Reviewer's report

Title: Predictors of poor nutritional status among children aged 6-24 months in agricultural regions of Mali: a cross-sectional study

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Reviewer: K. Ryan Wessells

Reviewer's report:

Comments to Authors:

The manuscript under consideration is a cross-sectional survey examining the prevalence and predictors of undernutrition (stunting, underweight, and wasting) among infants and young children in Mali. The topic is relevant, considering the high burden of malnutrition in this region, and the relationships between anthropometric indices and health outcomes. However, I have numerous concerns which need to be addressed (see below), before I believe that this manuscript is acceptable for publication. Overall, the level of detail, citation of other sources, and quality of the manuscript need to be improved.

Background:

1. The first paragraph of the background section establishes a nice framework for further interpretation of the present study. However, beginning with "children living in households ....", the introduction loses its organization and flow. In addition, the background section needs more information on the context (current situation in Mali), and why this research is necessary (limited data exploring associations between outcomes and predictors). I would suggest rewriting the introduction, to include some additional data from Mali (DHS) to explain the framework and justification for conducting this research. For example:
   a. Mention outcomes: Stunting prevalence (i.e. malnutrition), under-5 mortality rate, 2 week prevalence of diarrhea (DHS data)
   b. Cite studies which have shown an association between outcomes and underlying "causes" as mentioned in the framework. You start doing this in the background, but there seems to be
a focus only on diarrhea and pathogens, and not inadequate dietary intake, and other factors you assess in your study.

c. Create justification for your manuscript - objective of studying associations linking outcomes and underlying "causes".

2. The information describing the World Vegetable Center is misplaced in the introduction. The information about the project implementation should be in the methods section (study design and participants) - please describe that this is a cross-sectional survey that was part of a baseline evaluation for an intervention study (and cite if it has been described in detail elsewhere).

Materials and Methods

1. Study settings and target population: Too much information, lack of specifics and citations.

2. Study design and population: Were municipalities selected urban or rural? How were the districts and municipalities selected? What were the criteria for "not too far, with the same socio-demographic characteristics and lifestyle? How were villages selected? How many villages were selected? Was it random sampling, or convenience sampling? Were all households with children 6-24 months in selected villages eligible to participate? What if there was more than 1 child in this age range per household?

3. Since this is a cross-sectional survey conducted prior to an intervention, I do not believe you need to go into as much detail about control and intervention (i.e. is data collected during the census to match intervention and control households useful for your current analyses?).

4. Sample size calculations: You do not need to go into this much detail here, save this information for the intervention outcomes manuscript. You can simply state the first sentence, and mention the sample size per arm (it seems that you did not meet your sample size?). Then you could state this estimated sample size allows:

   a. Sample size would allow you to detect prevalence of stunting/underweight/wasting to within + X% (95% CI)

   b. Assumptions about intra-cluster correlation coefficients

   c. Power to detect what degree of associations between variables

5. Assessment of anthropometry: Were measures taken in duplicate? By whom (training)? Was height really measured to the nearest 1 cm (and not 1 mm)? Was height or length assessed?
6. What exclusion criteria were applied to child anthropometric data (i.e. > 6 SD)?
7. Who administered questionnaires?
8. Citation for household amenities scores (World Bank, Mali)?
9. HDDS - 12 food groups for household dietary diversity score - only 8 are listed; what is the given reference period?
10. Did you collect data on maternal parity/gravidity?
11. Please cite reference for definition of diarrhea.
12. How did you assess quality of complementary feeding? Did you use WHO IYCF indicators, and minimum dietary diversity? If not, why not? Why were only 8/12 items used in the scale you were using? How valid is this indicator for individual young children?
13. Statistical analyses: please go into more detail about statistical procedures used for the multi-stage random sampling design. It seems like the background situation in Sikasso and Mopti is very different. Was this taken into account?
14. Did you examine the 4 outcomes as continuous variables vs. dichotomous variables (to have increased power to detect differences)? If not, why not?
15. Correct: using either WHZWHO
16. Please provide citation for MUAC cut-offs
17. Why did you conduct a multivariable analyses? (please note: multivariable, not multivariate). It seems like bivariate analyses would adequately address your main objective, since you are not trying to build a predictive model (you are trying to identify potential predictors). Through larger multivariate models you are only able to learn if the potential predictor variable is significantly related to the response variable in the context of all of the covariates added to the model. In addition, the results are uninterpretable, because there is likely a high degree of collinearity between your different variables (what does "checked" and "handled" mean?)
18. Ethical considerations: A large proportion of the population was illiterate. How did you obtain informed consent (i.e. fingerprint, presence of a neutral witness)?

Results:
1. Flow diagram: A flow diagram would be helpful: number of households consented, number enrolled, number with main outcomes.
2. How is inadequate food provision defined (please add to materials and methods)?

3. Presentation of data in text vs. tables - the reporting of the data in the text could be tightened (made less wordy…reduce "one third… one third…", etc.)

4. 40% of children had reported diarrhea. This seems very high. How does this compare to DHS data? The specific data about diarrhea seems unnecessary, as it is not used in your analyses and does not contribute to your conclusions.

5. "Prevalence and risk factors of underweight…” only provides data on prevalence. Please adjust sub-heading appropriately.

6. WHZ is missing from initial list of variables (pg. 13, line 19); missing units of data presented (SD).

7. Why are 95% CI given for prevalence of underweight/stunting/wasting but not severe forms?

8. Define "chronic" and "acute" malnutrition (or preferably, use terms "stunting", "wasting", etc.).

9. Why are P values given for household indicators, but not child level characteristics (be consistent).

10. Tables should be numbered in the order in which they appear in the text.

11. How did region impact your results? Were their differences in associations by region?

Discussion:

1. How would seasonality impact your results? Please describe the season in which the survey was conducted. Discuss the impact that seasonality could have on the relationships between child nutrition and predictors.

2. I do not find the comparison of WHO indicators for anthropometry with other countries that helpful.

3. Was food security associated with dietary diversity? You posit this in your discussion, but both parameters were tested, so you could evaluate this.

4. Why do you think maternal factors were not associated with WHO indicators?

5. Maternal parity/gravidity: Is it that she has given birth to five or more children (or still has five or more children alive)? This could be a big difference in the context of high U5 mortality.
6. Large family size - could be related to lower SES, less access to family planning, maternal age? Instead of only financial constraints associated with having more children?

7. "rendering" - should be "rendering"

8. Do you have reason to believe that the children in this study were exposed to toxins and air pollutants? (i.e. explanation for stunting in boys). If so, link it back to your study population (i.e. fuel sources for cooking?).

Tables:
1. Definition of vegetable intakes for the mother? I am surprised to see them so low, in populations where the typical diet is a staple food with a vegetable based sauce?
2. Sex of child: male/female vs. boy/girl
3. Child still breastfed: Having "yes" first would be more consistent with other variables.
4. Define IDDS class.

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

No

**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

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Please indicate the quality of language in the manuscript:

Needs some language corrections before being published
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