

**Impact of the COVID-19 pandemic on vaccination uptake in Victorian children,
adolescents and older adults**

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Abstract (50 words)

We analysed Australian Immunisation Register data to assess COVID-19 pandemic impact on vaccination uptake in Victoria in 2020. No impact was seen in young children. HPV vaccinations were 18% lower in 2020 than 2019 for dose 2 but similar for dose 1, and zoster vaccinations in 70-year-olds were 4% lower.

Main text (799 words)

The coronavirus disease 2019 (COVID-19) pandemic and associated measures to reduce spread of disease have impacted routine immunisation in many countries.¹⁻³

Strict physical distancing and movement restrictions (stage 3 'lockdown' measures) were implemented nationally from 23 March 2020, with many healthcare providers pivoting to a telehealth-based model. While previous analyses found no impact of the first pandemic wave on uptake of childhood vaccinations due up to July 2020, at either national or state/territory level,⁴ these analyses did not assess potential impacts of the more stringent measures, particularly 'stage 4' lockdowns in Melbourne, implemented in Victoria from early August to late October 2020, due to a second epidemic wave. Additionally, no analyses have reported on impact of the shift to remote learning on adolescent vaccination, usually delivered on school premises in Australia, or uptake in older adults. Using Australian Immunisation Register (AIR) data as of 28 February 2021, we compared vaccination uptake in Victoria in 2020 with 2019.

Monthly uptake for selected vaccines due at 2, 4 and 12 months of age was assessed by Indigenous status (all/Indigenous). One-month wide birth cohorts were used with uptake assessed at one month after vaccine due, i.e. earlier than standard vaccination coverage reporting (6-12 months after due).⁵ Proportion of children vaccinated was calculated using number vaccinated with the relevant vaccine as numerator and number registered on AIR as denominator. Monthly counts of human papillomavirus (HPV) vaccinations (dose 1 and 2) in adolescents aged 11-14 years, and zoster vaccinations in adults aged 70 years, were calculated by Indigenous status. As we did not sample a population but analysed AIR data for the entire Victorian population within the specified age groups, we considered calculation of confidence intervals to not be required.

No substantial impact of either stage 3 or 4 lockdown restrictions was seen on uptake in young children of diphtheria-tetanus-pertussis-containing vaccine (dose 1 due at 2 months of age), 13-valent pneumococcal conjugate vaccine (dose 2 due at 4 months of age), and measles-mumps-rubella vaccine (12 months of age), in either all (Box 1A) or Indigenous (Box 1B) children.

HPV dose 1 vaccinations in adolescents were lower in March and April 2020 (20.0% and 79.3%, respectively), when students were learning from home, but substantially higher (96.4%-801.6%) in all subsequent months than in 2019, including August-October when students were also learning from home (Box 2A). HPV dose 2 vaccinations were lower in March and April 2020 (6.4% and 12.9%, respectively), and August-October (47.2%-61.1%), but higher in other months, notably December (352.8%). The total number of HPV

vaccinations was 0.2% lower for dose 1 (but 38.6% higher for Indigenous adolescents) and 17.6% lower for dose 2 (10.3% higher for Indigenous) in 2020 than 2019.

