Author’s response to reviews

Title: Validation of a food frequency questionnaire as a tool for assessing dietary intake in cardiovascular disease research and surveillance in Bangladesh

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Version: 1 Date: 25 Apr 2019

Author’s response to reviews:

We have uploaded 'Response to Editor Reviewers comment_NJ_1 Final.docx’ in the Supplementary material

Reviewer 1

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
<th>Page, line</th>
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<tbody>
<tr>
<td>1</td>
<td>This manuscript describes a validation study of a food frequency questionnaire developed for use in Bangladesh as a tool for cardiovascular disease surveillance. I would suggest that the title of the manuscript is re-worded. Thank you for reviewer’s suggestion. The title is re-worded</td>
<td>P 1; line 1-3</td>
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<tr>
<td>2</td>
<td>Overall the manuscript is well written but there are some typographical (e.g. line 242) and grammatical errors and therefore the manuscript requires a thorough proof read. Thank you for mentioning this typo. Now it is corrected.</td>
<td>P 15; line 295</td>
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<td>3</td>
<td>The authors state in the introduction that dietary patterns are of interest in the understanding of CVD and urban / rural differences but the validation of the method is based on</td>
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A through proof reading has been done
energy and nutrient intakes. We thank the reviewer for highlighting this issue. We have modified the title and the introduction to reflect our validation method.

P 6; line 100-102

4 Not all abbreviations are listed in lines 446-448 e.g. NPNL. Thank you. All abbreviations are now enlisted. P 24; line 513-518

5 Abstract: At present there are no data in the results section of the abstract. Ranges of correlation coefficients could be given for example. Correlation coefficients were inserted to the results section of the abstract P 3; line 43-52

6 Introduction: Lines 50-52: It would be helpful if the authors presented any data on CVD prevalence and/or mortality in Bangladesh or South Asia to provide some context. Thank you for this suggestion. Included. P 5; line 65-71

7 Methods: It is not clear why two FFQ were administered and it is not until the statistical analysis section that the authors state which FFQ is used in the validation analysis. Please state what the first FFQ was used for (if at all). Thank you for highlighting this issue. We have used last FFQ for validation as it covered the period of all three 24-hour. We now mention this clearly before the Statistical analysis.

Two FFQ were taken to assess the stability of the FFQ estimates, and any possible bias due to loss of participants from the original sample. We were happy to show no significant differences from most nutrients which is now mentioned in the text. P 10, 12, 14; line 185-187, 236-237, 288-290

8 Line 94: Please state clearly whether the participants in the validation study were also enrolled in the migration study or they were a separate sample? Two different samples were used. Included in the text. P 7; line 113-115

9 Line 98: Please check the wording of the exclusion criteria. At present it states that participants with 'no chronic conditions' were excluded. Is this correct? Thank you for highlighting this. Corrected. P 7; line 118

10 How was consent to take part in the study obtained? How was this handled for illiterate participants? The consent procedure is discussed in detail including how it was handled with illiterate participants. P 8; line 137-143

11 Line 119: Please be more specific about the outcomes to be assessed. What is meant by 'the results of the FFQ'? Thank you. Modified. P 8; line 147-148

12 Line 127: Which FFQ contained 172 items? The arsenic study or the present study? How were additional foods for the FFQ used in the present study identified? We have clarified the confusion and describe the process of adding additional food items. P 9; line 157-163
13 Lines 135-138: This section requires more detail e.g. How many people took part in this study? Total sample size calculation was mentioned in section 2.1 “Study population”. In the first paragraph of the results we now clarified the number recruited and the final analytical sample. P 7, 14; line 117-118, 119-123, 271-274

14 How were portion size data collected in the 24 hour recall? Were the same reference portion sizes used as for the FFQ?

Who administered the 24 hour recalls? Included in the text.

