Author’s response to reviews

Title: Assessment of Personal Exposure to Particulate Air Pollution: the First Result of City Health Outlook (CHO) Project

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Author’s response to reviews:

Dear Editor,

We are writing to resubmit our manuscript entitled, “City Health Outlook (CHO): Protocol for A Human Health and Air Pollution Study”.

We have carefully reviewed reviewer’s comments and addressed each of them. The major revisions include:

• We added the result of cross-validation of our device against a TSI reference in an outdoor environment.
• We restructured the manuscript by adding our goals in the intro and abstract, and moving detailed technical implementation to the supplemental files.
• We added three more supplemental files that explain our survey questions.

We deeply appreciate the opportunity to revise our manuscript and are confident that the quality of this work has been improved to meet the standards of BMC Public Health. We look forward to receiving decisions or feedbacks from the reviewers. If you have any queries, please don't hesitate to contact me.
PhD (Reviewer 1):

This paper investigates air pollution exposures for individuals undergoing their normal daily activities and establishes which factors are significant with respect to factors associated with the individuals who make up the samples. The paper is clear and largely well-written, with some interesting results to present and discuss. Newly-developed low-cost portable air monitoring technology allows such studies to be carried out at a scale that is required. I have a few minor suggestions which I feel would improve the paper:

Line 119 to 127: The cross-calibration with a DustTrak is explained but no mention is made in the text of the paper of the results of this test. I would expect that the instrument error is a major limitation of the study and should be considered more fully. It would have been helpful to have some simultaneous DustTrak measurements for one of the participant to get a good idea of the extent of instrument error outside of the lab setting - was this done?

Response: To address this question, we conducted cross-validation experiments in both indoor and outdoor environment and attached the results as supplement file1.

Lines 179-192: I am not convinced the 'technical implementation' section is really needed. It is suitable for a technical report but sounds a bit out of place in a journal paper. Consider deleting.

Response: Correction made in lines 182-187. This part is to present our platform that is an important element in our project for collecting, managing and visualizing our data. We have condensed this section by only including the data transmission manner, because we think the readers may be interested in knowing the data storage method of this project. All the other details were put aside in a supplementary file.

Was any analysis done looking at interaction effects? I think some interesting results might be being overlooked by looking at each variable independently. For example, wealth may impact on where someone lives and how much time is spent travelling.

Response: We appreciate this comment. If the goal of the study is to expand understanding of the relationships among the variables in the model, it is necessary to add interaction terms to a
regression model. We felt sorry for not addressing the study goal of this paper well at the beginning (as the reviewer pointed out this negligence in the next comment), which we have added in the revision: “As the first paper of a series, the aim of this paper is to illustrate the characteristics of the participants and examine the effects of different covariates on personal exposure at various air pollution exposure levels.” Thus, we did not include the interaction effects since we did not intend to explore which factor is the most important or least useful in determining the personal exposure. We believe that our current sample size is not big enough to establish unbiased regression models and would like to accumulate more longitudinal data to do such investigation. At that stage, we will definitely incorporate interaction effects to better interpret the environment-air pollution exposure relationship.

The aim of the study is not very well expressed either in the abstract or the main text. The aim of the overarching project is given but not the aim of the specific paper. Mention can be made of the CHO project but ultimately, this needs to be a stand-alone paper - it is currently not written as such.

Response: Thanks for this suggestion. We have added the aim of this manuscript in both abstract and introduction.

Line 53: Delete World Bank (2006) reference (or reword) and it refers to work that was done after 2006.

Response: Correction made.

Line 233. Change 'doublea' to 'double'

Response: Correction made.

Line 27: Change 'albeit with the' to 'albeit the'

Response: Correction made.

Line 43: Change "urbanization speed' to 'speed of urbanization'

Response: Correction made.
Reviewer 2 (Reviewer 2): PEER REVIEWER ASSESSMENTS:

GENERAL COMMENTS: My overall impression of this work is that it is interesting although could benefit with more defined hypotheses. The authors could make it clearer how representative the participants (and therefore exposure profiles) are compared to the greater Beijing population. The authors admit that this study is limited by sample size, and this publication is merely an introduction to the named project, so I look forward to seeing more publications to come!

Response: Thanks for this encouraging message!

ADDITIONAL REQUESTS/SUGGESTIONS:

Language is sometimes difficult to follow (e.g. "mucus" instead of "mucous membrane", "exposing" rather than "exposed") - revise throughout for English proficiency.

Response: Correction made in line 52 for replacing “mucus” with “mucous membrane”

Corrections made in lines 30 and 360 for replacing “exposing” with “exposed”.

Providing a translated version of the study website / questionnaire would be useful for the reader.

Response: We appreciate this comment. All the questionnaires that were translated into English are available in supplementary files 2, 3 and 4. The questionnaires 1, 2 and 3 were used for 1) get contact information from volunteers who are willing to participant; 2) get detailed socio-economic information of interested volunteers for filtering; 3) getting information on the daily activities of participated volunteers that could be a reference data while the environmental and GPS data are missing. Moreover, our English edition website in the planning will be available soon to provide more relevant information.

Some key literature, on in-transit exposures to particulate matter, is missing.

Response: Thanks for pointing it out. We have added some relevant literatures regarding transit exposure in various transport modes, e.g., train, buses, subway, automobile, bikes.

Authors should note representativeness of participant cohort compared to general Beijing population - very small proportion on population included, and recruitment via social media suggests participation bias.
Response: We agree with this critique and have acknowledged this small sample size problem in the “Limitation” section. Unlike questionnaire or telephone surveys that can be conducted with a large pool of selected and representative population samples, most participatory monitoring programs that involve wearing devices can hardly be done with a large sample due to the cost, labor, and recruitment. Even though we can make sure each population stratum was represented, the size for each stratum will be sample that may also lead to biased results. This can be a common issue in participatory monitoring projects. In the meantime, our project is continue recruiting volunteers from a larger pool, which will help enhancing the representativeness of our population samples.

Define all abbreviations at first use (e.g. OLS).

Response: Correction made in lines 206, 246 and 385. All abbreviations at first use were all listed in abbreviation list in alphabetical order.

Consider particle number concentrations (PNC) for future studies, especially when considering second-hand smoke exposure.

Response: We appreciate this insightful recommendation. Currently, the PM sensor deployed on our device doesn’t have the capacity to measure particle number concentrations, and we will consider this function in upgrading. In terms of second-hand smoke exposure, fortunately, the Chinese government outlawed indoor smoking nationwide in 2011 in public spaces. This greatly reduces the chances for second-hand smoking. In this participant pool, 64% of individuals do not have any exposure to passive smoking and 36% has more than one day suffering passive smoking for more than 15 mins per week. An alternative solution is to put a wired device at participants’ home to take PNC measurements since this is most likely the place where they receive passive smoking. We will definitely consider this improvement in our future campaigns.