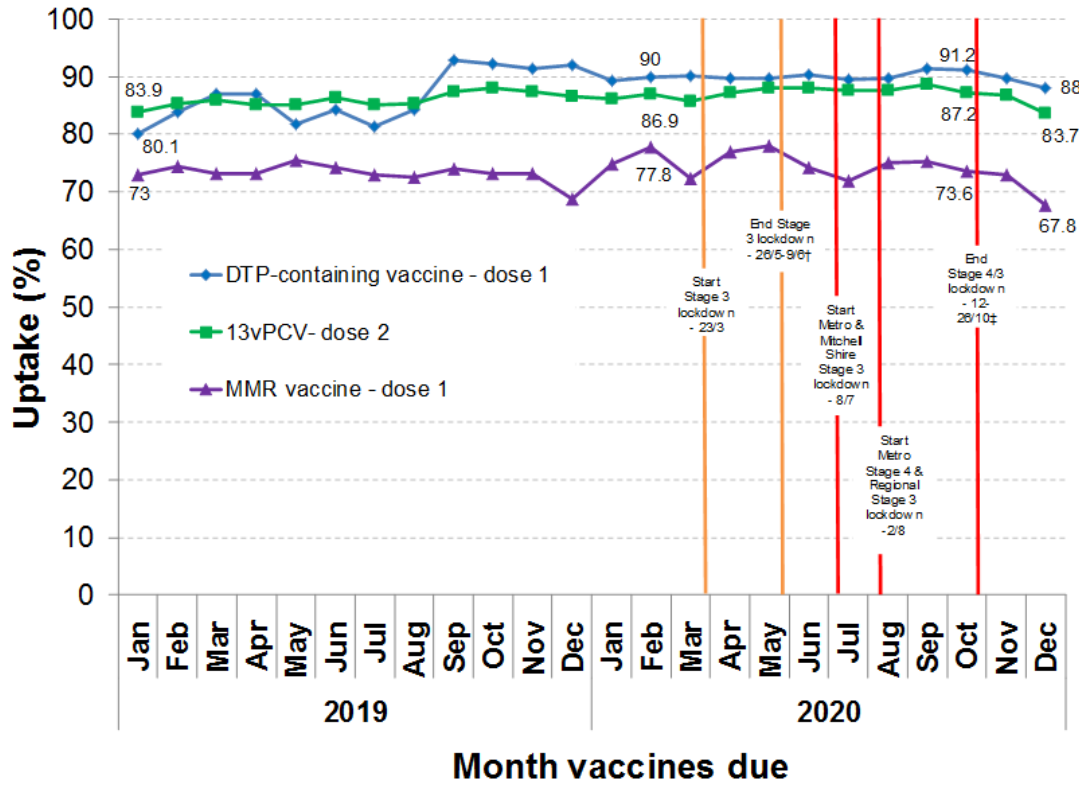
Zoster vaccine doses recorded for adults aged 70 years were substantially lower in May, August and September 2020 (45.2%, 42.2% and 23.4%, respectively), but higher in March (33.6%; likely due to earlier rollout of the influenza vaccination program), November (46.5%) and December (67.4%), than in in 2019 (Box 2B). The total number of zoster vaccinations recorded for adults aged 70 years was 3.8% lower (21.5% for Indigenous) in 2020 than 2019.

Study limitations include that substantial underreporting of zoster vaccination in older adults to the AIR has previously been identified,⁶ so if reporting completeness was greater in 2020 than 2019 we may have underestimated the impact on uptake. As we assessed vaccination uptake for young children earlier than usual, it will be important to monitor any impacts in populations where timeliness of vaccination is a known issue e.g. Indigenous children.

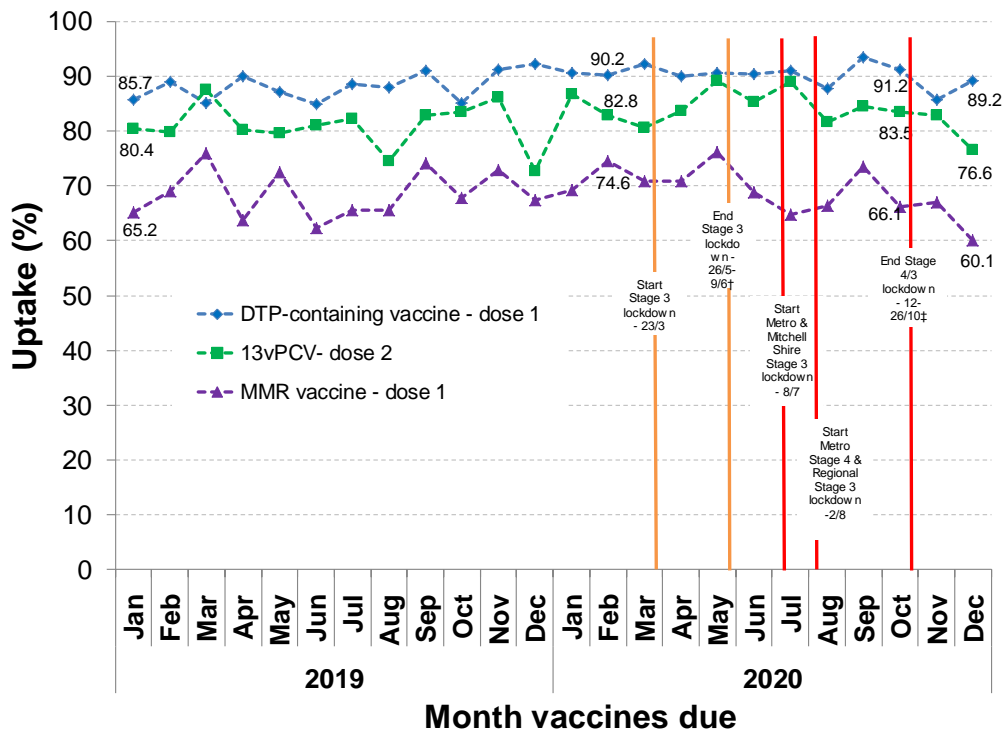
In summary, we found no evidence of impact of the pandemic and associated measures on vaccination uptake in Victoria in young children, despite the longest and most restrictive pandemic response measures in Australia. This continued strong uptake in Victoria, and Australia more broadly,⁴ is likely due to consistent messaging by health authorities that immunisation is an essential health service, efforts by vaccination providers to provide COVID-19 safe services, continued engagement of parents/carers, and lower disease rates than many other countries. However, there were substantial impacts on HPV dose 1 vaccination in adolescents in the first epidemic wave, with flow-on effect to dose 2 vaccinations later in 2020, given the minimum 6-month interval between doses. Pleasingly, no similar impact of the second epidemic wave was seen, likely due to the Victorian health department's engagement with local councils to facilitate alternative program delivery arrangements, and with general practitioners to promote catch-up vaccination, and mainstream and social media messaging and additional resources for providers and parents.⁷ We also found some impact on zoster vaccination uptake in older adults, particularly Indigenous, which may reflect greater propensity to delay routine vaccination due to concerns about COVID-19 infection risks. Overall our findings demonstrate resilience of the Victorian immunisation delivery system in the face of unprecedented social and healthcare disruption.

