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: 6 September 2010

Reviewer: Emilie Stroh

Reviewer’s report:

This study is, although an old study design, due to the high quality of data of importance within its field.

Major Compulsory Revision

In this study most of the results are presented using three different p-values: p<0.1, p<0.05 and p<0.01. In some sections results with p-values of <0.1 and <0.05 are described as “borderline significant”, however in most part of the document this is not the case and for results with a p-value of <0.1 this is often described in the text as “significant”. If this is the authors view it would be interesting to have a section describing why p<0.1 is considered as being significant especially with non-convincing confidence intervals (where presented)? I do not find these results convincing and there is no section in the discussion where these results are critically reviewed by the authors themselves.

In the abstract they state that: “Results were confirmed in long-term residents who showed even higher risk”. According to the last section on page 12 half of the OR:s presented are lower for the long-term residents – this is not critically considered in the discussion either.

The discussion consists mainly of a summary of similar work (that could have been fitted into the background section instead) and results that confirm their own. I lack a more critical review of this study’s results. As it is only the study’s advantages are mentioned and none of its disadvantages. There is a lack of discussion regarding the uncertainties that some of the results are showing as well as potential confounders and the study design.

I also lack information and a critical discussion about the individual occupational exposure. How was this exposure classified? How was this variable defined and on what grounds? Since twice as many men are occupationally exposed (to what??) compared to the women – this might cause the differences in exposure seen in table 2-4? Why are these analyses not adjusted for “occupational exposure” as well?

Minor Essential Revision

Abstract (p2):

Here you state that you use GIS to examine whether distance from main roads
has effects on respiratory health status. However; what you do examine is the effect from one major highway.

The analyses were not restricted to long-term residents but analysed as a sub-sample.

**Methods/Background (p5):**

In this section (first sentence) you state that the surveys were carried out “before” (85-88 and 91-93) when it should be “during”?

One page out of 1½ is devoted to describing the previous survey (conducted during 1985-1988) and its different zone’s and measures. This information is more misleading than guiding since this precious study has nothing to do with the present one nor the aim of the study and the results are not compared to it either. It would be much more helpful if the “new” survey (conducted in 91-93) where described in more detail (i.e. the area, the number of habitants, the Tosco-Romagnola highway and number of vehicles/day etc).

**Methods/Exposure assessment (p6):**

Figure 3: This map is really illustrative but the legend needs to be remade. Objects that are presented in a map must be described in the legend, in this case: the highway, major streets, buildings and the different zones. Also the heading is misleading; those dots are not ONLY showing the “samples home residences” but rather “their proximity to the Tosco-Romagnola highway”).

**Methods/health outcomes assessment (p7):**

Did you check if there were any geographical or socio-economic clustering in the number of study subjects that choose to participate in the clinical tests?

I lack a section under “Methods” about socio-demographic information/potential confounders. What information was obtained from the survey? Why did you choose to incorporate some information in this study and not other (for example: why were “indoor exposure left out?”). The middle section at page 9 would fit better in such a section than squeezed in under statistics. It would also be interesting to know if you had information about employment/unemployment since duration at the home address during the day would increase the exposure from the highway and (for example) if your study subject consisted of a large proportion of “housewives” these might be more exposed from the source in question and might explain some of the differences that can be seen in the gender stratified results.

I lack a section where you describe why choose to classify your study subjects in those age groups. Why cut off at 25 and 64?

**Statistical analysis (p7-9):**

You state that you had information about: “education” and “subjective perception of environmental pollution at own home” however these variables have not been
used in this study.

Why did you not adjust for occupational exposure in all your analysis?

Results (p10-12):

Table 1: Here you have added “Education” – however you do not use this variable in your analyses.

Where there any differences in “Time of residence” in the different exposure groups? People living close to a major highway might be more prone to move for example.

Is it really possible that there are people living less than 2 metres from a major highway?

Table 3: You have not defined the term “DLCO”.

Table 4/p11: The “observed trend” for skin prick test and bronchial reactivity in male is not significant and very weak.

Table 6: this table is redundant – the information is already obtained in table 3 and 4. However the numbers (n) between table 3 and table 6 does not correspond.

Discussion:

Needs to be rewritten (see major compulsory revisions)

Conclusion:

Could be expanded.

Discretionary Revision

It is interesting to notice that AFTER the construction of the highway the levels of TSP and SO2 decreases in the area - why is that? Maybe this should be addressed in this section (Method/background) since this comparison is being made?

Figure 1: The map would be much more appealing if you removed those buildings that are not within “Pisa” or “Cascina” municipality (in my opinion the buildings could be removed altogether from this map to add clarity). The scale bar should be presented in km for such large areas.

Figure 2: This is a good map but I think it could be even clearer if the buildings were removed. The scale bar should be presented in km for such large areas.

Methods/health outcomes assessment (p7):

It would add clarity to your paper if you added the abbreviations used in the tables to this section. Although the information in table six is redundant (already added in table 3 and 4) it would be better to refer to it in this section than later on.
The choice of “exposure groups” could be more clearly defined (p6). As presented in the discussion many similar studies have used a cut off at 50m from major roads for the highly exposed group. Also the choice of reference group could be debated depending on the size and intensity on the highway (number of vehicles/day etc.) a reference group consisting of individuals living as close as 250m from the highway could be discussed.

Statistical analysis (p7-9):
This section would gain a lot if you tried to organise it a little bit. My suggestion is that the first section (with the definition of the different health outcomes) should be fitted into a list, such as:
1) Chronic cough (or plegm)
Producing cough (or plegm) apart from common …
2) Attacks of shortness of breath with wheeze
Any attack of shortness of breath ….
Also; the section about confounders could be moved to “methods” (see earlier suggestion).

Results (p10-12):
It would suffice if you presented the average distance to the subjects home without any decimals.

It would be easier to read the results from the “long-term” residents if you put these: in table 5, in a table of its own or as a list.

Be consistent: sometimes you use the term “main road” and sometimes “highway” which are not the same thing.

Why do you make comparisons or refer to US questionnaires or systems? Their questionnaires or address system is not international standard.

Do you by civic number mean “house number”? Maybe you should consider using another term in that case since it might be confused with “identification code/number”.

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

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
I declare that I have no competing interests