

# ***Interactive comment on “Effects of AIR pollution on cardiopulmonary disEaSe in urban and peri-urban reSidents in Beijing: protocol for the AIRLESS study” by Yiqun Han et al.***

## **Anonymous Referee #2**

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This is an introduction paper on the protocol of the AIRLESS study conducted in Beijing. The overall study design is rigorous in terms of the methods presented in exposure and health outcome measurements. The comparison of the health effects of air pollution in hypertensive population between urban and suburban area is innovative and interesting. The scope to explore comprehensive range of exposure and health outcome metrics is the strength of the study. Despite of this, there are several places in the manuscript that need to be improved by better clarifications of the methodology and preliminary results. My major concerns are provided as below:

1) There are many air pollutants and health outcome measurements presented in this

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study. For air pollutants, it is possible that many species may come from the same sources and therefore, highly correlated. The association, if identified, may not directly reflect the true toxicity of health effect for a pollutant but an alternation of source-related effect. It is important to think more in the paper about how to make use of the comprehensive exposure data and propose novel method that can leverage the combination of multiple pollutants' effect in the health analysis. For the health outcomes, the multiple biomarkers from the same pathways may generate an issue of multiple comparison (or not). As this is a methodology paper, it would be helpful to include a discussion on this issue.

2) The study is unique for being able to use real-time low-cost sensor for personal exposure assessment. However, sensor technology is complex and requires careful calibration both internally within device and externally across the devices and with other standard instruments under various environmental circumstances. The current study only reported the specifications and performances of the PAM monitor, but did not include detailed descriptions on how to ensure the accuracy of the monitors in the real-world measurements. Although personal monitoring may provide better information on micro-environmental exposure for air pollution, it may also produce much larger noise and uncertainties (e.g. systematic or random error) during the measurements which contribute to the health analysis. Such misclassification, if not well-regulated with a valid calibration protocol, may not be less than use of a routine monitoring station for analysis. In summary, it is important for this study to include detailed discussion on QA/QC of the PAM monitors to ensure high quality monitoring data.

3) The results are relatively simple. At least, the demographics of the study population and the exposure and outcome measurement statistics are needed, so that it is good for readers to understand the overall differences of exposure and outcomes between the two study sites. The results will also help support the proposed hypothesis of the study.

4) As mentioned by the authors, one of the major differences in the urban and suburban

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sites is the contribution of indoor exposure to the personal exposure and the indoor exposure levels are supposed to be higher. However, only the outdoor monitoring sites include detailed air pollutant species as compared to the personal exposure. Thus, the importance of the contributions of the species to the personal exposure seems to be attenuated. Will it be possible to use the GPS data to split outdoor and indoor exposure in the health analysis, so that the comparisons are relatively fair?

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