Reviewer's report

Title: Risk Factors of Morbidity among Children under Age Five in Ethiopia

Version: 1  Date: 28 Feb 2019

Reviewer: Leanne Kosowan

Reviewer's report:

Overall: This is an interesting manuscript with some important findings to support strategies and interventions to address diarrhea and fever in children aged 5 or younger. However the manuscript does require some editing to prepare it for publication. There are a number of spelling, grammatical, and language (incorrect word/term, or additional and unnecessary words) that will need to be corrected. Below please find my overall suggestions to strengthen the manuscript:

Introduction:

1) Page 2, lines 53-57: results from your literature review are unclear. You explain that "most of the investigations used logistic regression", followed by a sentence explaining that "most articles... using simple statistics". If you could clarify and explain previously research on this topic.

2) Page 3, line 14-29: This paragraph should focus on what you are doing. The additional details included such as "an extension of generalized linear model", "among marginal model family" are not necessary. Your research focus can become a lot clearer with a succinct statement about the intent of this manuscript. Additionally "subjects for the same cluster" should be explained as it directly pertains to your research. In this case children from the same household.

Methods:

3) Page 3, lines 46-59: there needs to be a clearer presentation of the variables you used in your analysis. What are the survey questions that produced these variables? For example "mothers education level" Is this a dichotomous variable or continuous? What were the survey options for education level? what levels of education did you look at in your analysis. Similarly "Marital status" can include: single, co-habiting, married, divorced, widow, etc. Which 'marital status' categories did you include. This should also be done for diarrhea and fever. How were these defined. Did the respondent self-report diarrhea or fever in the 2 weeks? Did they attend a medical appointment for diarrhea or fever? If only self-reported what questions were used to ascertain if the respondent correctly labelled diarrhea or fever? Was a description of diarrhea and fever provided to the respondent?
4) The majority of the methods section is not study specific and should not be included. Although interesting, the Marginal Models, Generalized Estimating Equations, Alternating Logistic Regressions and model selection sections are more of a literature review then a description of what was done. This information should be summarized in a few sentences in a Strengths and Limitations section, not the focus of the methods section. Can you please review this section and provide a synthesized description of the (1) data source, (2) what model you used, (3) how you defined the variable, (4) description of your specific analysis. When discussing the methods they should be in related to study specific reasons, data, and proposed outcomes. I can review references provided for further details on the statistical models used. Which variables were controlled for in GEE, what p-value was used to denote significance, did you do any descriptive statistics to obtain prevalence or incidence rates and understand relationships between variables, etc. What about the cross-tabulation analysis you discuss in the results section?

Results:

5) Somali does not appear higher than a couple other regions such as Afar? Can you provide the proportion of cases by population in the region? Are there more cases because of the higher population. Some additional context can help the reader understand these results. For example, why are you comparing to Addis Ababa? This does not appear to the lowest incidence of fever? And given there are lower responses to "No" fever, is the population in Addis Ababa smaller? This might suggest a higher proportional incidence rate.

6) page 8, Line 16-17: male children do not have a significantly higher rate of fever in Table 1, as suggested in the text. P-value is 0.65?

7) page 8, line 27-28: " The prevalence of diarrhea and fever are among non-breastfeeding children than breastfeeding children" - This relationship needs to be clarified. This sentence suggests a different finding from your table 1. Table 1 shows that non-breastfed children have a lower rate of diarrhea. But breastfed children have a similar rate of fever compared to non-breastfed children (14.4 vs. 14.3%)

8) Table 1: The title needs to explain the analysis in the title, and what the p-value is referring to (i.e. significance between yes vs. no or between variable categories)? Additionally, there needs to be consistency in the number of decimal places used both in the table and the text.

9) Results from Marginal Models: section is a literature review, not results from your study. It should not be presented as your results. The explanation of methods used should be presented in the methods, strengths and limitation section.

10) page 10 line 12-13: Children 12-23 months have the highest odds ratio for diarrhea and fever, but your text is focused on children 0 - 11 months.
11) There is interpretation within your results section. Interpretation of the results should be presented in the discussion section.

12) page 10, line 25-26: There is a need to be careful with the language used in the paper. For example, "with respect to mothers work effect, it was observed that mothers work is significantly related to child diarrheal disease" This sentence is not necessary. Instead of "mothers work" I think you intent to focus on 'mothers work outside of the home' OR 'mother paid employment'. Mothers who are at home all day are still working, running a household is still work. If you are presenting this manuscript to an international audience, the language you use is important.

13) Table 2: define all abbreviations.

14) page 11 line 49-58: this is not appropriate for the results section of your manuscript.

15) page 12 line18-19: "this indicated that child from separated and never in union mother is more exposed to fever disease". This is not correct. You are assessing association not exposure. You are using self-reported survey data which does not control for all factors/variables and can present a self-report bias.

16) page 12, line 19-23: this is an interpretation. The word "observed" is used inappropriately throughout the results section.

17) page 12 line 23-24: this needs to be rephrased. Was there a question about literacy on the survey? How did the results move from education level to literacy? Higher education level of the husband was associated with a 0.747 (exp -0.2904) less odds of fever in a child compared to husbands with a lower education. (OR 25% lower odds)

18) If abbreviating Demographic and Health Survey, DHS should be used consistently.

Discussion:

19) page 13, line 60/page 14 lines 4-6: covariates should be explained. i.e. male children, ect. were significantly associated with higher odds of diarrhea

20) page 14 line 21: gender discrimination? can you elaborate?

21) page 14, line 38: "This may be due to the mothers are the most frequent primary caregivers for their children". This needs to be explained. How does a mother being the most frequent primary caregiver for their children" affect associations with fever and diarrhea? This is following a sentence about mothers with paid employment outside of the home. Are you suggesting that mothers are bringing home illnesses, or that if children are cared for by someone else they are more likely to have a fever or diarrhea? You should be careful how you word and explain this statement as it could suggest that the mother should not work. You have not
considered illness duration, severity or sequela, which may be different among different population subgroups. You have also used self-reported data, with perception bias.

22) page 14, line 27: education is one of the socioeconomic variables. By this statement do you intend to suggest that education is more important then income and employment? I do not this it is necessary to include this statement "husband education level is an important factors..."

23) page 14, lines 40 - 46: are these based on multi-variate or cross-tab analysis. The two analysis that were reported suggested differences.

24) page 14, lines 50-51: "Some communities living in Somali and Afar regions are nomadic so that they lack access to based health-case facilities and sanitation services" This statement is not supported by your research. These two regions did not experience higher odds of both fever and diarrhea, if this was related to access to health care and sanitation I would expect to see higher incidence and OR for these regions. But this was not found.

Conclusions:

25) page 14, line 56: "children and mothers... determinants". How do you define children and mothers determinants; you have listed socioeconomic determinants separate. Is socioeconomic status not a determinant of the mother?

26) page 15, line 10-12: define the covariates. As in the discussion section.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Not suitable for publication unless extensively edited

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