Reviewer's report

Title: Life expectancy, health-adjusted life expectancy and proportion of life spent in non-optimal health by body mass index category in adult Canadians

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Reviewer: Samir S Soneji

Reviewer's report:

The manuscript assesses patterns in life expectancy and healthy life expectancy by weight class among Canadian adults. The authors have prepared an well-written manuscript that I enjoyed reading. The topic is important, both in Canada and elsewhere. Also, the main results are very important. Overall, I think this paper will be an important contribution and will be well cited.

I only have minor essential revisions and no major compulsory revisions.

Abstract.

1. I did not understand "decomposition of HALE" until I read the paper. Just by reading the abstract I thought "decomposition" could have been a typo. I wonder if the authors can write what they decompose HALE into (contributions of morbidity and contributions of mortality) so the point reads more clearly.

2. An important point of this paper is the distinction between patterns in LE and patterns in HALE. The conclusion doesn't quite capture the discordant patterns. Maybe something like, "Although overweight adults experience higher LE than normal weight adults, they also experience a higher proportion of these additional years of life in poor health."

3. I'm not sure the second sentence of the conclusions is necessary. The first sentence is so much stronger and why not end on a strong note?

Background.

1. "Those with an insufficient body weight...". Vague antecedent (those what?). Maybe rewrite as "Adults with an insufficient body weight...".

2. Add common before "which is expressed..."

3. First sentence second paragraph is wordy. When I read "between", I was expecting two things. So maybe separate with [1] part 1 and [2] part 2. Otherwise it's hard to figure out what the between distinguishes.

4. "Other study populations may be..." I think are might be a more appropriate verb than may be. The other studies really are based on less recent cohorts, that's not questioned.

5. I think the final paragraph needs to be expanded. The authors have nicely laid
out the research gap—I know now what is not known. So how does this study fill the gap? The study does fill the gap (nicely, in fact), and this paragraph could be stronger.

Methods.

1. If the "These data sources were used..." sentence is written in the first person, it might read easier. "We used the NPHS data for estimation of mortality..., CCHS data for BMI prevalence ..., and CCDS data to estimate total mortality rates."

2. Was BMI self-reported, or height and weight?

3. In keeping with the formatting, 12 478 should not have a comma (top of page 7).

4. I'm not sure what the "separate approach" sentence is telling me. It's a little confusing.

5. Has HUI been defined earlier?

6. The authors could write equation 1 in more compact notation: the product (capital pi) from i=1 to 8 of b_i. Where does 1.371 and 0.371 come from? Can the authors provide a citation for this equation? Or did the authors develop it from their own model?

7 Sullivan method. In the paper below, Imai & Soneji proved Sullivan's estimator of healthy life expectancy is an unbiased and consistent estimator. Previously the properties of Sullivan's method were not well understood. The authors may want to add this point to strengthen the use of their method.


8. What is changing in the bootstrap? The HUI estimate change for each iteration of the bootstrap? Does the Lx value remain constant for each iteration? I think the HUI estimate is the only component changing--the authors may want to add this detail.

Results. Well written and comprehensive.

Discussion. Well written and comprehensive.

1. How much would a respondent need to understate his or her weight to move into a different obesity category (for a given height?). I suspect a fair amount. So maybe the association between obese class 1 and decreased mortality risk and increased LE should be interpreted with "some* caution, rather than "caution" (page 19). In other words, I don't think this potential limitation would invalidate the authors results.

Conclusions.
1. The first sentence is long. Maybe break it into two shorter sentences?

2. There's nothing wrong with the concluding paragraph. But the rest of the paper is so strong that I'm left wanting to know more about the implications of the authors' findings and results. What do the results mean for Canada and other developed nations? As the press picked up on the recent Flegal paper (authors citation 2), the public obesity debate shifted into thinking that "it's not really that bad--there's no big reduction in mortality." But this paper provides more caution. One implication is that the morbidity associated with obesity could be very expensive for healthcare systems.

Suppose the authors wrote an op-ed to describe their work and make important public health points. What would the authors write? Why should we care? Perhaps this exercise can help to bring out the important implications of this interesting paper.

Table and Figures. Concise, easy-to-read. Well done.

**Level of interest:** An article of outstanding merit and interest in its field

**Quality of written English:** Acceptable

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

**Declaration of competing interests:**

i declare that I have no competing interests.