Reviewer's report

Title: An exploratory spatial analysis to assess the relationship between deprivation, noise and infant mortality

Version: 2 Date: 2 November 2012

Reviewer: Kate Hoffman

Reviewer's report:

1. Is the question posed by the authors new and well defined?
The authors present an interesting analysis of geographic variability in infant mortality in Lyon, France. Their findings suggest that accounting for neighborhood characteristics (particularly deprivation) reduced the size areas of increased mortality as well as statistical evidence for differences.

2. Are the methods appropriate and well described, and are sufficient details provided to replicate the work?
Yes. Specific concerns are addressed below.

3. Are the data sound and well controlled?
Yes.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
Yes.

5. Are the discussion and conclusions well balanced and adequately supported by the data?
A great deal of the discussion is devoted to potential mechanistic pathways rather than the specific results of this research. While interesting, I think more of the discussion should be devoted to what is gained from the current study and how it fits into the context of previous research. See specifics below.

6. Do the title and abstract accurately convey what has been found?
The abstract and title, although accurate could use more detail (as indicated below).

7. Is the writing acceptable?
Yes, with editing for clarity.

Major Compulsory Revisions

1. Throughout: The authors devote a significant amount of text to their theoretical model of the ways in which neighborhood factors (noise) may impacts infant death. While I think it is useful to set-up the motivation for these analyses and to
provide some context for the results, it seems to be outside the scope of the current work. I commend the authors for such careful consideration of potential pathways of effect, but I feel that the conclusions from this study which incorporate the conceptual model are over stated and distract from what can be gain from the analyses.

Abstract:

2. Background: The authors are investigating the spatial distribution of infant mortality in France, and the impact of neighborhood characteristics on the geographic distribution of mortality (i.e. is the pattern explained by neighborhood characteristics or does spatial variability persist). As written it seems as though the authors are investigating the impact of neighborhood factors on mortality. If in fact the later is true the authors the authors should provide a justification for why they need a spatial analysis to answer this question. The effect estimates reported in the paper are for the spatial cluster, not for the neighborhood impacts.

3. Conclusions: Because Environmental Health affords room in the abstract, I would like to see the authors provide more detail in the conclusion section. Rather than saying that their findings are discussed in the main manuscript it would be helpful to add a brief discussion of their findings and the conceptual framework they mention.

Background:

4. Paragraph 5: As in the abstract, I think it would be more accurate to say that the authors are investigating the geographic distribution of infant mortality and the impact of neighborhood factors in that association (rather than the association between neighborhood factors and mortality which could be accessed directly in non-spatial analyses).

Methods:

5. Health Data: It would be helpful to see some information on the distribution of infant deaths among the 510 block groups. How many blocks groups had 0 deaths? It appears from the figures presented later in the manuscript that some block groups which fall within the geographic boundaries of the most likely cluster are not included as part of the cluster. Is that because no deaths occurred in those blocks? How might holes in the data (block with no deaths) impact the spatial scan statistic.

6. Analysis - Spatial Methodology: Did the authors consider other cluster shapes supported by SaTScan (i.e. ellipses)? The ellipse model provides additionally flexibility and may be more robust for situations where clusters aren’t circles.

7. Analytic strategy and results interpretation: Is the SaTScan hypothesis testing looking at global variability (as written in the H0) or specific to each cluster (indicated in the H1)? The null and alternative hypotheses seem incongruent. My understanding is that SaTScan hypothesis testing examines probability that disease within a circular zone equals that outside the zone (and is not a global statistic).

8. Discussion: The authors indicate that their “study show a relationship between
noise and infant mortality after adjustment”. I am not sure on what the basis of this conclusion is.

Minor Essential Revisions

Background:

9. Paragraph 6: It is unclear what “model” the authors are discussing. I assume the theoretical model but would suggest adding text to clarify.

Methods:

10. Socio-economic data: From the text in the methods it seems as though an index of deprivation was used in analyses, however this isn’t clear in the results where it seems as though each component of the index may have been used (in Table 4a for example).

11. Noise Exposure/Noise Exposure Modeling/Noise Exposure Indicator: I am unclear how each of these sections fits together. Does the noise exposure model go into the indicator calculation? I suspect so but it is confusing as written. Additionally, are the details of the mean weighted noise level essential? If this work has been reported previously perhaps a reference is sufficient.

12. In the section discussing possible outcomes of confounding adjustment, situation 2 (cluster shifts): Spatial confounding can also mask clusters. In this case the included covariates don’t “explain the excess risk” but might hide it. Adding this information would be helpful.

13. Paragraph beginning, “The third limitation”: In addition to having measures of different types of noise collected at different time points a major limitation of this research is having one noise variable over 9 years. The authors should acknowledge this limitation and provide a little detail as to how noise might be changing and how this might influence their results.

14. Tables: More details are needed to orient readers to the tables.

Discretionary Revisions

15. Throughout: The manuscript is broken into a number of disjointed sections which, in my opinion, makes it somewhat difficult to follow. Fewer headings or more descriptive headings may be helpful. For example, in the Results section, adding the analysis “stage” may help orient reads rather than using “noise exposure” as a standalone heading.

Abstract:

16. Background: Some context may be helpful in the abstract. It would be helpful to know why the authors undertook the analysis in the first place (what has been done/know previously). These details are in the introduction but it may be helpful to a distiller version to the abstract as well.

17. Results and Discussion: The authors might consider adding some estimates of effect in the abstract.

18. Figures: A figure displaying the number of infant deaths per block would be helpful. Additionally, it would be helpful to add a scale bar in at least one map to
get a since of the size of each block and the study area.

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

**Declaration of competing interests:**

I declare that I have no competing interests.