Reviewer’s report

Title: Assessing the magnitude and uncertainties of the burden of selected diseases attributable to extreme heat and extreme precipitation under a climate change scenario in Michigan for the period 2041-2070

Version: 0 Date: 14 Jun 2018

Reviewer: Zoe Chafe

Reviewer's report:

Thank you for the opportunity to review this interesting and important manuscript, "Assessing the Magnitude and Uncertainties of the Burden of Disease from Climate." The study contributes to the growing body of knowledge describing health effects of climate-related events and trends. This study also estimates the financial burden associated with the given health effects. The study focuses on the state of Michigan and specifically estimates health outcomes associated with extreme heat days and extreme precipitation in two periods: 1971-2000 and 2040-2070.

Major comments:

--The manuscript is clearly written and well organized, with useful tables.

--The authors might consider changing the title of the paper to reflect the fact that the study focuses on Michigan, on extreme heat and extreme precipitation, and on the period 2041-2070.

--The authors do an admirable job of incorporating and considering uncertainty around the central estimates of many of their variables.

--This paper seems to focus on "direct and immediate" association between health outcomes and extreme heat (see L239). Could the authors please comment on whether their analysis captures delayed mortality associated with exposure to extreme heat ("harvesting")? This is partially addressed in L502-506, but it would probably be useful to readers to explain earlier in the paper that deaths from heat exposure can occur within days to weeks after the exposure occurs.

--The discussion of uncertainty in exposure estimates (L450-461) due to the scale of analysis in the GCMs seems to warrant more attention than currently given. These data inputs are fundamental to this analysis. Perhaps a sentence explaining why the authors feel confident using global and downscaled climate projections for the units of analysis presented here (ZIP, county, state of Michigan) would help.

--The discussion section contains a helpful range of limitations and areas for future research related to EH, EP, and health outcomes.
Specific comments:

L109-110: Why was the A2 scenario selected for this analysis? A brief explanation would be useful here.

L129-133: Is there any reason to believe that Michigan's ED visit rates might differ from those in other parts of the Midwest? (This is discussed to some degree in Section 6, so perhaps refer readers to that section.)

L136-137: Were the population projections created specifically for the ICLUS project or are they drawn from an underlying data source and used in ICLUS? If the latter, it would be useful to mention where the population projections were originally developed.

L143: The meaning of the phrase "percent black" is not clear in its current form. Perhaps move L150-152 up to this section to clarify what this is and why this is an included variable.

L186-187: Please further clarify "C". ["C scaled the incidence rate from an annual to summer level (0.66 for emergency-department visits and 0.39 for mortality)."] Why was this scaling done and what was the effect on the analysis?

L206: If I am understanding this sentence correctly, the ranges for moderate and high uncertainty are not symmetrical around the point estimate. Could you clarify why this is?

L349: Please consider adding Table A2 to the main body of the paper, rather than having it appear in supplemental material. The findings shown in that table seem important to the results section.

L419: Consider adding to this paragraph: 1) The historical cost of EH mortality (for comparison to projected cost), and 2) a brief sentence on EP costs (for comparison to EH costs).

L428-429: Consider changing the wording in this sentence, as it could be read as stating that you are underestimating uncertainty, rather than that your estimate of uncertainty was characterized as being in the "low" category.

L521: The authors may want to consider adding to this sentence the fact that this analysis focused specifically on the health burden associated with extreme heat and extreme precipitation, as it relates to climate. There could be other health burdens associated with climate that are not quantified here.

L523: Please specify exactly what "projected ED burden" is being discussed here (e.g., heat-attributable ED visits).

L561: Please clarify the reason for mentioning pollen levels here (link to EH and EP) or delete the paragraph.
L594: Please restate major findings at the beginning of the conclusion.

L965: It would be helpful to change the colors and/or scales on Figure 2A/2B and 2C/2D to clearly highlight that the scale shown has changed drastically between the historical and projected time periods. As is, the color scale may lead readers to believe that there is a decrease in mortality rate between 2A and 2B, unless they look closely at the scale change in the legend. The same is true for 2C and 2D.

L970: Clarify that Figure 3B refers to *heat-attributable* emergency department visits.

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Please indicate how interesting you found the manuscript:

An article of importance in its field

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

Acceptable

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