily get anything like that. From a parent’s perspective, you’ve got these 10, 11 years that you’ve got to know or be notified by the school or your GP or by your friends as to what the schedule is.”

— *Father of 1 from metropolitan NSW*

Some parents also reported that school-based vaccinations were not ‘front of mind’ for them during the pandemic, due to the dominance of COVID-19 vaccination messaging. Receiving

information from the school or one's GP about school-based vaccinations was, however, reported as helpful and allowed parents to plan accordingly.

Table 16. Parent-reported barriers and facilitators to vaccinating school-aged children in 2021

Barrier	Key factors	Facilitator
Parental vaccine hesitancy, exacerbated during COVID-19 pandemic (described in Theme 1)	Parents' personal beliefs about vaccination	Parental strong support for vaccinations and conveying it to children Household-based approach to vaccination: vaccination important to protect others more vulnerable in the family
Parental perception that adolescents are not interested in learning about vaccinations	Parent reporting adolescent motivational factors	Adolescents themselves actively pursuing and/or motivating family to get vaccinated
Knowing people who experienced negative impacts of vaccinations Negative social treatment from peers, at work/school, and being denied health care when found to be unvaccinated	Vaccination social norms and influences from others	Parent/family having a good relationship with a trusted GP who reminds them about and recommends vaccinations Adolescents having good rapport with GP and peers who encourage vaccination
COVID-19 disruptions, including lockdowns, missing school when vaccinations offered, and difficulty seeing GP (only phone consults allowed) GP shortage in regional areas – impacts on ability to arrange adolescent vaccinations outside of school, and to ask questions about vaccinations	Accessibility and convenience of vaccination	School-based vaccination seen as convenient, making it easy for parents to consent and have children vaccinated Easy access to GP
The large time gap between early childhood and adolescent vaccinations, with no information for parents on the latter, other than from the school Not receiving or remembering information from school about upcoming vaccinations Domination of information about COVID-19 and COVID-19 vaccination in the public domain during the pandemic, conveying a message that other vaccinations are not as important	Knowledge/information about when and where school-based and catch-up vaccinations were due	Receiving communication from school about vaccination (e.g. information on school website, letter from school) Knowledge (health literacy) of where to look for information about vaccination Knowing where to go for vaccinations Central role of wife/mother in child's vaccination; knowledgeable about and arranges vaccinations for the family

Theme 3. Some parents reported organising catch-up vaccination; various factors made this either easier or more difficult.

Most parents who did not object to vaccination reported that their child obtained all their recommended adolescent vaccinations in 2021 (either at school or a GP, or combination thereof). Conversations about catch-up vaccination with parents whose children missed some vaccinations in 2021 were not straightforward, as many participants were not sure which vaccines their child had (or should have) received and whether they were part of a single or multidose vaccine schedule (see knowledge gaps described in Theme 2).

Participants whose children received catch-up vaccination through the school-based program were satisfied with processes overall. Most reported learning about opportunities for school-based catch-up vaccination from their school, via newsletter, parent portal or email. Knowing where to go for catch-up vaccination and having experience of arranging it for older children also built parents' confidence in arranging it during the pandemic.

Some participants whose children missed catch-up vaccination sessions at school reported needing to arrange catch-up vaccination with a GP instead. This was problematic for some participants who were busy, and those living in regional and rural areas with GP shortages impacting the availability of vaccination appointments. Those participants reported relying on the school's system for all their child's health needs, so needing to arrange a catch-up vaccination outside the school system was difficult. It was made even more difficult for some who reported complex logistics around 'navigating the system' of vaccinations and appointment bookings in their local area.

"I think anyone navigating anything in health in our town will need a lot of information before you – or you ask for help or you ask your friends but it's not necessarily ... You need to have a certain level of understanding, I imagine."

— Mother of 3 from rural NSW

Theme 4. Parents discussed various strengths of school-based vaccination and ways in which it could be improved, both in general and during times of service disruption (such as the pandemic).

While some participants reported having all vaccinations with their GP rather than through school, most praised the school-based vaccination system. Participants valued its convenience and found it to be a real time and money saver for parents who did not need to remember about or arrange vaccinations. Many referred to the school program as 'easy', 'smooth', 'convenient' and expressed confidence in the program. Some participants saw a

strength of the program to be ensuring that vaccination goes ahead even when there are other activities going on, or lockdowns as occurred during the pandemic.

“I think they actually did have to reschedule because initially they were scheduled for while we were still in lockdown ... then there was an overlap with having the vaccination scheduled on the same day that an excursion was planned, but the school just managed that ... It wasn't a problem ... They did both.”

— *Mother of 4 from metropolitan Victoria*

Some parents, however, described just the opposite, with the experience of group-based vaccination, including being visible to peers during vaccination and/or teased by peers about one's vaccination anxiety, aggravating their child's vaccination anxiety. Participants reflected that the pandemic experience and disruptions had led them to think closely about vaccination programs and ways they could be modified to work better for them (summarised in Appendix 2). For example, participants suggested improving access to vaccination both at school and at the GP when the family needs catch-up vaccination or prefers to vaccinate there. They acknowledged that this would require addressing GP shortages in regional/rural Australia to enable parents to get timely vaccination appointments, and ensuring adolescent vaccinations are bulk billed.

Participants also suggested improving access to, and content, mode of delivery and framing of information about school-based vaccination and offering that information to both parents and adolescents. Parents suggested that information about vaccination could be made available via the school system, the Medicare app on phones, and social media, and included as part of the school curriculum to let adolescents know about vaccines they were about to receive; for example, they could learn in science classes about how vaccines work.

“If the kids understand the benefit of it without obviously creating an anxiety, if they can understand why it's good.”

— *Mother of 4 from metropolitan Victoria*

Participants also suggested that parents needed greater clarity, reminders and strong messages about the importance of non-COVID-19 vaccinations for their school-aged children. Some parents also suggested that the quality of the school-based vaccination experience for children who are anxious about vaccinations could be improved by offering the option to receive vaccination with more privacy.

“Yes, maybe some level of screens or something that just allow a bit more privacy. I think that's probably the main thing. Yes, so that you don't feel that you all have to be standing up there in front of each other being the strong person or whatever.”

— *Mother of 3 from rural NSW*

Discussion

The COVID-19 pandemic and its ramifications, including lockdowns and other forms of movement control, remote learning, and physical distancing measures, have impacted school-based vaccination programs. Our analyses show that uptake of adolescent vaccinations varied between the pandemic period (2020–2021) and the pre-pandemic period (2018–2019), by vaccine and jurisdiction. While all school-based vaccinations were affected, the greatest impact was on HPV dose 2.

The number of first dose HPV vaccinations in 2020 and 2021 was largely similar to 2019, after accounting for the double year cohort vaccinated in WA in 2019; however, the number of vaccinations in March and April 2020 was 14–84% lower than the same months in the pre-pandemic period, reflecting school closures at the start of the pandemic. Following the staged reopening of schools and recommencement of school vaccination programs in May–June 2020, the monthly number of first dose HPV vaccinations administered in the second half of 2020 was substantially (75–303%) higher than in previous years.

The number of second dose HPV vaccinations administered in the same calendar year as the first dose was, however, substantially lower in 2020 and 2021 than in the pre-pandemic years, likely due to delays related to school closures and the 6-month dose interval required. From August to November 2020, the monthly number of second doses given in the same calendar year as the first dose was 7–42% lower than in 2019, likely due to the flow-on impact from school closures at the start of the pandemic. From August to October 2021, the monthly number was 57–71% lower than in 2019, likely due to school closures in some jurisdictions in response to the Delta wave of the pandemic, and redeployment of program staff into COVID-19 vaccination clinics, as documented in our stakeholder interviews.

The proportion of first dose HPV vaccine recipients receiving a catch-up second dose HPV vaccination in the year after their first dose was similar in 2019 and 2020 (7.8% and 7.3%, respectively) but two-fold higher in 2021 (17.2%), particularly related to higher catch-up activity from February to June. When this increased level of catch-up vaccination is factored in, the overall percentage of adolescents completing a two-dose HPV vaccine schedule was 3–4 percentage points lower in those commencing a course in 2020 (90.8% for girls and 89.2% for boys) than in 2019 (93.7% and 92.4%, respectively) or 2018 (93.9% and 92.9%, respectively). It will be important to monitor catch-up vaccination in 2022 to ensure high levels of HPV vaccination and schedule completion are maintained.

The number of dTpa vaccinations in 2020 and 2021 was slightly lower than in 2019, after accounting for the double year cohort vaccinated in WA in 2019. At the national level, the

patterns of monthly uptake of adolescent dTpa vaccination were similar to those for the first dose of HPV vaccine in all years assessed. However, the number of adolescent dTpa vaccinations administered in the ACT in 2021 was substantially (84–86%) lower than previous years, as dTpa delivery had been planned for the second half of the school year along with the second HPV vaccine dose. Due to a territory-wide lockdown from August to September 2021, and with adolescent COVID-19 vaccination prioritised upon school reopening, a decision was made to defer dTpa and second dose HPV vaccine for Year 8 students to 2022.⁸ Similarly to dTpa, the overall number of MenACWY vaccinations was slightly lower in 2020 and 2021 than in 2019, with similar monthly uptake patterns.

The majority of adolescent vaccinations during the pandemic years 2020 and 2021 continued to be provided in a community health/local council setting, the provider type recorded for most school-based vaccinations. However, there was a slight increase in the proportion of adolescents receiving HPV and dTpa vaccinations in general practice settings, compared to pre-pandemic years, which was more noticeable in Indigenous adolescents. A much larger proportion of catch-up second dose HPV vaccinations (given in the year after the first dose) in 2021 were given in community health/local council settings, likely due to increased focus on school-based vaccination catch-up following pandemic-related disruption to vaccination programs.

Overall, COVID-19 pandemic impacts on vaccination uptake in adolescents were relatively limited at the time this evaluation was conducted. This is likely due to jurisdictions being able to successfully mitigate impacts of school closures through modified and innovative service delivery models, such as the use of alternative venues and after-hours clinics, as documented in our interviews and surveys, and elsewhere.⁴ Perceptions among immunisation coordinators and school staff of the pandemic's impact on vaccination uptake were broadly similar to our coverage findings from AIR analysis, but GPs' perceptions were less consistent with AIR findings, likely due to their less close relationship to the school-based vaccination program. While a similar proportion of GPs and immunisation coordinators/school staff (around half) identified school closures as having a considerable impact on vaccination uptake, the proportions identifying other factors such as absenteeism, parent hesitancy about school-based vaccination, and missing consent forms were more disparate and substantially lower among GPs, again likely due to their less close relationship to the school-based vaccination program. Interviews of selected immunisation coordinators/school staff provided more in-depth understanding of the impact of the pandemic on school-based vaccination programs and the resultant high workload on staff. Immunisation coordinators and school staff worked very hard and used every available opportunity to keep the school-based vaccination program operational. They reported

vaccinating children during weekends, running vaccination sessions at the COVID-19 vaccine hubs, and organising outreach programs for priority/vulnerable populations.

Our parent interviews of children eligible for adolescent (HPV and dTpa) vaccinations in 2021 in three jurisdictions (NSW, Victoria and SA) identified a number of factors that played a key role in families' engagement with the program, including for both scheduled and catch-up vaccinations. A parent's strong personal support for vaccination, and access to a convenient and well-organised school vaccination program that was flexible in response to disruptions caused by the COVID-19 pandemic were helpful in getting adolescents vaccinated in 2021. Parent interviews suggest that the program provided parents with an efficient means of vaccinating their children despite the disruption caused by the pandemic. However, vaccine hesitancy reported by some parents was a barrier to their children receiving adolescent vaccinations, exacerbated in some instances by concerns that COVID-19 vaccines would be included in the school-based vaccination program. Conversely, those parents who described a strong personal support for vaccination reported feeling more attuned to the importance of adolescent vaccination because of the pandemic. While a few of these parents wanted to see influenza and COVID-19 vaccination added to the school-based vaccination program, this could negatively impact hesitant parents' motivation and intention to have their adolescents vaccinated.

Facilitators of adolescents successfully receiving catch-up vaccination identified through our parent interviews included vaccine delivery on school grounds; the school providing parents with practical and timely information about how to arrange to receive vaccines elsewhere; and having access to, and an established relationship with, a trusted GP who could advise on and provide the missed vaccinations. Conversely, barriers to catch-up vaccination were mostly due to issues of access, including not knowing where to go, difficulties getting an appointment (particularly pertinent to parents in regional and rural areas), and inflexibility in appointment times offered (particularly pertinent to working parents). These access barriers were further amplified by parents' reported gaps in knowledge about adolescent vaccination in general (i.e. what was due and when).

These findings suggest that successful catch-up vaccination outside the school-based program is dependent on the parent's access to a GP or other immunisation provider (which can be more difficult in regional and rural areas), parental ability and capacity to navigate health services, and the level of support parents receive from the school and/or school-based vaccination program.

Our evaluation has some limitations. The immunisation coordinators, school staff, GPs and parents interviewed or surveyed may not be fully representative of the respective groups.

While we attempted to recruit parents from both outer urban (regional/rural) and metropolitan areas, most of those recruited were from metropolitan areas.

It will be important to build on the lessons learnt in this pandemic and documented in this report, both to strengthen ongoing school-based vaccination programs and enhance preparedness for future pandemics. However, it is also important to recognise that the limited overall impacts on vaccination uptake could obscure greater impacts on priority/disadvantaged groups, which many stakeholders assumed had occurred despite acknowledging the lack of data to confirm this. Given that lockdowns and mitigating measures varied considerably both across and within jurisdictions, a more granular breakdown by small area and priority populations would be of benefit to assess for differential impacts on vaccination coverage.

The NPEV performance report for 2020–21 found that performance benchmark 3 (increase in HPV vaccination coverage by 15 years of age, for both adolescent boys and girls, relative to baseline) was met for 2020 coverage, relative to the 2017–2019 baseline period, in all states and territories.⁹ However, it is important to note that this predominantly represents adolescents vaccinated in school-based vaccination programs prior to the COVID-19 pandemic. It will be important to monitor for impacts on coverage at this internationally recognised milestone in future years, as the cohorts due for school-based vaccination in 2020 and 2021 reach this assessment age.

In conclusion, this evaluation found that COVID-19 had a variable impact on delivery of school-based vaccination programs in Australia. By strengthening and adjusting existing strategies, and using some innovative approaches, school-based vaccination programs successfully mitigated many of the pandemic's impacts. The experience has enriched the understanding and skills of staff on how to run an effective vaccination program even during a crisis situation. Finally, the pandemic has played a significant and diverse role in shaping parents' decisions about both school-based vaccination and vaccination more broadly.