All interviews were conducted by trained research assistants. All interviewers were equipped with interview manuals and the same reference portion for standardisation. Included in the text P 8, 10; line 148-150, 183-187

15 Lines 175-180: It would be helpful for the reader to know for how many foods the USDA, Indian and weighed records were used. Included in the text. P 11; line 216-220

16 Were participants asked about micronutrient supplement intakes as part of the FFQ and 24 hour recalls We missed this information and included it in the limitation. P 23; line 490-491

17 Discussion: Sub-headings would be useful in the discussion section. Thank you for this suggestion. We followed the journal instruction and sub-heading is not mandatory.

18 It would be interesting to discuss why there were differences in the correlation coefficients between urban and rural residents. This was only done in detail for sodium. Gender is one explanation of this difference. Now we have done the comparisons of methods for men and women separately. This enables us to see that the correlation hugely differed between men and women. For iron, sub-group analysis revealed that energy-adjusted correlation was moderate for rural male whereas poor for both urban male and female. Another reason could be literacy level but small sample size in each educational sub-group precludes doing sub analysis.

19 There is no comment on the effect of season on diet. How stable is the diet across seasons and might this affect the responses to the FFQ in particular? Our reference for recall period is short, only 3 months which cannot be affected by seasonal variations. We now included this in study limitations. However, arsenic study of Bangladesh showed small seasonal variation for total energy, protein and carbohydrate but larger variation for vitamin D, beta carotene and vitamin A. P 23; line 491-496

20 Lines 341-345: Not clear if the authors are talking about the IMS or the present study. Thank you. Modified. P 19; line 406-407

21 Line 374: Please provide a reference for effect of folate on CVD risk. Included. P 21; line 438
Line 387: What is meant by 'Eventually our FFQ revealed…'?
It is modified now.

P 21; line 451-453

Regarding ferritin, is it also possible that infection or inflammation affected serum ferritin concentrations? C-reactive protein could have been measured to determine this. This is a good point that inflammation could affect ferritin level. We included in the discussion of study limitations.

P 22; line 473-477

Reviewer 2

Comment Response Page, line

L 106-111: Can the authors justify the recruitment method for rural participants in the methods section and/or discuss it. When validating a tool, there is an interest to have a large variability into the selected population. In terms of SES, was there such variability in the rural sample? We have discussed the recruitment method in method section and added information and supplementary table on the characteristics of the rural sample in comparison to the urban sample.

P 7, 14; line 126-130, 274-284

Additional file 2

L 123-139: Can the authors give more details in the food frequency questionnaire section:

How many items does the arsenic study FFQ have? How many items were added to the new FFQ? How those added items were chosen? Especially, the arsenic FFQ was designed for rural participants and the new FFQ is designed for both rural and urban participants. How was it taken into account?

Thank you for this suggestion, this was also requested by another reviewer. We have now elaborated on the adaptation of the arsenic FFQ to the one used in here.

P 9; line 157-163

Can the authors mention the nutrients that are specifically relevant to monitor for CVD risk monitoring and/or the nutrients they were interested in monitoring.

We have included relatively all macro and micro nutrients relevant to CVD

It would be interesting to have access to the FFQ items (in an appendix for example).

We have included items in the Additional file.

P 9; line 159
28 It is no clear if the FFQ is self-administered or not. It may be assumed that not, as some participants were illiterate. That point may be discussed because there may be therefore a limit to use that FFQ at large scale if it is not self-administered. And if it is, how did the authors deal with illiterate participants?

It is interviewer administered. For developing countries like Bangladesh where literacy rate is 51.8% (according to Census 2011), self-administered questionnaire is not applicable.

P 8; line 148-149

29 “All completed questionnaires were checked by a nutritionist for accuracy and completeness”. Please, can the authors discuss that point and/or give more details. Did the nutritionist have to face large levels of inconsistency or missing data? We have now included these clarifications in text. Data was collected by trained research assistants. So, a small scale of missing data or inconsistency was found. Moreover, if any error was found, research assistants contacted the participants by phone for clarification. 

