

Influenza Vaccine Effectiveness and Coverage in Australian Children: 2019-2023

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on behalf of the PAEDS-FluCAN network



The Kids Research Institute Australia acknowledges
Aboriginal and Torres Strait Islander people as the
Traditional Custodians of the land and waters of Australia.

We also acknowledge the Nyoongar Wadjuk, Yawuru,
Kariyarra and Kurna Elders, their people and their land upon
which the Institute is located and seek their wisdom in our
work to improve the health and development of all children.



Background

- Influenza remains an important cause of paediatric morbidity and mortality in Australia
- Children with comorbidities are at risk of severe disease, however most children with severe influenza have no underlying health conditions
- Influenza immunisation is an important strategy to prevent hospitalisation and severe disease
- The COVID-19 pandemic has had far-reaching effects on influenza epidemiology, and community attitudes towards immunisation

Background

State based influenza vaccination program in Western Australia since 2008

Seasonal Influenza Vaccination has been covered by the National Immunisation Program since 2020 for children aged 6 months – 5 years and medically at-risk children

Background

- **PAEDS:** National surveillance network established in 2007
- Continues to monitor infections of public health significance and adverse events following immunisation
- Initially commenced with surveillance in 4 hospitals, currently undertaking surveillance in all major paediatric tertiary facilities

- **FluCAN:** Influenza Complications Alert Network, commenced in 2009 to monitor the burden of influenza hospitalisation and complications
- Expanded to collaborate with PAEDS to enhance paediatric influenza surveillance from 2014



Aim

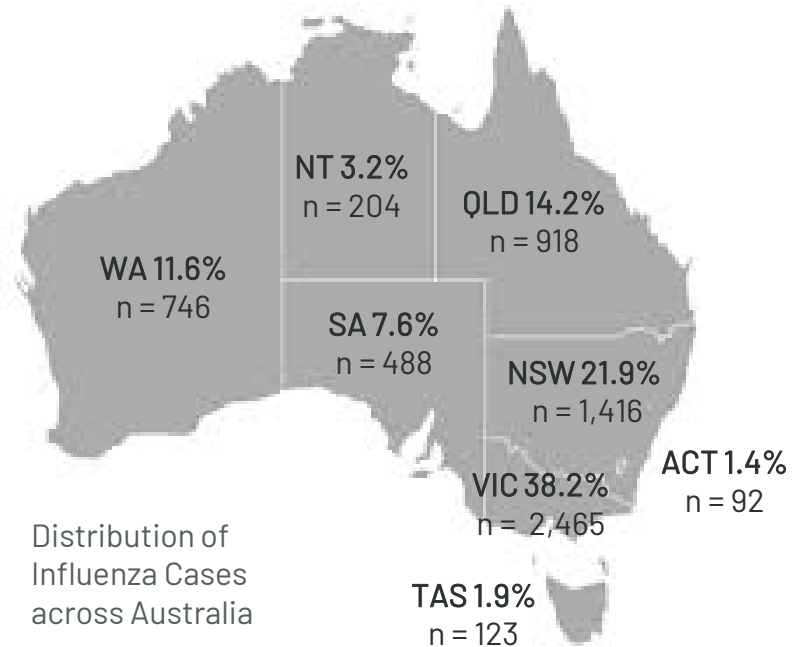
Assess contemporary influenza epidemiology, risk factors, vaccine coverage and vaccine effectiveness pre- and post-COVID-19.

