Reviewer’s report

Title: Development of an Environmental Health Tool Linking Chemical Exposures, Physical Location and Lung Function

Version: 0 Date: 10 Dec 2018

Reviewer: Hanns Moshamhammer

Reviewer’s report:

The paper is well-written and clearly structured. But the information is neither new nor very relevant. As far as I understand the paper shows that (a) asthmatics interested in air pollution are able to adhere to a protocol including wearing a wristband and performing spirometry 2 times a day for one week, (b) spirometry is able to measure lung function, (c) GPS devices are able to read and store position data, (d) passive sampling is a valid method for measuring air pollution, and (e) mobile phones can transfer data. Which of these is new?

The authors state that their study is only a pilot or feasibility study. Which of the parts did they fear is not feasible? Even the combination of the five parts cannot be the problem. What we would be interested in as readers is exactly the combination of the parts: are there any correlations between the data sets? The authors claim their study did not have enough power to detect any effects. (Line 183f: "This study was not designed to make inferences regarding health status." OK. But I want to point out that several panel studies have shown health effects using not many more data points. But apart from health effects: what about correlation between exposure estimates? (e.g. PAH x various estimates based on position data)

I wonder why the authors decided to measure PAHs. They provide 6 papers as justification that "Exposure to PAHs has been linked with diminished respiratory health". Well, the first paper (12) is not about health effects. References 13 and 14 are. Reference 15 indicates an association between PAH and respiratory disease but PAH and PM are highly correlated in that study. References 16 and 17 are about prenatal exposure and indeed in my understanding PAHs are much more relevant as carcinogens and as developmental toxicants than as short-term irritants of the respiratory system.

In a panel study you would be interested in current exposure and you would prefer high temporal and spatial resolution. Passive sampling, even with a resolution of 1 day, is not the best choice. The analytical technique might be feasible, but likely not very cost-effective. Other markers of exposure are cheaper and easier to measure and might be equally relevant for respiratory health. Different PAH mixtures might be indicative of specific sources but with a 24 hour averaging time I doubt clear links to sources are possible.

Lung function testing was restricted to the 3 easiest parameters: FVC, FEV1, and PEF. In my own experience the end-expiratory flows (MEF50, MEF25) are much more sensitive to early irritative effects and inflammatory responses of the small airways.
To sum up: (1) The choice of parameters (lung function, pollutants) is not very well argued. (2) At least some correlations would indeed increase the value of the paper. Right now it is only descriptive and therefore rather boring. I understand that this second requirement calls for additional calculations and therefore in my understanding the revision would be a major one.

Some minor points (language-wise):

Line 372f "...the use of cell phones … ha(s) been used…" (the use has been used???)

Line 357: "A basic assessment of compliance was assessed" (assessing an assessment?)

Line 417: "The ELF tool is now being used in a cohort study" (I assume "cohort study" is not the right term. I suggest using "panel study" instead!)

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Unable to assess

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

Not relevant to this manuscript

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:
1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal