Author’s response to reviews

**Title:** Caretakers' Understanding of Malaria, Use of Insecticide Treated Net and Care Seeking-Behavior for Febrile Illness of their Children in Ethiopia

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Malaria Related Perceptions among Caretakers' of Children 2-9 Years Old Living in Malaria Sentinel Sites, Ethiopia: Implication for Sustained Control and Enhancing Elimination Efforts

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BMC Infectious Diseases

Reviewer reports:

Reviewer 1: The manuscript entitled "Malaria Related Perceptions among Caretakers' of Children 2-9 Years Old Living in Malaria Sentinel Sites, Ethiopia: Implication for Sustained Control and Enhancing Elimination Efforts" is interesting and brings novel knowledge to the malaria community and in particularly in Ethiopia by bridging some of the knowledge gap on the perceptions and knowledge of malaria among communities.

The manuscript and the analyses would however benefit some revision before readiness of publication. One of the main issue to address concerns the statistical method used for the analysis. The knowledge score being constrained between 0 and 1, the statistical method should account for this and currently the authors have used ANOVA (and linear regression, which is redundant) and do not address this. The authors should transform their outcome before proceeding to the analysis.
Response: We express our heartfelt thanks to the reviewer for such extensive review and suggestions. We found that the comments are very useful to improve our manuscript. We tried to address most of the comments given by the reviewer and for some comments we provided further elaboration or clarifications. The following sections provide line by line response to reviewer’s comments including the response to the general comment given above.

1. lineplots are not adequate for the analysis - bar charts would be more appropriate, potentially CI could also be added. Use stacked bar charts where appropriate

Response: Thank you for the comment. In most cases, we used line graphs to present the findings by study sites and other characteristics as appropriate. This is due to our data points are many and maybe crowded if we use other types of graphs such as bar graphs. Thus, we found that our line graphs are suitable to the data. But, we convert some line graphs into bar chart (eg Figure 4). In addition, we converted figure 6 (now figure 7) into bar graphs with CI.

1. Spider chart makes it too complicated to read and add no additional information (bar chart typically used for scoring of a single component looking at different dimensions) - should use bar chart or other more adequate plot.

Response: The comment was accepted -the spider chart (figure 6) is converted to bar with CI and become figure 7.

2. The legends for each figure that contains results might need to be in the text rather than in legends.

Response: The results within the legends are actually part of the figure. To prevent fragmentation of the information/findings, we preferred keep them as part of the legends. Maybe during final formatting, the legends will become part of the text. In addition, we presented in that way as per the journal style.
3. I suggest to remove "Ethiopia, 2016" from all legends

Response: accepted, “Ethiopia 2016” removed from all legends: lines: 565, 573, 583, 590, 595, 602

- Analysis:

4. Linear regression and ANAVO suggest the same analysis. Where ANOVA is referred to in the text, it implies contrast (and differences between sites). Here the objective is not really to look at the paired-differences but looking at the difference overall so I am not not contrast is necessary. More importantly, a transformation such as log/logit should be used to constrained the outputs to lie between 0 and 1. The current approach is not acceptable.

Response: Thank you very much for the comments. The use of ANOVA to show contrast is removed. With respect to use of score, composite measure is very much common in survey and behavioral data. It facilitates interpretation, understandings, provide big picture of the data, summarizes the indicator on single dimensions and provides summary figure. It also attracts the public /readers/decision makers which increases utility and use of the data. Therefore, we have chosen the composite measure to show the overall malaria related knowledge in addition to individual based analysis. We explored the distribution of the data to check whether transformation is actually needed. The distribution shows (fig 1) indicates that the data are approximately normally distributed (Skewness=-0.44, Kurtosis=-0.21). The two test suggesting that the departure from normality is not too extreme in the present data. Visual inspection of the histogram of the data also indicates, the data approximately follow normal distribution. The log transformation does not improve the distribution of data, rather exacerbating the non-normality of the data (see fig 2). It makes the distribution more skewed than the original data. Consequently, we decided to use the composite score as it is. Perhaps, we look forward to hear from the reviewer/editor on this matter.

