Author’s response to reviews

Title: "Individual and household risk factors of severe acute malnutrition among under-five children in Mao, Chad: a matched case-control study"

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Reviewer Four

1. Reviewer four writes:

"Title: It is better to correct as follow "Individual and household risk factors of severe acute malnutrition among under-five children in Mao, Chad: a matched case-control study"

Thank you for the suggestion; we revised the title accordingly.

2. Reviewer four writes:
"Abstract: The abstract is well done, but it does not include all-important components of an abstract. For example, the method section of this abstract does not show the method of data entry and analysis. In addition, in line 25 it says multivariate analysis please write as multivariable analysis. Moreover, in line 19 please add a comma between year and month."

We added data entry method to the abstract. Using multivariable instead of multivariate has been synchronized throughout the manuscript.

3. Reviewer four writes:

"Please use Oxford English throughout the document. E.g line 35 insert comma before and

Be consistent when you write terms, therefore please write age in months or in years throughout the document. Line 46 women not women's"

Lines 35 and 46 corrected as per reviewer’s comment. Document is formatted English (United Kingdom), writing age in months synchronized throughout the document.

4. Reviewer four writes:

"Keywords: The number of key words should be between 3-5, but you put more than six key word words."

We reduced the number of key words, thanks for pointing it out.
5. Reviewer four writes:

"BACKGROUND: In this section, the authors should describe about the magnitude of SAM in worldwide, and the magnitude of SAM in developed countries. The authors should also explain about the impact of SAM on economical and psychological without intervention. In addition, what measurements the Chad government has done to alleviate the existing problem. Moreover, what were the effects of the interventions? Finally, what is the gap that you intended to fill? Generally, the paper needs extensive grammatical edition thought-out the document. Moreover, at the beginning please define what is SAM???

We added information on SAM trends, consequences and existing in-country efforts to the background section, as well as we elaborated more on the added value of conducting this study.

6. Reviewer four writes:

"Methods: Why you use 15% none response rate??? Because your study is case control.

In the data, collection toll you said a structured questioner was used. Please specify whether interviewer administered or self-administered. In line 29 data collectors were trained. For how many days???

We clarified in the text the fact that the increase in sample size was due to availability of resources. It was not due to foreseen non-response. We added missing information on the tool as per reviewer’s suggestion.

7. Reviewer four writes:
"The major limitation of this paper is on the statistical analysis. Under this section, the authors explained that data were entered and analyzed using EPI-info. In addition, the authors used conditional logistic regression, which is quite appropriate for matched-case control, but the authors did not consider cluster effect. The authors should do reanalysis by considering a two stage hierarchical model (a two stage multilevel analysis) to see the household level effect and the individual level effect of SAM."

We thank the reviewer for this suggestion. However, we think the multilevel analysis is not appropriate to our study for the following reasons.

In our study, we did not use a cluster sampling method. We recruited cases from one health centre and matched them with two controls, recruited from cases' neighbourhood.

We do have factors at different levels (i.e. individual and household). We approached this by, in effect, treating the data as two separate matched case-control studies:

(1) individual risk factors,

(2) household risk factors.

The first study has individual cases as cases of SAM. The second study has cases as households containing a case of SAM. For both studies the matching is at the individual level. We do not think this is wrong as we look at the effect of household level exposures on children of similar ages while controlling for environmental and other factors subsumed under "place of residence".

We think this is a useful approach as we can see (e.g) that diarrhoea and vomiting are significant individual risk factors at the individual level. These results suggest a general WASH (water,
sanitation, hygiene) intervention and indicates an ORS (Oral Rehydration Salts) promotion intervention. We can also see from the household level study that lack of a latrine and failure of the carer to wash hands after defecation are significant household risk factors. A WASH intervention is now indicated (alongside ORS promotion) as we have more evidence. We might also be able to concentrate the WASH intervention on hygiene promotion (as part of an Infant and Young Child Feeding intervention) and latrine building.

We do not have groups / levels as is usually understood in multilevel modelling (MLM). With MLM we are interested in careful assessment of the effects of group / level membership. We are completely uninterested in looking at the effect of set ID number since the matching criteria are treated, by design, as confounders that we want to ignore. When we match like this we exclude any consideration of the effects of matching criteria.

8. Reviewer four writes:

"Moreover, from line 33-35 it says, "Variables that were significant in bivariate analysis were considered". Therefore, what does mean significant please specify the p-value that you used in the variable selection process?

In case and control proportion, how much proportion you used 1:1 or 1:2 or1:3"

We did mention control to case ratio, which is 2:1, in Sample size calculation section, line 60. We also specified significance level for the variable selection process, lines 34-36: “Variables that were significant in bivariate analysis were considered for inclusion in the multivariable conditional logistic regression models. A p value <0.05 was considered to be significant” and lines 46-47: “A stepwise backwards elimination approach with a significance level of p <0.05 was used to build the final models.”
9. Reviewer four writes:

"Discussion: This section of the research did not give any meaning to the finding. The authors simply put the result, but they should interpret the result and compare this finding with other previous research output, studied either in the country or other countries, WHO or country guideline. Moreover, they should come up with possible justifications. Their finding has no possible justification for the discrepancy. The discussion is weak and does not explain the importance of the study as well."

We have revised the discussion section to include further references to existing studies, possible explanation and discussion points.

10. Reviewer four writes:

"In the discussion part, the researchers explained the whole result part. In addition, the authors discussed non-significant findings, for example to our surprise; we did not observe a significant association between point-of-use water quality and SAM. Please avoid such and the like issues. The discussion should be presented in related to the objective. Therefore, I recommend to the authors to modify the discussion based on our suggestions."

We do discuss one result that is not significant as this factor was expected to play a major role. We reduced the section on this.

11. Reviewer four writes:

"The limitation section was omitted, which is a very important issue in a case control study (recall bias is inevitable)."
We discussed potential limitations of this study in the last paragraph of the discussion section, lines 4-15, page 13. We quote: “While this is the first study on the household-level risk factors for SAM in the Kanem region, it has some limitations. The study relied on participants’ self-reported data, which is prone to recall bias and tendency of respondents to report socially desirable behaviours. Retrospective information tracking is one of weaknesses of case control studies. However, due attention was given to respecting study procedures, including training of data collectors, taking anthropometric measurements and supervision throughout data collection period to minimize expected bias. Overmatching might have occurred and hindered the identification of risk factors associated with the matching criteria (proximity).”

In addition to what was already written, we added some other limitations we could think of to the improved version of the manuscript.

12. Reviewer four writes:

Conclusion: This section is relatively well written.