Methods

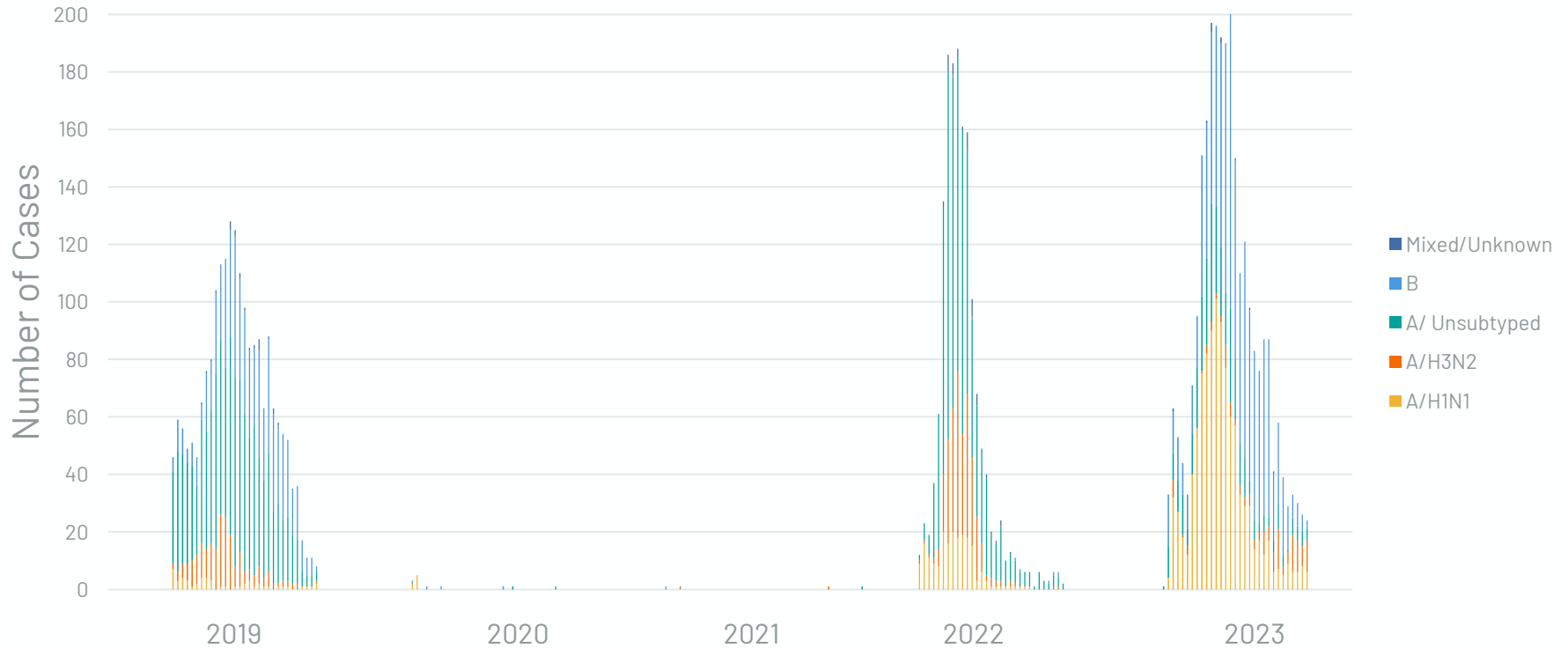
- Subjects recruited prospectively from PAEDS-FluCAN sentinel hospital sites between 2019 - 2023
- Children hospitalised with an acute respiratory illness were eligible for enrolment
- Those with laboratory confirmed influenza were considered cases
- Those with acute respiratory infection but testing negative for influenza were considered controls
- Vaccine coverage was estimated from test negative controls
- Vaccine effectiveness was estimated from the adjusted odds ratio of vaccination in cases and controls, using the test negative design

