

Article details: 2018-0137	
Title	Assessment of the burden of diseases and injuries attributable to risk factors in Canada from 1990 to 2016: an analysis of the Global Burden of Disease Study
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Reviewer 1	Jason Guertin
Institution	Universite Laval, Département de médecine sociale et preventive, Laval, Que.
General comments (author response in bold)	<p>I thank you for the opportunity to revise this manuscript. The authors should be commended for having provided so much data within their paper. That being said, I do not believe that the paper should be approved for publication in its current form. I list below a series of major comments which I believe the authors should address to improve the quality of the paper.</p> <p>I have to admit that my main criticism of this paper refers to the lack of information on the 1990 data. Though I understand that the authors wish to provide information on the trends over time, I do not believe that the data they provide fully supports any claims they make regarding these trends. In its current form, most of the information provided only regards to 2016 data. As noted below, I believe that both components of this paper (i.e., 1) the 2016 results and 2) the trends over time) could be split into two unique manuscripts. I believe that doing so would greatly improve the readability of both papers and provide the authors with more room to clarify the methods they've used.</p> <p>Major comments</p> <p>1. The abstract does not provide enough information on how the authors obtained their results. I would make sure to further clarify this in a revised version of the manuscript.  <b>Author Response: As per the Reviewer's suggestion (thank you!) we have added the following sentence to further clarify the methods in the abstract: "Using an established comparative risk assessment framework and pooling hundreds of Canadian data sources, we estimated the burden attributed to a given risk factor at each time-point." (lines 5-7)</b></p> <p>2. Figures 1, 2 and 3 and Supplementary Figures 1, 2 and 3. Although I like the format of the figure, I do not believe that readers can easily use the information provided within the graph. Instead of a figure, the authors should actively consider reformatting the figure in order to provide percentages of DALY, burden of diseases and YLD attributable to each of the 17 risk factors.  <b>Author Response: We thank the reviewer for this helpful suggestion. In order to provide the results requested by the reviewer, which we agree are important, we have added a Supplementary Table 3 to our revised manuscript. This table is many pages long, which is why we have made it a supplemental file.</b></p> <p><b>We acknowledge that there are many possible ways to present the data and we aim to do so in the most reader-friendly and impactful way possible. There is a lot to show in figures 1-3 including relative magnitude of burden of the specific diseases and injuries (in addition to the attributable risk for each factor within each disease and injury) and through many attempts, these figures are what we and the GBD staff and researchers worldwide as a whole have found works best. Although we have considered the Reviewer's suggestion to reformat the figures, we cannot fit the values of all 17 risk factor categories within each disease and burden categories in the figures because of space restrictions and because some of the coloured bars are too small to fit a value. The way that we have chosen to present figures 1-3 mirrors previous GBD publications (some examples: Murray et al 2013 JAMA<sup>1</sup>, Murray et al 2013 Lancet<sup>2</sup>, Mokdad et al 2018 JAMA<sup>3</sup>, Dandona et al 2017 Lancet<sup>4</sup>). The main strength of these figures is that their visually appealing and intuitive nature work well to engage readers in journals and can be referenced in presentations, online infographics, etc. We think that the new table we have added will complement our figures so that readers can use whichever form of results they prefer.</b></p>

3. Results. Page 7. I believe that the first sentence provided in the results section should be in the discussion section instead since it provides a summary result of the analysis. In its current form, it's unclear where this information was taken from and how the authors got these estimates.

**Author Response: We thank the reviewer for this suggestion. As per the Reviewer's comment, we moved this sentence from the results section to the first paragraph of the interpretation section; however, upon reading our revised manuscript, the majority of our team strongly felt that it was a result and should remain in the results section. These estimates were an analysis of level-0 risk factors (and therefore also a "summation" of our analyses reported in figures 1-3) and so did not involve their own methodology or source. We can see though that it was unclear what this analysis was in our previous manuscript, and so we have modified the sentence so that it now labels the data as level-0 data: "*In analyzing our Level-0 risk factor (all-age and all-cause) GBD study data, we estimated that 39.6% (36.9–42.3) of DALYs, 56.0% (53.6–58.2) of deaths, and 24.2% (22.7–25.8) of YLDs in Canada in 2016 could be attributed to the assessed risk factors.*" (lines 117-119)**

4. Results and Figures 1, 2, 3. It is unclear to me what the impact of each risk factors truly are. Though the relative importance of each factor seems important, it's unclear what the absolute impact of each risk factor actually is. Based on the information provided at lines 133-134 regarding the impact of dietary and tobacco on the number of deaths, the authors have this information even though they don't provide it elsewhere. I believe that the absolute and relative results could easily be combined within a table (refer to major comment 2).

**Author Response: Thank you to the reviewer for this helpful suggestion. As per the Reviewer's suggestion, we have created a new table (Supplementary Table 3) in the revised manuscript. To improve the clarity of our paper, we have deleted the results that we had previously included in lines 133-134.**

5. Results. Trends from 1990 to 2016. The current paper does not provide enough background information on how these estimates were obtained and what the 1990 estimates were. Though interesting, I wonder if this shouldn't be the focus of a different paper which could more accurately detail this section.

