Reviewer's report

Title: A multilevel analysis to explain self-reported adverse health effects and adaptation to heat: A cross-sectional survey in the deprived areas of 9 Canadian cities

Version: 1  Date: 24 May 2015

Reviewer: Julia Gohlke

Reviewer's report:

This manuscript describes an analysis of a cross-sectional survey. Multi-level analysis was applied to attempt to discern individual, building, and neighborhood level effects on 1) self-reported health effects from heat and humidity and 2) self-reported adaptation index based on answers to several questions on use of different adaptive measures.

Major Compulsory Revisions

1. The introduction should end with a clear statement of the author’s hypotheses that are tested in the presented analysis.

2. The perceptual approach taken is interesting. Limitations of the approach should be detailed more explicitly. In particular, the potential for unreliable results by using self-reported metrics from the same survey for both dependent and independent variables should be discussed. How does one differentiate between perception for both independent and dependent variables in this type of analysis? It seems the only variables gathered independent of the survey of individuals in this analysis are DA level attributes. I am not convinced that the methods employed in this analysis (although they need further clarification—see below) is measuring 'risk of adverse health impacts from heat' (e.g. see Line 245). At a minimum each of these statements should read ‘perceived risk of adverse health impacts from heat’ and ‘perceived adaptation to heat.’

3. Which questions were asked first in the survey? Those used as dependent or independent variables in models? Could the order of questions influence the answers?

4. Adverse health impacts in this survey are reported at a much higher rate than would be expected from other research studies examining hospital records. Under-reporting of heat-related illnesses by hospitals/urgent care facilities or relatively minor physical/mental affects that did not result in seeking healthcare might explain some of this discrepancy; however the very high rate of reported effects (46%) raises the question of what types of health effects participants were reporting. The two questions asked regarding health effects do not give an indication on the specifics of the adverse health impacts reported. Were additional notes taken to get an idea of what types of health effects participants were reporting? If so, these should be discussed in the context of the very high rate reported and the implications for this analysis in determining risk of adverse
health impacts (see comment #2 above).

Minor Essential Revisions

1. An abstract was not included. It needs to be added.

2. A separation of self-reported physical and mental health effects would be important to show. It is unclear why they were combined for analysis.

3. Several parts of the methodology should be further clarified:
   a. A schematic figure of the multilevel hypotheses being tested with the approach should be included.
   b. The Multiple Correspondence Analysis used to develop the heat adaptation index needs further clarification. For example the dimensions 1 and 2 should be explained in terms of the 14 variables used.
   c. What was the question structure such that ‘satisfaction with the indoor temperature of dwelling..’ is a continuous variable in multilevel models (e.g. Table 1)? Also, why is it also a building level covariate? Finally, is it the same variable as presented in Table 2 but labeled ‘satisfaction with thermal insulation..'?
   d. Were results from bivariate analyses used to pick variables to include in multivariate analyses? If so, methods should state what bivariate analysis metrics were used to determine inclusion in multivariate model. Variables not included should be noted.

4. All results should be explained in terms of the hypotheses being tested in several places (See # 1 under major compulsory revisions). One example, Line 262—‘but the aggregation rate is low.’ The meaning of this in terms of the hypotheses being tested should be described.

**Level of interest:** An article of limited interest

**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