Demographics

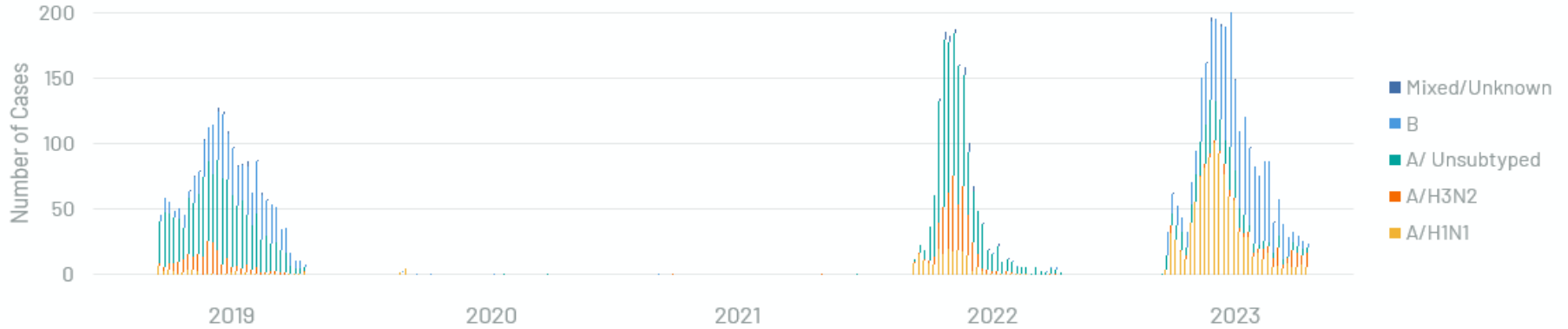
- Included 6452 children hospitalised with influenza (cases) and 6008 influenza negative controls
- 24.1% of children hospitalised with influenza were <2 years of age
- 55% were male
- 7.0% of influenza positive cases were Indigenous (4.6% of controls)
- 41.2% of children with influenza had medical comorbidities



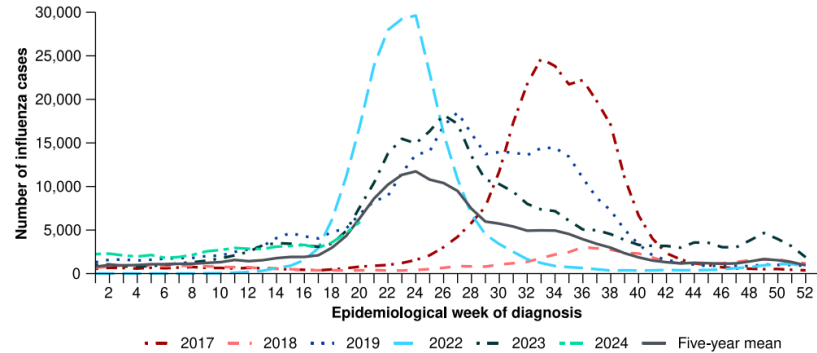
Epidemiology: Influenza Subtype by Week



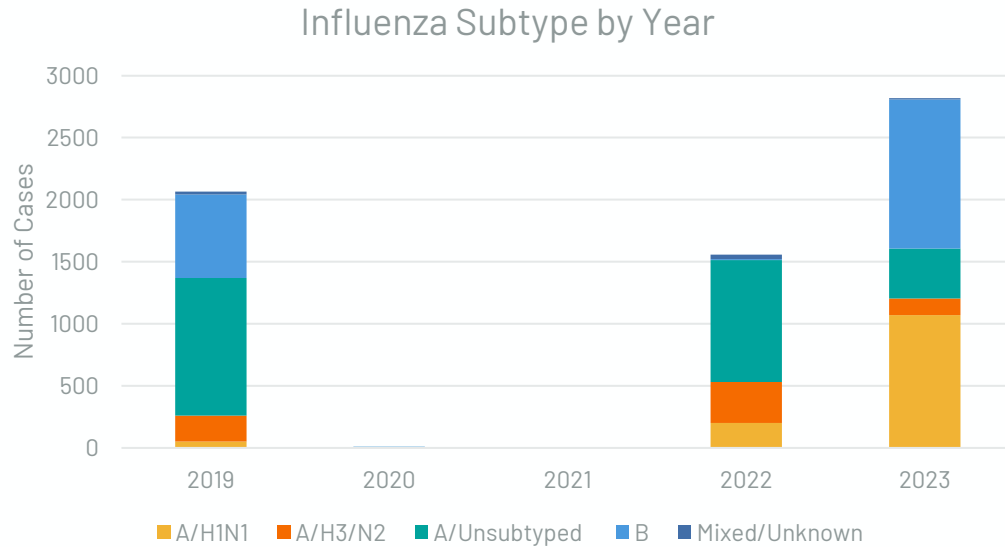
Epidemiology



Influenza cases notified to the NNDSS and five-year mean by year and week of diagnosis, 2017 to May 2024



