Author's response to reviews

Title: Seasonal variation in the prevalence of Acute Child Under-nutrition among children under-five years of age in east rural Ethiopia: A longitudinal study.

Authors:

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Author's response to reviews: see over
To: Reviewers

From: Authors

Subject: Reviewer's comments and authors responses

A) Reviewer 1 (Joan Kalyango)

Major compulsory revisions

1) The title of the paper says that "saving is a strong predictor of seasonal variation" but the analysis done or at least the description of it does not show how one could come to this conclusion. I would expect that such analysis would include the saving*season interaction which would then be tested for significance. I get the understanding from analysis explained that "saving" is a predictor of malnutrition. But is it a predictor of seasonal variation in that malnutrition?

Authors' response:

• The independent variables for this study including Ownership of saving bank account*season were checked in pair for the interaction (effect modification) using the following STATA command, for instance, (gen bankacctseason = bankacct*season, xtlogit dependant variable bankacct season bankacctseason). There was no evidence of interaction between the independent variables. Later on, during revision due to inclusion of other variables season did not show significant association with acute child under-nutrition. Moreover, predictors were taken away from the title during revision and the title is now neutral. This is also requested by the other reviewer.

2) The term "saving" in the title is also not clear

Authors' response:

• As the majority of the study population belongs to the rural setting their socio-economic background is more or less similar. We confirmed this by running a principal component analysis in which, of course we considered other sources of income. However, we were interested in looking at this variable (ownership of a cooperative saving bank accounts, a type of bank which rural population often have an access to it, in case it makes difference. We used lack of the saving account to justify poverty.
3) The authors should describe the seasons of the study area in more detail. How many wet seasons are there? Dry seasons? We need to know if the data was collected over all wet seasons if there are more than one or over all dry seasons if there are more than one. And if there are more than one season, how do you expect the results in the season not included to differ from the season that was studied? I expect that other changes may occur during the year which could affect household incomes or other factors related to food security which is not necessarily the season?

Authors' response:

• The two most common seasons in the study area are both wet (June to August) and dry (December to February) seasons. The Spring (September to November) and Autumn (March to May) are not more or less closer to dry season and are not characterized by food shortage in the study area. Thus, we considered the winter (dry) and summer (wet) seasons to see their effect on childhood under-nutrition as described on page 5 of the revised manuscript.

4) And was the data collected over the whole wet season or the whole dry season? Or was it collected at the end of the season?

Authors' response:

• For the dry season data were collected from mid of January throughout February while it was from mid of July throughout August as these are believed to have an association with child under-nutrition in the study area (page 7 of the revised manuscript)

5) In the abstract it says that "child saving was more common on children of poor households with no saving account". It is not clear if this means that persons were separated into poor and not poor and then further categorized into those that had saving account and those that did not.

Authors' response:

• As mentioned above under item number 2 of our response upon conducting the principal component analysis the majority were poor and we interested in looking at effect of having a cooperative bank saving account which could suggest the level of their poverty. It was also interesting to see who were these people among the rural farmers. On the other hand the current government is empowering farmers to save money based on the scale of their production..

6) There is need to do editing of the language and punctuation in various parts of the paper
Authors' response:

- We have now tried our best for the manuscript to be edited by the Language professionals and it was read prove.

7) The introduction does not show what the driving force behind this study is. Some literature has been presented that shows that malnutrition varies with season but have not gone ahead to show us what gaps this presented literature has left or what the controversies are.

8) Authors' response:

- The introduction is now revisited based on the concerns of both reviewer to include definition of acute child under-nutrition and all other issues. Acute child under-nutrition was emphasized than grossly looking into child malnutrition (page 3-4 of the revised manuscript).

9) In the description of the setting, include information about health conditions that could affect nutrition. For example, the prevalence of HIV in this setting could improve context description. What are the major illnesses in children in the setting? And how do these vary with season if at all? The findings are majorly explained by the season and food security but is there no possible roll of illnesses which come during the different seasons?

