

Supplementary Materials

1. Database search terms and history
2. Methodological Quality Assessment tool for Qualitative and Quantitative studies
3. Full-text articles excluded with reasons
4. Change of authorship request form

1. Database search terms and history

a) Embase search terms and history:

53 ('child'/exp OR child OR 'children'/exp OR children OR 'childhood'/exp OR childhood OR 'infant'/exp OR infant OR 'baby'/exp OR baby OR 'newborn'/exp OR newborn) AND ('immunization'/exp OR immunization OR 'immunisation'/exp OR immunisation OR 'vaccination'/exp OR vaccination OR 'vaccine'/exp OR vaccine OR 'immunity'/exp OR immunity) AND (('barrier'/exp OR barrier OR hesitant OR 'refuse'/exp OR refuse OR refusal OR delay OR 'denial'/exp OR denial OR denier OR denied OR concern OR reason OR 'doubt'/exp OR doubt) AND 'non acceptance' OR incomplete OR obstacle OR 'constraint'/exp OR constraint) AND ((sub AND saharan AND ('africa'/exp OR africa) OR 'angola'/exp OR angola OR 'benin'/exp OR benin OR 'botswana'/exp OR botswana OR 'burkina faso'/exp OR 'burkina faso' OR 'burundi'/exp OR burundi OR 'cabo verde'/exp OR 'cabo verde' OR 'cameroon'/exp OR cameroon OR 'central african republic'/exp OR 'central african republic' OR 'equatorial guinea'/exp OR 'equatorial guinea' OR 'eritrea'/exp OR eritrea OR 'ethiopia'/exp OR ethiopia OR 'gabon'/exp OR gabon OR 'gambia'/exp OR gambia OR 'ghana'/exp OR ghana OR 'guinea'/exp OR guinea OR 'guinea-bissau'/exp OR 'guinea-bissau' OR 'kenya'/exp OR kenya OR 'lesotho'/exp OR lesotho OR 'liberia'/exp OR liberia OR 'madagascar'/exp OR madagascar OR 'malawi'/exp OR malawi OR 'mali'/exp OR mali OR 'mauritania'/exp OR mauritania OR 'mauritius'/exp OR mauritius OR 'mozambique'/exp OR mozambique OR 'namibia'/exp OR namibia OR 'niger'/exp OR niger OR 'nigeria'/exp OR nigeria OR 'rwanda'/exp OR rwanda OR 'senegal'/exp OR senegal OR sierra) AND leone OR 'somalia'/exp OR somalia OR 'south africa'/exp OR 'south africa' OR 'south sudan'/exp OR 'south sudan' OR 'sudan'/exp OR sudan OR 'tanzania'/exp OR tanzania OR 'togo'/exp OR togo OR 'uganda'/exp OR uganda OR 'zambia'/exp OR zambia OR 'zimbabwe'/exp OR zimbabwe) AND [article]/lim AND [humans]/lim AND ([embase]/lim OR [medline]/lim)

b) Web of Science search terms and history:

1,985 TS=((child or children or childhood or infant or baby or newborn) and (immunization or immunisation or vaccination or vaccine or immunity) and (barrier or hesitant or refuse or refusal or delay or denial or denier or denied or concern or reason or doubt "non acceptance" or incomplete or obstacle or constraint) and (Sub Saharan Africa or Angola or Benin or Botswana or "Burkina Faso" or Burundi or "Cabo Verde" or Cameroon or "Central African Republic" or Chad or Comoros or Congo or "Cote d'Ivoire" or "Equatorial Guinea" or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or "Guinea-Bissau" or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Rwanda or Senegal or Sierra Leone or Somalia or "South Africa" or "South Sudan" or Sudan or Tanzania or Togo or Uganda or Zambia or Zimbabwe))

Databases= WOS, BCI, KJD, MEDLINE, RSCI, SCIELO Timespan=All years; Search language=Auto

c) PubMed search terms and history

Search	Query	Items found
#14	Search (((#3) AND #6) AND #10) AND #13	614
#13	Search (#11) OR #12	369841

2. Modified Methodological Quality Assessment tool for Qualitative and Quantitative studies

Appraisal questions:

1. Did the study address a clearly focused question / issue?
2. Is the research method (study design) appropriate for answering the research question?
3. Is the method of selection of the subjects (employees, teams, divisions, organizations) clearly described?
4. Could the way the sample was obtained introduce (selection) bias?
5. Was the sample of subjects' representative with regard to the population to which the findings will be referred?
6. Were the data collected in a way that addressed the research issue?
7. Was the sample size based on pre-study considerations of statistical power?
8. Was a satisfactory response rate achieved?
9. Are the measurements (questionnaires) likely to be valid and reliable?
10. Have ethical issues been taken into consideration?
11. Was the data analysis sufficiently rigorous?
12. Was the statistical significance assessed?
13. Is there a clear statement of findings?
14. Can the results be applied to your organization or field of study?

