Author's response to reviews

Title: Measures of handwashing behavior and indicators associated with hand hygiene in rural Bangladesh

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Author's response to reviews: see over
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To

The Editor
BMC Public Health

Subject: **Review response of manuscript MS: 3606377343657668**

We appreciate the interest of BMC public health in our manuscript, and are grateful for the thoughtful reviews. We have attempted to address each of the issues raised by the reviewers. Our detailed responses are below. We have uploaded a revised manuscript.

Response to Editor’s comments:

Authors should copy-edit their manuscript to improve the quality of written English.
*Response: We have done the copy-editing.*

Editorial formatting requests:
- Please include all authors affiliations and email addresses on the title page in accordance with our instructions for authors
*Response: We have inserted the information.*
- Please include a separate Conclusions section.
*Response: We have included the section.*
- Tables should be included in the main manuscript rather than as additional files.
*Response: We have included tables in the main manuscript.*
- Reference 26, cited in the text, is missing from your reference list.
*Response: We corrected the required serial numbering in the reference section.*
- Reference 15 is cited as 'in press', please complete the citation.
*Response: In this version we inserted the corrected reference.*

**Response to reviewer:** Elaine Larson

Major Compulsory Revisions:
1. You note that participants gave 'informed consent', but what were they told?
*Response: We revised the manuscript and clarified the consent matter.*

2. What was done to assess inter-rater reliability of data collectors' assessments of hand cleanliness?
*Response: We have provided additional details on the process of training and supervision of field workers (under 'instrument and data collection' and 'quality control of data collection'
sub-sections) of the method section. We did not, however, formally assess inter-rater reliability and had added this as a limitation within the discussion section.

3. How were data collectors monitored and what quality controls were in place during actual data collection?

Response: We inserted seventh paragraph in the method section as ‘Quality control of data collection’.

Minor Essential Revisions:

p.10, last sentence needs editing
Response: We have edited the sentence.

Discretionary Revisions:

Is it possible to reduce the number of tables and/or combine in some way? If not, I think each provides important information.
Response: We have reviewed the tables and concur with the reviewer that each provides important information. We have considered strategies to combine the tables, but we were unable to identify an approach that maintains clarity. Therefore we have retained each of the tables.

Reviewer: Amy Pickering

Minor Essential Revisions

1. A listed objective of the study is to “compare various measures of hand hygiene,” however this objective seems broader than the focus of the presented results and discussion, which is the comparison of hand cleanliness with “household characteristics” (tables 4 and 5). Please revise objective to match data analysis and results.

Response: We agree. We have revised the objective (Changes were made in the background of the abstract and last paragraph of the Background section), as well as the title of the manuscript to reflect this change.

2. Background: Please provide a literature review of the use of hand cleanliness as an indicator of hand hygiene behavior and describe how this paper contributes to important gaps in the literature (for example the relationship between hand cleanliness and hand hygiene behavior measured by structured observation has not been published before).

Response: We have incorporated the feedback in 3rd paragraph of the Background section.

3. Methods, data analysis, paragraph 3: Please clarify how “specific characteristics” were selected. Suggest differentiating between household characteristics (i.e. wealth, latrine use) and other indicators of hand hygiene behavior (i.e. caregivers’ handwashing behavior). Why isn’t the association between self reported handwashing behavior and hand cleanliness reported?

Response:
We have inserted the clarifications in the same paragraph of how specific characteristics were selected.
We believe differentiating between household characteristics and other indicators are not helpful because specific characteristics (separate soap for handwashing, availability of spare soap at household, use of improved latrines, availability of handwashing locations, availability of water and soap at handwashing locations, and respondents’ economic status) are somehow household characteristics.

Self-reported handwashing behavior was not associated with hand cleanliness. We presented just one indicator between self reported handwashing behavior and observed handwashing behavior because prior studies have repeatedly demonstrated that reported handwashing behavior is not a valid measure.

4. Methods, Instruments and Data Collection, paragraph 4: The following phrase is unclear: “followed by pre-testing in the field consecutive two days.”
Response: We edited the sentence to make it clearer.

5. Methods, Data analysis, paragraph 1: What does “for the cross sectional survey” refer to?
Response: In the 4th paragraph (under the sub-section of ‘instruments and data collection’) of Method section we described about the cross sectional survey.

6. Results, paragraph 3: First sentence should specify when subjects did not wash their hands. Do these numbers represent all key times?
Response: These numbers represent all key times. We have edited the sentence.

7. Table 4: Caption should specify results are from bivariate analysis.
Response: We have specified this.

8. Table 5: OR and p-value appear to be missing under mothers/caregivers for “separate soap available for handwashing.”
Response: Yes. We did not include that variable during multivariate analysis because bivariate analysis in table-4 indicated that there was no association between ‘Separate soap available at household for handwashing (spot checked) and mothers hand cleanliness’.

9. Table 5: Economic score is described as a “categorical variable” but appears to be an ordinal variable.
Response: In fact this is an ordinal variable. We have corrected this.

10. Discussion, paragraph 4: It should be mentioned that although hand cleanliness was associated with water at a handwashing station, it was not associated with observed handwashing behavior as measured by structured observation.
Response: We have included this.

Discretionary Revisions

11. Suggest defining “spot check.” Term may be considered jargon by some.
Minor issues (not for publication)
Response: We have clarified spot check at the end of 4th paragraph (under the sub-section of ‘instruments and data collection’) of Method section.
12. Abstract: In results section, delete “their” in following phrase: “14% of all persons observed washed their both hands with soap after defecation.”
Response: We corrected this.

13. Methods, Data analysis, paragraph 1: “primary outcome variable” should be changed to “primary outcome variables.”
Response: We have corrected this.

14. Methods, Data analysis, paragraph 2: “primary outcome variable” should be changed to “primary outcome variables”.
Response: We have corrected this.

15. Results, paragraph 4: Add the word “of” to “51% mothers/caregivers” and “37% children.”
Response: We have corrected this.

16. Discussion, last paragraph: Change “that” to “they” in second sentence.
Response: We have corrected this.

17. A few times throughout the paper generalized estimating equations were referred to as “general estimated equation.” Please correct these typos.
Response: We have corrected these errors.

Thanks and regards,

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