Epidemiology: Influenza Subtype



2019 Vaccine strains:

- A/Michigan/45/2015 (H1N1)pdm09-like virus
- A/Switzerland/8060/2017 (H3N2)-like virus
- B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage)
- B/Phuket/3073/2013-like virus (B/Yamagata/16/88 lineage)

2022 Vaccine Strains:

- A/Victoria/2570/2019 (H1N1)pdm09-like virus
- A/Darwin/9/2021 (H3N2)-like virus
- B/Austria/1359417/2021-like (B/Victoria lineage) virus
- B/Phuket/3073/2013 (B/Yamagata lineage)-like virus

2023 Vaccine Strains:

- A/Sydney/5/2021 (H1N1)pdm09-like virus;
- A/Darwin/6/2021 (H3N2)-like virus;
- B/Austria/1359417/2021 (B/Victoria lineage)-like virus
- B/Phuket/3073/2013 (B/Yamagata lineage)-like virus.

Outcomes

- Median Length of stay 1 day (IQR 1,3), mean of 2.9 days
- 7.7% admitted to Intensive Care
- 22 deaths
- 25.4% received oseltamivir
- 61.9% admitted to intensive care received oseltamivir

Factors associated with admission to the Intensive Care Unit

Variable		Crude odds ratio (95% CI)	Adjusted odds ratio* (95% CI)
Age	<6 months	1.34 (0.98, 1.85)	1.47(1.05, 2.07)
	>6 months	1 (referent)	1 (referent)
Medical comorbidities	Comorbidities present	2.19(1.82, 2.64)	2.19(1.81, 2.66)
	Comorbidities absent	1 (referent)	1 (referent)
Indigenous Australian	Indigenous	1.42 (1.03, 1.95)	1.30 (0.93, 1.82)
	Non-Indigenous	1 (referent)	1 (referent)
Influenza type	Influenza A	1 (referent)	1 (referent)
	Influenza B	0.97(0.75, 1.19)	1.01(0.82, 1.24)
Influenza vaccination	Vaccinated	1.17 (0.89, 1.53)	1.01(0.76, 1.33)
	Unvaccinated	1 (referent)	1 (referent)

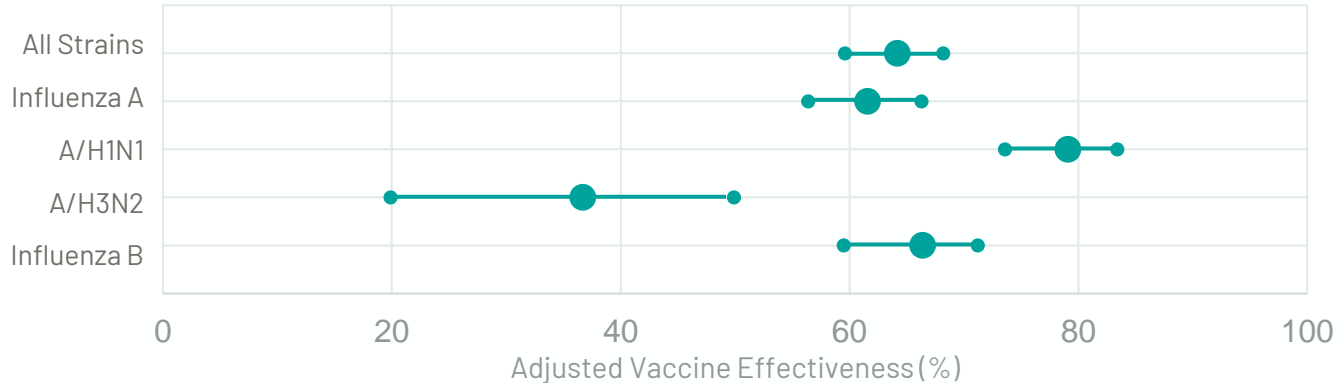
*Adjusted for: age group, presence of medical risk factors, Aboriginal status, influenza subtype and vaccination status

Vaccine Effectiveness

Adjusted* Vaccine Effectiveness:

