Author’s response to reviews

Title: Prevalence of Anemia among Under-5 Children in the Ghanaian Population: Estimates from the Ghana Demographic and Health Survey

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Author’s response to reviews: see over
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Editor
BMC Public Health Journal

Dear Editor,

On behalf of all authors, I would like to thank you for sending the reviewers’ comments/suggestions and giving us the opportunity to submit a revised version of our manuscript. The comments were very helpful and greatly improved the overall presentation of the manuscript. We have revised our manuscript accordingly (revision submitted) and prepared a point by point response to the reviewers’ concerns/comments. Referee # 3 has no further comments and our detailed responses for Referees #1 and #2 are enclosed with this cover letter.

The reviewers’ comments/suggestions are stated verbatim in italics and our responses in regular font. In answering Referee # 1, we used the table format the reviewer used.

Thank you for your consideration

Best regards,

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REVIEWER 1

Major revisions:

1. *Manuscript needs to be shortened and then should in corporate changes mention below. Authors should justify need of this study and how this differs from the GDHS report.*

We would like to thank the reviewer for the detailed comments and suggestions that, we believe, have improved the presentation of our manuscript greatly. We have revised the entire manuscript and the revised version is significantly shorter.

National and Regional estimates of the prevalence of anemia are provided in the 2008 GDHS report. Thus policy makers, program planners and other non-governmental organizations are well informed of the high prevalence of anemia. **What are widely unknown are the specific socio-demographic subgroups as well as regional and sub-regional areas that have been affected the most and need urgent attention. As can be seen from our results, for certain groups of children, prevalence is estimated to be more than 95%, even reaching as high as 98% for infants in specific areas - indicating that almost every infant in that region is anemic. We have also shown that severity of anemia varies across the different socio-demographic subgroups and regions. Due to lack of this detailed information, directing the limited resources to the appropriate target areas is mostly a challenge and a contributing factor to missing the target population. Furthermore, identifying the specific variables associated with anemia is relevant in prioritizing interventions and revealing patterns for improved results. Furthermore, the GDHS report does not provide 95% confidence intervals, without which it is not possible to see the precision of the estimates provided and understand sampling to sampling variability.**

It is also important to highlight that if published, this manuscript, to our knowledge, is the first peer reviewed article on childhood anemia in the Ghanaian population, which we believe will lay the ground work for further research and investigations/discussions regarding childhood anemia in Ghana. This, we hope, will lead to appropriate and targeted interventions (especially to children in the most affected regions) to alleviate this burden.

We have modified the introduction of the manuscript to reflect this – **Page 3, Paragraph 3.**

2. *There are no details about ethics clearance from the institute in Canada.*

Statements regarding ethics approval are provided on Page 4, of the revised manuscript under a separate heading. This statement is in agreement with the journals requirements as well as previous published studies using the GDHS dataset.
Minor revisions:

1. There are many minor revisions suggested below for each section.

   We have incorporated most of suggestions in the revised manuscript. Please also see the table in the next page for our point by point response to the comments/suggestions.

Discretionary revisions

1. Figures are not necessary to include as they do not add much.

   We added the figures because it gives a better visual presentation of the results and also easier to interpret and understand. We have now limited the number of figures to 2.
<table>
<thead>
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<th>Comment</th>
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| “Results are mentioned in percentages with confidence interval, but it will be important to have number of samples in each group, giving information for readers at first instance in the abstract, for example the prevalence of anemia was 78.4% (n=XXXX, 95% CI: 76.7-80.2). This also applies to the main result section of the manuscript. If this is followed, then readers will not need to refer to the table all the time.  

Conclusion: It will be better to avoid using terms such as grave, used in conclusion section. Similarly this is repeated in the last paragraph of background section. Similarly, 14th line page 4 (rich source of information).” | We thank the reviewer for the suggestion. We have modified the manuscript accordingly.  
We have also modified the conclusion and removed the suggested term. |
| “There was no information in the draft about funding support in the document (need to be mentioned under a separate heading if not mentioned during online submission).  

Overall the manuscript is very long, and there are repetitions and at many instances it needs revision considering journal guidelines and word limits.  