Key: NA: Not Applicable; NC: Not Clear; N: No; Y: Yes

Modified Methodological Quality Assessment tool for Qualitative and Quantitative studies																
Article, year	Appraisal questions														Remarks	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total scores	Quality status
Tadesse et al [1], 2009	Y	Y	Y	N	Y	Y	NA	Y	NC	N	Y	NA	Y	Y	10	Moderate
Phillips et al [2], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Oliver et al [3], 2014	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Wiysonge et al [7], 2012	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Yemesrach et al [11], 2018	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	14	High
Porth et al [12], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	13	High
Elizabeth et al [13], 2015	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Cockcroft et al [14], 2014	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Sylvie et al [15], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Zewdie et al [16], 2016	Y	Y	Y	N	Y	Y	NA	Y	NC	Y	Y	NA	Y	Y	11	Moderate

Juliet et al, ¹⁷ 2011	Y	Y	Y	N	Y	Y	NA	Y	Y	Y	Y	NA	Y	Y	12	High
Miyahara et al [18], 2016	Y	Y	Y	N	Y	Y	Y	Y	NC	Y	Y	Y	Y	Y	13	High
Pertet et al [19], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Yenit et al [20], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Tugumisirize et al [21], 2002	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	13	High
Babalola S [22], 2011	y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Oladokun et al [23], 2010	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Schwarz et al [24], 2009	Y	Y	Y	Y	Y	Y	N	Y	NC	Y	Y	NA	Y	Y	10	Moderate
Ismail et al [25], 2014	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Rees et al [26], 1991	y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	13	High
Nadella et al [27], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y		Y	Y	Y	14	High
Meleko et al [28], 2017	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Itimi et al [29], 2012	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Kagoné et al [30], 2018	Y	Y	Y	NC	Y	Y	NA	Y	Y	Y	Y	NA	Y	Y	11	Moderate
Tobin-West et al [31], 2012	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Braka et al [32], 2011	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	NA	Y	Y	12	High
Ambe et al [33], 2001	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	12	High
Tadesse et al [34], 2009	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Jani et al [35], 2008	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	13	High

Eng et al [36], 1991	Y	Y	Y	NC	Y	Y	N	Y	Y	Y	Y	N	Y	Y	11	Moderate
Landoh et al [37], 2016	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	14	High
Legesse et al [38], 2015	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Wemakor et al [39], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Adedokunlet al [40], 2017	Y	Y	Y	N	Y	Y	NC	NC	NA	NA	Y	Y	Y	Y	10	Moderate
Chidiebere et al [41], 2014	Y	Y	Y	N	Y	Y	NC	NC	NA	NA	Y	Y	Y	Y	10	Moderate
Ekouevi et al [42], 2018	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Tadess et al [43], 2017	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	NA	Y	Y	12	High
Negussie et al [44], 2016	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Bosu et al [45], 1997	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y	14	High
Desgrées du Loû et al [46], 1994	Y	Y	Y	Y	Y	Y	N	Y	NC	N	Y	Y	Y	Y	10	Moderate
Sato R. [47], 2019	Y	Y	Y	N	Y	Y	N	NA	NA	N	Y	Y	Y	Y	10	Moderate
Akwataghibe, N. N. et al [48], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Yismaw, A. E. et al [49], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Ntenda P. [50], 2019	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	13	High
Okenwa, U. J. et al [51], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Mthiyane, T. N et al [52], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
Mekonnen, A. G. et al [53], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High

Ibraheem, R. et al [54], 2019	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	14	High
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3. Full-text articles excluded with reasons (n=28)

No	Author, year	Title	Reason for exclusion
1	Aloysius R. 2016	Reasons for non-timely completion of the routine infant immunization schedule by children in rural South West Uganda	Letter to the editor
2	Bukenya et al, 1991	Possible reasons for non-completion of immunization in an urban settlement of Papua New Guinea.	Conducted in another region
3	Bender D et al, 1988	Immunization drop-outs and maternal behavior: evaluation of reasons given and strategies for maintaining gains made in the national vaccination campaign in Liberia	Full text not accessed
4	Adeloye et al, 2017	Coverage and determinants of childhood immunization in Nigeria: A systematic review and meta-analysis.	Review
5	Namuigi et al, 2005	Barriers to measles immunization: the beliefs and attitudes of caregivers in Goroka, Eastern Highlands Province, Papua New Guinea	Conducted in another region
6	Downing et al, 2018	Barriers to the delivery of the hepatitis B birth dose: a study of five Papua New Guinean hospitals in 2007.	Conducted in another region
7	Craciun et al, 2012	"Who will take the blame?": Understanding the reasons why Romanian mothers decline HPV vaccination for their daughters	Conducted in another region
8	Dammann et al, 1990	Vaccination--coverage of under-fives, validity of records, and the impact of mass campaigns in the Edendale/Vulindlela district of KwaZulu	Focusing on vaccination records validity
9	Sackou et al, 2012	Complete immunization coverage and reasons for non-vaccination in a periurban area of Abidjan	Full text not available in English
10	Douba et al, 2015	Sociodemographic factors associated with incomplete immunization of children aged 12 to 59 months in six West African countries	Full text not available in English
11	Nasiru et al,	Breaking community barriers to polio vaccination in northern Nigeria: the impact of a grass roots mobilization campaign (Majigi).	Focusing on impact of a grass roots mobilization
12	Sackou et al, 1990	Complete immunization coverage and reasons for non-vaccination in a periurban area of Abidjan	Full text not accessed
13	Mwamba et al, 2017	Vaccination coverage and factors influencing routine vaccination status in 12 high risk health zones in the Province of Kinshasa City, Democratic	supplement paper

