PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Determinants of childhood vaccination among children aged 12–23 months in Ethiopia: A community-based cross-sectional study
AUTHORS	Sako, Sewunet; Gilano, Girma; Samuel, Hailegebreal

VERSION 1 – REVIEW

REVIEWER	Zenbaba, Demisu Madda Walabu University, Public Health
REVIEW RETURNED	19-Dec-2022

GENERAL COMMENTS	Thank you for inviting me to review the manuscript entitled "Determinants of childhood vaccination among children aged 12–23 months in Ethiopia: A 2 multilevel analysis using 2019 Ethiopia mini demographic and health survey" Comment #1: Abstract Due to different reasons…what are these reasons?? Associated factors…be consistent with determinants? Your objective is incomplete…"study was aimed at identifying current prevalence and associated factors in Ethiopia"….prevalence of what? Community based cross-sectional study…is it the study you conducted? Add odds ratio of each determinants? How you get these keywords?? Comment #2: Strength and limitations What is the difference between the first and second bullets?? How only one limitation reported for such study?? Comment #3: Introduction Line number 52-53: not clear Line number 53-54: where?? Line number 55-58: need major revision…what does 2018 indicates?? Line number 58-60: which fact?? you indicated studies described …but you only cited one reference?? Is it possible to relate the fact in Ethiopia with global?? The whole your introduction part needs major revisions, in coherence of the paragraphs, incomplete idea, too long paragraph …etc. What is your research gap?? what make you different from previously conducted studies in Ethiopia??

REVIEWER	Ghosh, Arindam Midnapore Medical College
REVIEW RETURNED	30-Dec-2022

GENERAL COMMENTS	My sincere thanks to the Editor for giving me an opportunity to

review this article titled, "Determinants of childhood vaccination among children aged 12–23 months in Ethiopia: A 2 multilevel analysis using 2019 Ethiopia mini demographic and health survey." Though the study findings are not novel, it is always worth discovering and monitoring the determinants of childhood vaccination at the local level on regular basis, especially in a developing country. The authors have conducted a community-based study based on data from the 2019 EMDHS which may be an optimal representative study sample and developed Multilevel proportional odds models to identify the determinants. Overall, the manuscript is well written. It needs some revisions. The comments are as follows:

INTRODUCTION: Why only focus on healthcare facilities and socio-demographic variables as determinants of childhood vaccination? Why not also psychosocial variables of parents/guardians? Vaccine hesitancy is an emerging risk factor for incomplete immunization and has been identified as one of the WHO. The authors should enlighten about it with relevant references.

METHODS:
a) Authors should describe the sample size determination and sampling techniques in more detail.
b) The Authors should clarify the face-validity testing of the questions with an explanation of the validity of the content of the questionnaire about the research aims.
c) The Authors should describe how they had estimated the reliability, or internal consistency, of the questions and It should be clarified whether a pilot study has been conducted.

RESULTS:
a) Table 1, The total number of participants studied can be mentioned in the table heading.
b) Authors may include information about AEFI, and vaccination status based on the sex of the child, if available,
c) Was there any attempt to quantify the response bias: information about non-responders? It would be useful to indicate comparability with non-respondents. Is there any population-based data available? How did they differ from those in the sample, how representative is the sample and was the findings representative?

DISCUSSION:
a) Authors should discuss the dropouts of 1st vs 3rd doses of vaccines. Is there an explanation for the discussion? What would be the policy and recommendation for this situation?
b) A paragraph regarding the limitations of the study should discuss all limits including the social desirability bias.

VERSION 1 – AUTHOR RESPONSE

Reviewer #1		
1.	**Comment #1: Abstract** Due to different reasons…what are these reasons??	Dear reviewer #1, we thank you for your time and consideration. We replaced the former term with more appropriate term in the revised version. Kindly refer line 15.