Box 1: Vaccination uptake at 2-, 4- and 12-month age milestones for selected vaccine doses⁸, assessed 1 month after vaccines due for successive 1-month-wide birth cohorts; all children (A) and Indigenous children (B), Victoria, 2019-2020*

A (all children)



B (Indigenous children)



* Vaccination uptake in this figure represents timely uptake of selected doses and does not equate to vaccination coverage as usually assessed (at 6-12 months after dose due capturing catch-up vaccinations well beyond the first month as assessed here)

† Partial return to school on 26 May; full return on 9 June 2020.

‡ Stage 3 ended in regional areas on 12 October 2020; and metropolitan areas on 26 October 2020.

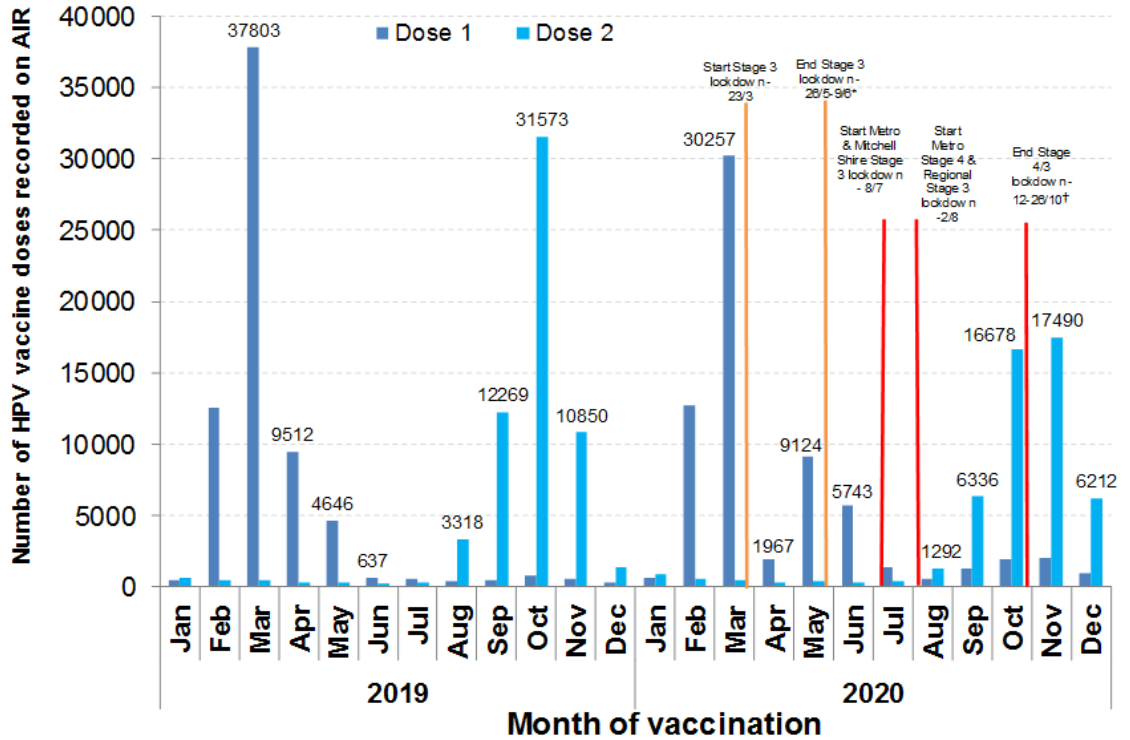
DTP = diphtheria-tetanus-pertussis

13vPCV = 13-valent pneumococcal conjugate vaccine

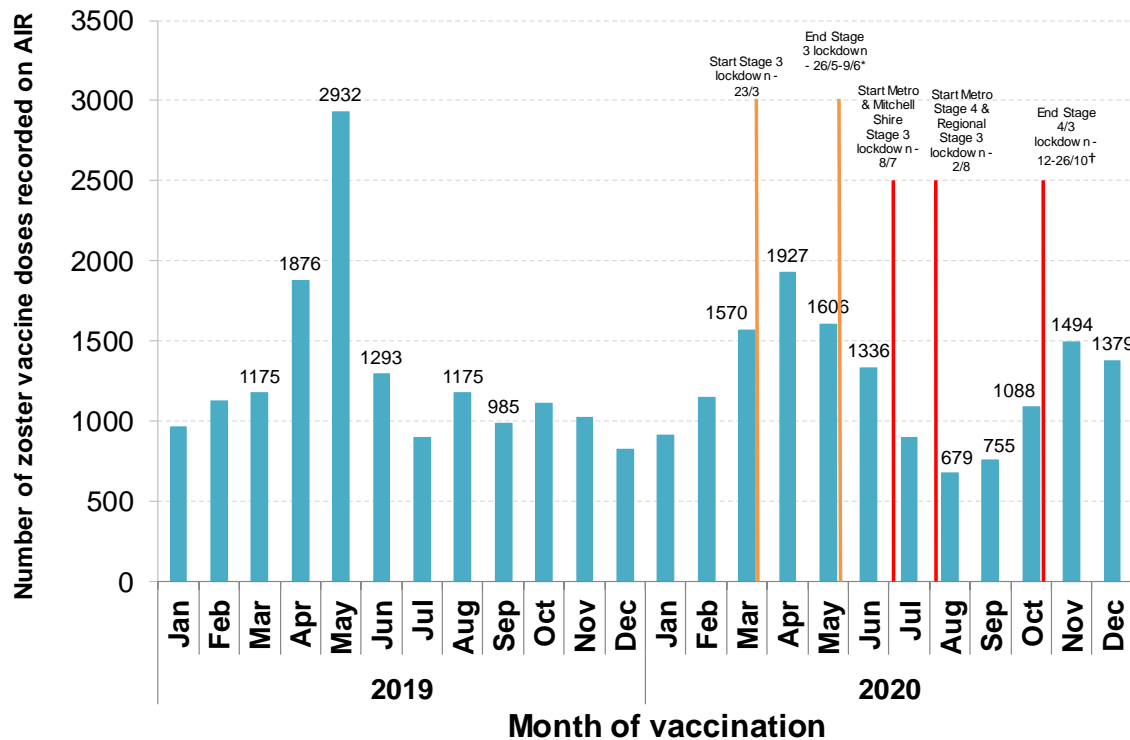
MMR = measles-mumps-rubella

Box 2: Monthly dose counts recorded on the AIR⁸ for HPV vaccinations (dose 1 and 2) in adolescents aged 11-14 years (A) and zoster vaccinations in adults aged 70 years (B), Victoria, 2019-2020

A (HPV)



B (zoster)



* Partial return to school on 26 May; full return on 9 June 2020.

