Author's response to reviews

Title: Influenza vaccination coverage rates among adults before and after the 2009 influenza pandemic and the reasons for non-vaccination in Beijing, China: a cross-sectional study

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Author's response to reviews: see over
Dear Editors and Reviewers:
My manuscript, ‘Influenza vaccination coverage rates among adults before and after the 2009 influenza pandemic and the reasons for non-vaccination in Beijing, China: a cross-sectional study’, was revised according to the reviewers' comments, and the itemized response to each reviewer’s comments is attached. Many thanks for your suggestion. I am so sorry to bring you so much trouble because of our carelessness. Thanks very much again for your attention to our paper. Once again, thank you for your help to our paper’s processing.
Sincerely yours,
ShuangSheng Wu

For your guidance, a point-to-point response to the reviews’ comments is appended below.
Dear Dr. Wetmore:

- Major Compulsory Revisions

1. The authors did not address one of my primary concerns about the analysis of these survey data. Specifically, in point #11 of my initial review, I asked the authors to comment on the extent to which their analysis accounted for their complex sampling design. It does not appear that communities were selected with probability proportional to population size, so I don’t think it is appropriate to simply calculate the proportion of survey responders who received the flu vaccine at each time point in unweighted analyses, since responders do not represent a simple random sample of the underlying population. I ask that the authors please confirm that they have accounted for the unequal selection probabilities of survey participants and that they provide this detail in the methods section of the paper. Without better information about the relationship between the sample and the population, we can not extrapolate from their sample data to make statements about the population of adults in Beijing. The authors should also provide some explanation of the method they used to select 3 urban districts and 3 suburban districts from which to draw their sample.

In our study, the communities were not selected with probability proportional to population size. So the sample might not represent a simple random sample of the underlying population. In addition, the multivariate regression analysis showed that age was significantly associated with uptake of the vaccines. For this reason, the data were weighted for age and gender. Weighted analysis was conducted to calculate the total coverage rates and vaccination frequency. The results of the weighted analysis were shown in the tables and the result section.

We revised the “participants” section as follows: “There are sixteen districts in Beijing, which are divided into urban and suburban districts according to population density. We randomly selected three urban districts and three suburban districts from the sixteen districts. The survey was undertaken in the six districts.”

2. The authors also failed to address comment #2 in my initial review concerning their extremely high response rate (97.9%). It would be interesting to know about the strategies they employed to achieve such a high response rate. Was response compulsory? Was participation incentivized? How many return visits were made? Were return visits made to homes when all residents were absent at the time of the initial visit? Or were those homes simply skipped?

Some measures were undertaken to obtain highest possible response rates. We revised the “data collection” section as follows: “In order to obtain highest possible response rates, most of the visits were undertaken by local health workers who had good relationships with the participants and knew how to motivate them. The interviewers would make an appointment before they visit a family. In addition, return visits were made to homes when all residents were absent.”

3. Urban/suburban residence is one of the few demographic characteristics that the authors examined in this study, but they have not provided any information on how
this designation was defined and assigned. This should be added to the methods section. Additionally, I don't think it is appropriate to refer to this characteristic as “region” throughout the text. The term region is very imprecise in this context. It might be better to refer to density or simply urban vs. suburban residence.

In the revised paper, we defined the urban/suburban as follows: “There are sixteen districts in Beijing, which are divided into urban and suburban districts according to population density.” And the word “region” was replaced with “population density”.

4. Results / Description of the Sample: The authors should indicate whether or not their sample is representative of the adult population of Beijing, and they should provide an appropriate reference to back up this statement. Since they have extrapolated results from their sample to the entire adult population of Beijing (in what appear to be completely unweighted analyses), it seems that that they are making this assumption. They should be explicit about it.

In our study, the communities were not selected with probability proportional to population size. In addition, the distribution of age and gender was not similar with the data from the sixth nationwide population census. So the sample might not represent a simple random sample of the underlying population. For this reason, weighted analysis was conducted to calculate the total coverage rates and vaccination frequency.

5. Discussion: Please comment on the notable increase in vaccination coverage during the 2009/2010 season.

We commented the higher vaccination coverage during the 2009/2010 season in paragraph 2 of the discussion section.

- Minor Essential Revisions

6. Overall, the abstract seems long and doesn’t describe a very compelling narrative. In addition, the authors have not included any of their statistical methods in the methods section of the abstract. I suggest that the authors work to distill their abstract to the most compelling findings from their work, while at the same time, providing readers with enough information to understand the process by which these results were generated.

The abstract was revised according to your suggestion.