Authors' response:

- We tried to incorporate the prevalence of HIV among adult population in the study area. we did not have the prevalence for under-five population. We have also mentioned the leading causes of morbidity among under-five children in the district of the study. There was no report at the health institution or district Health Office about variation of these illnesses by season. (page 5 of the revised manuscript)

10) The description of the sampling method is not clear. ".....The households were selected using simple random sampling from the sampling frame of KDS-HRC. The study population was proportionally drawn from each study kebele/village based on the household size".......... Was it the households that were sampled proportional to size? And which size? says here that household size but was it the population of each kebele? And how were the different climatic zones taken into account? Could this not affect the food security and therefore nutrition?

Authors' response:

- The study participants were recruited from the kebeles under KDS-HRC (DSS). Initially, the households in each kebele were selected using simple random sampling from the sampling frame of the DSS proportional to their estimated under-five population size. The study
population was then drawn from the selected households in each study kebele/village proportional to the maximum sample size (described in the sample size description section on page 6 of the revised manuscript) allocated for the study. For instance, among the 12 kebelses included in the DSS one of the kebels estimated population size was 1811 and it has contributed 89 children between 6 to 36 months to the follow-up proportional to the overall calculated sample size among its estimated under-five population. These children were obtained based on the simple random sampling of the total number of households in the kebele as per the sampling frame of the DSS. Children were obtained from all 12 kebels under DSS in the same fashion to satisfy the overall estimated sample size, that is, 2371 for initial recruitment. If more than one under-five children lived in the selected household, one child was selected by the lottery method. Data were obtained from the same mother-child pairs at the base-line and at the end line of the follow-up. Climatic zones were initially equally stratified upon establishment of the DSS. We feel that it will not have any significant effect on our study as children from each climatic zone were randomly assigned or recruited into the study.

11) The sample size computation ..."was initially based on single proportion". It is not clear why when the objective of the study is to compare wet and dry seasons. And was sample size for the second objective of associated factors done? Were you powered to assess the associated factors?

Authors' response:

- We calculated the sample size for two objectives as reflected in the title of the study to determine the prevalence of child under-nutrition in wet and dry season and associated factors. We have used the maximum sample for this study. In the second objective we have also considered 90% power of the study as per the required sample size calculation formula for the longitudinal study (on page 6 of the revised manuscript).

12) Variables:
Include some information on the aspects assessed under food security and then you can refer readers to the reference as you have done. -what was the basis for categorization of maternal age at 34? Explain -include information on what "others" referred to in the description of the paternal Occupation - how was illiterate evaluated? Were the mothers given something to read or is this self reported literacy? Also is there any limitation to grouping people at various levels of literacy.
- regardless of the education level? This cut-off used may not have been the critical education level for nutrition of the child

**Authors' response:**

- We have now included some information with regard to food security such as amount and variety of meal eaten, and the occurrence of food shortage for the household members, if any, so that they did not eat the whole day or at night only, in the past four weeks preceding the survey (as indicated on page 9 of the revised manuscript). There was no especial basis for categorization of maternal age at 34 but some of the cells tended to have less than 5 frequencies and we have categorized maternal age in such a manner. However, we guess that as age of the mother increases her child caring practices could also be improved through experience of multiple pregnancies.

- Concerning paternal occupation as majority of the fathers were farmers by occupation the category included civil servants, daily laborer, and some who were hired and working in the private business.

- With regard to the mothers' educational level such classification was deemed than other various levels of literacy as the majority of the rural mothers were illiterate. Literacy status was self reported and then confirmed by the data collector by giving the mother a text written by a local language. (as indicated on page 8 of the revised manuscript)

13) I would expect some similarity by the region where people stay and especially given that the sampling was not simple random sampling but took into account some population sizes and therefore I assume that there was some kind of stratification? Was this catered for in the analysis?

