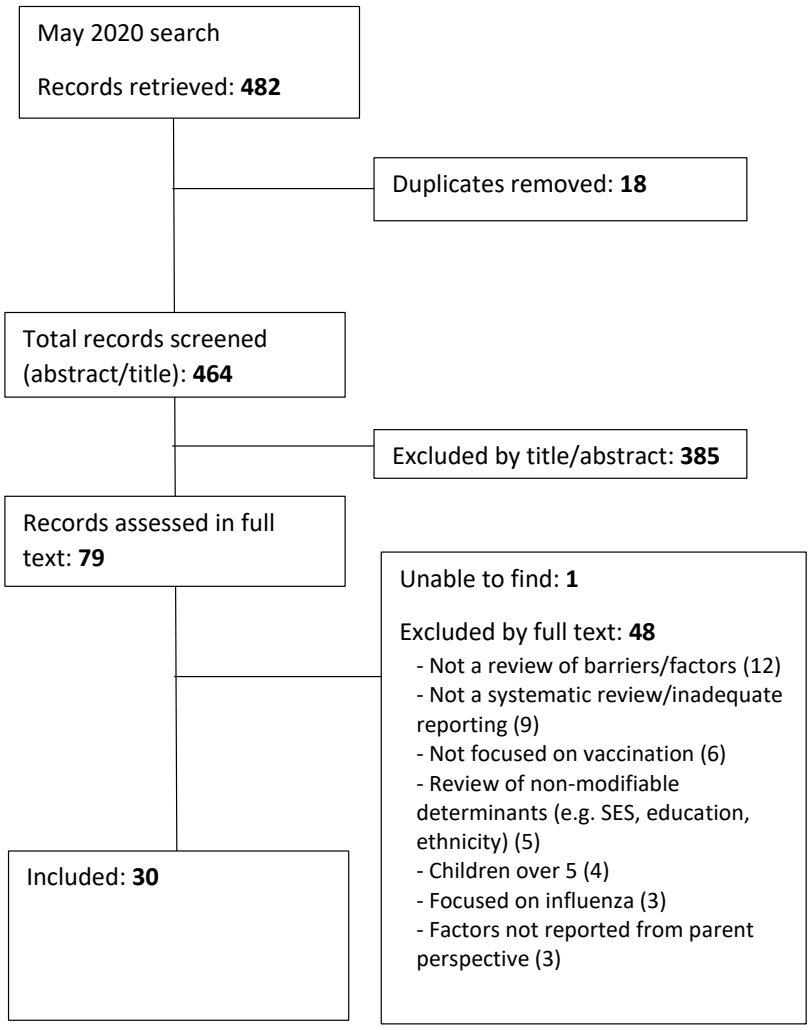
Supplemental materials

Epistemonikos search strategy

advanced_title_en:(((barrier* OR facilitat* OR factor* OR understand* OR reason*) AND (vacc* OR immunis* OR immuniz*))) OR advanced_abstract_en:(((barrier* OR facilitat* OR factor* OR understand* OR reason*) AND (vacc* OR immunis* OR immuniz*) AND (parent* OR child* OR infant* OR newborn*))) [Filters: protocol=no, classification=systematic-review]