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Appendix 1. Detailed vaccination uptake data by state/territory

Australian Capital Territory

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, Australian Capital Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	4671	4991	4999	4963	127	124	132	112
HPV dose 2 (same calendar year as dose 1)	3961	4246	4230	202	91	88	89	10
HPV dose 2 (catch-up in year after dose 1)	366	378	408	–	14	14	16	–
dTpa	4610	5148	4817	704	115	129	115	32
MenACWY	–	4310	4336	4603	198	107	107	92

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Australian Capital Territory, 2018–2021

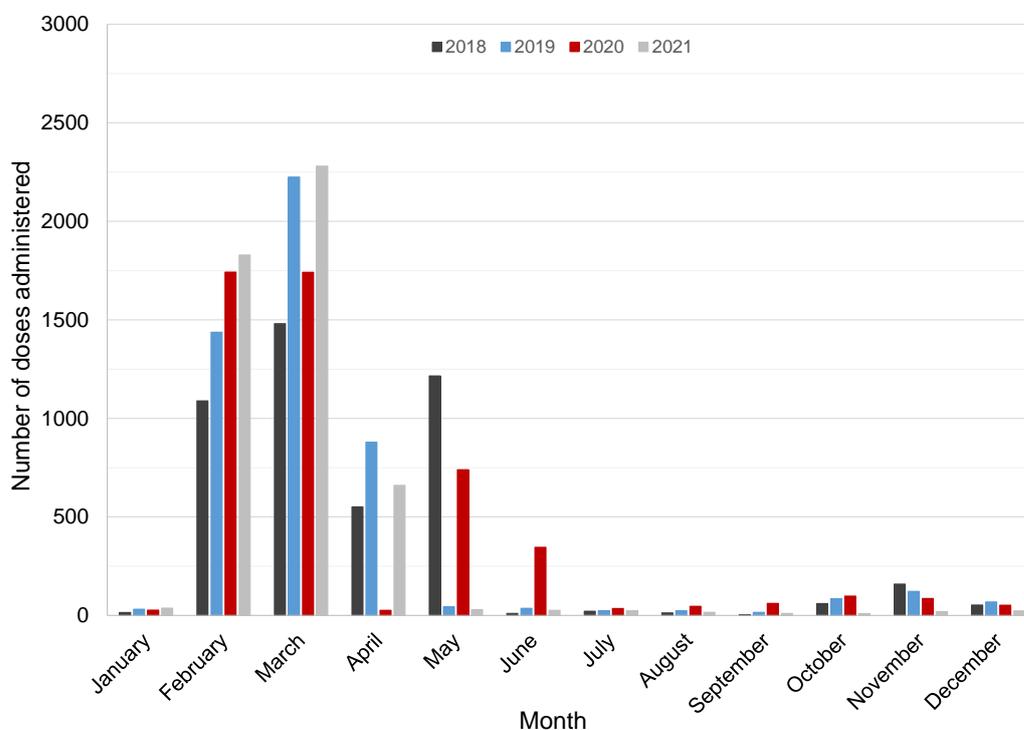


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Australian Capital Territory, 2018–2021

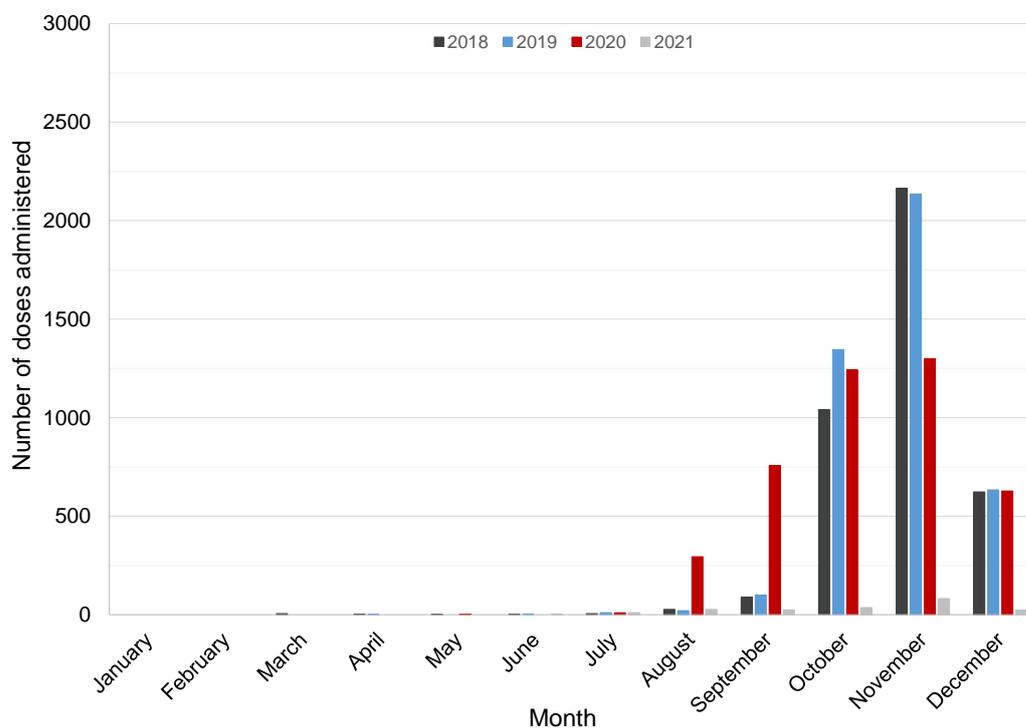


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Australian Capital Territory, 2019–2021

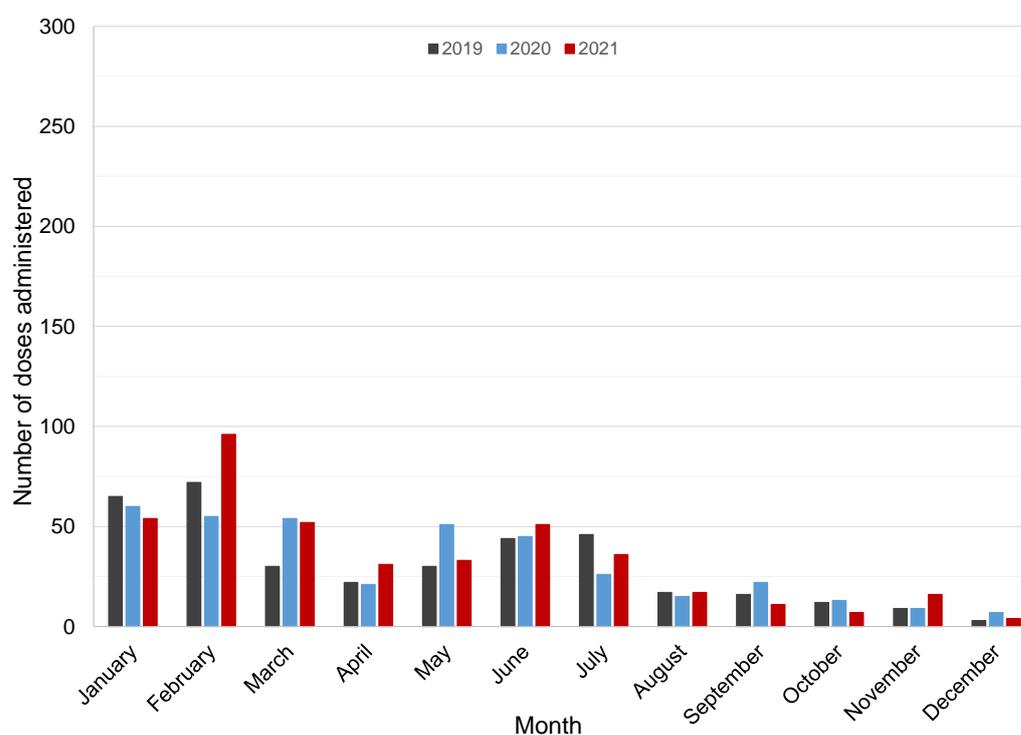


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Australian Capital Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	84.8	85.1	84.6	4.1	71.7	71.0	67.4	8.9
% Received dose 2 as catch-up in year following dose 1	7.8	7.6	8.2	–	11.0	11.3	12.1	–
Overall % received dose 2	92.6	92.6	92.8	–	82.7	82.3	79.5	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Australian Capital Territory, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	3.5	5.9	6.0	5.4	4.7	11.3	11.4	10.7
Community health / council clinic	96.2	94.0	94.0	94.5	94.5	88.7	88.6	86.6
Other	0.3	0.1	0.0	0.1	0.8	0.0	0.0	2.7
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	2.8	3.9	3.7	61.4	8.8	5.7	1.1	30.0
Community health / council clinic	97.0	96.1	96.3	38.1	91.2	94.3	98.9	70.0
Other	0.2	0.0	0.0	0.5	0.0	0.0	0.0	0.0
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	92.6	92.3	86.5		71.4	100.0	87.5	
Community health / council clinic	7.1	7.4	13.5		21.4	0.0	12.5	
Other	0.3	0.3	0.0		7.1	0.0	0.0	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Australian Capital Territory, 2018–2021

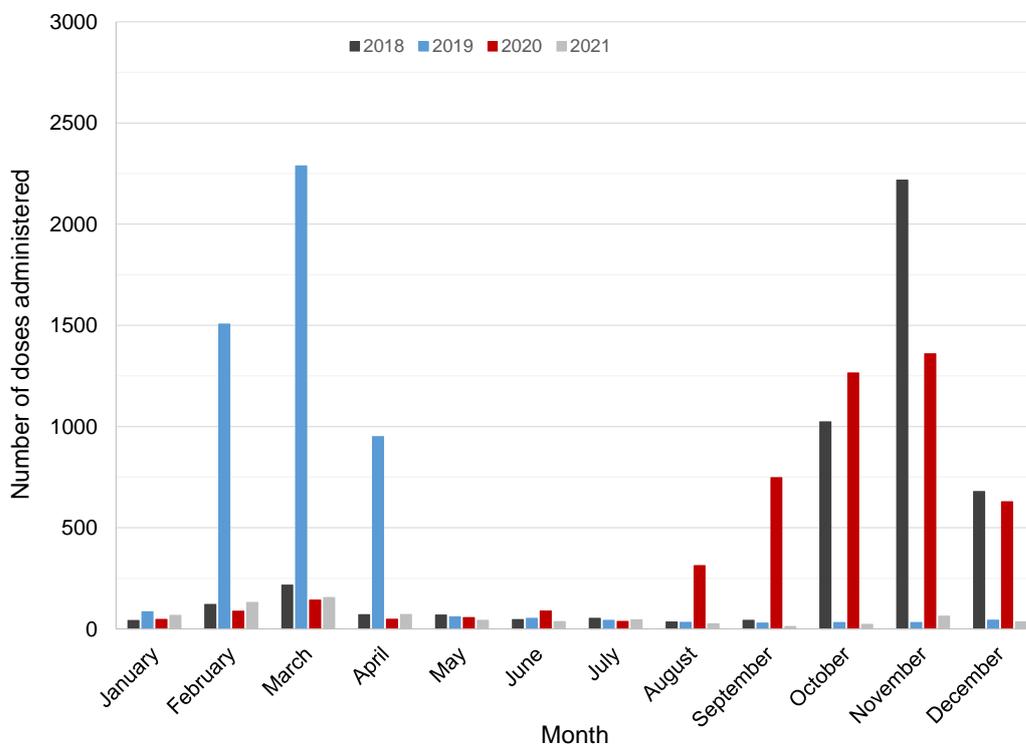


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Australian Capital Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	9.7	11.6	9.3	67.8	13.9	17.8	12.2	56.3
Community health / council clinic	90.2	88.2	90.7	31.3	85.2	81.4	87.8	34.4
Other	0.1	0.1	0.1	1.0	0.9	0.8	0.0	9.4

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Australian Capital Territory, 2019–2021

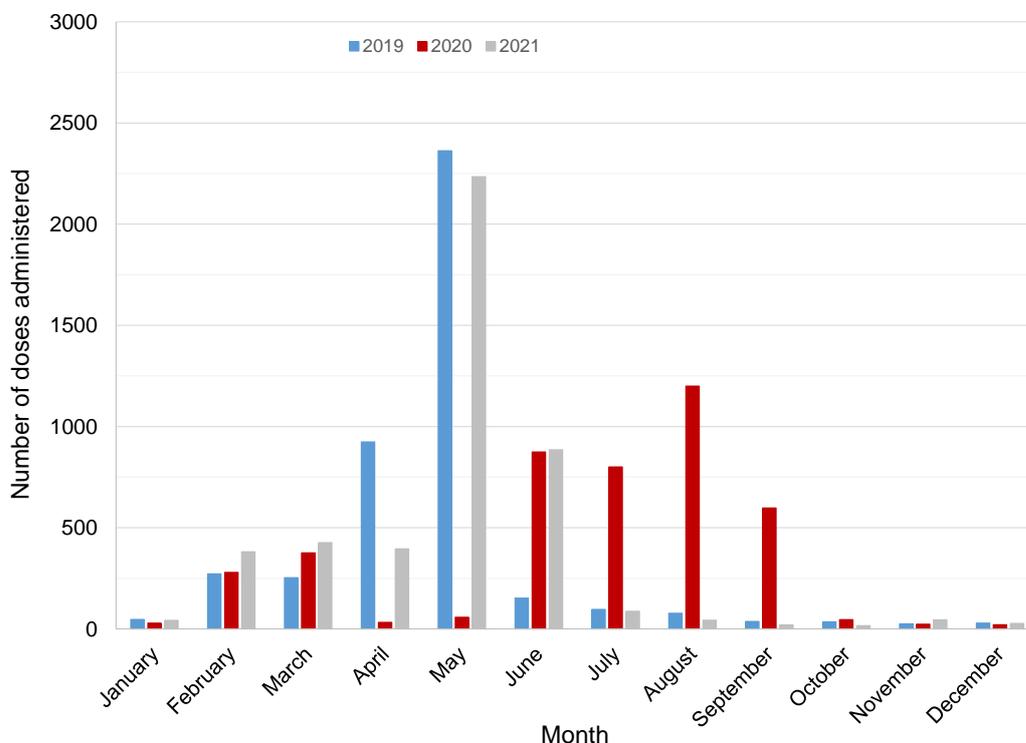


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Australian Capital Territory, 2019–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021	2019	2020	2021		
General practice	11.9	10.1	10.3	9.3	15.9	14.1		
Community health / council clinic	88.1	89.8	89.7	90.7	84.1	85.9		
Other	0.0	0.1	0.0	0.0	0.0	0.0		

New South Wales

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, New South Wales, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	85147	89493	88809	86313	4751	4974	4981	4774
HPV dose 2 (same calendar year as dose 1)	72280	75355	58858	26821	3502	3504	2744	1615
HPV dose 2 (catch-up in year after dose 1)	9348	9667	23460	–	804	860	1446	–
dTpa	89562	92700	90751	85614	4885	5067	5036	4813
MenACWY	–	75291	75945	63773	4276	2967	3336	2885

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, New South Wales, 2018–2021

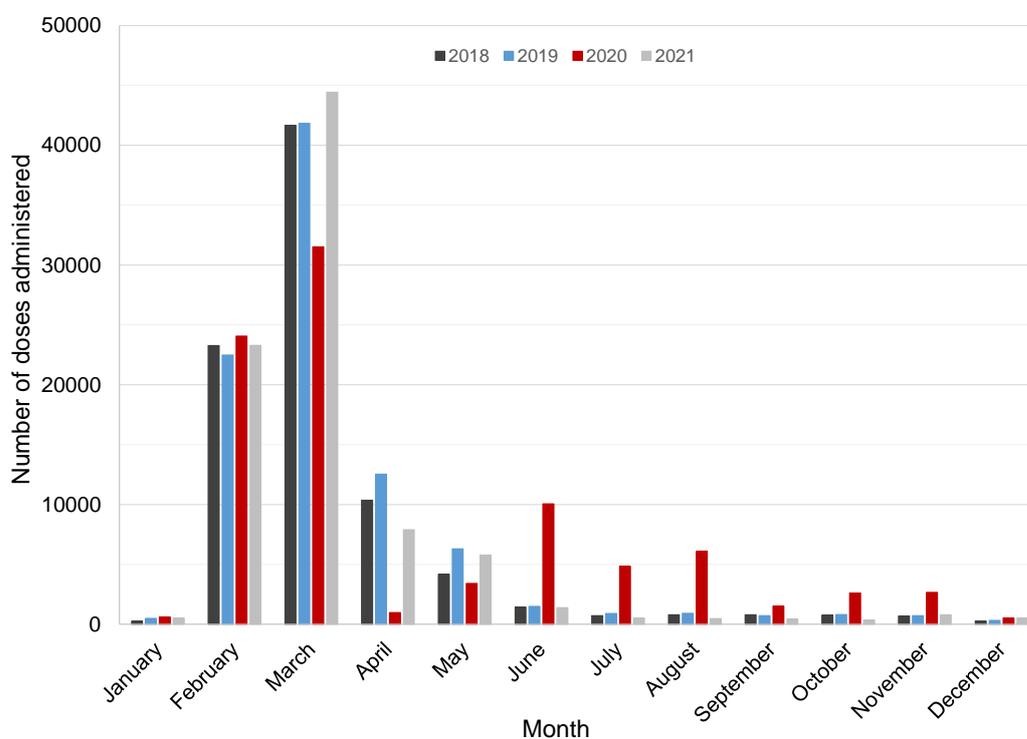


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, New South Wales, 2018–2021

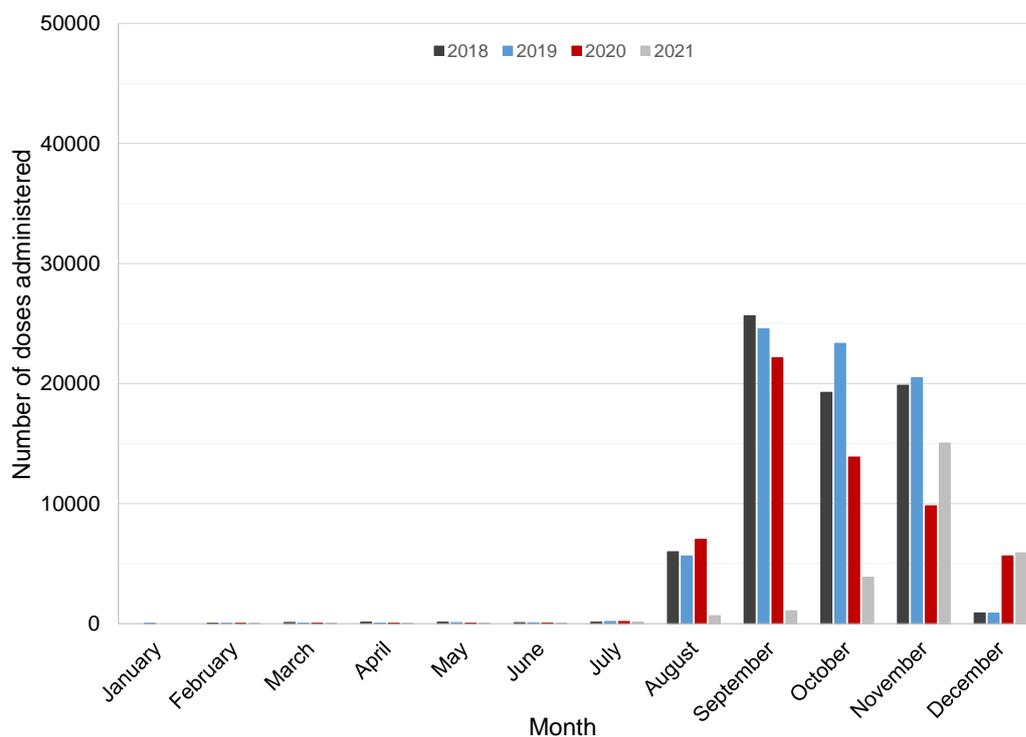


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, New South Wales, 2019–2021