7. In the first submission, the authors described their multistage sampling approach as selecting towns/streets from each district, and then selecting communities from each town/street. In the revision, the authors simply refer to “locations” and “sub-locations”. The use of “locations” and “sub-locations” is not very informative, and I’d suggest reverting to the language used in the initial submission (or something similar).

We replaced “locations” with “towns/streets”, and “sub-locations” with “communities”.
8. In the first submission, the authors indicated that 82 participants were selected from each sub-location; in the revised submission, the authors indicated that 87 participants were selected from each sub-location. No explanation was provided for this change. Can the authors please confirm the correct number? 

We are so sorry to make this mistake because of our carelessness. We checked out the research plan of design, and we confirmed that “87 participants were randomly selected from each community.”

9. Methods / Statistical Analysis section: The authors indicated that for their multivariable models they considered for inclusion all factors significant at p<0.2 in univariate analyses. They also indicated that they used a forward stepwise approach with p<0.05 required for entry. In effect, doesn’t this mean that they only considered for inclusion in the multivariable models those factors that were significant at the p<0.05 level in univariate comparisons? Please confirm and revise as necessary.

We confirmed this section. Actually, the analysis included two stages. Firstly, univariate logistic regressions were used to determine which variables would be put in the multivariate models. Only the variables significant at p<0.2 in univariate analyses could be put in the multivariate logistic regression. Secondly, the multivariate logistic regression was conducted using a forward stepwise approach. More than one variable were put in the multivariate model. So “a forward stepwise approach with p<0.05 required for entry” is not equal to “significant at the p<0.05 level in univariate comparisons”. The stepwise approach was described as follows: “Effects are entered into and removed from the model in such a way that each forward selection step may be followed by one or more backward elimination steps. The stepwise selection process terminates if no further effect can be added to the model or if the effect just entered into the model is the only effect removed in the subsequent backward elimination (Zoran Bursac: Purposeful selection of variables in logistic regression).”

10. Results / Description of the Sample: The authors note that approximately half of their sample lived in urban areas. They should explicitly note that this is by design. The authors stated in the methods section that they selected (by some unknown means) 3 urban districts and 3 suburban districts from which to draw equal-sized samples. The following sentence was added in this section: “The approximately equal-sized samples in urban and suburban areas were due to the sample design that 3 urban districts and 3 suburban districts were selected.”

11. Results / Demographic Variables Affecting Influenza Vaccination Uptake: This section would be greatly improved by reorganizing and condensing the three paragraphs into one paragraph. The first sentence in each of the existing paragraphs is extraneous and should be deleted. The last sentence in paragraph 1 should be re-written: “Across the three seasons, we observed significant differences in vaccine coverage by age and also by educational attainment” (or something similar). The second sentence in paragraph 2 should be re-written: “Vaccination frequency was not significantly associated with gender or residence in urban or suburban communities”
(or something similar). Paragraph 3 can be replaced entirely by weaving the following statement into paragraph 1 of this section: “Older age and educational attainment were independently associated with increased odds of reporting vaccination in season 2009/2010 and 2010/2011 (Table 3).”

We edited this section according to your suggestion.

12. Results / Reasons for Non-Vaccination: The first sentence of this paragraph is extraneous and should be deleted. The second sentence should be revised as follows: “Among participants who reported no influenza vaccinations over the previous three seasons, the most commonly reported reason for non-vaccination was ‘I don’t think I am very likely to catch the flu’ (49.0%) (Table 4).”

The first sentence of this paragraph was deleted, and the second sentence was revised according to your suggestion.

13. Discussion: The following sentence seems misplaced: “The elderly felt more at risk than younger people in our study, which may be one of the reasons for higher coverage rate among the elderly.” It should be moved to the next paragraph, and revised to “In our study, elderly participants also felt more susceptible to influenza than younger participants, which may be another reason for higher coverage among older adults.”

The sentence was revised according to your suggestion, and it was moved to the next paragraph.