**Authors' response:**

- The study was conducted in one the DSS in the country which comprises 12 kebeles (small administrative unit in Ethiopia). The DSS was established on the basis of different inclusion criteria such as climatic zones, crop production, etc. The selection for this was also based on simple random sampling from the DSS data base to justify equal chance of selection to the study and we do not think it requires further stratification

14) Was there assessment of statistical interaction between variables? Describe

**Authors' response:**
• Yes: Based on the knowledge of literatures variables were tested for interaction being in pair and there was no evidence of effect modification among the variables. STATA command was used, for example, \((\text{gen } X1X2 = X1*X2, \text{ xtlogit } Y X1 X2 )\) for the variable season and ownership of saving bank account and the like. Similarly, they were tested for multicollinearity using Variance Inflation Factor (VIF) and the Tolerance test.

15) Results
The number of pairs excluded from the analysis is small but could be significant if this lack of follow up data was informative. For example if these were children that died due to malnutrition related illnesses. Could you do a comparative analysis and show whether the children omitted are similar to the ones included in the analysis at baseline?

Authors' response:
• It is an interesting comment. We had only three deaths during the follow-up and we tried to investigate the cause at the spot and malnutrition was very less likely to be the cause of the death. The rest of them were lost due to changing the address out of the DSS. Regarding the similarity we believe they are 100% because we collected the data from panel samples or one mother-child pair was encountered twice as the nature of study was a kind of closed cohort

Minor essential revisions
16) The coding of the seasons includes the month of June and yet in the description of the data collection, data was not collected in this month ("study conducted from July 2010- February 2011"). This information is actually only appearing in the abstract but should also be put in the main body of the paper

Authors' response:
• It was by mistake. Now; we have corrected it as indicated on page 7 of the revised manuscript and the abstract section.

17) In abstract and in results section, include "95%CI" before the Confidence intervals for the prevalence of malnutrition

• Authors' response: It has been corrected where indicated (abstract and results section)

18) Be consistent in the description of the study population. In some places this is indicated as 6-36 months and other place it is under-five.

• Authors' response: addressed as requested
19) Make the analysis more concise by removing unnecessary text. For example, it is not necessary to include the specific codes that were used say for sex and other variables

- **Authors' response**: addressed as requested

20) Include the software that was used for data management and analysis

- **Authors' response**: addressed as requested

**Discussion**

21) - reference 23 is from Bangladesh but i is referred to in the discussion as coming from Ethiopia

- **Authors' response**: corrected on page 12 of the revised manuscript

22) The meaning of this sentence ....."The setting is known by its cash crop production mainly khat other than crop production"... is not clear. Is a cash crop not a crop?

- **Authors' response**: Both are crops but it is to differentiate between food crops and non-food crops or between edible and non-edible crops

23) This sentence is also not clear "...........the field work child ignorance in the rural setup could also.......". What do you mean by child ignorance?

- **Authors' response**: Child ignorance refers to giving less attention to the child by the mother probably in the presence of even adequate diet in the household due to other priority issues and also poor practice of child care practices or services.

**Discretionary revisions**

24) - Did you include in your assessment other important factors like the main source of food?

- **Authors' response**: Yes, but it turned out insignificant and taken away from the candidate variables probably the source of food the majority was almost all similar due to the nature of the study area.

25) what about household size and not number of under-fives? Possible for household to have many people and few children in whom nutrition problems are likely to occur

- **Authors' response**: Yes, we did, but it turned out insignificant and taken away from the candidate variables probably due to the nature of the model used which is strong enough in controlling unwanted relationship between variables of interest.

**Additional notes**

- Language has been carefully edited by professionals
- We have avoided sub-headings except for major headings of the manuscript.
Some variables were newly included in the model (Food security and maternal access to a health facility).

