Author's response to reviews

Title: A Cluster-Based Randomized Controlled Trial Promoting Community Participation in Arsenic Mitigation Efforts in Singair, Bangladesh

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Version: 2 Date: 13 May 2012

Author's response to reviews: see over
Dear Reviewers,

Thank you for your insightful comments we have responded to them below in bold.

Regards,

Christine Marie George

**Reviewer's report**

**Title:** A Cluster-Based Randomized Controlled Trial Promoting Community Participation in Arsenic Mitigation Efforts in Singair, Bangladesh

**Version:** 1  **Date:** 30 March 2012  
**Reviewer:** Nazmul Sohel

**Reviewer's report:**

Title: A Cluster-Based Randomized Controlled Trial Promoting Community Participation in Arsenic Mitigation Efforts in Singair, Bangladesh

Replace all unsafe well with arsenic contaminated well and safe well with arsenic safe well. Several studies from Bangladesh indicated that even arsenic safe well can contain large amount of iron, lid, manganese and some other metals that is also had adverse health effects.

*This was corrected.*

Major Compulsory Revisions

Abstract

1. Replace unsafe well to arsenic contaminated well. It can be contaminated with any other metal!

*This was corrected.*

2. Overall 53% respondents switched to arsenic safe water; specify it for outside tester and community tester.

*This was included.*

Switching was more common in the outside-tester (63%) versus community-tester villages (44%).

3. Was the Odds Ratio adjusted for potential confounders? If so, mention it.

*This was mentioned on Page 11, paragraph 3.*

“However, after adjusting for the availability of arsenic safe drinking water sources, well switching did not differ significantly by type of As tester (Odds ratio =0.86[95% confidence interval 0.42-1.77]).”
4. Under conclusions: Report the results of the study more specifically.

*Additional information has been included in the conclusion.*

“Conclusion: The overall intervention was effective in reducing As exposure provided there were As-safe drinking water sources available. There was not a significant difference observed in the ability of the community and outside testers to encourage study households to use As-safe water sources. The findings of this study suggest that As education and WAs testing programs provided by arsenic testers, irrespective of their residence, could be used as an effective, low cost approach to reduce As exposure in many As-affected areas of Bangladesh.”

Introduction
1. Page 4, second paragraph, and third sentence: Please provide a citation.

*A citation has been added.*

Methods
1. Page 5, middle paragraph: or 3) did not have a primary well….please clarify this statement. It is not clear that participant should have their own well or not.

*This sentence has been corrected.*

3) did not have a primary well they used to collect the majority of their household’s drinking water. *(The respondent could be using any well. They did not have to be using a well that they owned.)*

Results
1. Move the first sentence in the second paragraph to the Methods section under Design in page 6.

*We are unclear about this suggestion.*

2. Last sentence of second paragraph: The number of times the participant met with As tester….these information are missing in the table 1, include this information.

*This information is in table 2 with the odd ratio for each category reported.*

4. Add a new paragraph after fourth paragraph where you may describe different scenario of intervention and see the influence of each important covariates. Three most important covariates i.e. a) number of times met, b) well ownership and c) minutes to safe drinking water, may contribute most. First covariate contributes for switching arsenic contaminated well but well ownership may restrict switching well. Similarly, short distance or travel time insist people to switch from contaminated well to arsenic free well. First two covariates are
dominant in study area covered by community tester while third covariate is common in area covered by outside tester. May be this is the reason why performance of outside tester is better than community tester.

*This was already described in the discussion. However, we now elaborated further.*

“The unavailability of As-safe drinking water sources, i.e. the proportion of As contaminated wells, in a village was the greatest barrier to well switching. In villages with less than 60% As contaminated wells, 72% of respondents with As contaminated wells switched, compared to 35% well switching in villages with greater or equal to 60% As contaminated wells. This is consistent with Hanchett et al., who found that the unavailability of As-safe water sources was a barrier to well switching in six districts of Bangladesh (15). In our study, the time to walk to a safe water source was also a significant barrier to well switching. Previous studies have indicated that well switching significantly declines if the nearest safe well is located more than 100 meters away (14, 20, 21). Well ownership was also a significant barrier to well switching, likely because well owners are more reluctant to shift from a well in which they invested their own money. All of these barriers to well switching were significantly higher in the community versus outside tester villages suggesting a possible reason for the lower well switching observed in these villages.”

Provide a separate analysis (OR between type of tester) for number of visits.

We calculated the number of times the participant met with their arsenic tester as a binary variable (up to 3 times and 4 or more times). After adjustment with all other covariates we found an odds ratio of 1.55, 95% CI: (0.98, 2.46). However in the manuscript we have decided to present the variables in the categories used in our study questionnaire.