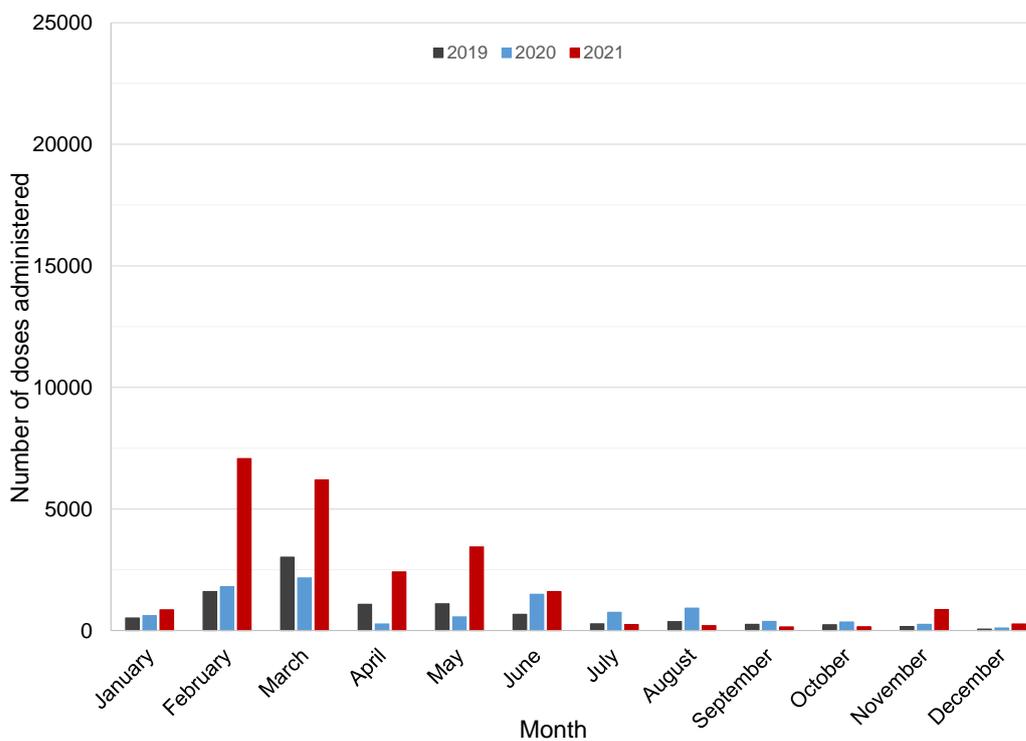


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, New South Wales, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	84.9	84.2	66.3	31.1	73.7	70.4	55.1	33.8
% Received dose 2 as catch-up in year following dose 1	11.0	10.8	26.4	11.0	16.9	17.3	29.0	–
Overall % received dose 2	95.9	95.0	92.7	–	90.6	87.7	84.1	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, New South Wales, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	7.4	9.1	10.0	9.2	12.5	13.9	15.9	14.3
Community health / council clinic	75.9	90.7	89.8	90.6	73.8	84.7	82.3	84.0
Other	16.7	0.2	0.2	0.2	13.7	1.4	1.9	1.7
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	4.8	5.6	6.2	17.3	7.2	8.0	9.1	16.3
Community health / council clinic	89.4	94.3	93.7	82.5	88.0	91.0	90.0	82.4
Other	5.8	0.1	0.1	0.2	4.8	0.9	0.9	1.2
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	24.1	26.7	13.7		25.6	28.5	17.8	
Community health / council clinic	75.4	72.7	86.1		71.5	69.0	80.0	
Other	0.5	0.5	0.2		2.9	2.6	2.1	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, New South Wales, 2018–2021

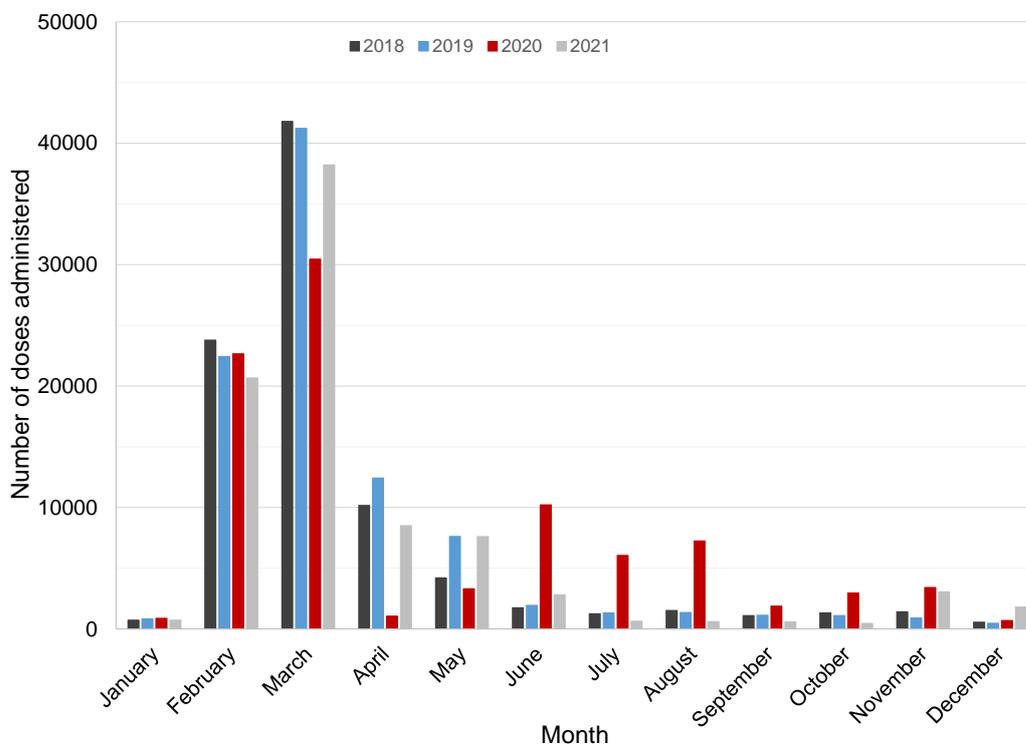


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, New South Wales, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	10.6	11.1	11.1	11.1	14.1	15.3	16.6	16.2
Community health / council clinic	89.1	88.6	88.6	88.6	84.0	83.1	81.7	82.1
Other	0.3	0.3	0.3	0.3	1.9	1.6	1.7	1.7

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, New South Wales, 2019–2021

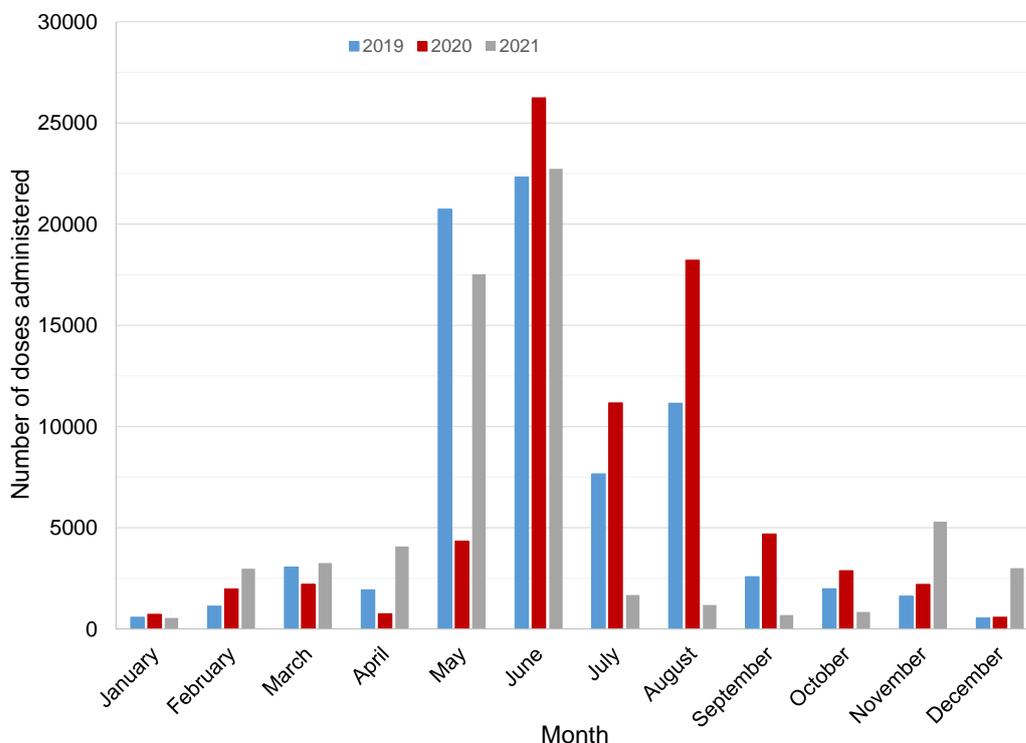


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, New South Wales, 2019–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021	2019	2020	2021		
General practice	10.8	10.9	12.6	17.3	16.9	17.7		
Community health / council clinic	89.0	88.8	87.2	80.7	80.6	80.1		
Other	0.2	0.2	0.2	2.1	2.5	2.2		

Victoria

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, Victoria, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	66550	69919	69508	69665	850	818	844	833
HPV dose 2 (same calendar year as dose 1)	58312	61048	49556	51606	632	586	470	481
HPV dose 2 (catch-up in year after dose 1)	3434	3453	11714	–	83	72	176	–
dTpa	68885	72362	70268	71359	859	833	848	843
MenACWY	–	58813	56199	59530	–	596	617	615

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Victoria, 2018–2021

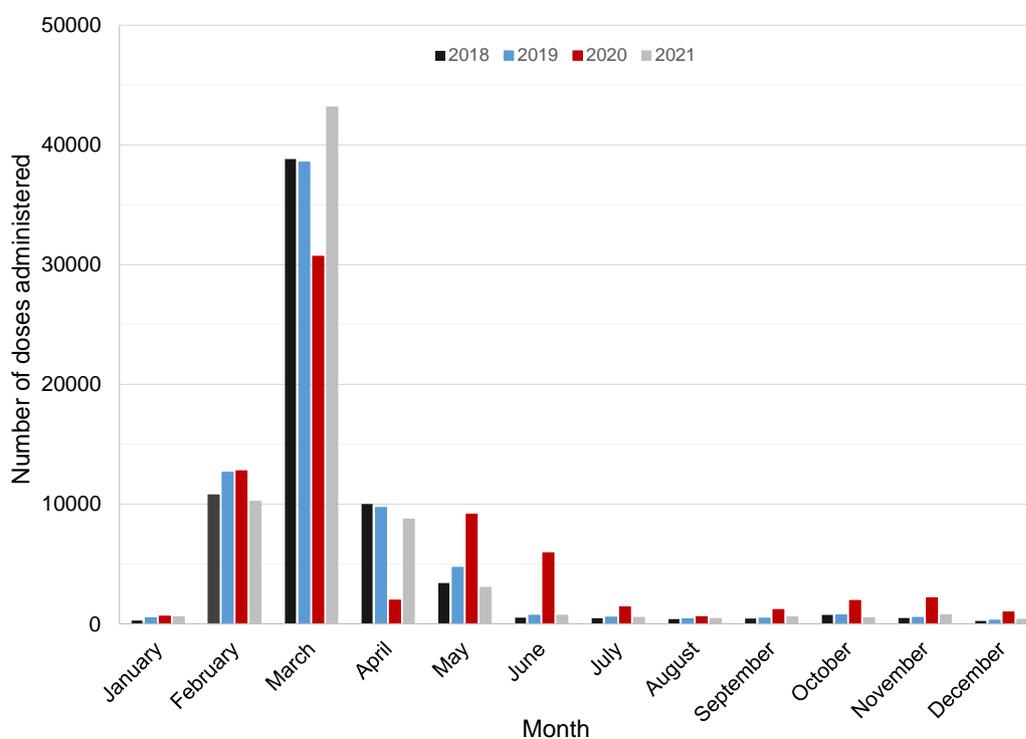


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Victoria, 2018–2021

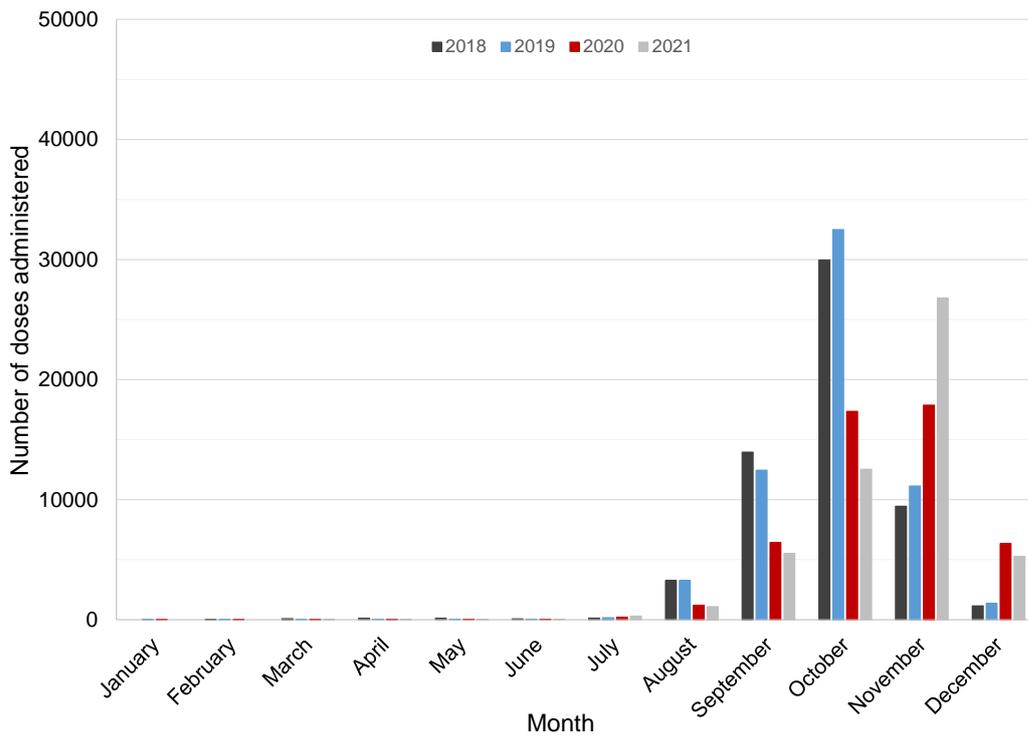


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Victoria, 2019–2021

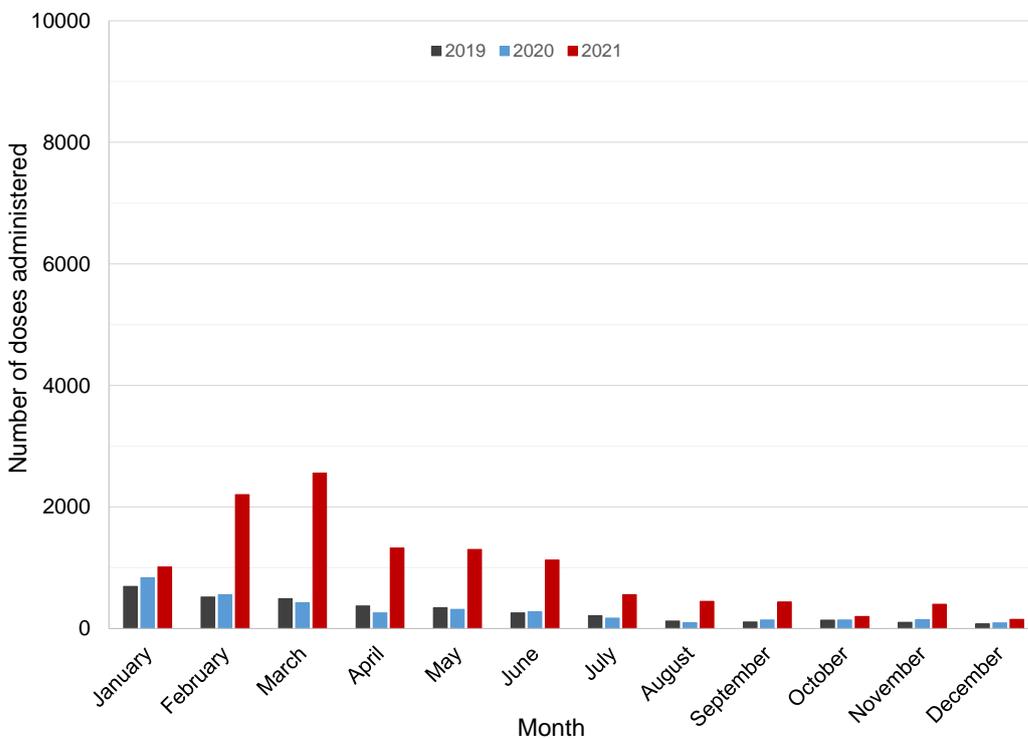


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Victoria, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	87.6	87.3	71.3	74.1	74.4	71.6	55.7	57.7
% Received dose 2 as catch-up in year following dose 1	5.2	4.9	16.9	–	9.8	8.8	20.9	–
Overall % received dose 2	92.8	92.3	88.1	–	84.1	80.4	76.5	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Victoria, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	9.7	10.4	12.7	10.9	12.5	16.7	16.1	15.7
Community health / council clinic	89.8	89.1	86.9	88.6	84.0	79.2	79.1	79.6
Other	0.5	0.4	0.4	0.5	3.5	4.0	4.7	4.7
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	7.1	7.4	12.6	14.1	9.0	12.3	12.3	13.5
Community health / council clinic	92.6	92.4	87.0	85.6	88.6	86.5	85.7	84.2
Other	0.3	0.2	0.3	0.3	2.4	1.2	1.9	2.3
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	63.3	68.1	30.1		45.8	56.9	27.3	
Community health / council clinic	34.0	28.9	69.0		42.2	26.4	63.6	
Other	2.8	2.9	0.9		12.0	16.7	9.1	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Victoria, 2018–2021