PRISMA diagram

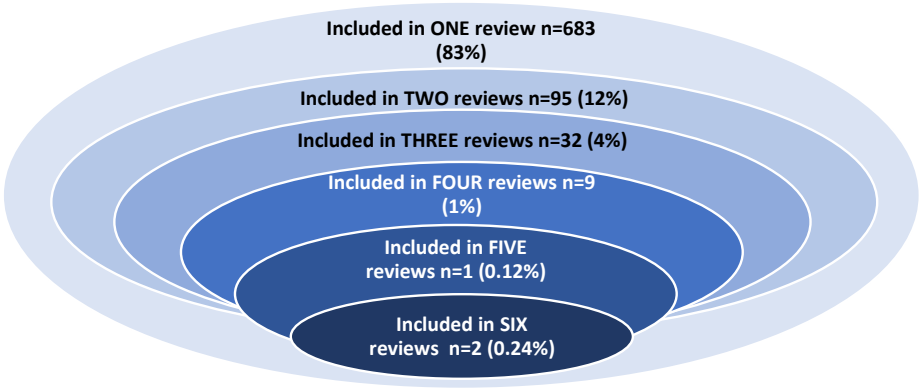


Excluded studies and reasons

1. Abahussin 2016	Not a review of barriers/factors (review of strategies)
2. Ames 2017	Not a review of barriers/factors (review of parent views about communication and its impact on decisions)
3. Arat 2019	Review of non-modifiable determinants (SES and healthcare systems)
4. Atkinson 1994	Not a systematic review
5. Bish 2011	Focused on seasonal influenza vaccination, barriers to childhood vaccination not clear
6. Bocquier 2017	Review of non-modifiable determinants (SES)
7. Bright 2017	Not a review of barriers/factors (review of strategies)
8. Bright 2018	Children over 5
9. Cook 2013	Not focused on vaccination
10. CooperRobbins 2011	Children over 5
11. ElisabettaPegurri 2005	Not a review of barriers/factors (review of strategies)
12. Flores 1998	Not focused on vaccination
13. Forshaw 2017	Review of non-modifiable determinants (maternal education)
14. Gidengil 2019	Includes children over 5
15. Grabenstein 2013	Not a systematic review
16. Guzman-Holst 2020	Includes children over 5
17. Hill 2019	Factors not reported from parent perspective
18. Hinton 2012	Not a systematic review
19. Huang 2018a	Review of non-modifiable determinants (ethnicity)
20. Huang 2018b	Not focused on vaccination
21. Hutchins 1993	Not a systematic review
22. Jarrett 2015	Not a review of barriers/factors (review of strategies)
23. Kang 2017	Children over 5
24. Kaufman 2018	Not a review of barriers/factors (review of strategies)
25. Larson 2014	Not a systematic review
26. Lipstein 2012	Not focused on vaccination
27. Lukusa 2018	Not a review of barriers/factors (review of strategies)
28. Magwood 2018	Not focused on vaccination
29. Mathew 2012	Review of non-modifiable determinants (gender, birth order, residential area, migrants, maternal education, religion etc)
30. Mureed 2015	Not a review of barriers/factors (review of strategies)
31. Niederhauser 2010	Not a systematic review
32. Oliver-Williams 2017	Not a review of barriers/factors (review of strategies)
33. Perman 2017	Children over 5
34. Pulver 2016	Not a systematic review
35. Quansah 2016	Review of non-modifiable determinants (gender, birth order, residential area, migrants, maternal education, religion etc)
36. Roberts 2002	Source of barriers not identified in review
37. Rosso 2020	Not a review of barriers/factors (review of studies of knowledge/attitudes)
38. Ruiz 2016	*Dissertation, unclear if an SR and cannot find*
39. Sadaf 2013	Not a review of barriers/factors (review of strategies)
40. Schmid 2017	Focused on seasonal influenza vaccination, barriers to childhood vaccination not clear

41. Shaikh 2018	Not a systematic review (inadequate reporting of included studies)
42. Simone 2012	Factors not reported from parent perspective
43. Singh 2018	Not a systematic review (inadequate reporting of included studies and search)
44. Sridhar 2014	Not a review of barriers/factors (review of prevalence of missed opportunities)
45. Storr 2018	Not a systematic review (inadequate reporting of included studies and search)
46. Wang 2018	Focused on seasonal influenza vaccination, barriers to childhood vaccination not clear
47. Wardle 2016	Factors not reported from parent perspective
48. Williams 2014	Not a systematic review
49. Wiysonge 2012	Not a review of barriers/factors (review of professional practice interventions)

Number of times individual primary studies (N=822) were included in reviews



Tabular presentation of ROBIS ratings

	1: STUDY ELIGIBILITY CRITERIA	2: IDENTIFICATION AND SELECTION OF STUDIES	3: DATA COLLECTION AND STUDY APPRAISAL	4: SYNTHESIS AND FINDINGS
Adamu_2019	✓	✓	?	✓
Allan_2014	X	X	?	X
Apte_2018	✓	X	✓	X
Brown_2010	X	X	?	X
CobosMunoz_2015	X	?	?	X
Connors_2012	?	✓	?	X
Crescitelli 2020	X	X	✓	X
CrockerBuque_2017	X	✓	X	X
Falagas_2008	X	X	X	X
Forster_2016a	X	✓	?	X
Forster_2017	X	✓	?	X
Fournet_2018	X	✓	X	X
Hermann_2019	X	✓	✓	✓
Karthigesu_2018	X	X	X	X
Kurup_2017	X	X	X	X
Malerba_2015	X	✓	X	X
Merten_2015	X	X	✓	X
Mills_2005a	X	✓	✓	X
Mills_2005b	X	✓	✓	X
Phillips_2017	X	X	?	✓
QuadriSheriff_2012	X	X	X	X
Rainey_2011	X	X	✓	X
Smith_2017	X	✓	?	X
Tabacchi_2016	X	X	X	X
Tauil_2016	X	X	?	X
Thorpe_2016	✓	X	X	X
Wallace_2014	X	✓	X	X
Walton_2017	X	X	X	X
Wilder-Smith 2019	X	X	X	X
Wilson_2018	X	X	✓	X