Covariate (excluding number of times met, well ownership and minutes to safe drinking water) adjusted OR for community and outside community tester can be presented first.

*Unadjusted OR for Type of Tester is OR=0.50 95% CI: (0.21, 1.21)*

Then add number of times met in the analysis and present it.

*OR for Type of Tester adjusted for “Number of times met with arsenic tester” is OR=0.44 95% CI: (0.18, 1.07)*

Subsequently replace “number of times met” with “well ownership” and "minutes
to safe drinking water”. It may explain why performance of outside tester is better than the community tester.

**OR for Type of Tester adjusted for Well Ownership is OR=0.49 95% CI: (0.20, 1.21)**

**OR for Type of Tester adjusted for Proportion Unsafe is OR=0.77 95% CI: (0.39, 1.52)**

**OR for Type of Tester adjusted for Minutes to Safe: OR=0.53 95% CI: (0.22, 1.25)**

As we state in the manuscript the proportion of unsafe wells in a respondent’s village was very influential in a household’s decision to switch wells and this was much higher in the community tester village versus the outside tester villages. Once this was adjusted for in our GEE model the OR increased by 0.27.

5. Second last paragraph of the result section didn’t refer to any table nor stated that data not shown. It will be nice to have a table or graph for these information.

*We added this in table 3.*

Discussion

1. Page 13, first paragraph: include 'key findings and how it contribute' in this paragraph.

*We combined the first and second paragraph of the discussion section.*

“Millions in Bangladesh continue to drink groundwater containing elevated levels of As (13). Many households lack access to As testing services, preventing them from knowing the As status of their wells and locating As-safe water sources in their villages. Thus, there is an urgent need for effective As education and WAs testing programs in Bangladesh (13-15). This study is the first randomized trial evaluating the effectiveness of community participation in As mitigation in Bangladesh. We hypothesized that community-testers would be more effective than outside-testers in terms of reducing As exposure because the former would offer additional reinforcement by living within the community. Although our data did not support this hypothesis, the intervention program was very successful in encouraging households to use As-safe drinking water sources. Fifty-three percent of participants with As contaminated wells at baseline switched wells at follow-up, mostly because their baseline well was As contaminated relative to As.”

2. Page 14, last paragraph: Move first sentence to the end of the first paragraph.

*We are unclear about this suggestion.*

3. Page 14, second paragraph: It's a bit awkward to see one single paper
described in details. Either compares it with different studies or briefly describes it and merges this paragraph with next one.

*Since this study is the only one to our knowledge in Bangladesh using a biomarker of arsenic exposure to evaluate the effectiveness of a water arsenic and arsenic education program we felt it was important to describe the findings in detail.*

4. Page 14, third paragraph: Second sentence - result or discussion? Rephrase it.

*We have rephrased this section*

*Our study suggests that WAs testing and As education programs would be most effective in areas where <60% of wells are As-contaminated. In these villages the vast majority of respondents with contaminated wells switched (72%). A recent report of a nationwide survey in Bangladesh indicated that 77% of the population lives in areas with between 0-60% of their wells being As contamination (38). Therefore our intervention is a viable option for the majority of the population residing in As affected areas of Bangladesh. For the 23% of the population who reside in areas with > 60% As contaminated wells, this intervention will likely need to be combined with the provision of alternative mitigation options such as the installation of deep tubewells, As filters, or rain water harvesting.*

5. Several studies indicated that in arsenic contaminated areas, food also contaminated with arsenic and may contribute additional intake. Your study indicates UAs is always higher than WAs. Add one paragraph describing the contribution of arsenic via food and how it can increase UAs which is a biomarker of arsenic intake.

*We added the below paragraph in the discussion section*

*Sources of dietary As such as cooking rice in contaminated water or using rice with elevated arsenic concentrations can contribute to elevated urinary arsenic concentrations (1, 2). Therefore, it is possible that food arsenic has contributed to the ingested dose of arsenic in our study population. However the literature suggests that when water arsenic concentrations exceed 50 µg/L, ingested water arsenic is the dominant exposure route (2). In our educational program we encouraged households to both drink and cook with arsenic safe water. Only 8% of study respondents using arsenic contaminated wells at baseline who switched to safe wells at follow-up reported using their previous tubewell for cooking.*

Table 1:
Minutes to an arsenic safe drinking water sources: please provide column
percentage instead of row percentage.