2.	Associated factors…be consistent with determinants?	Thank you for your valuable suggestion. We have corrected it as suggested, kindly refer line 16 of the revised version.
3.	Your objective is incomplete… "study was aimed at identifying current prevalence and associated factors in Ethiopia"….prevalence of what?	Dear reviewer, thank you for this comment and accordingly we modified objective of the study as per your comment. (see line 16-17)
4.	Community based cross-sectional study…is it the study you conducted?	Thank you dear reviewer for your pertinent question. We used secondary data from Ethiopian Mini Demographic and Health Survey 2019 (EMDHS) data to conduct this study, as described in the Methods section. Generally, the 2019 EMDHS sample was stratified and selected in two stages. They stratified the country in to nine geographical regions and two administrative cities. Then, each region of the country was stratified into urban and rural areas. And they used a frame of all census enumeration areas (EA) created for the upcoming Ethiopia population and housing census as a sampling frame. Finally, they selected samples for the study in two stages (1st stage: 93 EA in urban and 212 EA in rural areas and 2nd stage: 30 households per cluster were selected). All women age 15-49 in the selected households were eligible to be interviewed. Accordingly, 9,012 eligible women were identified for individual interviews and interviews were completed with 8,885 women, yielding a response rate of 98.6%. Hence, we used the data that was collected using community based cross-sectional study, as mentioned above. For detail information we kindly ask you to refer the EMDHS 2019 report (1).
5.	Add odds ratio of each determinants?	Thank you, now we included AOR of each determinant. Please, refer line 27-33.
6.	How you get these keywords??	Thank you for this observation. Actually, we selected the given keywords mainly based on the topic of the study, considering terms that increase the chance of readability of our article (after publication), and we also tried to follow the journal guidelines.
7.	**Comment #2: Strength and limitations** What is the difference between the first and second bullets??	Great, the difference b/n the two statements are: • The 1st bullet specify the source population of the study • While the 2nd bullet indicates total number of records that satisfy the eligibility criteria of the study (sample

		size).
8.	How only one limitation reported for such study??	We thank you dear reviewer for your concern. We have added only one additional limitation of the study (line 46) since the journal submission guideline do not allow us to include more than 5 bullet points under strength and limitations section.
9.	**Comment #3: Introduction** Line number 52-53: not clear	Thanks, we revised the statement. Kindly refer line 72-73.
10.	Line number 53-54: where??	Based on your comment, we edited the statement and mentioned the region. Kindly, see line 81-82. Thanks a lot.
11.	Line number 55-58: need major revision…what does 2018 indicates??	Thank you, we revised the section as per your suggestion (line 82-84).
12.	Line number 58-60: which fact?? you indicated studies described …but you only cited one reference?? Is it possible to relate the fact in Ethiopia with global??	Dear reviewer, we made correction according to your comments (kindly, refer line 85-86).
13.	The whole your introduction part needs major revisions, in coherence of the paragraphs, incomplete idea, too long paragraph …etc.	Sure. We did it and therefore, we kindly ask you to refer the revised version. Thank you for your positive feedbacks.
14.	What is your research gap?? what make you different from previously conducted studies in Ethiopia??	Thank you very much for your very interesting question. We tried to give justification of this study in the revised version, line 110-116.
	Reviewer #2	
15.	My sincere thanks to the Editor for giving me an opportunity to review this article titled, "Determinants of childhood vaccination among children aged 12–23 months in Ethiopia: A 2 multilevel analysis using 2019 Ethiopia mini demographic and health survey." Though the study findings are not novel, it is always worth discovering and monitoring the determinants of childhood vaccination at the local level on regular basis, especially in a developing country. The authors have conducted a community-based study based on data from the 2019 EMDHS which may be an optimal representative study sample and developed Multilevel proportional odds models to identify the determinants. Overall, the manuscript is well written. It needs some revisions. The comments are as	Dear reviewer #2, we thank you for your appreciation. As you said, the study findings might not be novel but we tried to disclose what makes our study different from other similar studies and what motivated us to conduct the present study in the last paragraph of the introduction section of the revised version. Please, kindly see line 110-116.