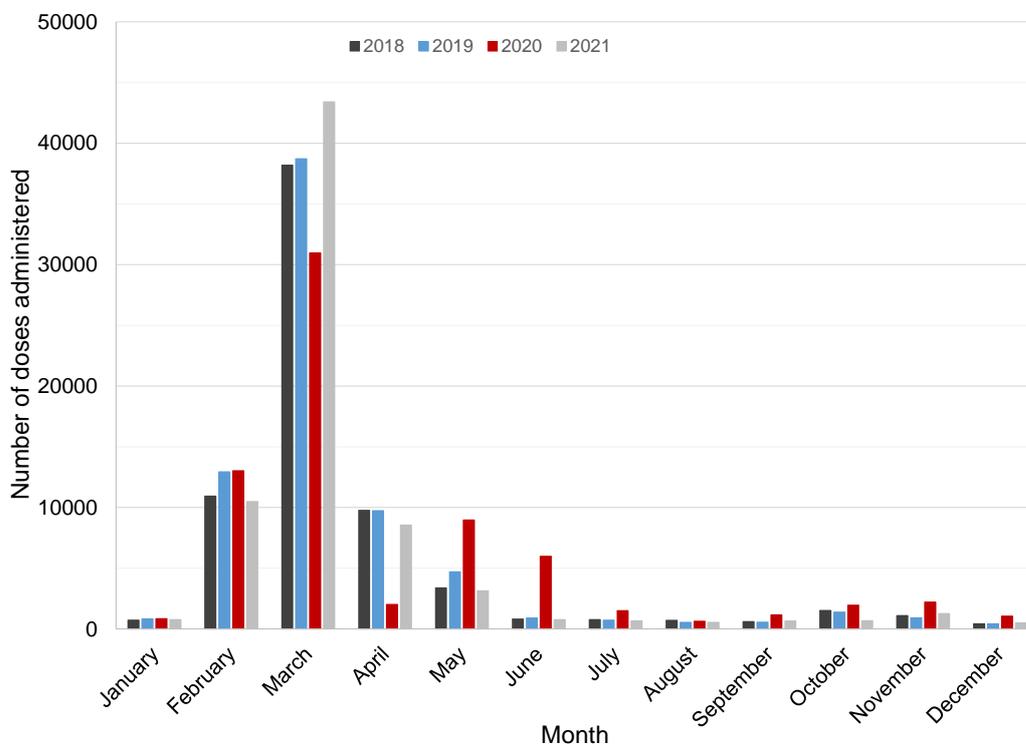


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Victoria, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	12.7	12.3	13.2	11.8	12.8	16.9	16.4	16.7
Community health / council clinic	86.8	87.1	86.3	87.5	83.5	79.1	78.7	78.4
Other	0.5	0.6	0.6	0.7	3.7	4.0	5.0	4.9

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Victoria, 2019–2021

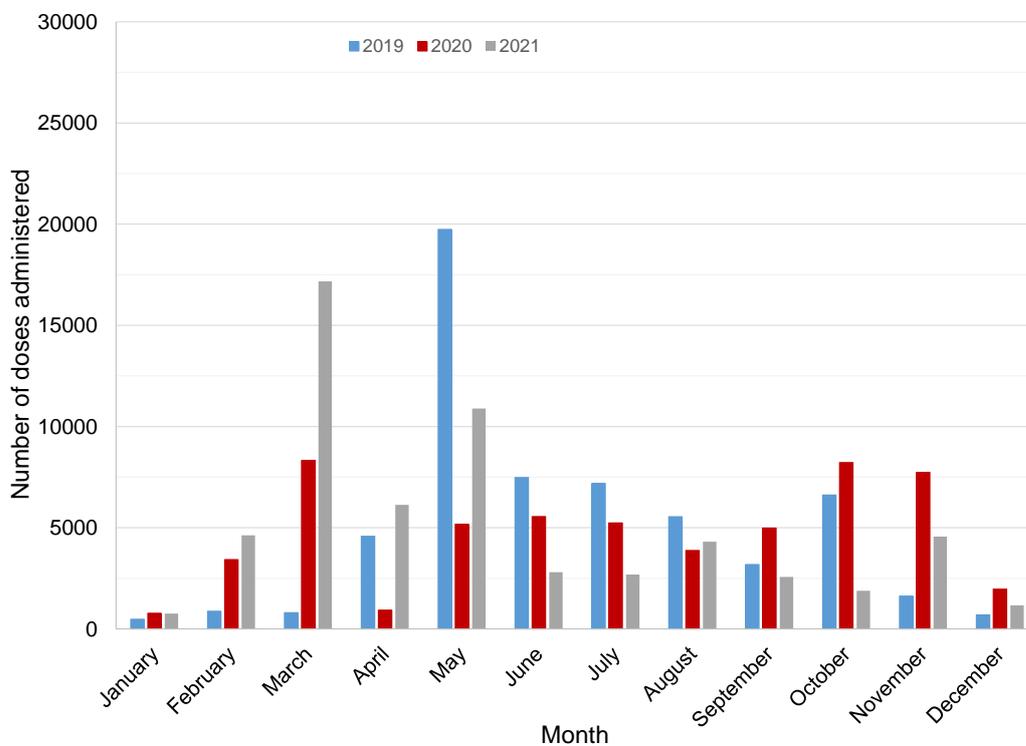


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Victoria, 2019–2021

	All			Indigenous				
	Pre-pandemic	Pandemic		Pre-pandemic	Pandemic			
		2019	2020	2021	2019	2020	2021	
General practice		13.1	17.5	15.2		21.3	22.5	23.1
Community health / council clinic		86.4	81.8	84.1		75.3	70.3	72.8
Other		0.5	0.8	0.7		3.4	7.1	4.1

Queensland

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, Queensland, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	56781	60555	59681	59603	3869	4134	4231	4255
HPV dose 2 (same calendar year as dose 1)	47556	50391	46677	44526	2716	2827	2573	2548
HPV dose 2 (catch-up in year after dose 1)	4384	4549	6109	–	525	571	722	–
dTpa	59597	62767	61216	61304	3979	4187	4316	4362
MenACWY	–	52081	50769	50362	–	2539	2765	2827

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Queensland, 2018–2021

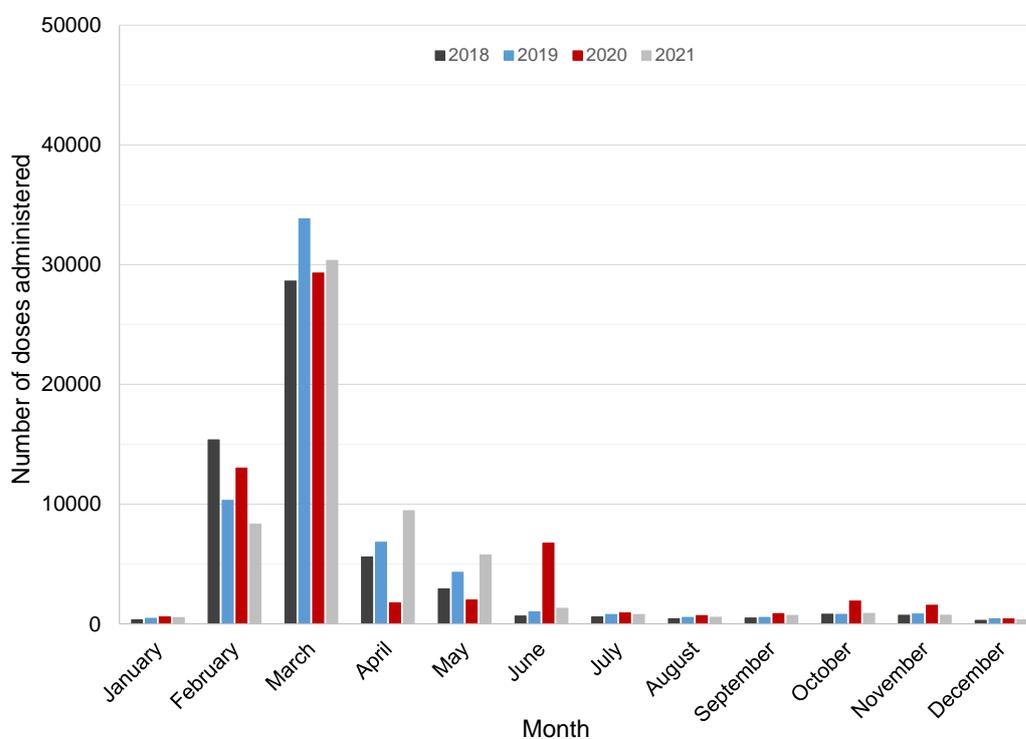


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Queensland, 2018–2021

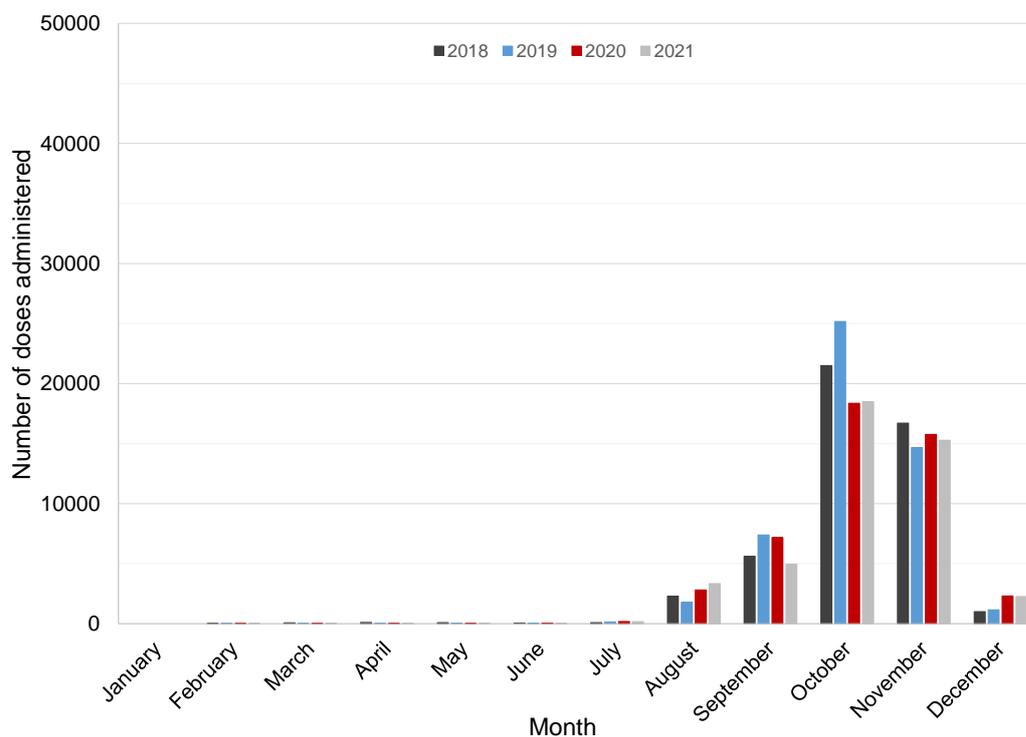


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Queensland, 2019–2021

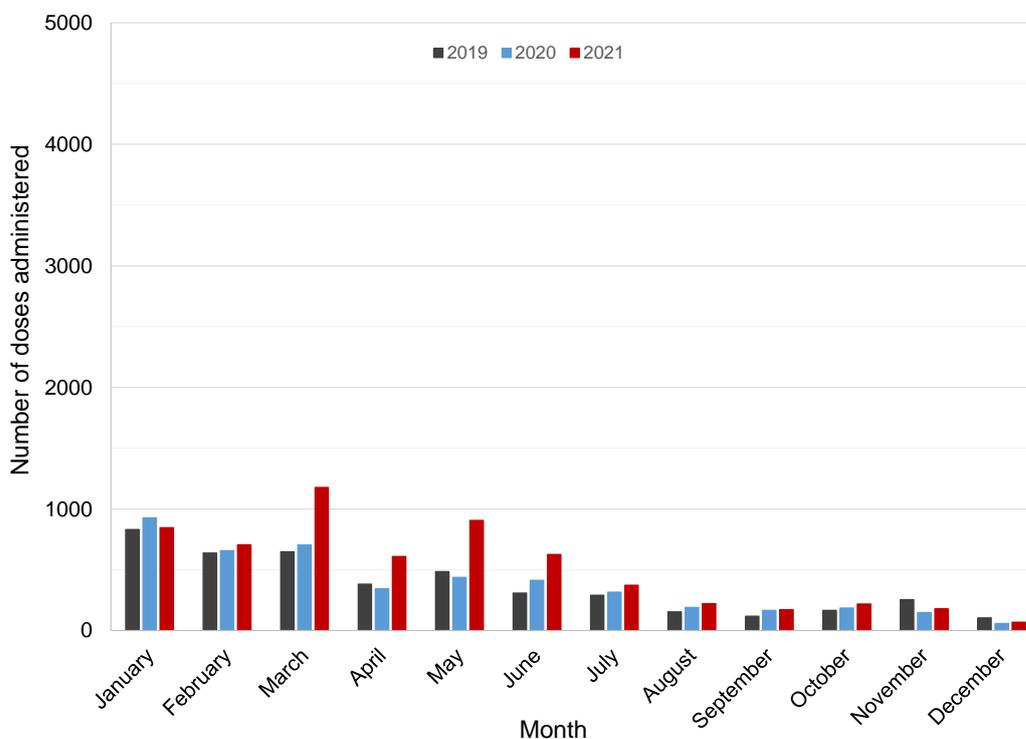


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Queensland, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	83.8	83.2	78.2	74.7	70.2	68.4	60.8	59.9
% Received dose 2 as catch-up in year following dose 1	7.7	7.5	10.2	–	13.6	13.8	17.1	–
Overall % received dose 2	91.5	90.7	88.4	–	83.8	82.2	77.9	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Queensland, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	17.7	19.8	19.6	20.8	22.5	24.2	24.5	28.8
Community health / council clinic	78.6	77.2	77.2	76.3	67.5	67.3	67.6	64.8
Other	3.6	3.0	3.2	2.9	10.0	8.5	7.9	6.4
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	14.2	14.4	15.0	18.5	17.3	17.0	20.3	22.6
Community health / council clinic	82.8	82.7	82.0	78.4	74.6	75.6	72.7	71.1
Other	3.0	2.8	3.0	3.1	8.1	7.4	7.0	6.4
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	73.2	76.1	66.6		53.9	61.6	53.7	
Community health / council clinic	23.6	21.5	29.6		34.7	33.1	38.5	
Other	3.1	2.4	3.8		11.4	5.3	7.8	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Queensland, 2018–2021

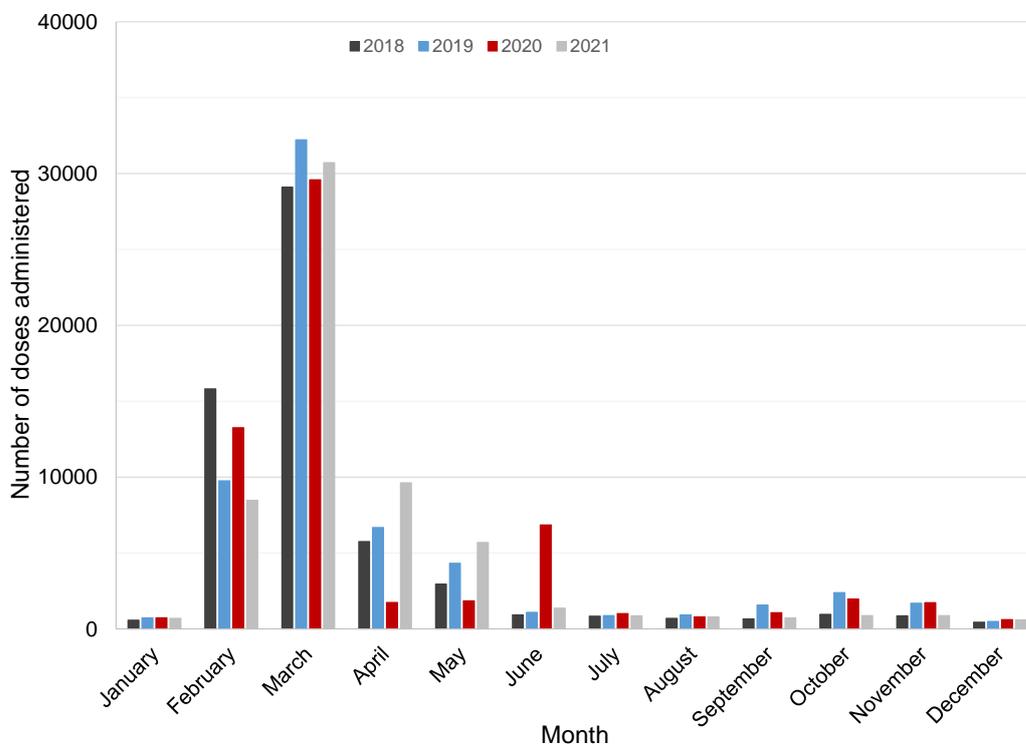


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Queensland, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	19.9	21.2	20.2	21.8	24.1	24.5	24.8	29.7
Community health / council clinic	77.3	75.6	76.3	74.9	67.1	66.7	67.0	63.5
Other	2.8	3.2	3.6	3.3	8.8	8.8	8.2	6.8

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Queensland, 2019–2021

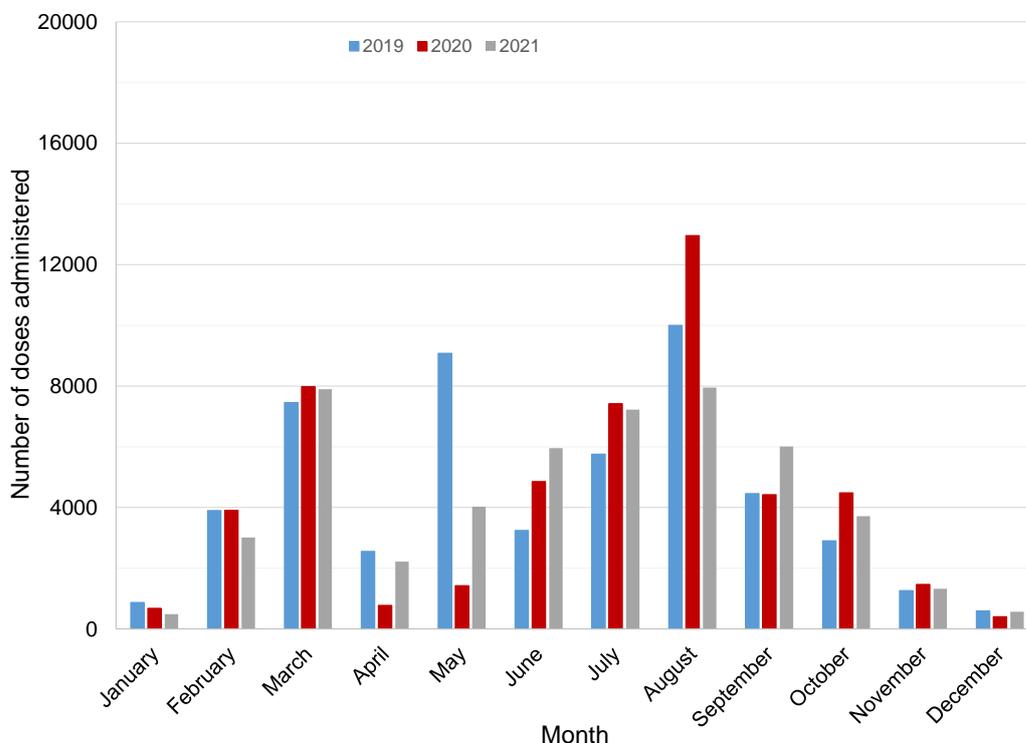


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Queensland, 2019–2021

	All				Indigenous			
	Pre-pandemic	Pandemic			Pre-pandemic	Pandemic		
		2019	2020	2021		2019	2020	2021
General practice		22.0	20.0	20.6		28.0	27.2	29.8
Community health / council clinic		75.3	77.2	76.1		65.3	66.2	63.6
Other		2.8	2.8	3.3		6.7	6.6	6.5

South Australia

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, South Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	16608	18122	17970	18700	458	557	559	560
HPV dose 2 (same calendar year as dose 1)	14386	15598	14787	14814	305	350	341	324
HPV dose 2 (catch-up in year after dose 1)	784	984	1286	–	55	73	59	–
dTpa	17575	18902	18679	19315	493	557	563	579
Meningococcal ACWY	–	19004	17915	17365	–	383	396	395

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, South Australia, 2018–2021

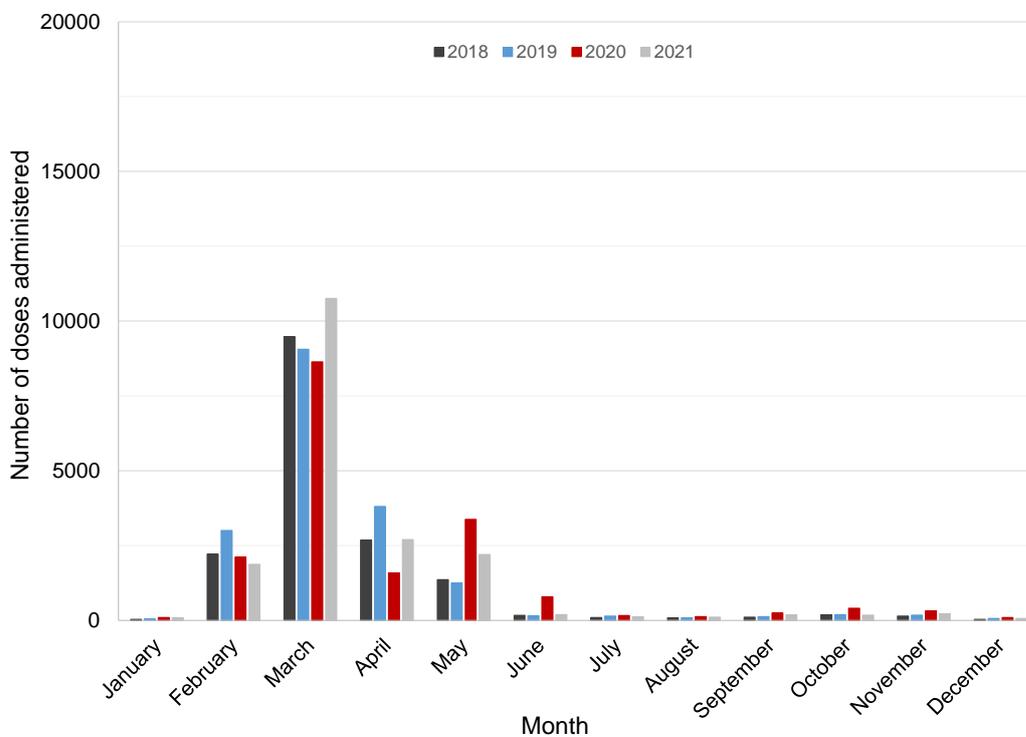


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, South Australia, 2018–2021

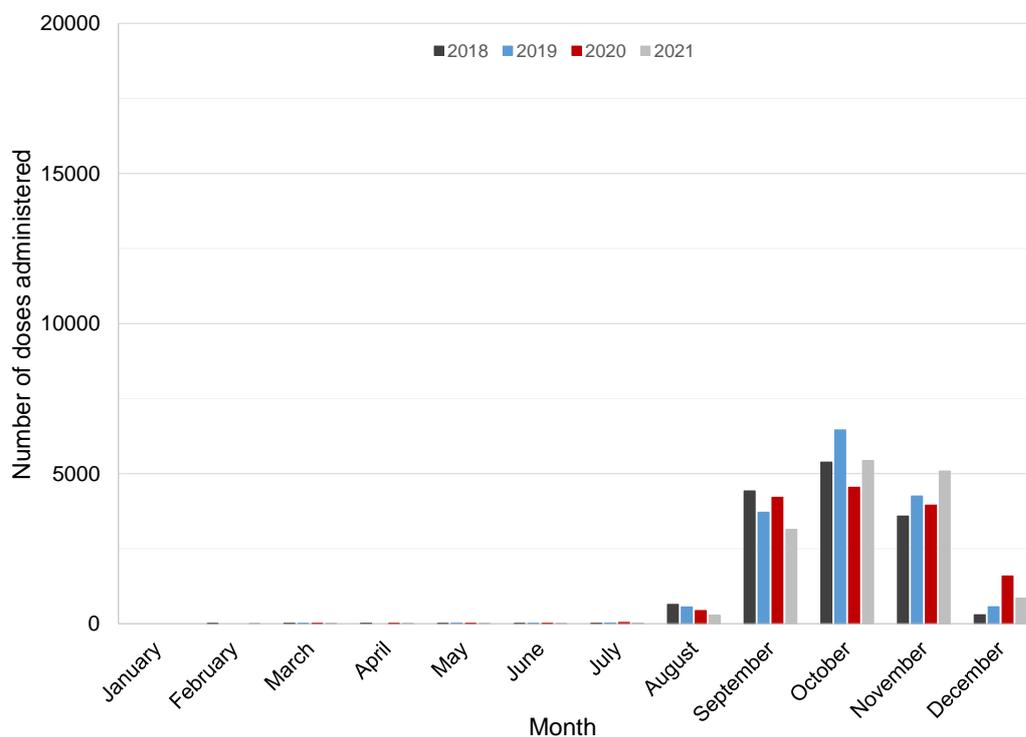


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, South Australia, 2019–2021

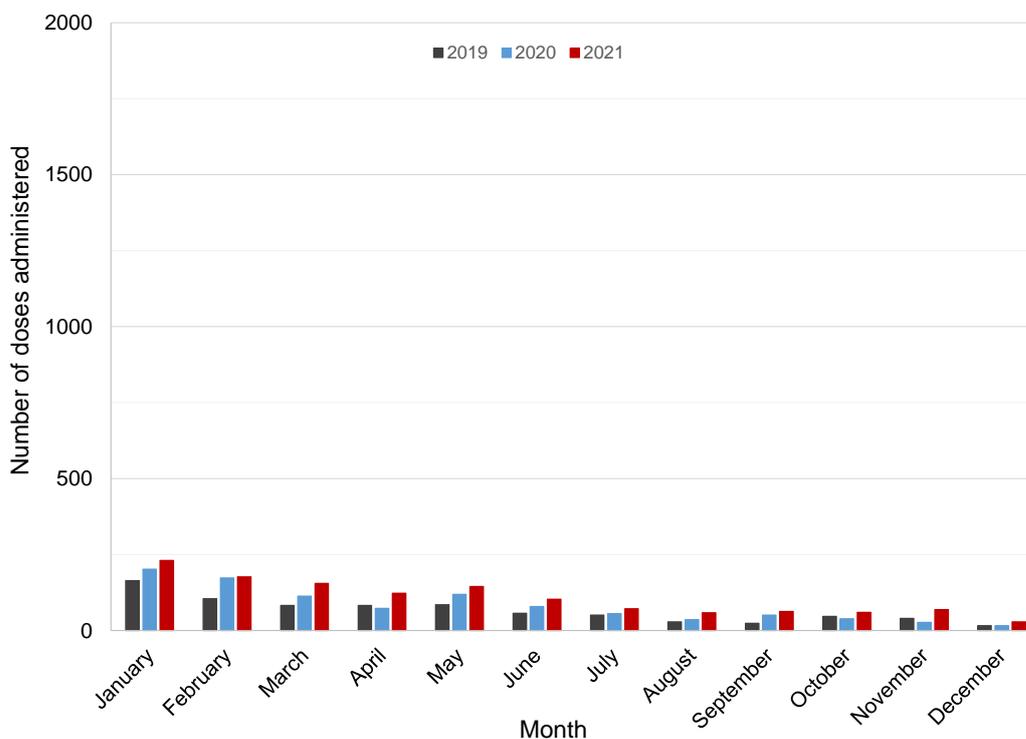


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, South Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	86.6	86.1	82.3	79.2	66.6	62.8	61.0	57.9
% Received dose 2 as catch-up in year following dose 1	4.7	5.4	7.2	–	12.0	13.1	10.6	–
Overall % received dose 2	91.3	91.5	89.4	–	78.6	75.9	71.6	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, South Australia, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	7.5	9.2	11.3	10.6	12.2	13.6	15.6	17.0
Community health / council clinic	91.3	89.0	85.8	87.9	79.5	75.0	72.5	75.4
Other	1.2	1.8	2.9	1.5	8.3	11.3	12.0	7.7
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	6.0	6.8	7.9	9.3	9.8	10.3	11.1	11.1
Community health / council clinic	93.5	91.2	89.4	88.6	87.9	85.1	81.5	81.8
Other	0.4	2.0	2.7	2.1	2.3	4.6	7.3	7.1
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	47.3	58.4	51.2		29.1	43.8	37.3	
Community health / council clinic	48.1	38.9	45.3		34.5	32.9	47.5	
Other	4.6	2.6	3.6		36.4	23.3	15.3	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, South Australia, 2018–2021

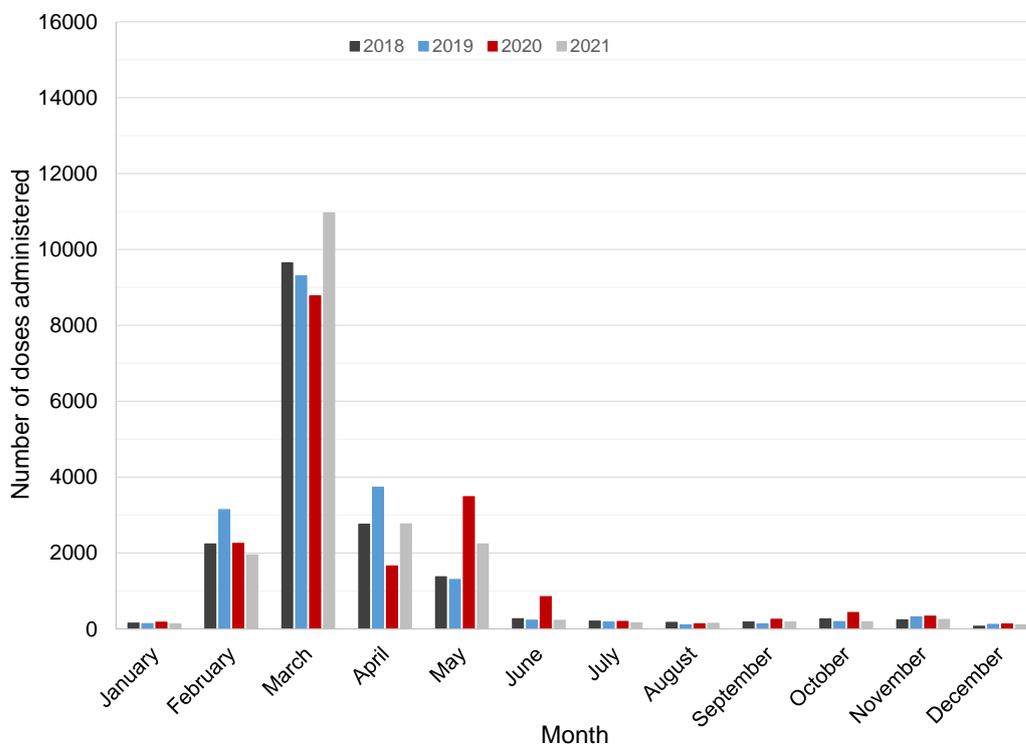


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, South Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	10.8	10.9	12.3	11.6	16.6	13.6	15.8	17.6
Community health / council clinic	87.8	87.3	84.8	86.8	73.6	75.4	71.9	73.2
Other	1.3	1.8	2.9	1.6	9.7	11.0	12.4	9.2

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, South Australia, 2019–2021

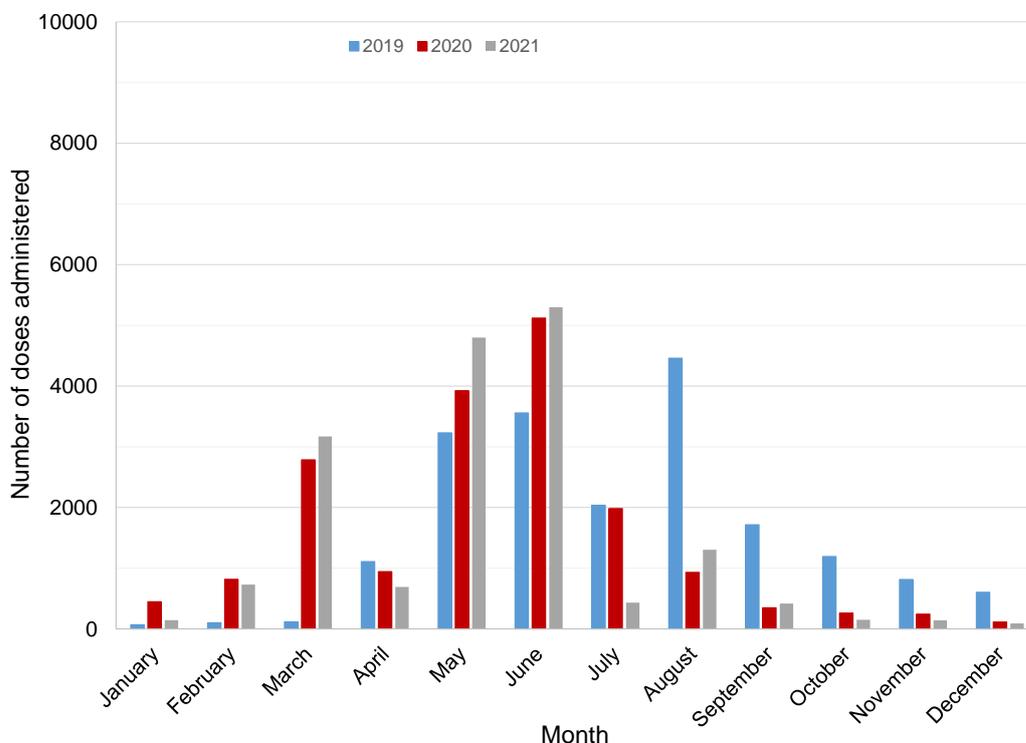


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, South Australia, 2019–2021

	All				Indigenous			
	Pre-pandemic	Pandemic			Pre-pandemic	Pandemic		
		2019	2020	2021		2019	2020	2021
General practice		18.2	16.2	11.2		22.5	23.2	18.2
Community health / council clinic		80.3	81.6	87.2		71.8	67.4	73.4
Other		1.6	2.2	1.5		5.7	9.6	8.4

Western Australia

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, Western Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	27756	58117	31192	29132	1458	3144	1830	1571
HPV dose 2 (same calendar year as dose 1)	24335	51355	24308	17015	891	2125	1027	714
HPV dose 2 (catch-up in year after dose 1)	1930	3682	4255	–	316	513	387	–
dTpa	30001	60447	32225	30227	1555	3171	1823	1622
MenACWY	–	26624	26350	25844	–	1282	1005	1095

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Western Australia, 2018–2021

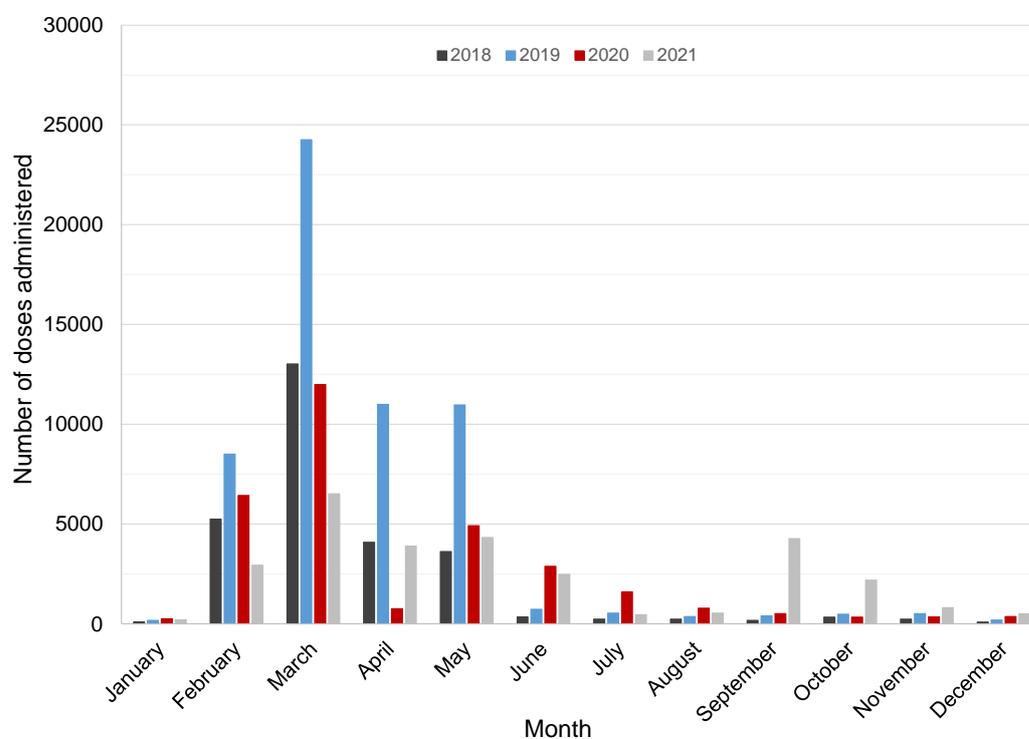


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Western Australia, 2018–2021

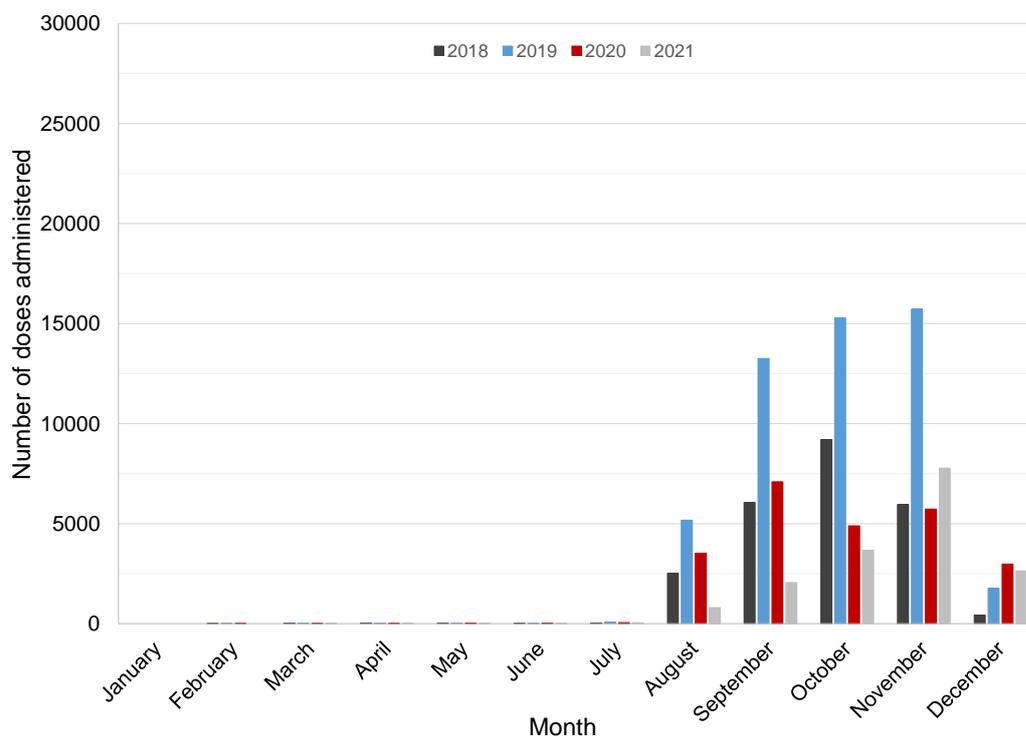


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Western Australia, 2019–2021

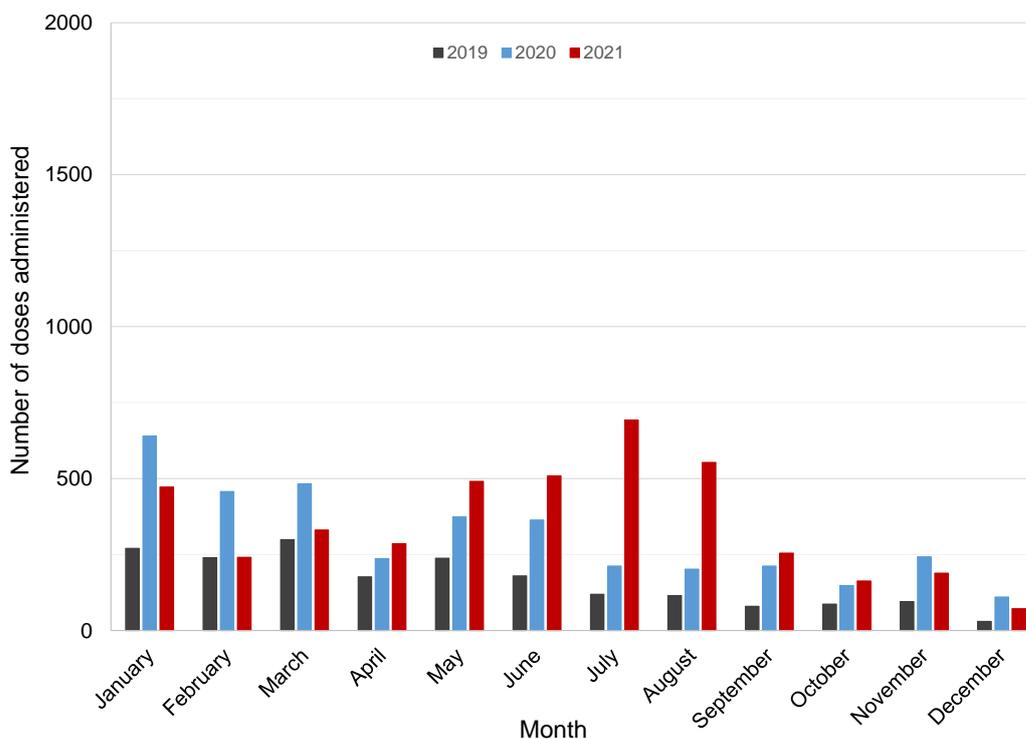


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Western Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	87.7	88.4	77.9	58.4	61.1	67.6	56.1	45.4
% Received dose 2 as catch-up in year following dose 1	7.0	6.3	13.6	–	21.7	16.3	21.1	–
Overall % received dose 2	94.6	94.7	91.6	–	82.8	83.9	77.3	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Western Australia, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	7.5	7.2	10.1	10.5	8.6	6.8	9.4	10.3
Community health / council clinic	91.5	91.9	88.9	88.5	87.0	89.6	86.9	86.5
Other	1.1	0.9	1.0	1.0	4.3	3.6	3.7	3.2
Dose 2 (given in same calendar year as dose 1)								
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	4.5	5.0	6.0	8.5	3.4	3.5	5.0	6.3
Community health / council clinic	94.5	94.2	93.3	90.6	92.5	93.6	93.2	92.0
Other	0.9	0.8	0.7	0.9	4.2	2.9	1.9	1.7
Dose 2 (given in calendar year following dose 1)								
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	43.0	43.3	29.5		20.3	18.7	19.4	
Community health / council clinic	54.2	54.0	69.1		72.5	72.9	74.9	
Other	2.7	2.7	1.3		7.3	8.4	5.7	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Western Australia, 2018–2021

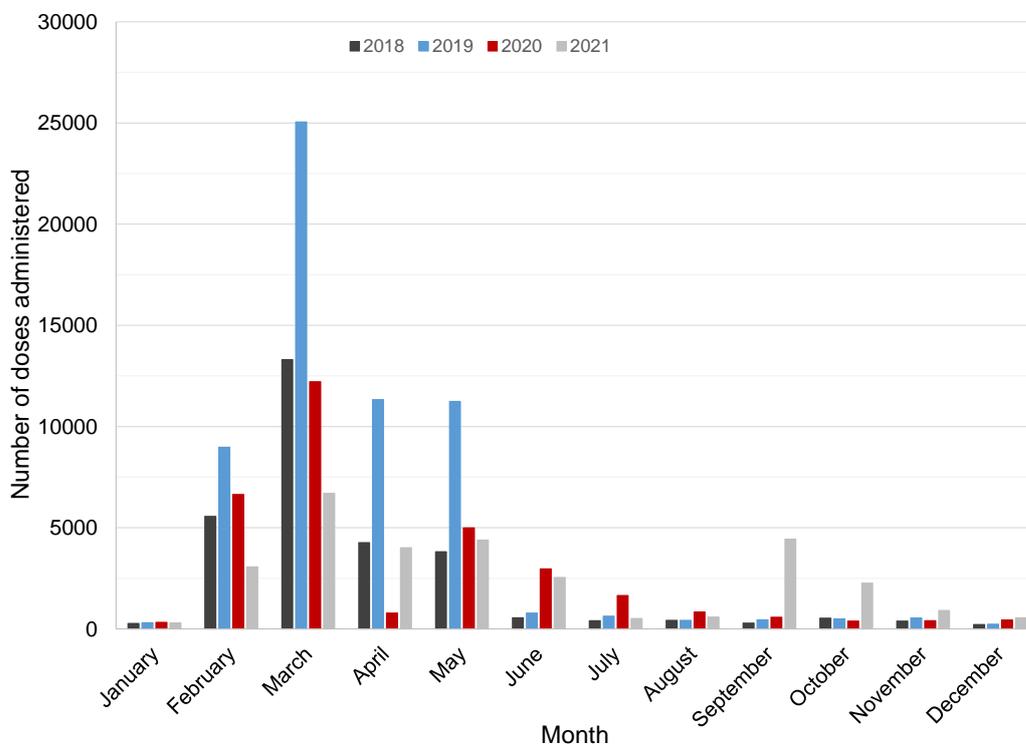


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Western Australia, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	10.8	7.8	10.7	11.4	12.2	7.0	9.3	11.5
Community health / council clinic	88.0	91.2	88.2	87.5	83.3	89.4	86.8	85.0
Other	1.1	1.0	1.1	1.1	4.5	3.6	3.9	3.6

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Western Australia, 2019–2021

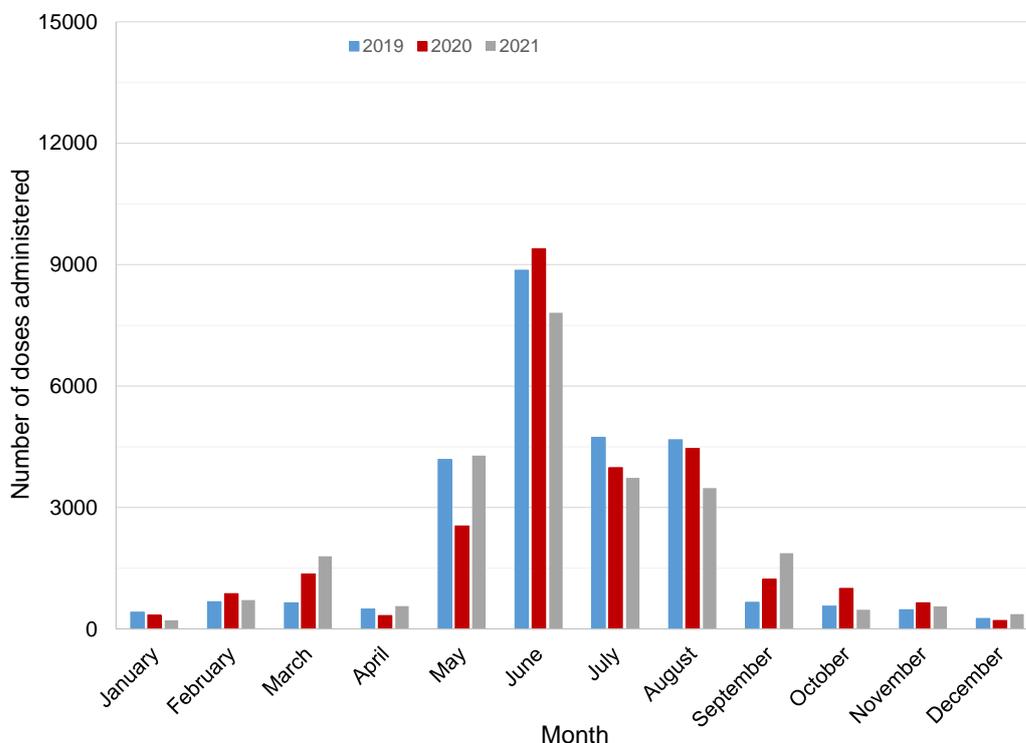


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Western Australia, 2019–2021

	All				Indigenous			
	Pre-pandemic	Pandemic			Pre-pandemic	Pandemic		
		2019	2020	2021		2019	2020	2021
General practice		12.1	10.2	9.9		14.0	13.0	11.7
Community health / council clinic		86.8	88.9	89.2		80.3	83.1	85.6
Other		1.2	1.0	0.9		5.6	3.9	2.7

Tasmania

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, Tasmania, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	5722	5753	5319	5653	443	456	465	540
HPV dose 2 (same calendar year as dose 1)	4469	4723	3489	3725	315	357	270	316
HPV dose 2 (catch-up in year after dose 1)	573	394	1013	–	68	35	104	–
dTpa	5646	5884	5404	5587	437	474	466	528
Meningococcal ACWY	–	1208	1141	1227	–	118	114	107

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Tasmania, 2018–2021

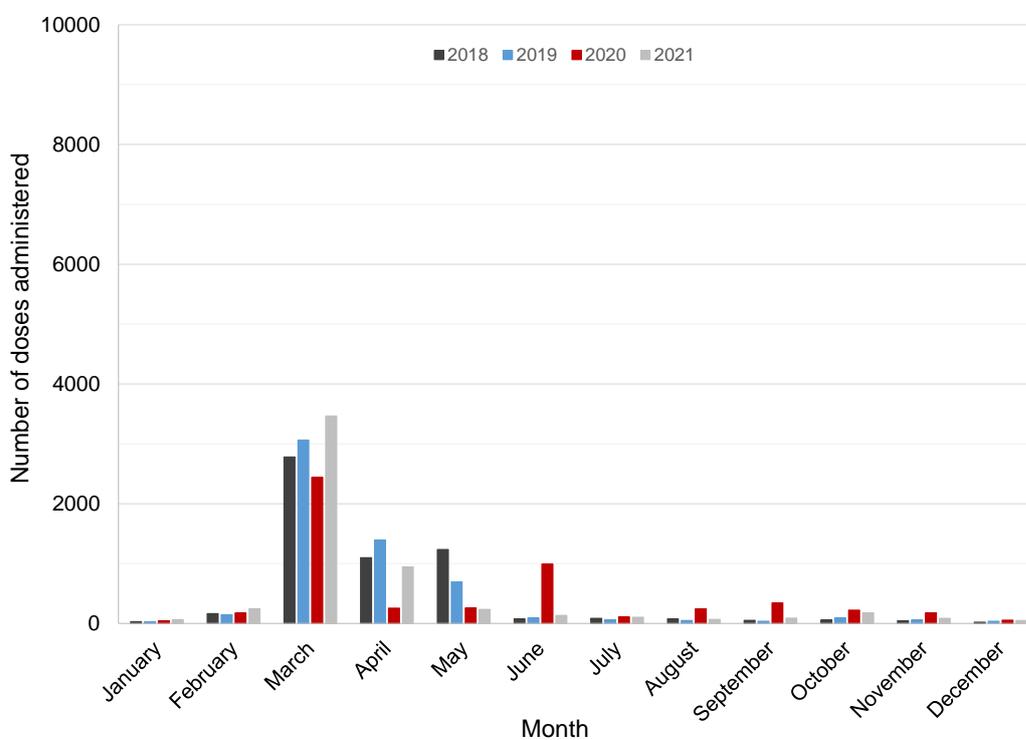


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Tasmania, 2018–2021

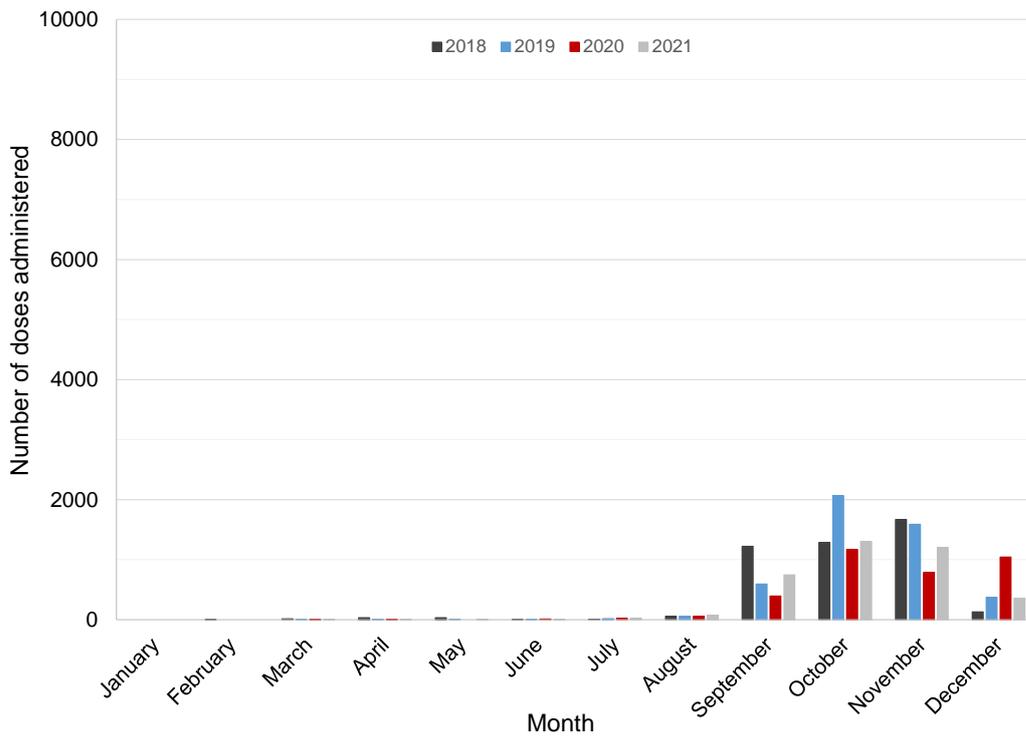


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Tasmania, 2019–2021

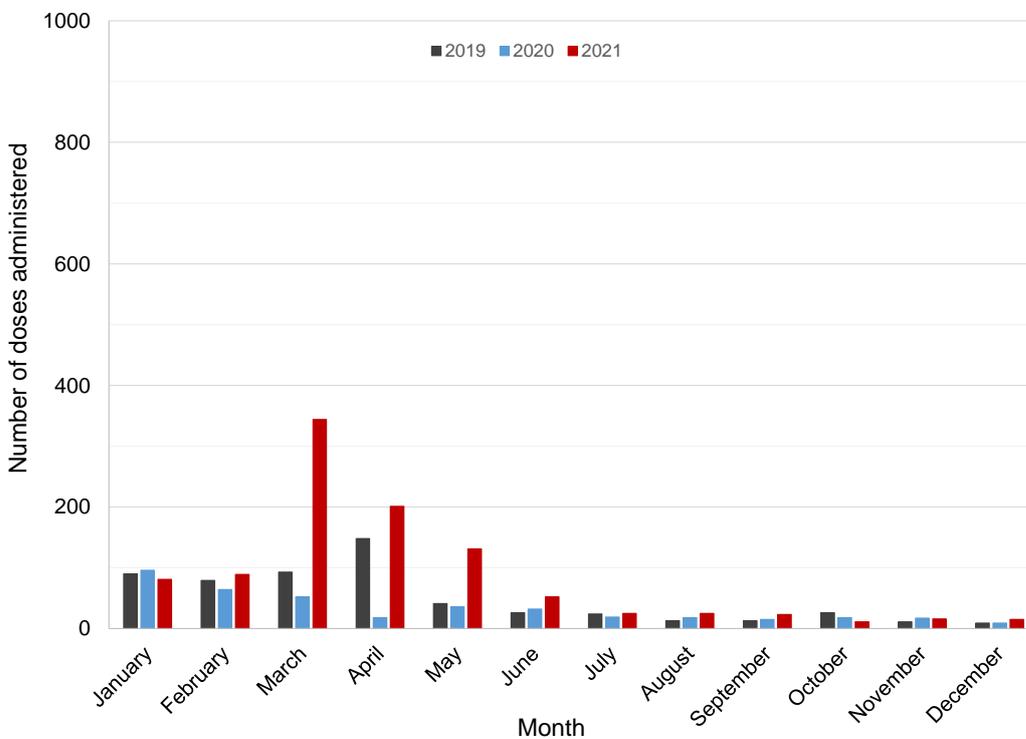


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Tasmania, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	78.1	82.1	65.6	65.9	71.1	78.3	58.1	58.5
% Received dose 2 as catch-up in year following dose 1	10.0	6.8	19.0	–	15.3	7.7	22.4	–
Overall % received dose 2	88.1	88.9	84.6	–	86.5	86.0	80.4	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Tasmania, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	18.5	16.7	22.3	23.3	24.6	22.6	26.7	26.7
Community health / council clinic	81.2	83.1	77.6	76.3	74.9	77.0	73.1	70.2
Other	0.2	0.2	0.1	0.4	0.5	0.4	0.2	3.1
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	14.6	11.3	14.5	21.3	14.9	16.5	17.4	22.2
Community health / council clinic	85.4	88.6	85.4	78.4	84.8	83.2	82.6	75.0
Other	0.0	0.1	0.1	0.3	0.3	0.3	0.0	2.8
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	64.4	83.8	48.9		66.2	80.0	58.7	
Community health / council clinic	35.1	15.0	50.5		32.4	20.0	38.5	
Other	0.5	1.3	0.6		1.5	0.0	2.9	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Tasmania, 2018–2021

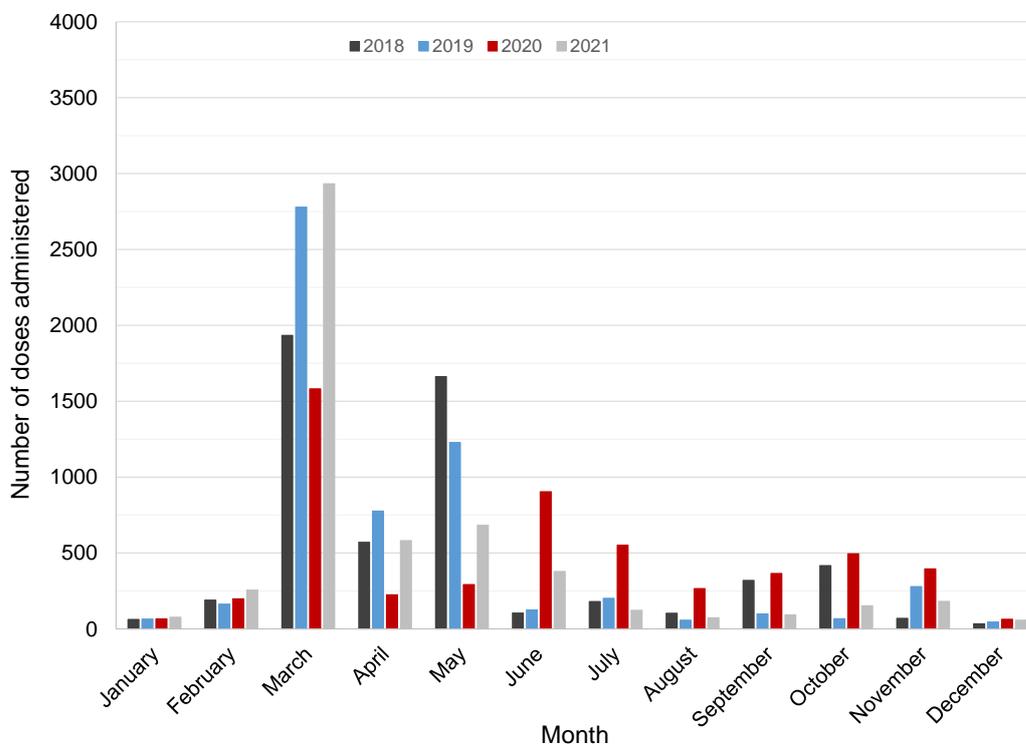


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Tasmania, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	22.5	19.4	23.6	25.2	28.4	24.5	27.9	27.3
Community health / council clinic	77.3	80.2	76.1	74.2	71.2	75.1	71.9	68.8
Other	0.2	0.4	0.2	0.6	0.5	0.4	0.2	4.0

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Tasmania, 2019–2021

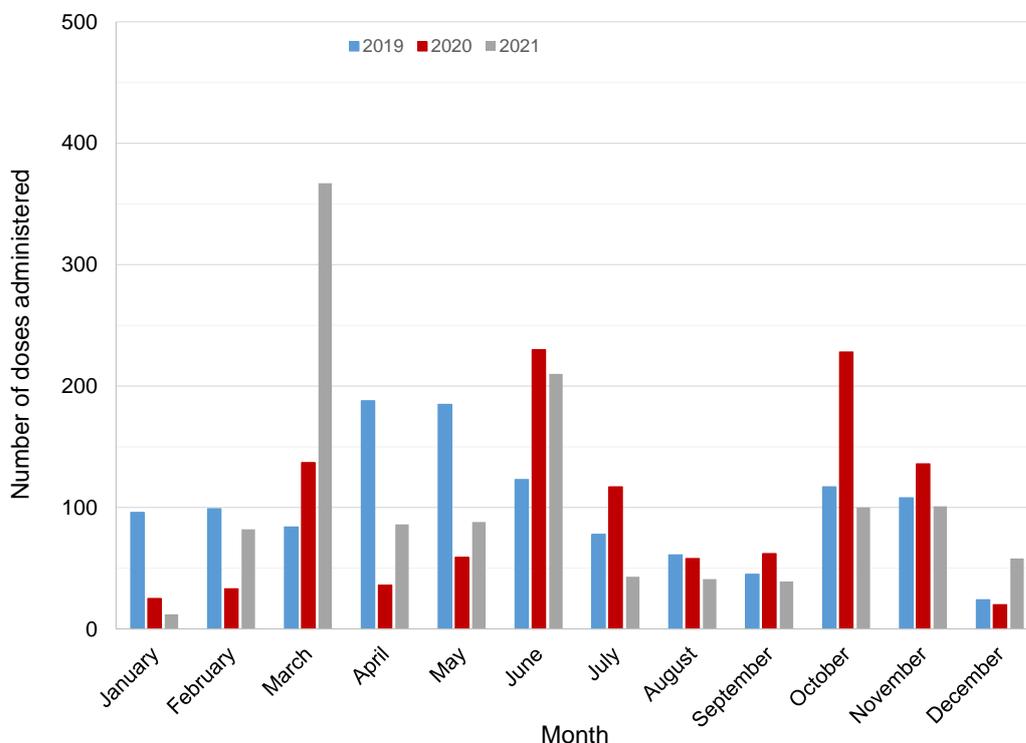


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Tasmania, 2019–2021

	All			Indigenous				
	Pre-pandemic	Pandemic		Pre-pandemic	Pandemic			
		2019	2020	2021	2019	2020	2021	
General practice		45.3	25.3	31.8		59.3	28.1	24.3
Community health / council clinic		53.2	74.1	67.0		40.7	71.1	70.1
Other		1.5	0.6	1.2		0.0	0.9	5.6

Northern Territory

Table A1. Number of HPV and dTpa vaccinations given to adolescents aged 11 to <15 years and number of MenACWY vaccinations given to adolescents aged 14 to <18 years, Northern Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
HPV dose 1	2887	2967	2733	2507	1250	1274	1036	886
HPV dose 2 (same calendar year as dose 1)	1816	1865	1643	1408	493	494	360	269
HPV dose 2 (catch-up in year after dose 1)	616	571	436	–	485	423	294	–
dTpa	3161	3040	2792	2586	1408	1313	1039	934
MenACWY	–	1630	1297	1103	–	470	300	251

HPV vaccination uptake

Figure A1. Number of first dose HPV vaccinations by month, adolescents aged 11 to <15 years, Northern Territory, 2018–2021

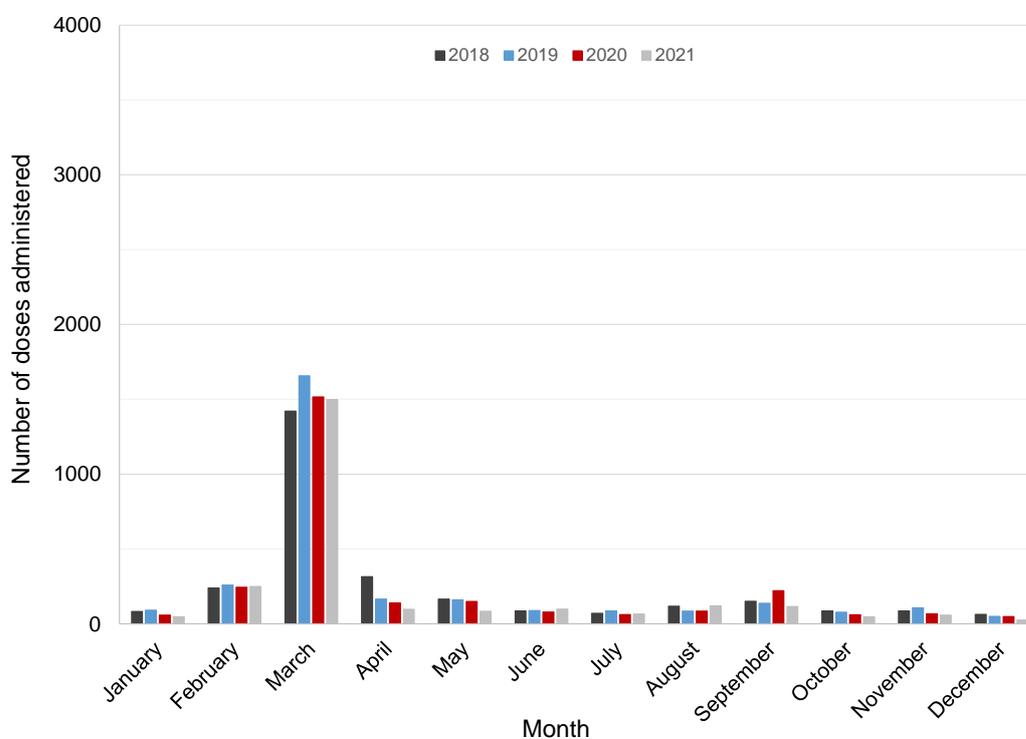


Figure A2. Number of second dose HPV vaccinations administered in same calendar year as first dose, by month, adolescents aged 11 to <15 years, Northern Territory, 2018–2021

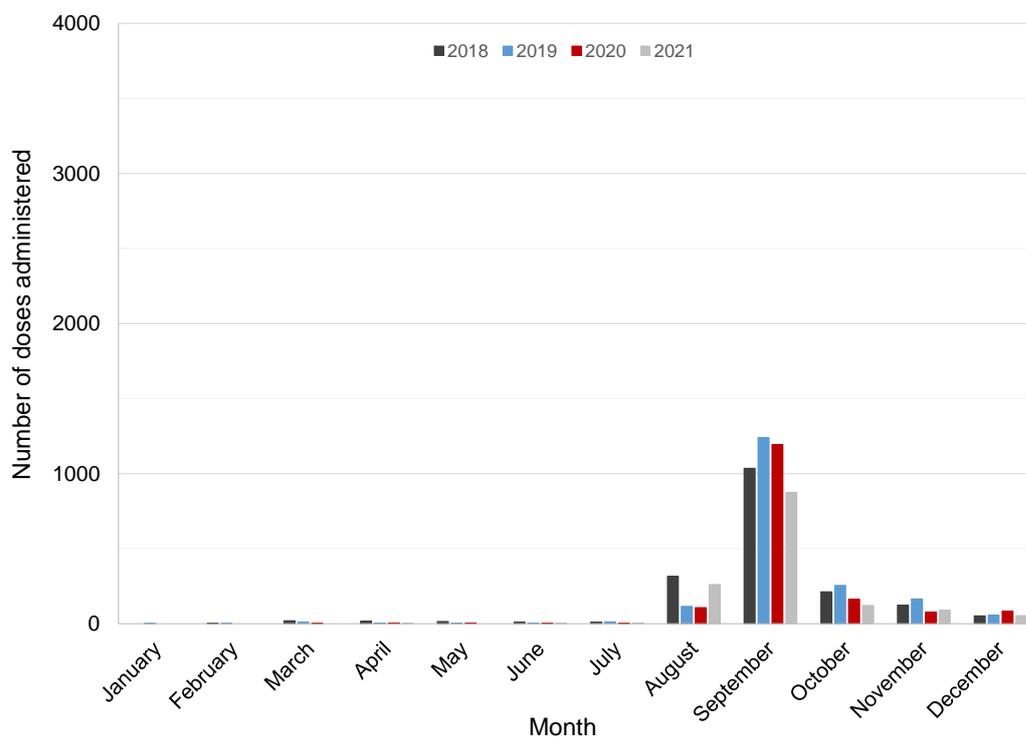


Figure A3. Number of catch-up second dose HPV vaccinations given in calendar year after first dose, by month, adolescents aged 11 to <15 years, Northern Territory, 2019–2021

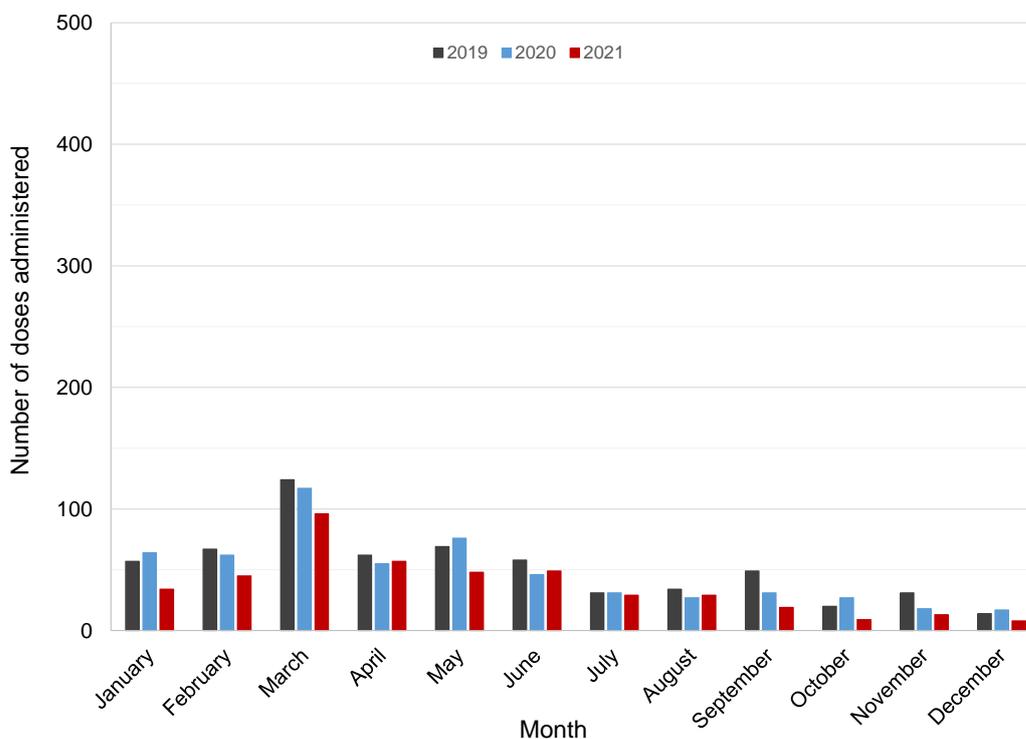


Table A2. Percentage of first dose HPV-vaccinated adolescents aged 11 to <15 years who received a second dose in same calendar year as first dose or in the year following, Northern Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
% Received dose 2 in same year as dose 1	62.9	62.9	60.1	56.2	39.4	38.8	34.7	30.4
% Received dose 2 as catch-up in year following dose 1	21.3	19.2	16.0	–	38.8	33.2	28.4	–
Overall % received dose 2	84.2	82.1	76.1	–	78.2	72.0	63.1	–

Table A3. Percentage of first and second dose HPV vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Northern Territory, 2018–2021

	Dose 1							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	6.7	9.6	9.4	11.0	8.0	10.5	13.9	13.7
Community health / council clinic	72.7	69.1	74.5	75.6	46.4	42.0	46.1	50.5
Other	20.5	21.3	16.0	13.4	45.6	47.5	40.0	35.9
	Dose 2 (given in same calendar year as dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	4.5	6.2	4.6	6.0	6.3	6.9	5.8	4.1
Community health / council clinic	87.1	84.8	89.7	91.2	64.7	62.6	69.2	83.6
Other	8.4	9.0	5.7	2.8	29.0	30.6	25.0	12.3
	Dose 2 (given in calendar year following dose 1)							
	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2019	2020	2021		2019	2020	2021	
General practice	15.4	26.6	21.8		12.0	21.5	17.3	
Community health / council clinic	37.5	31.0	41.1		29.1	22.0	31.0	
Other	47.1	42.4	37.2		59.0	56.5	51.7	

dTpa vaccination uptake

Figure A4. Number of dTpa vaccinations by month, adolescents aged 11 to <15 years, Northern Territory, 2018–2021

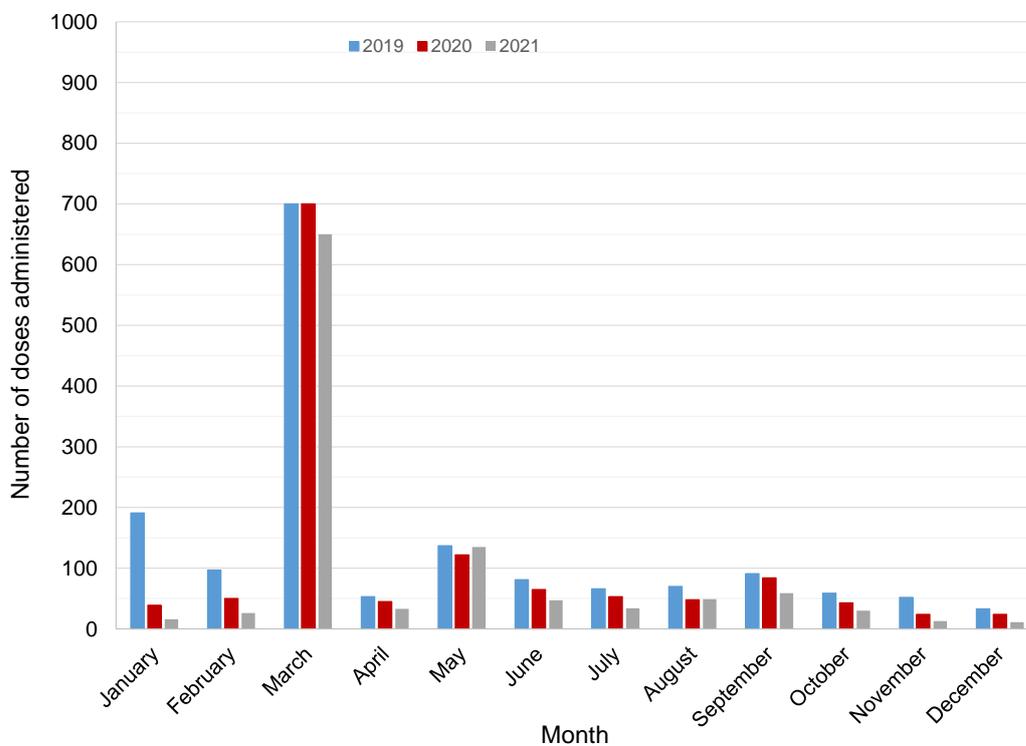


Table A4. Percentage of dTpa vaccinations given to adolescents aged 11 to <15 years, by provider type and Indigenous status, Northern Territory, 2018–2021

	All				Indigenous			
	Pre-pandemic		Pandemic		Pre-pandemic		Pandemic	
	2018	2019	2020	2021	2018	2019	2020	2021
General practice	6.3	8.8	8.7	11.3	5.0	8.5	10.3	12.8
Community health / council clinic	71.7	69.6	75.2	74.1	46.9	43.8	49.4	49.4
Other	22.0	21.6	16.0	14.6	48.0	47.7	40.3	37.8

Meningococcal ACWY vaccination uptake

Figure A5. Number of meningococcal ACWY vaccinations by month, adolescents aged 14 to <18 years, Northern Territory, 2019–2021

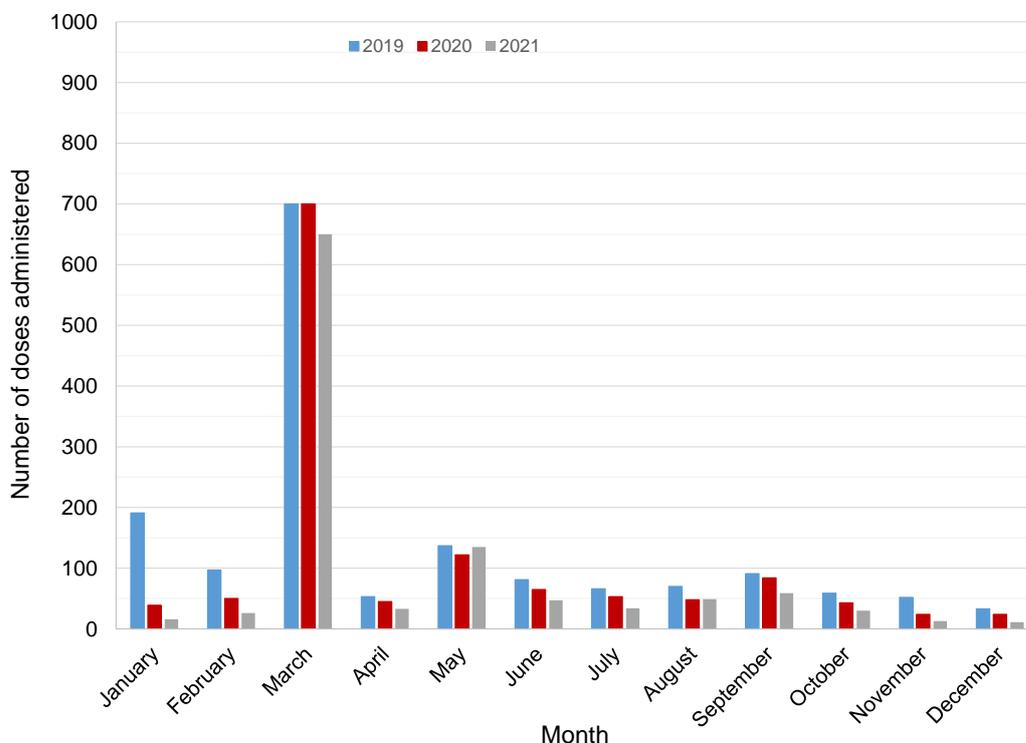


Table A5. Percentage of meningococcal ACWY vaccinations given to adolescents aged 14 to <18 years, by provider type and Indigenous status, Northern Territory, 2019–2021

	All				Indigenous			
	Pre-pandemic	Pandemic			Pre-pandemic	Pandemic		
		2019	2020	2021		2019	2020	2021
General practice		18.3	15.7	12.7		19.4	24.0	23.5
Community health / council clinic		70.5	79.3	81.8		45.7	57.0	56.2
Other		11.2	5.1	5.5		34.9	19.0	20.3

Appendix 2. Parents' suggestions

Parents' suggestions on how to improve adolescent vaccination program (including and beyond school-based vaccination program)

Key area	Examples
Improve access to vaccination	<ul style="list-style-type: none"> • Address GP shortages in regional/rural areas so that people can 'get on the books' for appointments • Make vaccinations easy to access – not only at school, but also outside of school (i.e. GP, medical centre) if vaccinations are missed at school or kids prefer to be vaccinated outside of school (reduce appointment wait time, all vaccinations bulk billed) • Offer school-based vaccinations as part of home visits • Have a dedicated adolescent vaccine hub, like the ones created for COVID-19
Improve information about school-based vaccines and vaccinations	<p>Mechanism of delivery:</p> <ul style="list-style-type: none"> • ads on social media (none of the participants saw any ads on catch-up programs on social media) • information available in one place (i.e. not across multiple places/websites) • an app that provides information about vaccinations, and enables parents/adolescents to book an appointment • reminders via messages, Medicare app or phone • add information about vaccination to the school curriculum so the children getting vaccinated learn about it • even more information and resources on vaccinations for parents, including in school newsletters and in other school-based information channels that parents use <p>Content of the information provided:</p> <ul style="list-style-type: none"> • which vaccines are available at what age and for whom (similar to what is included in the 'blue book' for children aged 0–5) • how vaccines work, that vaccines are safe and appropriate, how they protect against disease, and what side effects are likely • stressing the importance of non-COVID vaccinations (so that parents don't forget about non-COVID vaccinations) • options for where to vaccinate, if family prefers to do it outside of school <p>Framing of the information provided:</p> <ul style="list-style-type: none"> • perceived as unbiased, i.e. does not come from people or organisations who have vested vaccination interests • messages not forceful and acknowledging that everyone has a choice and options on vaccinating, including receipt of vaccine doses • messages that steer clear from making parents who have questions about vaccines feel guilty; acknowledging that all parents want the best for their child • avoiding saying 'go to your GP with questions' as this may not be a viable option for many parents, particularly in regional/rural areas
Improve the quality of vaccination experience for adolescents	Provide the option to receive vaccination at school privately (as opposed to in a group setting) to accommodate children who get anxious about vaccination