Reviewer's report

Title: Age of onset in chronic diseases: New methods and application to dementia in Germany

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Reviewer: Samir S Soneji

Reviewer's report:

The authors develop a new method to assess the age of onset of dementia in Germany. The authors have submitted a much improved revision of their manuscript, which was already very strong. The paper makes many contributions and I strongly encourage the authors to edit the text a bit to highlight these contributions.

Major Compulsory Revisions

1. Abstract. The background sentences aren't really that compelling. I think there are two relevant points to the background. First, tell me why dementia is an especially burdensome chronic disease in Germany (years of life lost? cost? prevalence?)? Second, tell me why knowing the age of onset is important. Why is age of onset a better alternative to disease patterns than say incidence?

2. Abstract. I think more conversational language would be fine. For example, "We develop an incidence-prevalence-mortality model to estimate the mean and variance of the age of onset in chronic diseases."

3. Background. I think Introduction might be a more appropriate name for this section and fit with other PHM papers. First paragraph--I'd like to see this exclusively German focused. The paper is about German dementia, not global dementia. I like this paragraph--it sets the stage of what we know and why we should care. But I want to know why I should care about Germany and dementia.

Second paragraph--what don't we know? What is the research gap? Why is the age of onset a more appealing measure of burden than incidence? I think this is a key point. Can I reach the wrong conclusion about the burden of dementia by looking at other indicators that I wouldn't reach by looking at the age of onset?

Third paragraph--how does this paper help to solve what we don't know. How does this paper help to fill the research gap. I had to find the answer to this question buried in the paper. Instead, highlight the contribution of this paper. The authors have identified a better measure (still need to convince readers that age of onset is better) and also develop a method to measure age of onset. That's their contribution, as I understand the paper.

4. I'm still not sure why R is not R(a). Maybe m1(a) / m0(a) is 2.4 for all ages a? I can imagine many readers will be confused about this point.
5. I agree with my fellow reviewer. If the authors are able to make their R code available as a technical appendix, that would increase citations to the paper.

6. Discussion. The 2nd and 3rd sentences are key points of this paper. The age distribution is the reason why age of onset might be a better indicator than other measures. I would like to see this point in the introduction because it’s counter-intuitive and brings the reader into the paper.

7. Discussion. The research gap and contribution are buried in the discussion and should be highlighted in the introduction. "Finally the approach presented in this article for the first time...". That’s the contribution of this paper. "Currently there are no patient registers...". That’s part of the research gap.

Minor Essential Revisions
1. Abstract. Why 2002? Is there more recent data available?

2. Remove so-called in Methods.

3. Change verb from "get" to "obtain" on page 4.

4. Move reference to Figure 1 at the end of sentence and in parentheses on page 4.

5. I find the order of terms confusing on page 4. Start with N=S+C, then p=C/N. So S=(1-p)N.

6. Label the y-axes of the figures. And maybe las=1 to turn the text horizontal?

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.