**B) Reviewer 2 (Ingunn Engebretsen)**

**Major:**

1) I guess the 'saving' ability would be interlinked with many other issues such as family income, education, heritage, profession and ownership of assets/housing/land. Thus, I think that condition would be more like confounding other more distal/proximal factors resulting in actual food intake among children.

**Authors' response:**

- Of course. We tried to conduct principal component analysis by considering saving capacity of the households, however, as majority of the study population are homogenous and the model we used for the analysis was so strong we could not appreciate the wealth status of them. Therefore, we are interested in looking at saving capacity of available households as part of the indication for their economical status. It is also interesting to see such occasion at the very rural setup to scale up such intervention. In the study setup farmers are starting to use the bank to save their money and this is also being getting attention by the existing government of the country.

2) Page 3: End of page has longer sections with no references and many arguments. Language is also poor.

**Authors' response:**

- This has been revisited as indicated in the revised version of the manuscript on page 4.

3) Language:

There is a need for language checks. E.g. in the first para the word undernutrition is written with and without '-'and '.' is missing, etc. Language needs upgrading in the entire manuscript.

**Authors' response:**

- Language has been carefully edited by professionals

4) Inclusion criteria are different in the methods in the manuscript and in the abstract.

**Authors' response:**

- We tried to maintain the uniformity of the inclusion criteria as mentioned in the revised version of our manuscript
5) I do not understand the methods: "A panel longitudinal study was conducted on children between the age of 6 to 36 months (mother - child pair) during wet and dry seasons. Data were obtained from the same study subject twice during the follow-up."

Authors' response:

- This is to mean that we have recruited our sample population at the baseline and obtained all necessary information from them. Again at the end line we collected the same information from the same mother-child pair who were available during the end line period of data collection. Such study design refers to a panel longitudinal study although we can have other synonymous for the same term in the epidemiology text.

6) Thereafter 2 different sample size calculations are given.

Authors' response:

- This because we calculated the sample size for two objectives as they have been reflected in the "Title"; one for the prevalence of acute child under-nutrition and the other for assessing the risk factors and finally we considered the larger sample size for our study.

7) I do not get completely what is said about testing of the material. I do not understand why and what is tested visually using histograms.

Authors' response:

- These are some of the available tests we use to see the distribution of the variables particularly for the continuous variables like age and the like whether they are normally distributed or not. Similarly, we often use histogram with normal curve to see the nature of the distribution visually whether it normal or skewed so that it is in line with the assumptions of the model we are using for our analysis.

8) There is a chronic swapping between malnutrition, undernutrition and other terms regarding nutrition. It would have been tidier if this was consistent in the paper. Definitions should be clearly given in the abstract and the body.

Authors' response:

- This concern has been given due attention throughout the manuscript during revision. We clarified what we mean by malnutrition. In this study we emphasized on acute child under-nutrition. This has been well addressed in the background section of the revised manuscript including the definition and where indicated too in the manuscript.

Minor:
9) Title: Maybe nice not to have a result presentation in the title. It is a broad topic and it would be best I think with a neutral title.

- **Authors' response:** The title is rephrased during revision and avoided the appearance or reflection of result in the title as indicated in the revised title.

Abstract:

10) Cooperative saving account is a fairly 'unfamiliar' factor to many readers. I would think the methods would need to highlight more of the independent factors in order for us to understand why this is presented in the result section. That has also an implications for the conclusion.

- **Authors' response:** Of course; Taking this concern into consideration we have re-emphasized it and it was well described in the method section as indicated on page 8-9 of the revised version of the manuscript.

11) 'Malnutrition' would need definition also in the abstract.

- **Authors' response:** The definition of malnutrition was included both in the abstract and background sections.

Background:

12) 1st sentence does not seem well written.

- **Authors' response:** This part is totally rephrased during revision

Discrete:

- Is it an error in the 1st author's e-mail address?
- One decimal place in the result section in the abstract is less busy to read.

- **Authors' response:** This sections are well revisited and corrected

With Regards!

Gudina Egata

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