Author’s response to reviews

Title: Evolution of educational inequalities in life and health expectancies at 25 years in Belgium between 2001 and 2011: a census-based study

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Response to reviewer comments

We are very grateful for the opportunity to submit a revised manuscript, and we thank the reviewers for their help in improving the manuscript. Below we provide a point-by-point reply to the issues raised by the reviewers. We hope that we have adequately addressed all comments and that our manuscript may now be deemed suitable for publication in Archives of Public Health.

Reviewer #1:

The study analyzed changes in life expectancy (LE) and disability-free life expectancy (DFLE) in Belgium and estimated inequalities between genders and educational levels (EL) by various measures. The manuscript is a nice contribution to the literature on trends in health inequality. However, the authors do not relate the results to findings from other countries on inequalities in LE and DFLE.

I have some specific comments:

1. On page 5, line 76-78, the HIS surveys used are mentioned. I wonder why the study was not based on HIS 2001 and 2008, because HIS 2013 is too close to mortality follow-up. Please explain.

Answer to 1: Actually, the disability prevalence is not a risk factor but one of the measured outcomes, the other being mortality. So it seems logical to use prevalence figures of the follow-
up period; ideally, it would have been within the periods 2001-2006, and 2011-2016. For the census 2001, the best waves for the follow-up were years 2001 and 2004. For the census 2011, we ideally should have used data from 2011 and 2014 if they had existed, but there was no HIS in those years, as Health Interview Surveys only occur every 3 to 5 years. We then used data from HIS waves that were most close to those ideal years, that were waves 2008 and 2013. We have added this point to the discussion “As health interview surveys only take place every 3 to 5 years in Belgium, we used data from the two HIS waves that were the closest to the follow up periods. The use of the HIS 2008 data can however be questionable, as this survey took place before the follow up period. However, as health status only slowly changes over time, we assume that this would have little impact on the results.”

2. Page 6, line 98. The choice of ages is in line with that chosen in international comparisons. However, the authors did not make much of international comparisons!

Answer 2: OK, we have added more comparisons, please see in the subsection ‘comparisons with other studies’ of the discussion.

3. Page 8, line 141-142: "The gap then progressively decreased with age" is explained by "health selectivity in ageing". First of all the decrease is not surprising or worth mentioning when looking at absolute differences!

Answer 3: Ok we changed towards: “The absolute gap although progressively decreasing with age, remained substantial until age 65.”

4. Page 10. The section "Comparison with other studies" only compare the results with other studies on the population in Belgium and discuss the misleading ranking in OECD studies. Apart from OECD studies, it would be nice to see comparisons with studies on DFLE by SE position or at least by EL from other countries.

Answer 4: OK, we have added more comparisons, please see in the subsection ‘comparisons with other studies’ of the discussion.

5. On page 12, line 247-257, the authors discuss the effect of EL on the results when comparing different birth cohorts. The change in EL composition and LE was also assessed in a Danish study (https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-12-994).

Answer 5: Thanks, we have mentioned the study and added the reference.

6. Page 12, line 260-261: "... This is to be accounted for when comparing with studies classifying EL in more or different categories". Please, add comparisons.

Answer 6: done.

7. Page 12, line 263-270. This section does not really add much to what has already been written.
Answer: you are right, and I have rephrased it in a more interpretative way.

“The improvement of LE25 in all ELs and both sexes is a clear public health progress. However, the increasing LE25 gap highlights that not all educational groups benefit equally from the LE improvement. The considerable increase of DFLE25 in high educated men is certainly a progress; however, the stability of the DFLE25 in the other groups, again reflects a differential benefit across the ELs. The group of less educated women is the only one to experience a worsening of health between both periods. Since the raise of the educational level has been particularly important in women, the group of women with the lowest educational level represents a diminishing group, that is probably worse off today than 10 years ago, and deserves further investigation and efforts. “

8. On page 4, line 51-52, is stated that in Belgium, the study of inequalities … started in the mid-nineties, but the papers referred to (22-27) were all published after 2003. I guess that the oldest data that has been used was from the mid-nineties.

Answer: OK, the word “data” was added to the sentence

9. Page 6, line 95: change "… we when grouped…” to "… we then grouped…".

Answer 9: OK, thanks

10. Reference List: ref no 20 equals ref no 45.

Answer 10: thanks, this has been corrected.

Appendix Table 1: I assume that "Low + missing" for Males is the same category as "low" for Females.

Answer: you are right, we have corrected

Reviewer #2:

The article addresses a pertinent issue with inequalities in both life and health expectancies. The paper is unique in its sense of combining data from the census, national register and also pooled data from the HIS. The methodology is sound and adequate for the different objectives of the study. On addition, the results were well summarized and the main findings knotted with results from other studies. Limitations of the study were well discussed and conclusions nicely presented.