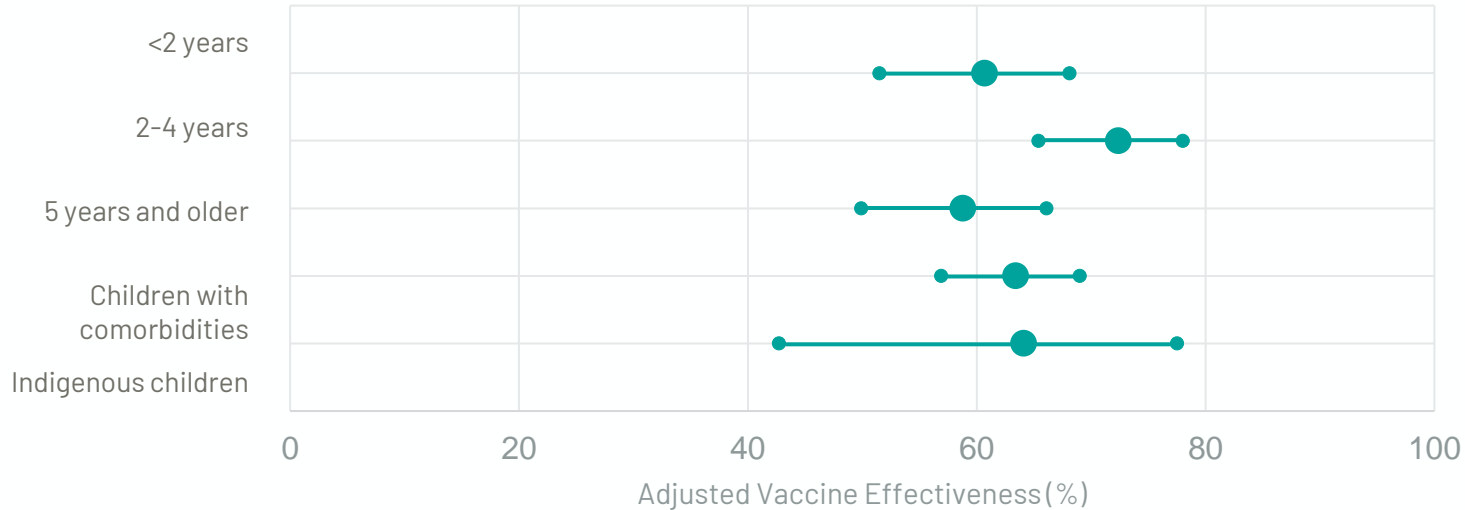
- 2019: 56.6% (95% CI: 48.0, 63.7)
- 2022: 65.3% (95% CI: 53.3, 74.1)
- 2023: 81.2% (95% CI: 76.2, 85.2)

Estimated Vaccine Effectiveness across all FluCAN sites:
– 2019: 43% (95% CI: 36-49)
– 2022: 44% (95% CI: 22-60)
– 2023: 68% (95% CI: 59-74)