		Republic of Congo (DRC), 2015	
14	Olorunsaiye et al, 2017	Missed opportunities and barriers for vaccination: a descriptive analysis of private and public health facilities in four African countries	Supplement paper
15	Michael et al, 2014	An Assessment of the Reasons for Oral Poliovirus Vaccine Refusals in Northern Nigeria	Supplement paper
16	Burnett et al., 2018	Impact of vaccine stock-outs on infant vaccination coverage: a hospital-based survey from South Africa	Focus on impact of vaccine stock-outs
17	Jalloh et al, 2019	Rapid behavioral assessment of barriers and opportunities to improve vaccination coverage among displaced Rohingyas in Bangladesh, January 2018	Conducted in another region
18	Koruk et al, 2013	A case of childhood vaccination barrier: migrant and seasonal farmworkers	Conducted in another region
19	Ports et al, 2013	Barriers and Facilitators to HPV Vaccination: Perspectives from Malawian Women	Focus on adult vaccines
20	Attia et al, 2018	On surmounting the barriers to HPV vaccination: we can do better	Focus on adult vaccines
21	Sato R. 2019	Barriers and facilitators of immunisation in refugees and migrants in Australia: an east-African case study	Conducted in another region
22	Carter, E. D., et al. 2019	Impact of vaccination delay on deaths averted by pneumococcal conjugate vaccine: Modeled effects in 8 country scenarios	Focus on impact of vaccination delay on deaths
23	Ferreras, E., et al. 2016	Delayed second dose of oral cholera vaccine administered before high-risk period for cholera transmission: Cholera control strategy in Lusaka, 2016	Included adults
24	Hajizadeh M. et al 2019	Decomposing socioeconomic inequality in child vaccination in the Gambia, the Kyrgyz Republic and Namibia	Focus on socioeconomic inequalities
25	Ko, L. K. et al 2019	"We brought our culture here with us": A qualitative study of perceptions of HPV vaccine and vaccine uptake among East African immigrant mothers	Focus on adult vaccines
26	Madlon-Kay, D. J., & Smith, E. R. 2019	Interpreters' knowledge and perceptions of childhood vaccines: Effect of an educational session	Focus on effects of an educational session on interpreter beliefs and knowledge
27	Tambe, T. A. et al, 2019	Reasons for non-compliance to immunization among Fulani children aged between 0-11 months in the Vekovi community in Cameroon	Letter to the editor
28	Hvass, A. M. F. & Wejse, C. 2019	High coverage of polio immunization program in refugees resettling in Denmark. A cross-sectional study of polio serology in newly arrived refugees	Conducted in another region

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13. **Mwamba GN, Yoloyolo N, Masembe Y, Nsambu MN, Nzuzi C, Tshkoya P, Dah B, Kaya G.** Vaccination coverage and factors influencing routine vaccination status in 12 high risk health zones in the Province of Kinshasa City, Democratic Republic of Congo (DRC), 2015. *The Pan African Medical Journal Vol.27 (2017) 3: 7-7*
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Section 1: Please provide the current title of manuscript

Manuscript ID no.: PUBH-D-19-04480R1

Title: BARRIERS TO CHILDHOOD IMMUNIZATION IN SUBSAHARAN AFRICA: A SYSTEMATIC REVIEW

Section 2: Please provide the previous authorship, in the order shown on the manuscript before the changes were introduced. Please indicate the corresponding author by adding (CA) behind the name.

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4 th author	DAN	YU	
5 th author	FEIYUN	QIYANG	
6 th author			
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We did not remove or add new author. We rearranged the list, i.e. LEI CHEN moved from 3rd to 5th position. LEI CHEN was instrumental in the supervision and revision of the final manuscript.

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7 th author				
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1 st author	JOSEPH BENJAMIN	ISANOCURA	I agree to the proposed new authorship shown in section 4 /and the addition/removal of my name to the authorship list /and the proposed change in corresponding author		9-03-2020
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3 rd author	DAN	QIU	I agree to the proposed new authorship shown in section 4 /and the addition/removal of my name to the authorship list /and the proposed change in corresponding author	Dan Qiu	16-3-2020
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