Grammar and presentation: Authors need to follow only one English format, for many instances, UK and US English formats are used at the same time (Program and Programme). This needs to be revised according to the journal guidelines. It is important to note about use of ‘tense’, sometimes past/present/future tense are used at the same time. It’s suggested that professional proof reading must be used before further submission.” | The survey is funded by USAID and this is now stated in the Acknowledgement section on Page 13.  
We have reduced the length of the manuscript considerably and removed repetitions. Regarding journal guidelines, there are no word limits for this particular journal.  
We have also revised the entire manuscript for consistency in English format and corrected any grammatical and typographical errors. |
| “It will be important to provide additional definition of anemia (on the basis of hemoglobin level) considering g/dl unit. In developing countries, (where the paper is likely to be searched more), interpretation of alternative definition for scientific as well as general readers will be feasible. Background was very long and needs revision (appears to be around 900-1000 words, which is as much as of discussion). This section could be improved if prevalence and data only from Sub-Saharan African region are presented in detail, instead of conveying much about developed countries. Indeed, the overall comparison is important, but this could be limited to few lines.  

There is a need to revise all tenses (related to the study) and follow past tense at some instances. For example: in the 4th paragraph, it uses present tense about objectives, where past tense seems appropriate. Further at few places, authors used word, we investigate….., it will be a good academic practice to mention – we investigated…………. Similarly, the last paragraph (which is in future tense) of background should be at the end of discussion/conclusion. This continuous also in the methods section: Page 6 first paragraph, information is | We thank the reviewer for the suggestions. Definition of anemia on the basis of hemoglobin level is provided – Page 5, last Paragraph. The necessary revisions needed in the specified section have also been done and the introduction is now significantly shorter.  
The grammatical errors specified by the reviewer are now corrected. We have also revised the entire manuscript for possible grammatical and typographical errors.  
Further information on the rationale for this study and the contribution of our manuscript has been added to the manuscript – Page 3, Paragraph 3. Please also refer to our response under above (#2) under the Major Revisions. |
presented in present tense, which should be in past tense considering standard academic practices.

- The main question is what this study adds? Authors mentioned some information in the first paragraph on page 5 and compared with the GDHS report. But still, this needs to be presented, and why the specific study was needed, must be answered. Literature gap? Lack of Evidences for Policy?

- “Typing mistake: Line 2 in methods. There are few mistakes in the paper, such as (GSS). ). Some are later in results and discussion. USAID full form is incomplete. In Acknowledgment section, the agency word is written, but that is missed in the methods.

- Ethics registration number should be provided if allotted by the agency in Ghana. What about the ethics clearance from Canada, as some researchers are based in institute in Canada? This should meet the journal’s ethics guidelines.

- There is a paragraph on page 7, Haemoglobin testing. It was mentioned earlier that authors obtained anonymous data from the GDHS, and hence the section seems inappropriate, until and unless authors are involved in blood withdrawal and testing process. If yes, then that has to be mentioned and presented accordingly.

- Further sections such as weighing scales, statistical analyses should be shortened and revised. Typing mistakes: 12th line page 9, 1st line page 10. Needs a reference for statistical software used in the study."

- “It will be more useful for readers to have SD (standard deviation) in years along with months, which will be in accordance with the title.

- Some paragraphs could be difficult to interpret for nonscientific readers such as 2nd Paragraph from result section, hence needs to simplified and reorganized. Number of samples in each group should be presented as mentioned before.

- Across the paper at some instances 95% CI was mentioned in the brackets and most of the place it is not, hence this needs to be uniform. It will be a good practice to have 95% wherever CI is written.

- 15th Line, Page 11: It says that one comorbidity disease was significantly higher, and there is no p value, however all associations tested (found to be non-significant in the same paragraph do have p values. Again results could be shortened

- The typing errors have been duly corrected. Thank you!

- Ethical approval for the GDHS was received from the Ghana Health Service Ethical Review Committee and thus no further ethical approval was needed because the data was anonymous with no personal identifier. None of the authors were involved in data collection. In the revised manuscript, we have provided the necessary (according to journal guideline) statement regarding ethics in the manuscript – Page 4, last Paragraph.

- The section on Hemoglobin testing was added because we thought it appropriate to describe how the hemoglobin testing was done since anemia status is defined based on the level of haemoglobin. However, we agree with the reviewer this statement might not be appropriate and hence we removed it in the revised manuscript.

- The other sections have been shortened and revised as suggested. The specified typographical errors are also corrected.

- We have included SD in years as suggested – Page 6, Paragraph 1.

- The suggested paragraphs are revised and included number of samples along with prevalence estimates and 95% CIs.

- The typographical errors and inconsistencies in the presentation of 95% CIs have been corrected.