✓	Low risk
X	High risk
?	Unclear risk

Summary of included reviews

Author (year published)	Vaccine/s of interest	No. of primary studies included	Methodology of included primary studies	Countries of primary studies	Country income levels of primary studies	Review authors reported appraising primary study quality	Access	Clinic or health system	Concerns & beliefs	Health perception & experience	Knowledge & info	Social or family influence
Adamu (2019)	Childhood vaccines for <23 months of age	20	Quantitative	Benin, Congo, Egypt, Eswatini, Ethiopia, Ghana, Kenya, Malawi, Nigeria, Republic of the Niger, South Sudan, Sudan, South Africa, Zimbabwe	LIC	yes	x	x	x	x	x	x
Allan (2015)	MMR	14	Qualitative	UK	HIC	yes			x	x	x	x
Apte (2018)	Rotavirus vaccine	15	Quantitative	Belgium, Brazil, Canada, China, El Salvador, India, UK, USA	Mixed	yes	x	x		x	x	x
Brown (2010)	Combination vaccines (majority MMR)	31	Mixed (quantitative n=13; quantitative cohort n=6; qualitative n=12)	Australia, Ireland, Italy, Sweden, UK, USA	HIC	Yes	x	x	x	x	x	x
Cobus-Munoz (2015)	Routine childhood vaccines (some studies specifically focused on polio or measles)	44	Mixed (quantitative n=20, qualitative n=19, mixed methods n=5)	Studies conducted in 19 countries (Asia 23, Africa 16, South America 4, Oceania 1)	LMIC	Yes	x	x	x	x	x	x
Connors (2012)	Routine childhood vaccines	45	Study designs not described	USA	HIC	No	x	x		x		
Crescitelli (2020)	Routine childhood vaccines	27	Qualitative	Australia, Burkina Faso, Canada, Netherlands, Spain, Sweden, UK, USA, Venezuela	Mixed	Yes			x	x	x	

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Crocker-Buque (2017)	Routine childhood vaccines	63	Mixed (cross-sectional surveys n=42, qualitative study n=1, ecological study n=1, intervention evaluations n=20)	Brazil, Burkina Faso, Central African Republic, China, Democratic Republic of the Congo, Ethiopia, India, Iran, Kenya, Nigeria, Pakistan, Zambia	LMIC	No	x				x	
Falagas (2008)	Routine childhood vaccines (some specifically focused on HBV/ HAV/ Hib)	39	Mixed (analytical statistical n=27, quantitative n=6, mixed methods n=6)	Australia, Canada, Italy, Netherlands, Russia, Turkey, UK, USA	HIC	No	x	x	x	x	x	x
Forster (2016)	UK routine childhood vaccines	34	Qualitative	UK	HIC	Yes			x			x
Forster (2017)	UK routine childhood vaccines	8	Qualitative	UK	HIC	Yes			x			x
Fournet (2018)	Not specified	13	Mixed	Europe	HIC	No	x		x	x	x	x
Hermann (2019)	Routine childhood vaccines (defined as recommended immunisation schedule from the study setting)	12	Mixed (quantitative n=11, qualitative n=1)	Australia, UK, USA	HIC	Yes	x	x			x	
Karthigesu (2018)	Childhood vaccines (incl measles and	6	Study designs not described	Canada, Lebanon, Pakistan, UK, USA	HIC	No						x