5. Line 56: Format of estimates not consistent. I would suggest mean+CI instead of mean+SE. This should be consistent throughout the whole document if proportions are cited. If SE is chosen, the notation should be SE (and not St. Erro (line 56) or St.err (line 614), and so on…)

Response: Thank you for the comment. We accepted the comment and mean difference across study sites are reported as “Mean + CI”. (fig 7). In addition, we removed st.err from regression table 4 [page 17].
6. Line 60: for results from linear regression, estimates of coefficients do not need to be cited. P-values should be enough and readers can refer to the table for more information (leaving it there is confusing to know whether it is a regression or a correlation coefficient).

Response: Thank you for the comment. We feel it is important to mention regression coefficient for important findings. To avoid confusion whether the coefficient is regression or something else, we added qualifying expression, “linear regression analysis” [line 44]

7. Line 85-87: the sentence is not clear (would it be better with "to provide" instead of "providing"? and a synonym for "named"? appointed?)

Response: accepted [line 74], instead of appointed/named, we used “deployed”

8. Line 88: "(laboratory confirmed plus clinical) cases of malaria" should be cases of malaria (presumptive and laboratory confirmed)".

Response: accepted with thanks [line 77]

9. Line 89-90: when referring to Plasmodium falciparum and Pf, there are naming conventions and it should be in italics and as return just here.

Response: accepted with thanks [line 78-79]

10. Line 90: "accounting" should be replaced by "accounting for"

Response: accepted [line 79]
11. Line 91: the number of people at risk is irrelevant as unlikely to be absolutely accurate so it would be better to round the number or write "around 61 millions"

Response: accepted [line 80]

12. Line 91-101: I am not sure about the relevance of this paragraph in the context of the study. It remains very generic and not necessary.

Response: accepted with thanks. The paragraph has been shorted and irrelevant and generic ones are removed (line 83-85)

13. Line 103: "Global malaria technical strategy" could be written as "Global malaria Technical Strategy (GTS)" as its acronym is often used.

Response: Accepted with thanks! [line 85]

14. Line 103-104: there is a mistake with the sentence, it seems incomplete with "2016-2030) vision,"

Response: edited for clarity [line 85-88]

15. Line 112-114: the sentence does not make sense

Response: edited for clarity [line 94-96]

16. Line 115: "requiring" should be replaced by "as it requires"

Response: accepted [ line 97]
17. Line 118: "malaria is no longer a perceived risk" could be replaced by "malaria is no longer perceived as a risk"

Response: accepted [line 100]

18. Line 134: the statements affirm that "little is documented regarding community knowledge and perceptions on malaria among community reside on malaria surveillance system". However on line 126/127 it states that the detection system "lacks program elements to capture community side factors such as local knowledge and perceptions". These sentences seem to contradict each others. These should be rephrased.

Response: We think that the two expressions are supporting each other than contradicting; we preferred the word “little” not to totally underestimate the possibility of existence of evidences on related subjects in malaria surveillance area. Thus, we prefer to keep the sentences are they are.

19. Line 136: this is the place in the manuscript to define the study participants, i.e. describe the fact that the study focuses on children and their caretaker will be interviewed.

Response: we described study population in method section, line …. We feel methodology is right place to discuss about the study population [line 140-146].

20. Line 149: the sentence starting with "Health centers are usually…" This sentence provides details irrelevant to the study that could be dropped.

Response: thank you for the comment. We accepted the comment and the description is reduced. The description was reduced and instead map of the study is included [ line 126-137].

21. Line 154: do you mean that sites were "added" instead of "replaced"?

Response: accepted [line 135]
22. Line 154/155: "(to meet local health system)" - what does it mean in the context of the study?
Response: yes, it mean in the context of the study. However, we removed the phrase from the sentence as it may create confusion to readers

23. Line 159: *Plasmodium vivax* should be in italics. Also vivax was not mentioned in the introduction and appear in the material & methods, should this not be included in the introduction or not mentioned at all?
Response: Thank you very much! We mentioned *Plasmodium vivax* in introduction section, line 78-79

24. Line 161: *Plasmodium falciparum* should be in italics
Response: accepted

25. Line 168: the acronym should be "ELISA" and not "EIA"
Response: accepted [of course we removed ELISA as it less related to the present study]

26. Line 168: "anti-body" should be "antibody"
Response: Accepted-throughout the document, we corrected as “antibody”

27. Line 171: the sample size calculation is not really necessary in the text especially when it was derived for the endemicity city rather than this study. This should refer to the study design of the endemicity study explained somewhere else.
Response: We agree that the sample size was meant for the larger endemicity study and we mentioned in that way. The main study (endemicity study) is not published yet, once it is get published we will cite it here. Now, we removed sample estimation from the present paper and shortened the description to fit into this paper. Line 140-146.

28. Line 174: "equal number" is stated - but how many should be mentioned.
Response: accepted and number is added (line 143)

29. Line 174: "to assess caretaker's perception" should be replaced by "to assess their perception"
Response: accepted (line 144)

30. Line 174: Need some consistency on numbers format if come is used it should be used throughout the whole document so here it should be 1,038 instead of 1038. Check the whole document for consistency.
Response: accepted, 1038 corrected as 1,038 throughout the document. However, this number was corrected to 1,040 as we rounded decimal points during equal allocation of the sample size to ten study sites.

31. Line 170-176: It is not really clear whether the text refers to the endemicity study or to this study described here. The paragraph needs restructure with focus on this particular study and refers the other study when needed.
Response: We really thank the review, and we restructured and edited the paragraph to fit into the present study context (line 140-156)
32. Line 179: "children together with respective caretakers" should be replaced by "children accompanied by their caretaker"

Response: Accepted, modified as “caretakers accompanied their children” [line 149]

33. Line 181: "The sample size (1038 children with equal numbers of caretakers)" should be replaced by "The sample size (1,038 participants)"

Response: The comment is considered, we edited the sentence as a whole

34. Line 182: "Second" is mentioned when "First" is no in the document. Please change for consistency. Could you "additionally" for instance.

Response: accepted (line 151)

35. Line 181-186: The design of the study is not very clear. If equal number of participants is considered in each of the 8 health posts that makes 1038/8 which is not an integer. Could you be clearer on the design?

Response (clarifications): The estimated sample size was 1038 (children with their caretakers) and the study sites were 10. Thus, 1038/10=103.8. We rounded the decimal and initially planned to recruit 1040 children and 1040 caretakers. Therefore, edition was made to the entire document.

36. Line 187 'parents' are mentioned while on line 190 it is stated parents/caretakers. This should be defined and described once at the beginning and then the same terminology should be used to avoid inconsistencies.

Response: Accepted with thanks. We used caretakers throughout the document and editions made accordingly.
37. Line 191: "Up on arrival, parents/caretaker were given detail information about the study and signed written consent form for participation in the interview, only when agreed to participate" should be replaced by "Upon arrival, caretaker were given detailed information about the study and signed written consent form were sought when they agreed to participate to the study."

Response: agreed and accepted [line 159-160).

38. Line 199-200: Rephrase the sentence only stating that responders were not probed. The list was pre-determined. Answers were recorded with corresponding to items on the list or open text otherwise. Only at the end they were probed if they had anything else to add.

Response: Accepted with thanks, and modifications are made accordingly (164-169).

39. Line 205: Remove "nine"

Response: accepted, removed.

40. Line 206: Replace "specific" by "most important"

Response: accepted (line 171).

41. Line 212: "this knowledge score was used for further analysis using ANOVA and linear regression" This sentence should be removed as both these methods are equivalent so you should mention one or the other and this should appear in the statistical analysis section and not here.

Response: Thank you! We removed both of them here, instead mentioned in data analysis section
42. Line 219: I believe "enumerators" should be replaced by "interviewers"?
Response: accepted and replaced (line 185).

43. Line 222: inconsistencies by using terminology caretaker/parents- be consistent throughout the whole document.
Response: accepted, caretaker is used consistently

44. Line 226-233: This section needs to be revisited as the analysis needs to change. Log transformation should be used and only one analysis should be stated (ANOVA or linear regression as it does the same analysis). I believe contrasts are not necessary here. Statements on correlation, chisquare (& t-test if used) should be added.
Response: we dropped use of contrasts in ANOVA analysis. We used linear regression to identify background factors associated with knowledge (table 4). In addition, we computed mean knowledge by study sites and used ANOVA to check whether mean knowledge score is different by study sites. We believe there is no overlap here (line 195-200).

45. Line 239: How many individuals took part to the interview? The text states 702 but the tables states 709 and it seems the analyses are derived on 709. Please check this and correct adequately.
Response: Thank you very much! We noted this typo after we submitted the manuscript. Now corrected 702 to 709 (line 201).

