Reviewer's report

Title: GIS and Environmental Epidemiology: spatial analysis of the effects of traffic-related air pollution on population respiratory health

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Reviewer: Joachim Heinrich

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Nuvolone D et al

The study by Nuvolone et al. analysed the association between living close to major roads and respiratory health in the general population in northern Italy. The strength of the study is that distances to a major road has derived from GIS, and the rich data set, which was gathered by detailed lung function measurements, skin prick tests and further blood tests for IgE measurements. Unfortunately the methodology including the statistical analyses is insufficient. Thus it is questionable whether the study substantially adds to the current knowledge. The major shortcomings of the study will be addressed below.

Major

The statistical analysis plan obviously focussed to study sex-specific associations, although this question was neither mentioned as a major aim nor was it discussed. Also the presentation of the key findings followed the sex specific question, which was never justified why long term exposure to ambient traffic related air pollutants should have a different effect in men and women. There is no consistent finding of potential effects of air pollution exposure on the outcome of interest between men and women. This causes some scepticism. The question is whether the sex specific effect was an a priori assumption before having looked at the data or whether this decision on sex-specific analysis was made after having seen that there is no overall health impact of the traffic related pollutants.

It is not acceptable, that continous outcomes such as the log slope for BHR testing was just dichotomized and a lot of information of the continuous variable was not used. This is more or less the case as well for the IgE data.

The age of the study population remained hidden. It is unknown whether also children were included in the analysis or not. This is not acceptable in particular when outcomes such as COPD and COPD related outcomes were used, which were not present in childhood.

The exclusion of subjects who are living farther away than 800 m to a major road is not convincingly justified. The reader would like to see the entire data set of the study.
Minor

Abstract
The age of the study should be given, in addition 95% CI needs to be added to the OR and also whether the given OR were adjusted or not.

The referenced literature is not complete and not up to date. The selection criteria for the referenced literature remain obscure. The presentation of the data does not follow the aim of the study. In addition, the age of the study subjects were not mentioned at all.

Method's background
1st sentence: This sentence is referring to a “longitudinal epidemiological survey”, while I would consider two repeated cross-sectional surveys not as a longitudinal study. Since no data were used from the first survey in the year 1985-1988 all information on this study needs to be removed from the manuscript.

Exposure assessment, p. 6:
What was the definition for a main road? Please provide information on traffic volume. In addition to the simple distance to a major road other exposure metrices could also have been developed such as road lengths of main roads of a certain buffer or road lengths of minor roads within the three different buffer zones.

Statistical analysis, p. 8:
A reference should be given how the percent predicted lung function values were calculated.

Discussion, p. 13 ff:
My guess would be that this manuscript used only data from adults. Therefore all the referenced studies with children need to be removed. However, if also data from children were included in the manuscript, then the tables need to be completely reorganised showing the effect restricted to childhood. What is completely entirely unacceptable is that the gender specific effects which could be considered as the key message of the entire paper were not discussed with one single sentence.

Conclusions, p. 18:
The first sentence is saying that both subjective and objective methods for the exposure assessment was used, but no data on subjective exposure assessment were shown in the tables or were described in the text.

Table 1, p. 25:
Passive smoking is defined by inhalation of tobacco smoke by a non smoker. Thus, the numbers need to be referred to the non smoking population. The label ‘working exposure’ needs an explanation.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

'I declare that I have no competing interests'