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	BCG, excl influenza and HPV)											
Kurup (2017)	Childhood vaccines for children aged ≤6yrs	20	Mixed (quantitative n=10, qualitative n=10)	Brazil, Canada, Hong Kong, Iran, New Zealand, Norway, Poland, Taiwan, Spain, Sweden, UK, USA	HIC	yes	x		x	x	x	x
Malerbra (2015)	Pneumococcal and meningococcal (only data relating to children < 5 yrs were extracted)	3	Quantitative	Belgium, Poland	HIC	No	x	x		x		
Merten (2015)	Childhood vaccines	25	Qualitative	Bangladesh, Bolivia, Cameroon, China, Ethiopia, Gabon, Haiti, India, Kenya, Mozambique, Nigeria, Senegal, South Africa, Togo, Turkey, Uganda	LMIC	Yes	x	x	x	x	x	x
Mills (2005a)	Childhood vaccines	15	Qualitative	Australia, Canada, Ireland, New Zealand, UK, USA	HIC	Yes	x	x	x	x	x	x
Mills (2005b)	Childhood vaccines	29	Mixed (survey n=19, structured interview n=7, telephone questionnaire n=3)	Australia, Belgium, New Zealand, UK, USA	HIC	Yes	x	x	x	x	x	x
Phillips (2017)	Childhood vaccines (including BCG, yellow fever, HPV)	78	Mixed (study designs not reported but review mentions	NR for all studies. Includes developing/ LMIC	LMIC	Yes	x	x		x	x	x

Author (year published)	Vaccine/s of interest	No. of primary studies included	Methodology of included primary studies	Countries of primary studies	Country income levels of primary studies	Review authors reported appraising primary study quality	Access	Clinic or health system	Concerns & beliefs	Health perception & experience	Knowledge & info	Social or family influence
			included quant, qual, intervention studies and systematic reviews)									
Quadri-Sheriff (2012)	Childhood vaccines (some studies focus on MMR, all routine vaccines, HPV, Varicella, Influenza, catch-up vaccination)	29	Mixed (quantitative n=12, qualitative n=17)	Australia, Europe, Hong Kong, New Zealand, USA	HIC	No						x
Rainey (2011)	Routine childhood vaccines (focus on routine vaccination generally or on one or more EPI vaccines)	203	Mixed (n=153 cross-sectional studies or secondary analysis of cross-sectional surveys; n=22 intervention studies; n=10 anthropological investigations or focus groups; n=8 systematic reviews)	Afghanistan, Angola, Argentina, Australia, Bangladesh, Benin, Botswana, Brazil, Burkina Faso, Cambodia, Cameroun, Chad, Chile, China, Columbia, Congo, Costa Rica, Ecuador	Mixed	Yes	x	x	x	x	x	x
Smith (2017)	Routine childhood vaccines (defined as recommended immunisation schedule from the study setting)	64[φ]	Quantitative	Australia, Canada, France, Hong Kong, Iraq, Israel, Japan, Korea, Netherlands, Sweden, UK, USA	HIC	Yes	x	x	x	x	x	x

Author (year published)	Vaccine/s of interest	No. of primary studies included	Methodology of included primary studies	Countries of primary studies	Country income levels of primary studies	Review authors reported appraising primary study quality	Access	Clinic or health system	Concerns & beliefs	Health perception & experience	Knowledge & info	Social or family influence
Tabacchi (2016)	MMR	45	Mixed (questionnaires n=28; qualitative n=17)	Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Spain, Sweden, UK	HIC	Yes				x	x	x
Tauil (2016)	Childhood vaccines (schedules with at least 3 DTP, 3 polio, 1 measles)	23	Quantitative	Argentina, Australia, Belgium, Brazil, Burkina Faso, Canada, China, India, Kenya, Mozambique, Philippines, Uganda, USA	Mixed	No	x	x		x	x	
Thorpe (2016)	Routine childhood vaccines (excluding HPV)	12	Quantitative	Bangladesh, India, Kenya, Nepal, Nigeria	LMIC	No			x			
Wallace (2014)	Childhood vaccinations (focus on multiple injections delivered simultaneously)	44	Mixed (qualitative n=37; quantitative n=8)	Australia, Belgium, Canada, Germany, The Netherlands, Rwanda, Ukraine, UK, USA	HIC	No			x			
Walton (2017)	Routine childhood vaccines (including HPV)	32	Quantitative	Australia, Italy, Sweden, UK, USA	HIC	No	x	x		x	x	
Wilder-Smith (2020)	MMR	20	Mixed (qualitative n=11; quantitative n=9)	France, Germany, Italy, the Netherlands, Sweden, Switzerland, UK	HIC	Yes	x	x	x	x	x	x
Wilson (2018)	Routine childhood vaccines	5	Qualitative	Australia, Canada, England, Hong Kong, The Netherlands,	HIC	Yes	x	x	x	x	x	x

Footnote: φ 64 studies were reported in 68 citations.