Reviewer's report

Title: ENVIRONMENTAL INJUSTICE AND CHILDHOOD LEAD EXPOSURE IN PERIURBAN (GER) AREAS OF DARKHAN AND ERDENET, MONGOLIA

Version: 0 Date: 05 Jun 2018

Reviewer: Bert Morrens

Reviewer's report:

Both research topic and study design are highly relevant. The framing of the research results in terms of environmental injustice is certainly justified and illustrates well the expanding scope of the environmental justice literature. However, the statistics and the description of the data contain a lot of imperfections and irregularities, making the manuscript messy and disordered.

Major revisions

1. Due to the high detection limit of the LeadCare II, lead exposure is measured rather inaccurate (42% below detection limit). I therefore wonder if the variability in exposure is adequate enough for doing regression analysis. Furthermore, there seems to be a warning from the CDC about risks of inaccurate results from lead tests with the LeadCare II in the same period as the study sampling (May 2017): https://www.cdc.gov/nceh/lead/about/blood_lead_test_safety_alert.html
   The authors should clarify this point.

2. There is a lack of specificity regarding the methods, particularly the operationalization of variables and the description of the data analysis in the tables.
   - Table 1: no reference to the log-transformation of the data; not clear if the p value belongs to mean value or to the % < 5 µg/dl.
   - Table 2/3: these tables are difficult to interpret since there is no indication of the data type (continuous or categorical variables?); replace 'sig. (2-tailes)' by 'p-value'; the asterisks behind the Pearson correlations are a unnecessary addition when p-values are also given.
   - Table 4: the title of this table is not clear (only child risk factors and no environmental factors were considered?); the coefficients are difficult to interpret without information about the number of categories for each parameter. The description of the final equation on p. 9 line 53-54 is unclear and in my opinion not correct.
   - Table 5: this table cannot be interpreted. This should be the summary of a multiple regression model (as stated in the text), but the title mentions 'correlations' and the table shows no models or coefficients ('F' and 'Sigma' are not clear).
3. Throughout the manuscript, the terminology of various concepts and variables is used inconsistently, making it difficult to follow the storyline and interpret the tables. I suggest the authors to bring more uniformity in the terminology used.

- 'Occupation' - 'parents have a job' - 'parents holding a paying job' - 'socio-economic status'
- 'Parental educational level' - 'parents highest degree'
- Sex (table 1) - gender (table 2)
- 'adults' - 'parents' - 'respondent'
- 'type of house' (table 3) - 'apartment type' (p.8, line 46)
- 'lead exposure' - 'lead poisoning'

4. Some statements in the text appear to be incorrect.

- P.5 line 42 the 'less-than' symbol is displayed wrong (BLL < 5 µg/dL)
- p.7 line 56-57: the variable 'parental work in an environment with lead' is not related to BLL according to table 2 (variable 'lead related job or hobbies' p=0.536). Presumably, the authors talk about the variable 'occupation' in table 2 but the relation with lead environment then is not clear.
- P.8 line 50: the variable 'peeling paint off the wall' does not appear in the table.
- Table 3: numbers are missing in block Heating method (line 16)
- P.10 line 28-29: the difference between residential structure (ger tent versus apartment building- and residential location (tent city versus city proper) is not clear throughout the rest of the text. For instance in table 1 the term 'house type' is used for apartment versus ger area.
- p.10 line 43: F=3.91 instead of F=0.3.91?
- p.12 line 16 stated that 58% had BBL >5µg/dL but on p.6 line 10 it is 27.8%
- p.13 line 11-13: sentence starting with 'Average blood' is grammatically incorrect.
- p.13 line 32: the statement that there is an increased risk of behavioural problems among children in ger households is not supported by the regression models in table 5. Ger vs city proper showed no significant correlations with behavioural problems. Strongest correlations are for parental occupation.
Minor revisions

5. Some statements and sections need more elaborating or clarification.

- P.2 line 16: 5 µg/dl should be referred to as the US CDC reference value and not a level of concern.

- P.4 line 10-11: the authors should briefly explain the EJ framework with some key references.

- p.5 line 8-10: more emphasis on the operationalization of some variables is needed in order to correctly interpret tables 2-4, for instance are the variables dichotomous, categorical or continuous?

- P.6 line 11-27: when results are compared with other national and international studies, it would be useful to indicate whether these studies used the same sampling method (with a high LOD) or a more accurate one (venous blood sample). Also, the children in the Ulaanbaatar study were aged 7 to 14, while children in this study were aged 4 to 7. Since BLL can increase with age, this should be mentioned when comparing studies.

- P.10 line 23: I suggest replacing the term 'income disparities' with 'socio-economic status' because this is also used on p. 11 line 5.

- p.10 line 56: not clear what 'externalizing issues' are.

- P.11 line 8-9: the Belgian study had a different study design: it compared prenatal lead exposure with behavioural problems at age 7-8 years.

- Table 2: not clear what 'respondent' mean on line 35 and how this differ from 'adults' on line 26.

- Table 2: not clear how the variable 'Who is smoking' should be interpreted.

- Table 2: I suggest adding to the title 'social' risk factors of lead exposure, to make the distinction with the 'environmental' risk factors in table 3.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Unable to assess

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?
If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal