Reviewer’s report

Title: Potential gains in health expectancy by improving lifestyle: an application for European regions.

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Reviewer: Marc Luy

Reviewer's report:

The paper “Potential gains in health expectancy by improving lifestyle: an application for European regions” provides a very nice quantitative demonstration of the fact that the major part of differentials in healthy life years results from lifestyles and could thus be reduced by human action. This is an important message for health researchers, policy officials and public health experts. I like in particular the exploitation of different data sources. The authors did great efforts and I would be happy to see the paper published. I have only some comments and suggestions that I summarize below by paper sections.

*Introduction

It is true that the EU describes HLY as an indicator for disabilities. However, given that the measure is based on the GALI indicator ("Global Activity Limitation Indicator") I think it would be more precise to characterize HLY as measure for activity limitations. Similarly, it might be more appropriate to substitute the term "health loss" used on the EU website by health "deterioration" or "decline".

*Methods

The text of this section provides a good and intuitive idea about data, analytic concept and estimation scenarios, but more details would be appreciated. The combination of different data sources requires usually several adjustments and kinds of "smoothing". I am aware that these are in most cases complicated and difficult to describe briefly in such a short paper. It is therefore a necessary consequence that the descriptions are not detailed enough to get a sufficient idea of what has been done, even with the additional information in appendix and supplement. The
reference to a report with 156 pages (Ref #9) is according to me not the appropriate way to solve this issue. It would be good if data and R codes could be made available upon publication to enable interested readers to understand and reproduce the analysis.

*Results*

Results are well explained and presented in tables. This is naturally the most precise way to present results. However, tables are at the same time probably the most unspectacular way to present results. I would therefore like to motivate the authors to think about alternative graphical ways to illustrate their main findings.

With regard to the interpretation of the results, I missed the note that the different quantitative HLY gains of reduced smoking among women and men are most likely a result of the smoking epidemic process. The period approach used in the paper depicts women and men in different stages of the smoking epidemic. It is therefore highly likely that the impact of smoking will rise among women as well in the next 10-20 years. Making these characteristics of the period approach clear in the description of the results would be helpful to avoid misinterpretations by readers who are less familiar with the used estimation techniques.

*Discussion and Conclusion*

The authors have nicely interpreted and discussed the results. Nonetheless, I think it is important to give more emphasis to the insecurities resulting from the combination of data from different sources - Dynamo-hia, SHARE, Eurohex, HMD, Eurobarometer - with their very different characteristics and weaknesses. Although I highly appreciate the use of information from different sources, such an analysis (with its methodological complexities, see above) naturally limits the validity and statistical power of the results. The subjective self-reports of survey respondents increase this insecurity. (The highest alcohol abstain rates among Eastern Europeans as reported by the authors are a nice example.) The use of period outcome measures and the assumptions underlying the Sullivan method add even further limitations when it comes to drawing conclusions for the real populations. I recommend making these limitations and insecurities much clearer in the discussion and conclusion sections. As mentioned above, the messages obtained from this study are highly valuable and very interesting for a broad audience, but the authors should try to avoid over-estimations of over-interpretations of their results.
Finally, I would like to note that I perceived the paper across broad parts somehow difficult to read. I therefore suggest revising the language to make the text more fluent and easily readable.

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