*The column percentages are presented.*

Table 2
Please check the numbers. Footnotes stated OR were adjusted for all variables in the table. If you use all variables in the analysis and if there is any missing value in any of the variables, it will be excluded from the analysis. Therefore, we may assume that you have complete information for 543 respondents. However, number of times met with arsenic tester, minutes to safe drinking water source and baseline creatinine-adjusted UAs has low numbers.

*We checked this and it is now corrected.*

Minor Essential Revisions

1. Page 6, first paragraph: second line, edit ‘indictor’ to indicator.
   *This was corrected.*

2. Delete “of” from the first sentence of the first paragraph of results.
   *This was corrected.*

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests

**Reviewer's report**

**Title:** A Cluster-Based Randomized Controlled Trial Promoting Community Participation in Arsenic Mitigation Efforts in Singair, Bangladesh

**Version:** 1  **Date:** 26 March 2012

**Reviewer:** Anisur Rahman

**Reviewer's report:**
The major compulsory revision:
1. The claim that community tester is as effective as tester from outside is not consistent with the hypothesis the authors made. Therefore, the claim of equivalence of the effect of the intervention (community tester) in comparison to the outside tester is not acceptable. To test the equivalence of new intervention in comparison to the available regime, the authors should mention beforehand what difference of outcome should be considered equivalent effect. In the present study it is evident that the adjusted odd of switching to safe tube-well is 23% lower in the community tester group in comparison with outside tester group (although not significant). The authors should tell beforehand that this difference is equivalent in public health point of view and should justify the statement.

*We change this wording in the text of the conclusion to state the following:*
“In conclusion, the overall intervention was effective in reducing As exposure provided there were As-safe drinking water sources available. However, there was not a significant difference observed in the ability of the community and outside testers to encourage study households to use As-safe water sources. “

2. The authors should clearly describe the intervention. The authors attempted to evaluate if community tester is performing well than the outside tester. However, to evaluate this hypothesis the two groups will be similar except the assignment of testers either by selecting from the same community or from the outside community. As the community tester group selected from the ongoing CCDB workers, who also involved with the health and poverty alleviation activities, it is implied that the outcome will also be influenced by the assignment of the group. This may introduce bias in outcome of the study.

CCDB forum workers were not participating in any arsenic related programs prior to the start of the study. Furthermore, we did not observe any significant differences in baseline knowledge of arsenic, determined by the baseline arsenic knowledge quiz scores, between the community and outside arsenic tester villages. These findings suggest that the health and poverty alleviation activities occurring in the CCDB villages did not influence our study population’s knowledge of arsenic prior to the start of the study. It is possible that the role of the CCDB worker within the community affected their perception by the study population. We would hypothesize that this would make the community arsenic tester more effective in their ability to encourage study respondents to utilize arsenic safe drinking water sources because they are well known to the community they are working in and perhaps through their role in the community more highly respected then an outside tester would be. We did not evaluate trust or the degree of respect given to the As testers in this study. Future research should look at this more closely.

3. What is the guideline of the testers’ visit schedule? Was it that respondents visited tester or the testers visited the respondent? This should be clear in the text.

This is stated in the last paragraph of page 6. The arsenic tester went to each study household at least once.

The tester went to each study household at least once to: 1) measure the As concentration of the household’s primary drinking water source using an As field testing kit; 2) conduct a structured 40 minute As education session; and 3) provide assistance to participants with As contaminated wells to locate a nearby As-safe drinking water source. These tasks were performed in each study village over a period of 3 months.

4. Water and urinary arsenic concentrations are highly skewed. Therefore, parametric test is not a suitable method to test the difference. It is suggested that
the authors use a non-parametric tests and also present the concentrations in medians and percentiles (25th, 75th). The authors should also present adjusted difference of urine arsenic concentrations.

*Water and urinary arsenic were log transformed when the two sample t-tests were performed at baseline, and when the paired t-test was performed to compare baseline and follow-up urinary arsenic concentrations. A note stating this has been added to table 1 and figure 2.*

5. To be consistent with the objectives, the authors should present the main outcome and also the reduction of arsenic exposure data in two groups first (community tester vs. outside testers).

*We have added this in table 3.*

It is noted that few variables (knowledge of arsenic quiz score, number of time met with arsenic tester) which were adjusted are actually impact of interventions. Therefore should not be adjusted as this might attenuate the effect estimates.

*We have made this change to table 2.*

6. The data in the Table 2 is based on 543 respondents. This is also a limitation and author should clearly mention in the methods section.

