

Supporting Information

Supplementary methods and tables

This supporting information is part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.

Appendix to: McRae JE, McHugh L, King C, et al. Influenza and pertussis vaccine coverage in pregnancy in Australia, 2016–2021. *Med J Aust* 2023; doi: 10.5694/mja2.51989.

Supporting Information

Appendix 1: Search methods for published data on maternal vaccine coverage

The following databases were used to identify relevant literature: Ovid Medline, (1946-4 March 2022), Ovid Embase (1974-2 March 2022), Cochrane Library databases (Database of Systematic Reviews, Issue 2 of 12, 2022 and Central Register of Controlled Trials, Issue 2 of 12, 2022), and Informit. Where available, searches used both controlled vocabulary and text-word terms. Key search terms included 'Immunization', 'Immunization Programs', 'Influenza, Human', 'Influenza Vaccines', 'Whooping Cough', 'Pertussis Vaccine', 'Pregnancy', 'Vaccine Coverage' and 'Australia'. The search was date limited from 2016 onwards. The search was date limited from 2016 onwards. The last search was conducted on 4 March 2022.

Additionally, grey literature was specifically searched for in government websites, including State, Territory and Federal government websites. These websites were searched by the first author using search terms including 'maternal', 'pregnant/pregnancy', 'antenatal', 'vaccination', 'immunisation', 'influenza' and 'pertussis'.

Ovid MEDLINE Search Strategy

Database: MEDLINE(R) All including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) <1946-current>

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1  exp Immunization/  
2  exp Immunization Programs/  
3  (immuni$ or vaccin$).tw.  
4  1 or 2 or 3  
5  exp Influenza, Human/  
6  (influenza or flu).tw.  
7  5 or 6  
8  4 and 7  
9  exp Influenza Vaccines/  
10 8 or 9  
11 exp Whooping Cough/  
12 (whooping adj cough).tw.  
13 pertussis.tw.  
14 11 or 12 or 13  
15 4 and 14  
16 exp Pertussis Vaccine/  
17 dtp$.tw.  
18 16 or 17  
19 15 or 18  
20 10 or 19
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21 exp Pregnancy/
22 (pregnan\$ or matern\$ or antenatal\$).tw.
23 21 or 22
24 20 and 23
25 exp Vaccination Coverage/
26 (uptake\$ or coverage\$ or status\$).tw.
27 25 or 26
28 24 and 27
29 exp Australia/
30 austral\$.tw.
31 victoria\$.tw.
32 tasmania\$.tw.
33 (new adj south adj wales).tw.
34 nsw.tw.
35 (south adj australia\$).tw.
36 (west\$ adj australia\$).tw.
37 (northern adj territor\$).tw.
38 queensland\$.tw.
39 (australian adj capital adj territor\$).tw.
40 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39
41 28 and 40

Table 1: Summary of interventional studies in this review reporting influenza and pertussis vaccine uptake

A – Influenza vaccine uptake

Author	Year of study	Method	N	Pre-intervention coverage	Post-intervention coverage
Kaufman et al (2020) ¹	Oct 2018-2019 (follow up)	Multi-component intervention addressing immunisation providers and pregnant women (Recruited 18-22 weeks gestation during October - December 2018)	55	43%	82%
Mohammed et al (2018) ²	Nov 2014-Jun 2016	Midwife delivered antenatal vaccination program with standing orders	155	32%	83%
Giles et al (2021) ³	2019	Implementation of a co-designed vaccine delivery model (either a pharmacy led model, midwife led model or primary care led model) supported by provider education.	11,121	Range 27-56% across 6 sites (2017-2018)	50-196% increase in coverage from baseline reaching monthly coverage of 90-100%

B – Pertussis vaccine uptake

Author	Year of study	Method	N	Pre-intervention coverage	Post-intervention coverage
Kaufman et al (2020) ¹	Oct 2018-2019 (follow up)	Multi-component intervention addressing immunisation providers and pregnant women (Recruited 18-22 weeks gestation during October - December 2018)	55	60%	93%
Mohammed et al (2018) ²	Nov 2014-Jun 2016	Midwife delivered antenatal vaccination program with standing orders	155	20%	90%
Giles et al (2021) ³	2019	Implementation of a co-designed vaccine delivery model (either a pharmacy led model, midwife led model or primary care led model) supported by provider education.	11,121	60-97% (2017) across 6 sites	Up to 100% for monthly coverage

Krishnaswamy et al (2018) ⁴	2015-2017	Implementation of standing orders in midwifery-led antenatal clinics when compared to vaccination delivered through a dedicated hospital-based immunisation service or primary care	Information not complete, n=2848 deliveries at one site.	39-65% across 3 sites	68-91% across 3 sites
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References

1. Kaufman J, Attwell K, Tuckerman J, et al. Feasibility and acceptability of the multi-component P3-MumBubVax antenatal intervention to promote maternal and childhood vaccination: A pilot study. *Vaccine*. 2020;38(24):4024-4031. doi:10.1016/j.vaccine.2020.04.010
2. Mohammed H, Clarke M, Koehler A, Watson M, Marshall H. Factors associated with uptake of influenza and pertussis vaccines among pregnant women in South Australia. *PLoS One*. 2018;13(6):e0197867. doi:10.1371/journal.pone.0197867
3. Giles ML, Khai K, Krishnaswamy S, et al. An evaluation of strategies to achieve greater than 90% coverage of maternal influenza and pertussis vaccines including an economic evaluation. *BMC Pregnancy Childbirth*. 2021;21(1):771. doi:10.1186/s12884-021-04248-9
4. Krishnaswamy S, Wallace E, Buttery J, Giles M. Strategies to implement maternal vaccination: A comparison between standing orders for midwife delivery, a hospital based maternal immunisation service and primary care. *Vaccine*. 2018;36(13):1796-1800. doi:10.1016/j.vaccine.2017.12.080

Table 2: Summary data on women from culturally and linguistically diverse backgrounds

Author	Jurisdiction	CALD status	Influenza vaccine coverage				Pertussis vaccine coverage			
			Vaccinated	Not vaccinated	Total N	% Vaccinated	Vaccinated	Not vaccinated	Total N	% Vaccinated
Rowe et al (2021) ¹	Victoria	Born in Australia	53745	53492	107237	50.12	81695	23423	105118	77.72
		Born overseas	31326	32120	63446	49.37	44889	17843	62732	71.56
Carlson et al (2020) ²	New South Wales	Speaks English only	16	11	27	59.26	No data			
		Speaks languages instead of or in addition to English	20	22	42	47.62	No data			
Rowe et al (2019) ³	Victoria	Born in Australia	20420	25084	45504	44.88	33398	10572	43970	75.96
		Born overseas	11382	15283	26665	42.69	17428	8578	26006	67.02
Mohammed et al (2020) ⁴	South Australia	Born in Australia	491	541	1032	47.58	852	213	1065	80.00
		Born overseas	114	117	231	49.35	172	59	231	74.46
Moir et al (2020) ⁵	Victoria	Born in Australia	230	330	560	41.07	483	77	560	86.25
		Born overseas	400	345	745	53.69	599	146	745	80.40
Giles et al (2021) ⁶	Victoria	Born in Australia	85903	69848	155751	55.15	121769	32573	154342	78.90
		Born overseas (all)	52311	41736	94047	55.62	70040	23922	93962	74.54
		<i>Americas</i>	1981	1525	3506	56.50	2652	809	3461	76.63
		<i>North Africa and the Middle East</i>	4042	4783	8825	45.80	5569	3244	8813	63.19
		<i>North-East Asia</i>	6978	5845	12823	54.42	9310	3504	12814	72.65
		<i>North-West Europe</i>	4268	2892	7160	59.61	5688	1385	7073	80.42
		<i>Oceania and Antarctica</i>	3501	3527	7028	49.82	5008	2013	7021	71.33
		<i>South-East Asia</i>	9391	6580	15971	58.80	12103	3842	15945	75.90
		<i>Southern and Central Asia</i>	17405	11346	28751	60.54	22858	6025	28883	79.14
		<i>Southern and Eastern Europe</i>	2120	2411	4531	46.79	3282	1240	4522	72.58

Krishnaswamy et al (2018) ⁷	Victoria	Sub-Saharan Africa 69% (370/537) born overseas from 62 different countries	2625	2827	5452	48.15	3570	1860	5430	65.75
			279	210	489	57.00	124	80	204	61.00

References

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2. Carlson S, Dey A, Beard F. An evaluation of the 2016 influenza vaccination in pregnancy campaign in NSW, Australia. *Public Heal Res Pract*. 2019;30(1):29121908. doi:10.17061/phrp29121908
3. Rowe SL, Perrett KP, Morey R, et al. Influenza and pertussis vaccination of women during pregnancy in Victoria, 2015–2017. *Med J Aust*. 2019;210(10):454-462. doi:10.5694/mja2.50125
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Table 3: Summary of SEIFA data (IRSD - quintiles) captured in this review

Author	Jurisdiction	Socioeconomic status	Influenza vaccine coverage				Pertussis vaccine coverage			
			Vaccinated	Not vaccinated	Total N	% Vaccinated	Vaccinated	Not vaccinated	Total N	% Vaccinated
Rowe et al (2019) ¹	Victoria	IRSD (Quintile) - 1	5575	8852	14427	38.64	9680	4585	14265	67.86
		IRSD (Quintile) - 2	6241	8415	14656	42.58	10284	4153	14437	71.23
		IRSD (Quintile) - 3	6181	8722	14903	41.47	10358	4092	14450	71.68
		IRSD (Quintile) - 4	6440	7805	14245	45.21	10402	3425	13827	75.23
		IRSD (Quintile) - 5	7470	6773	14243	52.45	10269	3027	13296	77.23
Giles (2021) ²	Victoria	IRSD (Quintile) - 1	25398	23824	49222	51.60	37019	12411	49430	74.89
		IRSD (Quintile) - 2	26845	22923	49768	53.94	39005	10748	49753	78.40
		IRSD (Quintile) - 3	27710	22321	50031	55.39	38849	10909	49758	78.08
		IRSD (Quintile) - 4	28391	20988	49379	57.50	38308	10675	48983	78.21
		IRSD (Quintile) - 5	28693	20456	49149	58.38	36974	11201	48175	76.75

References

1. Rowe SL, Perrett KP, Morey R, et al. Influenza and pertussis vaccination of women during pregnancy in Victoria, 2015–2017. *Med J Aust.* 2019;210(10):454-462. doi:10.5694/mja2.50125
2. Giles ML, Davey MA, Wallace EM. Associations between maternal immunisation and reduced rates of preterm birth and stillbirth: A population based retrospective cohort study. *Front Immunol.* 2021;12:704254. doi:10.3389/fimmu.2021.704254 1