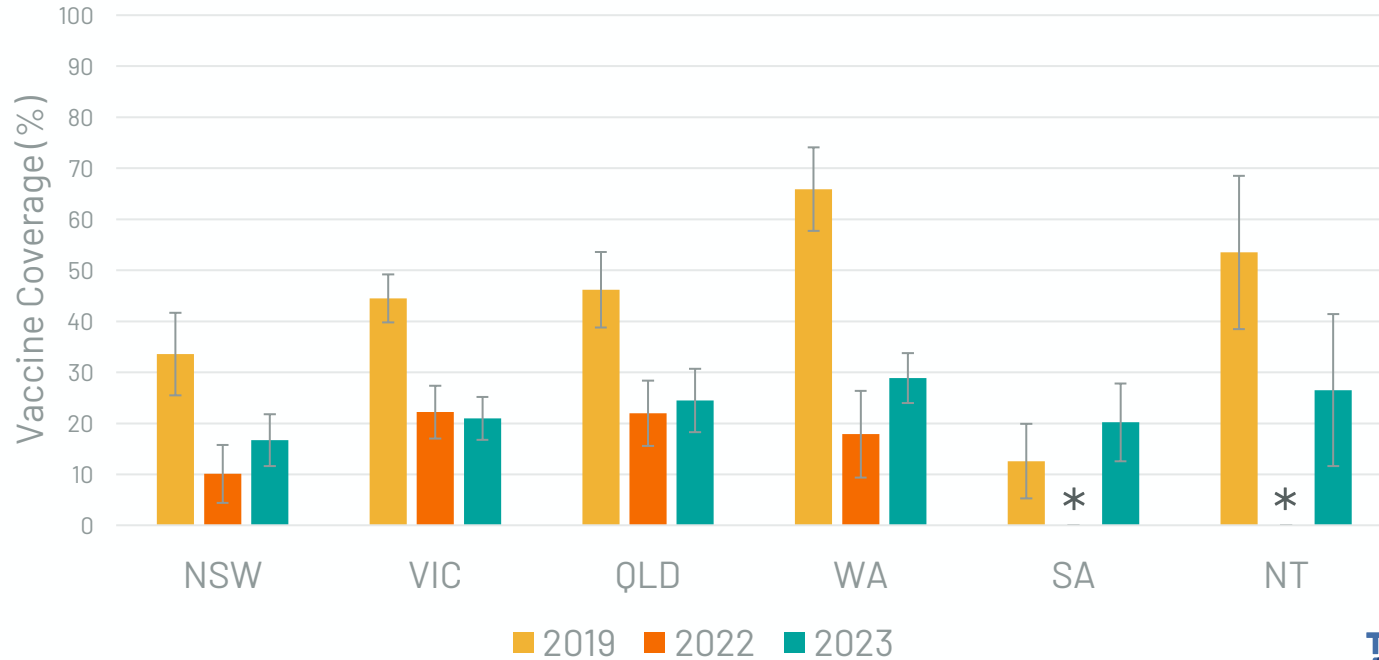
*Adjusted for: age group, Aboriginal status, epidemiological week, presence of medical comorbidity and vaccination status