**Author Response: As per the Reviewer's comment (thank you!), we have revised the manuscript to make the methodology more transparent. We have clarified that the 1990 estimates were obtained in the same way as the 2016 estimates. Data sources for all time-periods are listed in Supplementary Table 1. The analysis was conducted using the same methods for both time periods (1990 and 2016), and the 1990 rankings are included in the figures 4-6 beside the 2016 rankings.**

**We have updated the manuscript to include the words 'for each time point' when describing methods (lines 7, 63, 104, 105) to clarify that the same methods were used to model estimates for 1990 and for 2016.**

**We have also added a sentence to the Methods section on how ranks for figures 4-6 were determined: "*Risk factors were ranked high to low on the rate (per 100,000) of DALYs, deaths, and YLDs they contributed to for each time point.*" (lines 104-105)**

**Although we considered the Reviewer's suggestion to write a second paper, one for 1990 and one for 2016, we decided to keep our paper as is for 3 main reasons:**

- 1. It is important to report the trends over time in a single paper to provide context for the current values as it illustrates how risk factors are changing with respect to disease burden and suggests the impact of and the time expected for specific policies to take effect. We need to know which risk factors are increasing so we can identify and tackle future health challenges. Demonstrating trends also allows**

us to understand that it can take a significant duration of time for changes in policy to have positive impact on population health burden. For example, we found that smoking is the top risk factor; however, we also observe that the contribution to health burden from smoking is on the decline. This speaks to how a risk factor such as smoking can influence the population for a substantial length of time, and that decreasing the health burden attributable to smoking for Canadians requires a long-term commitment to risk reduction, one that is proving to be effective. Without including the trends, our results would suggest that Canada needs to redouble its attention on tobacco. In reality, when we observe the time trends, they are heartening and suggest that focusing on other risk factors that have not shown decreases over time would be beneficial. This is a strength of our paper.

2. Presenting data from two time-points in this way allows comparisons with other country-specific papers. For example, Germany,<sup>5</sup> England,<sup>2</sup> India,<sup>4</sup> and USA<sup>1,3</sup> report for change over time in the last quarter century as we do.
3. This manuscript is the second in a series of two from the Canadian Global Burden of Disease Study (GBD) Collaborators. The other paper in the series, entitled "Global Burden of Disease Study trends for Canada from 1990 to 2016" (reference CMAJ-18-0698) is in revision at *CMAJ*. The inclusion of both time periods was a noted strength of this first paper, and we want the time periods to be a match between the two papers as they are a series.

6. Interpretation. Similar to my point in major comment 5, I do not feel that the paper provides enough information on how the results in 1990 were obtained for the differences in ranking and lack of to be the main focus of the discussion. I believe that the authors should focus their interpretation on what the main risk factors were in 2016 and what would be the impact of removing them.

**Author Response: We thank the reviewer for this suggestion to improve the Interpretation section of our manuscript. We have addressed the first part of this comment in our response to the previous comment (#5) where we describe the corresponding edits we have made to the manuscript.**

**The impact of removing the top risk factors would be to substantially decrease DALYs and improve quality of life for thousands of Canadians and their families! We love this idea, but to model this data to estimate in detail the impact of removing them would take many more additional methods, tables and figures and is not part of the objective of the manuscript. It is an excellent idea for a future paper.**

Minor comment

1. Methods section. Page 5. The authors provide a very brief description of a DALY. I don't believe that the general target audience of *CMAJ* would be familiar with this metric. I would recommend providing additional background on this measure, namely its importance such as within WHO initiatives.

**Author Response: We thank the reviewer for this suggestion. As per the Reviewer's comment we have added the following sentence to the manuscript:**

***"Because DALYs quantify both mortality and morbidity, total DALYs are considered to represent the burden of disease for a country, indicating the gap between the country's current health status and an ideal health situation in which the country's entire population lives to an advanced age, free of disease and disability."***<sup>5</sup> (lines 71-74)

**Additionally, we have cited the WHO, and we have cited 3 papers that detail how DALYs are calculated (line 68-74).**

2. Throughout the manuscript. The authors do not define what a "UI" is. I'm assuming that this

	<p>acronym refers to "Uncertainty interval". Please confirm..</p> <p><b>Author Response: We thank the reviewer for bringing this to our attention. UI stands for "uncertainty interval" in our manuscript. In the revised manuscript this acronym is spelled out in the methods section (line 63).</b></p> <p>Of note, there was a formatting error regarding Supplementary figures 6 and 7. This should be revised.</p> <p><b>Author Response: We thank the reviewer for pointing this out. This formatting error occurred when converting to pdf at submission. We have taken steps to ensure that it does not occur again.</b></p>
Reviewer 2	Name and review withheld