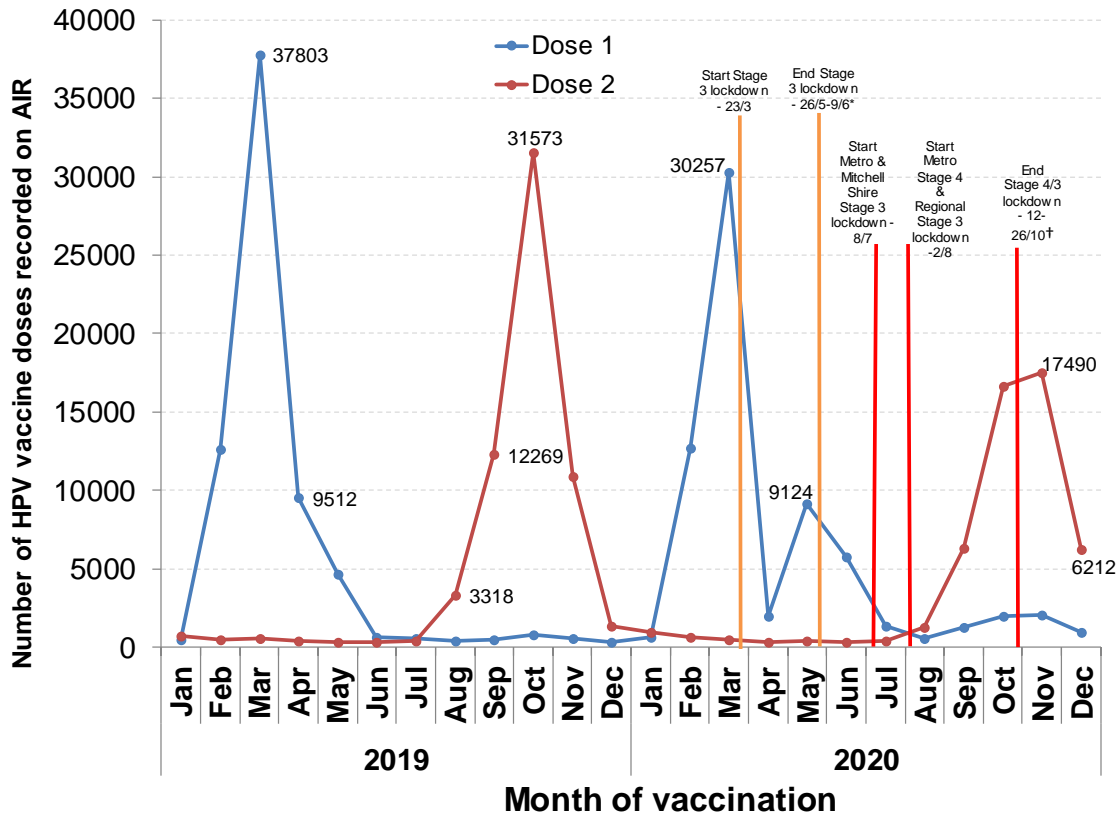
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HPV = human papillomavirus

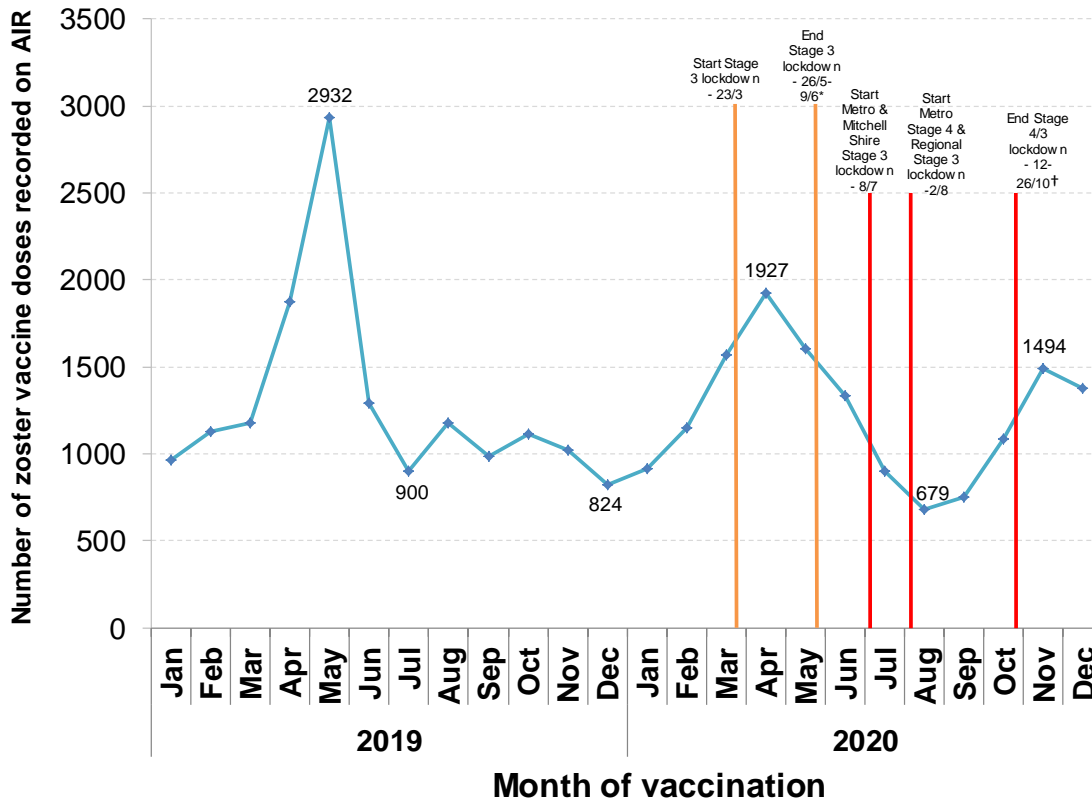
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