Reviewer’s report

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

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Reviewer: Ketan Shankardass

Reviewer’s report:

The authors have completed an interesting and novel spatial analysis about the inter-relationship between deprivation, noise and infant mortality. The authors also describe a conceptual model of these relationships and possible mediating pathways in detail in the Discussion. An examination of these inter-relationships is important for a better understanding health inequalities across the life course.

Major Compulsory Revisions

Background

1- What’s readily apparent but missing from Paragraph 3 on page 3 (and onto Paragraph 1 of page 4) is the idea that noise and pollution may be correlated in the case of traffic and some types of industrial pollution. This is a critical piece to understanding why it’s worth thinking more about noise; since this relationship implies that some of the associations with air pollution may reflect noise.

2- Page 4, paragraph 1: Can the authors clarify what "adverse pregnancy outcomes" noise has been associated with? Seems highly relevant to the study.

3- Page 4, paragraph 3: Please consider presenting your theoretical framework in total (or at least in more detail) up front; as currently written, the one paragraph summary is overly brief.

Results

4- Page 9, paragraph 2: can the authors provide some correlation statistic to support the statement, "Typically, the blocks where the noise levels are the highest are those in the medium deprivation category."

5- Page 9-10: I was left very unclear about the adjusted analysis. I have several questions:

a-- Why is the analysis of SES variables divided by a) unemployment and immigrant status in Table 3 (with noise exposure, and including information about radius and census blocks included), and b) housing, % blue collar workers, education, deprivation in Table 4a (without radius and census block included)? Why were these two groups of similar variables (i.e., SES) not presented in the same table, distinct from resulted adjusted for noise? Why are the results for stage 3 of the analysis instead included in Table 4b? The grouping of the results and the inconsistency in what data is presented in these tables does not help the reader with the narrative of the results.
b-- Why do the authors evaluate control for noise exposure to have had a minimal effect on explaining the cluster of infant mortality (based on the LR dropping from 7.525 to 7.142; "We can conclude that noise alone does not explain the excess infant mortality risk..."); whereas controlling for housing, which has a lesser impact on the LR (7.52 to 7.17) is assessed as "explaining a great part of the excess of infant mortality? There seems to be an inconsistency in the way the authors are evaluating the results of their analysis.

c-- In paragraph 3 of page 10, the authors suggest that Figure 4A indicates that "excess risk remaining to be explained becomes not significant", followed by the suggestion that there was a similar result when more than one of the SES measures was used. But doesn't this imply that Figure 4A is the result from adjusted for only one of these SES measures? If so, which one?

d-- Why were % blue collar workers and education not included in Stage 3 of the analysis when they seem to have had a larger impact on the LR than housing conditions, for example (See results in Table 4A).

e-- Figure 4B is never referred to in the manuscript??

Discussion

6- Page 12: Based on the results in Table 4B, it's hard to determine how significant the impact of additionally controlling for noise over an above SES is; particularly since the p-value of the cluster was already quite non-significant following control for the SES variables. This make it hard to agree with the importance of the relationship between noise and infant mortality after controlling for SES. How can the authors respond to this concern; is there some way of testing the change in LR between these two models (e.g., a likelihood ratio test?)

7- Considering the authors emphasize air pollution as a potential hazard for adverse perinatal outcome in the Introduction, and given the potential inter-relationship between noise and air pollution (via traffic and industrial sources), I found it odd that the authors did not discuss air pollution as a potential confounder of their findings.

Minor Essential Revisions

Abstract - Results and discussion

8- I recommend reporting the number of deaths included in the analysis here.

Background

9- "Low Birth Weight" should not be capitalized in the last sentence of paragraph 2 on page 3.

10- Page 4, paragraph 2: the last sentence is awkwardly written.

Materials and methods

11- Table 1: please capitalize the variable descriptions consistently

12- Page 5, paragraph 3: there is an open bracket in the 5th lines of this section.
13- Page 8, paragraph 4: SaTScan is described as "Sat Scan"; please be consistent across the manuscript; also please simply this sentence as, "Because SaTScan does not allow for an interaction term in the model..."

Results
14- Table 2: The endnote for footnotes a and b are cut off.
15- Page 9, paragraph 3: I would not refer the reader to Table 3 (adjusted analysis) here; save it for the next section since you don't address the results in this Table until then.

Discussion
16- Page 11, paragraph 2: "pregnant outcomes" should probably read "pregnancy outcomes"

Discretionary Revisions

Abstract – Background
17- I recommend a clarification of how the methodology is described; currently obscure as written. E.g., "In this paper we investigate the ecological relationship between the spatial distribution of SES, ambient noise levels and infant mortality across neighbourhoods in the Lyon metropolitan area of France."

Background
18- Consider revising Paragraph 2 on page 3 for clarity. E.g., In order to further explain these health inequalities, researcher of infant mortality and its determinants have advanced the hypothesis that: "deprived populations are more likely to be exposed to a higher number of environmental nuisances or to a higher level of environmental exposure like ambient air pollution", framing differential environmental exposure as an important social determinant of health.
19- The last sentence of Paragraph 2 on page 3 would be strengthened with a clarification of precisely how priori research indicates that air pollutant exposure has "modified the socio-economic patterns of preterm birth.

Results
20- Page 9, paragraph 1: it seems redundant to refer us to Figure 2A both here and in the Methods and materials; I would keep the reference here and drop it earlier. This map is a "result" of your analysis.

Level of interest: An article of importance in its field
Quality of written English: Needs some language corrections before being published
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests:

I declare that I have no competing interests.