*Five hundred and forty three respondents is the number of respondents found to have arsenic contaminated wells at baseline. This is not a study limitation; we accounted for this in our power calculation. We have clarified this in the text using the below statements.*

*The following statement was added to paragraph 1 of the results section:*

> “Five hundred and forty three (56%) respondents were found to be using arsenic contaminated wells, and 427 (44%) we found to be using arsenic safe wells.”

*In the statistical methods section in paragraph 2 we added the statement below:*

> “Furthermore, based on the results of the household drinking water survey we estimated that approximately 50% (500) of the 1000 respondents included in our study population would be using wells that were arsenic contaminated.”

1. The flow diagram: should be started with 26 villages with 6746 households. The box in the second row should be 20 villages with total respondents in those villages. Then the next boxes (third row) may be community tester group (10 villages with 500 respondents), and outside tester groups (10 villages with 500 respondents). The boxes at the bottom should contain the number of
respondents available in the final analysis (487 and 483 in the community and outside tester, respectively). The lost to follow-up should be indicated by horizontal arrows above the boxes at the bottom.

We have revised Figure 1 accordingly.

2. Due to un-blinding nature of intervention, the author should discuss the validity of the data collected by the interviewers.

The interviewers were not told the purpose of the study only that we were evaluating the effectiveness of an arsenic education and water arsenic testing program in terms of well switching and change in arsenic awareness between baseline and follow-up.

3. The authors should discuss the sustainability and scalability of the intervention in public health point of view.

We have added a section on this to the last paragraph of the discussion:

“Nevertheless, the use of the community-testers provides a potentially sustainable approach for As mitigation because of the continued presence of the testers in villages over time to provide additional reinforcement and WAs testing services. Further, community testers will likely be less costly because they do not require transportation costs. We recommend that if this intervention approach is upscaled that it be incorporated in existing community health worker programs conducted by non-governmental organizations or by local government. This would reduce on the required operation cost. Working with existing organizations would allow for greater accountability of those providing the As testing and education and make refresher trainings over time easier to organize.”

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests: No competing interest

Reviewer’s report
Title: A Cluster-Based Randomized Controlled Trial Promoting Community Participation in Arsenic Mitigation Efforts in Singair, Bangladesh
Version: 1 Date: 29 December 2011
Reviewer: Ginro Endo
Reviewer’s report:
The reviewer would like to point some minor but essential revisions of the paper to improve the paper quality. Those are as follows.
1. Abbreviations; Some abbreviations are used without any explanation in the text. They should be spelled out fully at their first appearances. For instance,
“WSs” in the page 4, line 2, should be “water arsenics (WAs)”.  

This error has been corrected.

2. The reviewer rates the article high because the originality of the paper is investigation on the effectiveness of community testers and outside testers who were worked as educators and checkers for reduction of the public health problems by arsenic contamination drinking water. Therefore, the authors should show the differences or the same effectiveness between the community tester case and the outside tester case. Therefore, Table 2 or other table must be rewritten or provided for this purpose.

We have made this change to table 2.

3. Please describe the period of intervention in the villages also in section “Methods” of the paper.

This is included in the last sentence of the second paragraph of the intervention section:

“These tasks were performed in each study village over a period of 3 months.”

4. Please explain “SAS 9.2” (page 6, line 5).

Additional information has been added.

“Villages were randomly assigned by the study project coordinator to each intervention group at baseline using the random number generator in SAS, version 9.2 (SAS Institute Inc., Cary, NC, USA).”

5. Because too religious description reduces academic value of a paper, the reviewer recommends deletion of “with assistance of CCDB” in the page 6, lines 9-10. This description should be moved to the section of Acknowledgment.

One of my authors is a member of CCDB therefore respectfully I request to leave the name in the text.

6. What is “As field test kit”? Please explain it or cite a reference for it.

A description is given in paragraph 2 of the section on arsenic measurements.

“WAs field testing was conducted using the Hach EZ As Test Kit (Part No. 2822800) which measures As concentrations in water using a colorimetric scale that ranges from 0-500 μg/L. A 40 minute reaction period was used in these studies rather than the manufacturer recommended 20 minutes because a
previous study showed that the increased reaction period reduced inconsistencies in the 50-100 µg/L range (22, 29).”

7. What is “type 1 error” and what is “type 2 error” in the page 9, lines 11-12? Please explain these in the text.

We have included this in the text:

“We specified the type 1 error, the probability of rejecting H₀ when it is true, at 5% and the type 2 error, the probability of not rejecting H₀ when it is false, at 20%.”

8. Please cite a reference for the “Generalized estimation equations (GEE)”.

We have included a reference.

Level of interest: An article of importance in its field
Quality of written English: Needs some language corrections before being published
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests:
I declare that I have no competing interests.