- The missing p-value is included. We have also revised the results section further to shorten this section and the overall manuscript.
<table>
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<th>We observed that the total number of children in the GDHS report (in some of the categories) were different from what we have. This might have resulted in the discrepancy in the estimates. However, we would like to highlight that these differences are negligible. Having said that, we agree with the reviewer that the statement provided in our original manuscript does not satisfactorily convey this message. We have, therefore, made some modifications – please refer to Page 12, Paragraph 1 of the revised manuscript.</th>
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<td>We have revised the discussion significantly.</td>
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<td>We did not investigate the malaria data in our analysis, mainly because our manuscript as it is had many layer of sub-groups (factors) and we wanted to limit the scope. However, Ghana is a malaria-endemic country with intense malaria transmission in the Northern and Upper regions. The results (high prevalence of anemia in these two regions) are in agreement with previous literature indicating that malaria and anemia are indeed associated (co-exist) – <strong>this was what we wanted to convey in our discussion.</strong> However, it is important to investigate this further using the malaria data in the GDHS, which we plan to do in future studies.</td>
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<td>References are provided and strong words are also avoided throughout the manuscript</td>
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<td>Most of the journals follow numerical system for reference. The present one does not appear in accordance with the recommended method.</td>
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<td>At few instances (;) is used after the year of publication and at some (,) is used (example- reference number 31 and 35). It is a good practice to use software for references or if prepared manually then needs a second check. There are many instances where title of paper is in Bold format, which need to be organized well. Some online links do not work.</td>
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<td>It is suggested that authors can study reference pattern of the</td>
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<td>“There should be reference group mentioned in the tables (example those who do not have infection are reference group for those with infection?)”</td>
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<td>We did not perform pairwise comparisons in our analysis; rather we used the chi-square test for association between the variables of interest.</td>
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<td>It appears that figures are not adding much to the study/presentation. Could be provided as supplementary if authors wish to submit considering journal policy.</td>
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<tr>
<td>We added the figures because it gives a better visual presentation of the results and also easier to interpret and understand especially for non-scientific readers who may not easily visualise the percentages. We have now limited the number of figures to 2.</td>
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REVIEWER 2

MAJOR REVISIONS

1) “The authors report findings based on data from the 2008 Ghana Demographic and Health Survey (GDHS) conducted by the Ghana Statistical Service. A more recent survey, also performed by the Ghana Statistical Service–Multiple Indicator Cluster Survey (MICS), 2011—report more up-to-date findings on the population prevalence of anaemia in Ghanaian under-5s. The cover letter indicates that the authors have been made aware of this; however, there is no mention of the MICS in the manuscript. While the findings reported in the manuscript are more detailed than those published in the MICS 2011 report, it is important for the authors to at least briefly discuss how their findings compare with the more recent MICS 2011 figures and what their findings add to existing evidence. The authors state in their cover letter that they are currently attempting to obtain the MICS 2011 dataset; would the manuscript be more insightful after the MICS 2011 data have been obtained and analysed?”

We thank the reviewer for the comments and suggestions. We agree that the 2011 MICS is a more recent survey on the Ghanaian population. This survey came to our attention during the submission (review process) and we have requested access to the data for future analysis along with the latest (2013) GDHS survey, for which data is not available yet. We also plan to investigate the trend of anaemia using all available data from both MICS and GDHS and investigate similarities and differences between the two surveys.

Having said that, we would like to highlight that our manuscript provides an in-depth analysis of prevalence of anaemia, using the latest available data (2008) from GDHS. To our knowledge, this is the first (and only) research paper on anaemia in Ghanaian population. If accepted, it will be the first peer reviewed article discussing prevalence of childhood anaemia (or any anaemia) in Ghanaian population.

Moreover, reports from both MICS and GDHS provide only summary data and population level estimates for many variables, where anaemia is briefly presented often in a single page report. Although government, policy makers and other NGOs are aware of population level estimates (from GDHS and MICS reports), what is widely unknown is the specific socio-demographic subgroups as well as regional and sub-regional areas in Ghana for which prevalence is very high and need urgent attention. As can be seen from our results, for certain groups of children, prevalence is estimated to be more than 95%, reaching as high as 98% for infants in certain regions, indicating that almost every infant in that particular region of Ghana is affected by anaemia and needs attention. Due to lack of this detailed information, directing the limited resources to the appropriate target areas is mostly a challenge and a contributing factor to missing the target population. Moreover, identifying the specific variables associated with anaemia is relevant in prioritizing interventions and revealing patterns for improved results. Furthermore, the GDHS and MICS reports do not provide 95% confidence intervals, without which it is not possible to see the precision of the estimates provided and understand sampling to sampling variability.