14. Discussion: The following sentences are included in the discussion: “People with low education level are less likely to be exposed to the information [13], which might have negative effect on the vaccination coverage rates. Furthermore, to our knowledge, the elderly are usually not well-educated in Beijing. This may cause quite a few of low-educated people receiving the free vaccination when the free vaccination policy for the elderly was carried out.” There are several issues with these statements. First, I don’t think it is appropriate to state “to our knowledge, the elderly are usually not well-educated in Beijing” without a reference. The statement was replaced with “we found that the elderly get less education than the young people in our study.”
### Table Distribution of educational levels by age (%)

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Age (years)</th>
<th>18~29</th>
<th>30~39</th>
<th>40~49</th>
<th>50~59</th>
<th>≥60</th>
</tr>
</thead>
<tbody>
<tr>
<td>illiteracy</td>
<td></td>
<td>0.33</td>
<td>0.71</td>
<td>1.04</td>
<td>2.73</td>
<td>10.32</td>
</tr>
<tr>
<td>primary school</td>
<td></td>
<td>3.04</td>
<td>4.85</td>
<td>7.12</td>
<td>12.20</td>
<td>27.66</td>
</tr>
<tr>
<td>junior high school</td>
<td></td>
<td>13.40</td>
<td>24.00</td>
<td>34.27</td>
<td>37.69</td>
<td>32.10</td>
</tr>
<tr>
<td>senior high school</td>
<td></td>
<td>32.54</td>
<td>28.85</td>
<td>30.11</td>
<td>32.80</td>
<td>17.26</td>
</tr>
<tr>
<td>3 year college graduate or above</td>
<td></td>
<td>50.69</td>
<td>41.58</td>
<td>27.45</td>
<td>14.58</td>
<td>12.66</td>
</tr>
</tbody>
</table>

Second, we had commented the response bias in the limitations paragraph as follows: “In addition, the interviewer administered questionnaires could have lead to response bias. The interviewees might report ‘uptake of vaccination’ because they felt a social pressure in the face of the interviewer. This might partially explain the reported higher uptake among illiterate people.”

15. Discussion: The following sentence should be revised from “Secondly, the different reasons could not be given for each influenza season as the reason for non-vaccination may be different at different times.” to “Secondly, reasons for non-vaccination may differ from season-to-season, but respondents were not able to provide different reasons for each season on the survey” (or something similar).

The sentence was revised according to your suggestion.

- Minor Issues Not for Publication

16. Review of this revision would have been facilitated by the inclusion of a “tracked-changes” version of the revised manuscript. Please include a “tracked-changes” version with all subsequent resubmissions.

All changes were tracked in this version.

17. Numerous typographical/grammatical/editorial errors that should be addressed throughout the abstract and text of the manuscript. These issues are too numerous to list in this review.

In addition, some corrections and editing have been done by our team according to your suggestions.

Finally, thank you for your arduous work and instructive advice.
Dear Dr. Bish

1. The ‘Background’ section is still rather weak and seasonal and pandemic vaccination uptake studies are not distinguished from one another. The ‘background’ section was revised according to your suggestion.

2. The authors still need to comment on the fact that the priority groups for vaccination are different for different seasons. Whilst the elderly and students are included at each time, in the pandemic season the authors state that ‘public servants in key positions, teachers and people with chronic disease’ are also included. We commented the fact that the priority groups for vaccination are different for different seasons in paragraph 2 of the discussion section.

3. In the final paragraph of ‘background’ please add in the words ‘associated with uptake of vaccination’ after ‘possible demographic factors’. The words ‘associated with uptake of vaccination’ were added after ‘possible demographic factors’.

4. The participants section is still very unclear to me, can it be further revised? The participants section was revised.

5. Data collection – authors should say in the paper that their response options were based on evidence in the existing literature. The statement “All the response options were based on evidence in the existing literature” in the data collection.

6. Discussion – it might be worth adding in that the significantly increased uptake of vaccination during the pandemic was not sustained. This would make it clearer when the authors talk about a significant difference in the results but no significant difference (i.e. no sustained increase) over the course of the three seasons, in the discussion. We added the statement “the significantly increased uptake of vaccination during the pandemic was not sustained” in paragraph 2 of the discussion section.

7. Discussion – the point about response bias in paragraph 4 should be in the limitations paragraph. The statement about response bias was moved to the limitations paragraph.

8. Discussion – they still haven’t referenced the elderly not being well educated except to say that this is the case ‘in their knowledge’. We don’t think it is appropriate to state “to our knowledge, the elderly are usually not well-educated in Beijing” without a reference. The statement was replaced with “we found that the elderly get less education than the young people in our study.”

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Age (years)</th>
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<td></td>
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</table>
9. Discussion, limitations paragraph – rewrite the sentence ‘the different reasons could not be given for each influenza season as the reason for non-vaccination may be different at different times’ in order to make this clearer. They could perhaps write something like ‘Secondly, different reasons could not be given for each influenza season. This is a weakness as it is possible that the reason for non-vaccination may be different at different times’

The sentence was revised as follows: “Secondly, reasons for non-vaccination may differ from season-to-season, but respondents were not able to provide different reasons for each season on the survey.”

Finally, thank you for your arduous work and instructive advice.