	follows:	
16.	INTRODUCTION: Why only focus on healthcare facilities and socio-demographic variables as determinants of childhood vaccination? Why not also psychosocial variables of parents/guardians? Vaccine hesitancy is an emerging risk factor for incomplete immunization and has been identified as one of the WHO. The authors should enlighten about it with relevant references.	As stated in the method section, we used secondary data from EMDHS 2019. The variables you mentioned were not included in the dataset. This is the only reason why we did not consider these variables in the analysis. Instead, we described the issue as limitation of the study, in the discussion section.
17.	METHODS: a) Authors should describe the sample size determination and sampling techniques in more detail.	Dear reviewer, we addressed this issue by depicting the sampling procedures using schematic diagram. Please, kindly see fig. 1. Thanks a lot for the positive feedback.
18.	b) The Authors should clarify the face-validity testing of the questions with an explanation of the validity of the content of the questionnaire about the research aims. c) The Authors should describe how they had estimated the reliability, or internal consistency, of the questions and It should be clarified whether a pilot study has been conducted.	Dear reviewer, we understand your concern. But this study used a secondary data and hence the issue of face-validity, reliability (internal consistency), and related concerns were described in the original study (EMDHS report). That is why we did not raise such issues in this section.
19.	RESULTS: a) Table 1, The total number of participants studied can be mentioned in the table heading.	Dear reviewer, that is right. We mentioned the figure in the table tile as per your suggestion.
20.	b) Authors may include information about AEFI, and vaccination status based on the sex of the child, if available,	Dear reviewer, an adverse event following immunization data is not available in the EMDHS 2019 dataset, the dataset we used for this analysis.
21.	c) Was there any attempt to quantify the response bias: information about non-responders? It would be useful to indicate comparability with non-respondents. Is there any population-based data available? How did they differ from those in the sample, how representative is the sample and was the findings representative?	Thank you for the question. As described in the EMDHS report, the authors of the original study used community-based cross-sectional study design. Therefore, we mentioned recall and social desirability bias as most relevant limitation of the study. However, it is difficult to investigate the reasons for variation between non-responders and responders of the study, as it is not a longitudinal study. Consequently, there is no population-based data. In addition, the response rate of the survey was 98.6%, as stated in the EMDHS 2019 report(line

		139)(1). As described above, we tried to address sampling procedures and sample size determination techniques used in the original study. Based on the given data, the EMDHS sample is representative and accordingly we made inferences.
22.	DISCUSSION: a) Authors should discuss the dropouts of 1st vs 3rd doses of vaccines. Is there an explanation for the discussion? What would be the policy and recommendation for this situation?	Thank you for your good feedback. We described the measles dropout rate ([BCG-MCV1]/BCG*100) since it shows the overall EPI dropout rate. The figure (18.8%) is greater than the acceptable range (5-10%) of dropout rate, based on the guideline.
23.	b) A paragraph regarding the limitations of the study should discuss all limits including the social desirability bias.	Thank you, that is true. Hence, we modified the statements under limitation of the study.

VERSION 2 – REVIEW

REVIEWER	Ghosh, Arindam Midnapore Medical College
REVIEW RETURNED	13-Feb-2023

GENERAL COMMENTS	As I mentioned during the 1st review, the authors should discuss the study's limitations in detail, which is still incomplete. The rest of the responses are satisfactory. Thank you.

VERSION 2 – AUTHOR RESPONSE

Reviewer #1

1. As I mentioned during the 1st review, the authors should discuss the study's limitations in detail, which is still incomplete. The rest of the responses are satisfactory. Thank you. Dear reviewer #1, thank you very much for your positive feedback and comment. As per your suggestion, we added one additional limitation of the study as the journal submission guideline do not allow us to include more than 5 bullet points under "strength and limitations of the study" section. Additionally, we tried to include detail limitation of the study in the last paragraph of the discussion section (line 330-339).