Reviewer's report

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

Version: 1  Date: 30 August 2010

Reviewer: Jaime Hart

Reviewer's report:

This manuscript details the results of an analysis of residential proximity to roadways and a variety of respiratory and allergic health outcomes. Overall, it is an interesting analysis which combines a number of outcomes that previously have not often been available in a single cohort. Like many studies, the authors demonstrate that residential proximity to roadways is associated with a wide variety of respiratory and allergic health outcomes.

(1) In the background section, two surveys (one in 1985-1988, the other in 1991-1993) are mentioned with the implication is that the surveys were conducted to determine the impact of the construction of the new highway between Pisa and Florence. However the authors only choose to use data from the second (1991-1993) survey. The reasoning behind this decision is unclear. My guess is that it is because information on lung function, skin prick tests, and IgE were only available in the 2nd survey. However, this should be noted more clearly, or mention of the first survey should be omitted.

(2) However, since the construction of the highway offers a natural experiment of changing exposure levels, the authors may want to consider looking at incidence of symptoms in residents of the areas where the highway was built, especially if individuals participated in both surveys. This may be outside the scope of this paper, but would be interesting.

(2) In the Background, the authors mention levels of TSP and SO2 in the study area. Have they chosen not to use these pollutant measures directly because of sparse monitoring density?

(3) Figure 1 (and the rest of the Figures) would be much more effective in color.

(4) In the first paragraph of the Exposure Assessment section (and thereafter) the authors refer to distance to the "main road". Does this refer to the Tosco-Romagnola highway? This should be explicitly stated, since the Figures include numerous additional roads, and the Background also refers to a large highway connecting Pisa and Rome.

(5) In the first paragraph of the Statistical analysis section: "or stopping while walking in plain to take breath (Ill grade dyspnoea)" is unclear.

(6) The authors should note if there were any major differences (in age, other
potential confounders, traffic exposures, etc.) between individuals providing information on skin prick tests, IgE, lung function tests, etc.

(7) The authors should note how the % predicted spirometry values were determined.

(8) In the background, there is some mention of available time-activity information. Was this not considered as a confounder or effect modifier?

(9) The sentence "Residences within 100m were 585 (28.4%; mean distance 38.8m; median distance 32.9m); between 100m and 250m were 611 (29.6%; mean distance 167.2m; median distance 169.8m); between 250m and 800m were 866 (42.0%; mean distance 424.5; median distance 398.1m)." is awkward.

(10) In the results, the authors note a large number of different tests for significance (Tukey, Least Significant Difference (LSD) for lung function; Analysis of variance, Tukey, Bonferroni, LSD, and Duncan for bronchial activity). The use of these multiple tests should be explained in the Statistical Analysis section. Ideally the authors would focus on one measure per association.

(11) The paragraph highlighting the results of Table 5 would be much easier to follow if all of the ORs and 95%CIs (which are already presented in the table) were not repeated. The authors should also note that many of their outcomes were not significant, and in some cases were negatively associated, in the intermediate exposure group.

(12) Table 6 presents the sample sizes by gender and exposure group. This may be more useful before the results tables, though it does seem to have been incorporated into Tables 3 and 4. It may just be worth reformatting Table 5 to also include this information.

(13) Overall, the discussion would be stronger if more work was put into summarizing groups of studies. This may be somewhat difficult due to the different "exposed" cut-offs used in each study, but if possible at all would be helpful. It may be easier to put together a table comparing the key findings of this paper to others.

(14) Most previous studies are conducted either in adults or children. One unique feature of this study is the wide age range. The authors may want to talk about some of their results in different age groups for a more direct comparison.

(15) The authors should dedicate a bit more space in the discussion to additional (non-geocoding) strengths and limitations of their analysis. One topic they should certainly mention is socioeconomic status, since it has often been shown to be a confounder or effect modifier in studies of proximity to traffic/air pollution. Additional comment on the apparent effect modification by gender is also
warranted.

(16) The second part of the conclusion may be true, but I am not sure that it follows from the rest of the text.

(17) The authors should also have a statement about human subjects procedures somewhere in the document. Are there any privacy concerns with the tight spatial focus of Figure 3?

Level of interest: An article whose findings are important to those with closely related research interests

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.