46. Line 257: what does the surrounded R refers to?
Response: It is just a symbol to indicate note in the table. To avoid confusion, we changed to into **** (line 219)
47. Line 262: Same as Line 239. Is the sample size 702 or 709?
Response: This is okay as we corrected the first number (709)

48. Line 266: "sign" should be "signs"
Response: accepted (line 231)

49. Line 271: it is not clear anywhere in the document what the expected manifestation of malaria illness should be. Please define these somewhere.
Response: accepted, descriptions of manifestation of malaria are added in introduction session, line 59-62

50. Line 278: format of the legend are not consistent between parenthesis "(" and square parenthesis "[" and the translations.
Response: accepted, the same parenthesis was used

51. Line 287 & 291: chisquare not mentioned in methods and only p value might be useful if the chisquare value can be stated somewhere else. Revisit the format to be consistent when you mention results from Chisquare tests.
Response: accepted, we mentioned use of chi-square in data analysis section and displayed only p-value in result section. (line 195-196)
52. Line 296: "children caretaker" should be replaced by "respondents"

Response: accepted (line 277)

53. Line 298: same as line 271. Make it clear what is and what is not a misconception

Response: accepted and further elaboration was made to the description (line 281-284)

54. Line 299-301. This sentence repeats the same idea as the sentence above.

Response: the sentence is restructured and redundant ideas are removed [line 277-284]

55. Line 328: revisit the format for citing correlation and mention it in the method.

Response: Thank you for the comment. We added the description for this statistics in data analysis section

56. Line 330: is it pearson or spearman correlation?

Response: we used Spearman (rho) correlation and editions are made accordingly.

57. Line 347: I would merge this section with the section below and I would add a bar chart comparing score values instead of table 4 comparing sites 2 by 2 (has little interest here).

Response: accepted-we merged the two sections together; table 4 was deleted, and instead we used bar chart with CI [fig 7].
58. Line 397: "knowledge of the basic signs" should be replaced by "the proportion of individuals knowing about the basic signs"
Response: Accepted [line 364-365].

59. Line 400: Levels of endemicity could be added as a covariate in the ANOVA (looking at MAP estimates if not available otherwise for instance). Does it make much difference between the sites?
Response: Endemcity is addressed in another part of the manuscript, and to prevent information overlap, we preferred not to discuss it in this manuscript. Instead we removed the justification related to level of endemicity.

60. Line 411: what is an unacceptably low knowledge of correct malaria? What is the estimate? It should be the proportion of people knowing about… (same as line 397).
Response: accepted-“the proportion of people knowing…”[line 376].

61. Line 424: "Unexpectedly" instead of "unusually"?
Response: accepted [line 379]

62. Line 425: "geographically widespread" instead of "multiple"?
Response: accepted [line 382]
63. Line 424-438: it seems that the idea from this paragraph is similar as the one in the paragraph above. Could this paragraph be shortened and combined with the preceeding one?
Response: accepted-the paragraphs are merged, edited and shorted [line: 380-388]

64. Line 443: "adherence" should be replaced by "adhere"
Response: accepted [line 406]

65. Line 465-471: Not sure about the relevance of this paragraph
Response: This paragraph discusses how the different aspects of malaria related knowledge are related. eg. To what extent people who knew malaria is caused by mosquito bite also knew that ITN prevents misquote bite. This type of knowledge is essential to help people connect facts about malaria and finally apply appropriate preventive measures. So, we preferred to keep the paragraph than removing it

66. Line 474: "fives" should be replaced by "five"
Response: Accepted [line 438]

67. Line 492: Statements should be made on the use of a score and its limitations.
Response: Thank you for the comment. We included possible limitations on use of score and other potential limitation of the study. Line 436-446.
68. Line 575-581: A statement on altitude needs to be added in the text if this is mentioned in the discussion.

Response: We did not understand the comment. Line 575-581 talks about figure 1 legend and it did not contain the specific comment. However, there is a finding on knowledge of mosquito by altitude [line 272-274].

69. Line 587: do not use "and so on" in the text.

Response: accepted “so on” removed

70. Line 612-617: same as Line 56 be consistent in the format for your estimations all different in this paragraph. Consider using CI instead of SE.

Response: accepted throughout the document.

I. If improvements to the English language within your manuscript have been requested, you should have your manuscript reviewed by someone who is fluent in English.

Response: The manuscript has reviewed and edited by English language specialist

Additional changes to the manuscript

→ Reference list was updated using Zotero reference manager tool, and more references were added.

→ The numbers of figures are increased to 7 as we added map of the study area and the citation of the figure in the text is updated accordingly.