In conclusion, although analysing (and comparing) the latest (as well as the previous) MICS data provides additional insights (evidence), our manuscript addresses an important research question and
provides detailed evidence based on a thoroughly conducted national health survey. We feel our manuscript contributes evidence towards understanding childhood anemia and lays the groundwork, for not only providing an in-depth information regarding childhood anemia in the Ghanaian population with respect to age, socio-demographic as well as regional and sub-regional factors, but also facilitates possible discussion regarding policies and targeted interventions towards alleviating the problem.

We have now revised the introduction (Page 3, Paragraph 3) and discussion (Page 9, first Paragraph under discussion) to reflect this contribution. We also added a statement regarding the MICS survey in our discussion (Page 11, last Paragraph).

2) “In Table 1, the authors report 1,179 children with birth weight classified as “Large”, 664 with “Normal” and 306 with “Small”. The total does not add up to 2,168 (total sample size). Please clarify why there are 19 fewer observations.”

The total does not add up to 2168 because of missing data. That is, not all the respondents had data on their birth weight and all those with no information on birth weight were excluded in the chi-squared analysis for this particular measurement. This information is now added to the revised manuscript as a foot note in Table 1.

3) “In Table 1, the authors report 945 children as having had an infection and 1,219 children as not having had an infection. The total does not add up to 2,168 (total sample size). Please clarify why there are 4 fewer observations.”

Similarly, the respondents with no information on comorbidity diseases (pneumonia, fever and diarrhea) were not included in the chi squared analysis. This information is now provided in the revised manuscript.

MINOR REVISIONS

1) “Typographical error at the end of the first sentence of the ‘Methods’ section (redundant bracket).”

Thank you, the typographical error is corrected.

2) “In the second sentence of the ‘Methods’ section, “Agency for” has been missed out from the expansion of USAID (USAID- United States Agency for International Development).”

Corrected.

3) “Under ‘Statistical Analysis’, the authors state that they have classified birth weight as “Large”, “Average” and “Normal”, but have labelled birth weight in Table 1 as “Large”, “Normal” and “Small”. Please correct this to maintain consistency of terminology throughout the manuscript. It would be clearer to present exact birth weight measurements for each of these categories.”
Thank you for the suggestion. We have modified accordingly.

4) “Typographical error in the second paragraph of the ‘Results’ section: “Also, about 32% of the respondents were in urban residences WHILE 68% were in rural residences.”

Corrected.

5) “In the fourth paragraph of the ‘Results’ section (last sentence), the authors state: “The prevalence of anemia among children who had at least one COMORBIDITY disease was significantly higher than the prevalence among children who had no INFECTION, 83.3% and 74.6% respectively”. The corresponding numbers in Table 1 have been labelled “Has an INFECTION? Yes/No.” “Comorbidity” is not synonymous with “infection”; the authors will have to correct this.”

Thank you. We agree with the reviewer and this is now corrected in the revised manuscript.

6) “Are the p-values that the authors report in their tables exactly the same for both weighted and un-weighted figures? For example, in Table 1, the prevalence of anaemia was greater in males than in females for both weighted and un-weighted analyses. It is not clear if the reported p-value of 0.4530 is for the weighted analysis or un-weighted analysis or both. Please consider re formatting all tables to make this clearer.”

The p-values reported in the tables and/or the manuscript is only for the weighted analysis and this has been indicated in the tables. The un-weighted analysis was only done to compare the percentages with that of the weighted analysis.

DISCRETIONARY REVISIONS

7) “I understand that the 2008 survey is the fifth edition of the GDHS with previous surveys having been performed in 1988, 1993, 1998 and 2003. Data on the prevalence of anaemia in under-5 children were not reported in the first three surveys but were reported in the 2003 GDHS. Has there been a change in the reported prevalence of anaemia in under-5s from 2003 to 2008? The authors briefly allude to this towards the end of their manuscript but this could be discussed further with reporting of the exact anaemia prevalence figures from the 2003 GDHS report.”

We agree with the reviewer that the first data on anemia was collected during the 2003 GDHS. We have already analysed the 2003 GDHS but we did not include it in the manuscript because of length of the paper (since it is very long as it is), in fact we have been asked (by Reviewer #1) to reduce the length of the manuscript and we feel that adding the results from the 2003 survey would significantly increase the length of the manuscript.

Having said that, we plan a trend analysis using all available data from both GDHS and MICS and the 2003 GDHS results will be included.