Vaccine Effectiveness

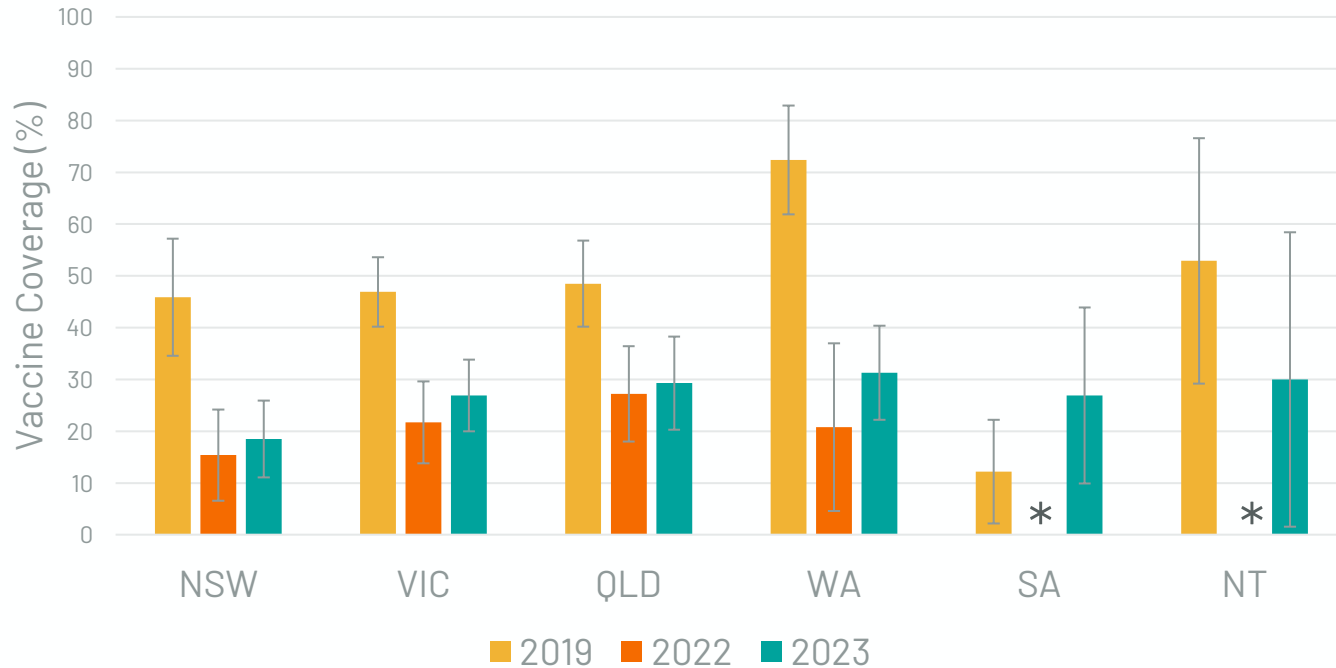


*Adjusted for: age group, Aboriginal status, epidemiological week, presence of medical comorbidity and vaccination status

Influenza Vaccine Coverage by State

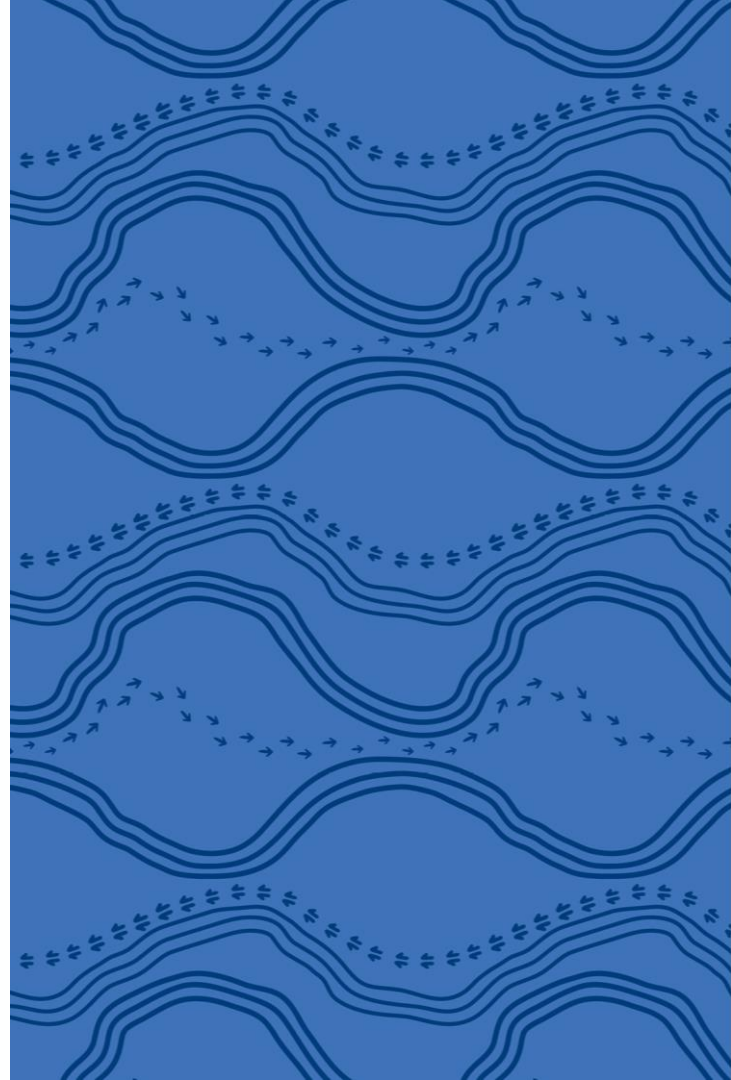


Vaccine Coverage in Children with Comorbidities



Conclusion

- Influenza remains an important condition in paediatrics
- There was reduced paediatric influenza vaccine coverage across Australia in both 2022 & 2023 compared to 2019, likely impacted by the COVID-19 pandemic
- Despite reduced uptake, the influenza vaccine remained moderately effective in preventing influenza hospitalisations in children
- Strategies to understand community sentiments, provider behaviour and improve vaccine coverage are urgently required



Acknowledgements

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