Page 9; line 171-175

30 L 148-173: A large number of biomarkers were studied. Can the authors justify the choice of those biomarkers. During the planning phase we have included a number of biomarkers related to CVD, however, we could not do all due to feasibility and costs. The relation of biomarkers to CVD is given while discussing the nutrient. Page 21, 22; line 437-438, 461-464, 478-479

31 Results section: Reproducibility results were not reported. Can the authors add a sentence in the results section. Included in the discussion. We are planning to publish data about reproducibility. Page 23; line 495-496

32 Discussion section: L 429-430: How do the sampling methods ensure that urban residents from all SES were included?

Can the authors discuss the sampling methods and the potential impact of it on the results. Also, urban residents had higher correlation between the two dietary methods than rural residents. Can the authors discuss those results. There are 12 different employment grades from the highest grade (e.g., professor) to the lowest rank (e.g., cleaner). To ensure the validity study included all grades we used poster advertisements and emails to staff as well as actively approaching individual workers who were less likely to have access to email or more likely to be illiterate. We have now included this information in the paragraph.

Our sampling methods in rural and urban area were described in details in section 2.1 of the methods. In the discussion we highlighted several explanations for the differences between locations. Gender and literacy level could be the reasons of this difference. Page 7-8; line 132-136
To monitor CVD risk, some authors use dietary patterns (with food intakes only or with a mix of food/nutrients intakes). Why were the authors only interested in monitoring nutrients? Did they conduct validity analyses with food intakes information?

Can the authors discuss the future use of the FFQ in the future study. Will they use it to obtain a nutrient score for CVD risk? Or will they use it to classify participants according to some relevant nutrients for CVD risk? Other? Although some authors examine dietary patterns as well as nutrient intake, in this paper we did our validation using nutrient intake; our validation was planned and was used in the parent study (rural to urban migrant study) which was designed to compare the nutrient intake and the frequency of consumption of different food items between migrants and their sibling. We did not use CVD risk score based on diet although it is important comment to consider.

The results for some relevant nutrients for CVD risks may not be optimal. Can the authors discuss it in relation to the future use of the FFQ. How will they deal with it?

We are not sure whether reviewer is talking about the comparison with 24-hour recall or biomarker. For 24-hour recall, fair to moderate agreement for ranking energy, macro and micronutrients into quartiles were observed.

For biomarkers, we addressed the probable explanation of poor correlation with some biomarkers in the limitation. One of the reasons is that we could not use recovery biomarkers due to feasibility and cost. Our conclusion is that future research should apply recovery biomarkers.

We think that this FFQ meets the validity standards of many other FFQ and it is therefore can be used for dietary intake research and population monitoring.

Some authors used the method of triads when analyzing their data obtained from 3 types of dietary collection method. Can the authors discuss that point. Although we have done three dietary methods, using method of triads was not the objective of this paper. We have used several other methods instead. However, this is a good suggestion to apply in next manuscript.

« Continued research to enhance its validity with recovery biomarkers to reflect usual intake is suggested ». Biomarkers may not be the best validity method to reflect usual intake. They are really precise, but only at a given time. (Abstract and conclusion)

"This validation study demonstrated good agreement": Regarding results, "acceptable" agreement may be more adapted (Abstract and conclusion). We now use acceptable agreement.

Abstract: Can the authors add the number of FFQ items. Added.
39 L98: "those who had no chronic medical conditions which require dietary restriction, intellectual disability and pregnant women were excluded ». Can the authors rephrase. Corrected. Page 7; line 118

40 L138: Can the authors add the reference This is unpublished. We have included in text Page 9; line 160

Editor Comment

Comment Response

41 The reviewers raise important points to address in revising the paper. My concern is that the comparisons between dietary methods are based on combined data for men and women. Although for some analyses there is adjustment for gender, this may not be sufficient to enable the reader to fully understand the performance of the FFQ. For example, the unadjusted correlation for energy intake shown in Table 2 is very high (0.739) when compared with similar evaluation studies. While this suggests excellent agreement with the reference method - it could also be the result of combining men (who eat more) than women? To make this clearer for the reader, it would therefore be helpful if comparisons of methods were done for men and women separately. Thank you for this suggestion. The comparisons of methods in men and women were conducted separately.

A table was created and added to the results section and further discussed in the discussion. This enables us to see that the correlation differed between men and women.

P 15, 17, 22; line 307-314, 360-362, 466-471

Additional file 3