

Dear Reviewer,

Thank you for the comments to help improve the quality of the paper. We have revised the manuscript to address your comments. A detailed response to each comment is provided in this file with comments from referees in black, author's response in red, and author's changes in manuscript in blue.

Anonymous Referee #2

This article studied the health effects of exposure to fine particulate matter in India using the source oriented CMAQ model. It quantified the premature mortality due to exposure to fine particulate matter in India based on CMAQ simulation of air quality for India in 2015. It also compared the mortality estimate with other existing studies. A new aspect of the study is that the source oriented CMAQ model allows it to quantify contributions to premature mortality from different source sectors. The residential sector was found to be the largest contributor. This can provide compelling argument for prioritizing emission control from that emission sector. In addition, it also estimated the health benefits if PM2.5 concentrations in India are reduced to levels corresponding to different air quality standards. Certainly, this highlighted the enormous health benefit from reduced PM2.5 concentrations. I found the findings of the article to be significant and relevant for publication. I have the following comments for the authors to address.

Response: The authors thank the reviewer for the positive comments and addressed below comments carefully.

1.) Lines 105-106, the article can provide more information about the model performance, particularly with regard to PM2.5 predictions in India. It will also strength the paper if it can provide any comments on source apportionment results (e.g., comparison to other published study or observations if possible)

Responses: Summarized validation results and discussions of comparison with other source apportionment study were added.

Changes in manuscript: Lines 110 to 117 were added in the revised manuscript.

2.) Since SOA is found to be significant contributor to PM2.5 and mortality, any comments on the sources of the SOA (e.g., biogenic or anthropogenic)?

Responses: Figure S4, which showed components concentration of SOA, was added in supplemental materials and discussions were added.

Changes in manuscript: Figure S4 was added and lines 215 to 216 were added.

3.) Table S3 should be moved to the main body of the paper. In addition, this table can provide more information about the difference in these studies (e.g., models used, emissions, resolution, mortality estimate method, etc.)

Responses: Thanks for the suggestion. We added more information of other studies and moved TableS3 to Table 2.

Changes in manuscript: Table S3 was moved to Table 2 in main draft. Discussions were added in lines 237 to 240.

4.) Lines 103-104, is "open burning" referred later in the article corresponding to wildfires?

Responses: Yes, it is wildfire. Sorry for the confusion. We modified line 108 to make it clear.

Changes in manuscript: Statement "which is assigned as open-burning sector" was added to line 108.

5.) Lines 113-120, what are the distribution assumptions used for Monte Carlo simulations?

Responses: Bayesian MCMC nonlinear curve-fitting was used by Global Burden of Disease (<http://ghdx.healthdata.org/>), where we could get the MC simulation results.

Changes in manuscript: No changes.

6.) Line 137, a "." is missing after Table S2. "ai is the remaining years. . ." should be moved to line 137.

Responses: Thanks for the correction. Modified as above.

Changes in manuscript: Lines 148 to 150 were modified.

7.) A map showing the locations that are referred in the paper could be provided in supplemental material. This will help readers who are not familiar with geography of India.

Responses: Thanks for the suggestion.

Changes in manuscript: Figure S2 was added to supplemental materials.

8.) Table 1 could be revised. The states can be grouped to east India, north India, south, northeast, west, and central as discussed in lines 144-154.

Responses: As we also discussed some heavy-polluted states of India, Table 1 was kept.

Changes in manuscript: No changes.

9.) Lines 194-200, the description about source contributions is not clear and needs to be revised. It seems that the maximum contribution among grid cells is used to describe the significance of source contributions. Would average values or population weighted average values in India be more appropriate? Similarly, in the conclusion and abstract part, this (e.g., 40 $\mu\text{g}/\text{m}^3$ from residential sector) needs to be clear about whether it is maximum or average.

Responses: Thanks for the suggestion. In order to look at the spatial distribution and some hotspot on the map, we used maximum contribution among grid cells here. We modified the description to make it clear.

Changes in manuscript: Lines 207 to 208 were modified.

10.) Line 202, missing “are” after “power plants”.

Responses: Thanks for pointing out.

Changes in manuscript: Modified.

11.) Line 257, “for” changes to “of”

Responses: Thanks for the correction.

Changes in manuscript: Modified.

12.) Line 260, add “respectively” after “0.39 year”.

Responses: Thanks for the correction suggestion.

Changes in manuscript: Added.

13.) Line 273, similar to comment 9, the source contribution of $\sim 40 \mu\text{g}/\text{m}^3$ is just the maximum contribution among different grid cells, correct?

Responses: Yes, it is maximum contribution.

Changes in manuscript: Line 288 was modified to “with source contribution of $\sim 40 \mu\text{g}/\text{m}^3$ maximum to total $\text{PM}_{2.5}$ ”.