Author's response to reviews

Title: The effects of ambient temperature on cerebrovascular mortality: an epidemiologic study in four climatic zones in China

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Author's response to reviews: see over
Dr. Kristie Ebi
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Dear Professor Ebi,

Ref: MS: 1724692392109675

The effects of ambient temperature on cerebrovascular mortality: an epidemiologic study in four climatic zones in China.

Thank you for your letter with the reviewers’ comments on 31 January 2014. We have revised the paper as detailed below.

With best regards,

Yuming Guo
The University of Queensland
Reviewer 1#: Dr. Geoffrey Morgan

We thank Dr. Geoffrey Morgan for his comments and helpful suggestions. We have taken all these comments and suggestions in the revision.

Major compulsory revisions:

1. Methods, data collection, par 2: it would be helpful to include the populations of these cities and some information of the geographic extent of the city specific study regions.

   [Response] We have added population in the revision, as well as information of the geographic extent. (see page 7)

2. Methods, data collection, par 2: it would be helpful to include more information on the completeness of the death registrations and any issues that may complicate comparisons between cities, if available.

   [Response] We have added the progress of the death registrations in the revision. (see page 7)

3. Results, par 1: I am a little confused by the numbers of cerebrovascular deaths in each city. Without information on the city specific study region, I assume shanghai and Beijing have study populations around 20 million, with Guangzhou, Tianjin and Wuhan around 10 million. If this is the case, then I am confused as to why Beijing and Shanghai have substantial smaller numbers of cerebrovascular deaths compared to the other three cities. This is not necessarily a problem, but needs to be clarified.

   [Response] We thank the reviewer very much for his concern. Actually, after checking with the data providers, they only provided us cerebrovascular death data from only one district in each city. The reason is that the death registry system is only conducted at one district in each city. However, we believe this does not influence the temperature-cerebrovascular death relationship for each city. We have clarified this in the revision. (see page 7)

Minor essential revisions:

1. The reviewer suggested to list the northern cities with low mean temperature in results of abstract part.
[Response] We have revised the “Northern cities” to “Beijing and Tianjin”. (see page 3)

2. The reviewer suggested to list the southern cities with high mean temperature in results of abstract part.

[Response] We have revised the “southern cities” to “Shanghai, Wuhan and Guangzhou”. (see page 3)

3. The reviewer suggested to capitalize first letter of Tianjin in reference 11.

[Response] Done. (see reference)

4. Methods, data collection, par 1: more supporting information, including references would be helpful to support the statements about the differences in the climates of the five cities and the justification for groupings. The descriptive statistics provided in table 1 do not provide sufficient detail to verify the unreferenced statement about the types of climates of the cities and the different climate categories assigned to the cities.

[Response] Done. (see pages 6 and 7)

5. Methods, data analysis, par 1: we used 20 lag days for temperature, as most studies have shown that …. The only reference provided to support this general statement is of a single city study. Suggest either qualifying the statement or supporting with additional references.

[Response] Done.

6. Methods, data analysis, par 1: according to previous studies.[11]. Once again the reference supporting this statement is of one single city study. Suggest either qualifying the statement or supporting with additional references.

[Response] Done.

7. Results, par 4: generally, there were J-shaped relationships between temperature and cerebrovascular morality in all cities, with a threshold below (above) which the cold (hot) effect is linear. The wide range for the relative risk scale in figure 3 makes it difficult to assess this statement. It would be helpful to provide more supporting evidence for the application of a J-shaped relationship for each city.

[Response] We have changed the scale of y-axis in the Figure 3.
Discretionary revisions

1. Background, par 2: … relations appear J-, V, or U- shaped …

   Suggest including refs covering more than just one location for such a broad statement.

   [Response] Done.

2. The reviewer suggested to improve the grammar of the sentence “Previous studies have identified that elderly and women are more vulnerable to extreme temperatures than youth and men” in par 4 in background part.

   [Response] We have revised the sentence as “Previous studies have reported that the elderly and women are more vulnerable to extreme temperatures than the young and men, respectively.” (see page 6)

3. Figure 3: reduce the range of the relative risk axis (eg: 0 to 4 or 0 to 6) so that the plots show more detail and the comparisons between plots are easier. A footnote could be added to clarify the UCI limit for Beijing that would be outside this range.

   [Response] Done.

4. Figure 4: reduce the range of the relative risk axis (eg: 0.98 to 1.02 or 0.98 to 1.04) so that the plots show more detail and the comparisons between plots are easier. A footnote could be added to clarify the UCI limit for the RR’s outside this range.

   [Response] Done.

5. The reviewer suggested to revise the sentence “… adapted for cold weather by have heaters and warm clothes” in paragraph 4 in discussion part because of grammar problem.

   [Response] We have revised the sentence as “…, people living in cities in cold climate are better adapted for cold weather by having heaters and wearing warm clothes, but may not have air conditioning needed during warmer days.” (see page 15)
**Reviewer 2#: Dr. Yasushi Honda**

We thank Dr. Yasushi Honda very much for his helpful comments and suggestions. We have taken all these comments and suggestions into account as follows:

**Major compulsory revisions:**

1. Table 1 clearly shows that Shanghai and Wuhan have quite similar climate conditions. This similarity made the overall relation for Shanghai and for Wuhan similar, as shown in Figure 3. Although the method the authors used is usually considered valid, this method yielded quite different threshold temperature value, i.e., 9.9 for Shanghai and 25 for Wuhan. Nine point nine lies in the middle of apparent straight line, and it is counter-intuitive from the figure; the figure suggests that the threshold would be between 25 and 30, like Wuhan. Because the slope is very sensitive to the threshold, the results would be quite different if the threshold for Shanghai were set different. I would recommend to use 25 for example to see how this affects other analyses.

   **[Response]** We thank the reviewer very much for his concern. After checking the analysis, we found that we wrote a wrong threshold for Shanghai. The correct threshold is 26.9. We have revised this mistake in the revision. Meanwhile, as a sensitivity analysis we also used 10th and 90th percentile temperatures as cold and hot thresholds, and estimated the increase in mortality with a 1 degree decrease (increase) in temperature below (above) the cold (hot) threshold. The results are similar as our original approach, but with wider confidence intervals (pages 10 and 13, Appendix Figure 1).

2. The reviewer suggested to mention the untold confounding effect from the influenza epidemic or describe the epidemic periods for each city in each year.

   **[Response]** We have discussed this weakness in the revision as “we cannot exclude completely the confounding effect from influenza epidemic because of data unavailability”. (see page 17)

**Minor essential revisions:**

1. The reviewer suggested using the word “point estimate” rather than “mean
relative risk” in describing the figure legend for figure 4 and 5.

[Response] Done.

2. P.12, the first line under the heading “Sensitivity analysis”: 6 degree is what the authors did in the main analysis. The estimated temperature-effects did not change when using more than 6 degrees of freedom per year for time.

[Response] We have improved the statement in the revision to “The estimated temperature-effects did not change when using more than 6 degrees of freedom per year for time (7–10 df per year)”. (see page 10)

Discretionary revisions:

1. The reviewer suggested that including too long lag of seasonal trend and treating 0-20 lag analyses as the best may not be the best choice because seasonal outbreak which is unrelated to temperature can result in long lag effect.

[Response] We believe our model is correct, as it has been widely used in this field. We have validated the models by sensitivity analyses.

2. The package dlnm requires to set the cen value. It would be informative for readers to show which values were used for the five cities.

[Response] Actually, the cen value does not change the non-linear relationship (shape) at all. It really does not change which point is the threshold. Therefore, we don’t think it is useful to provide the cen value for each city.