- However, after reading through the paper, it was not immediately clear what extra advantage using the census data has over usual national mortality data base.
Answer: in Belgium the “National mortality database” is precisely the database resulting from the linkage of census data with mortality follow up data, as explained in the method section. This can be somewhat confusing if it is not called the same way in other countries.

Maybe your question meant: what is the added value of using this complicated design, rather than using the unlinked simple "Cause of deaths database"? Actually, in Belgium, the socio-economic status is very poorly recorded in the death certificates (between 50 to 80% missing). Using data from the death certificates would lead to an enormous numerator-denominator bias, as appeared from the conclusions and the results of the OECD study, which used such an unlinked database. This has been discussed in the paper, but it was probably not clear. So, I have rewrote this passage, in the discussion, like this: “This dataset is highly reliable with regards to mortality and does not suffer from a numerator-denominator bias, like it is the case when using the death certificates database where socio-economic data are poorly recorded.”

- Are there any future perspectives following from this research?

Answer: it would be great if a comprehensive plan was set up to tackle inequality in Belgium, as there is already a commitment from all authorities. However, health inequalities impact assessment research should first occur to support those policies.

- Differences across regions were not discussed which could have further implications.

Answer: you are right, the differences by region could not be studied in this first analysis, and would deserve an additional study.

- The implications for health policy makers were not discussed.

Answer: please see above.

Overall, the paper is sound for publication but some minor issues need attention before this can happen. I have listed them under different sub-headings for clarity. I ignored many typos and English language mistakes.

Abstract

Page 2 Line 23: By disability rates what do authors mean? Should this be simply disability prevalence?

Answer= Ok we have changed in the text

Page 2 Line 38: Authors claim a 6% increase of low-versus-high. in both men and women from 2001 to 2011. How was this determined?

Answer: You are completely right, it was a mistaken; we have corrected; we have also added an additional column in the tables, for more clarity about the calculations.
Page 2 Line 46: "increased strongly" may be replaced with "increased significantly" or There was an important increase in males of 4.5…"

Answer: Ok thanks, we have changed

Page 2 Line 50: replace "respective" with "respectively"

Answer: Ok thanks, we have changed

Page 2 Line 59: please replace "more strongly". The "increase more strongly" cannot be associated with a decline. Split the sentence into two one of the overall increase and one with the exception in women.

Answer: Ok thanks

Page 3 Line 4: Authors could replace "further increase health levels" with "further improve health status".

Answer: Ok thanks

What is it with a lower educational level that will lead to such a large difference in DFLE between 2001 and 2011? Any explanations? If possible, authors can propose some efforts that can be helpful in bridging these gaps.

Answer: we explained in the discussion that there was an important raise of the educational level of women, making the low educated ones a more negatively selected group. So comparisons over time are made on groups that differ in their meaning. Unfortunately, the RII and SII cannot correct for this change in the meaning, they just show that the relative position of the group has changed. Studies that show percentiles are more suited to compare evolutions among groups comparable with respect to their relative positions.

Introduction

Page 4 Line 9: Authors may write: "finding in public health research".

Answer: Ok done

Page 4 Line 11: replace "public policies issue" with "public policy issue". The word crucial here is probably an overstatement. A word like "important" suits this context better in my opinion. I believe there are more crucial issues at hand.

Answer: we have replaced with ‘policy’. About crucial, we prefer to leave it because it is really a longstanding and important problem, and now it becomes also to be high political agendas.
Page 4 Line 14: Could authors mention some of the policies in the literature or from elsewhere that aim at reducing inequalities in health and life expectancies?

Answer: we have added some references.

Page 4 Line 49: replace "census 2011" with "2011 census"

Answer: Ok done.

Page 4 Line 54: When authors say aim of the contribution was to describe the size of the inequalities, this should be reflected in the presentation of the results. The size of the inequalities were determined but were not described...in effect the sizes should stimulate some discussions in this sense. If not it is better to just say aim was to determine the size of... Page 5 lines 5 and 6: What is the difference between the second and the third objective? Overtime here means from when to when?

Answer: ok we changed “describe” to “determine”.

The second objective is to describe changes in LE25 and DFLE25 by EL between 2001 and 2011. So it allows to see if there is an improvement of the health outcomes, and in which ELs (all, or only some of them). The 3rd objective measures the change in inequalities: inequalities can occur with improvement of health status, worsening, stagnation, so the point 2 is insufficient to give the trends in inequalities.

Methods:

Page 5 Line 37: Data from the HIS 2001 and 2004 were pooled. And also for 2008 and 2013. How was this done? were any special statistical considerations made? Details will be very helpful. The census for 2011 was combined with HIS data from 2008 and 2013. There is some nice symmetry here. Why was data from 1997 and 2004 not use for the 2001 census? This would have introduced a symmetry similar to that of the 2011 census. Before and after the census.

Answer: Actually, the disability prevalence is not a risk factor but one of the measured outcomes, the other being mortality. So it seems logical to use prevalence figures of the follow-up period; ideally, it would have been within the periods 2001-2006, and 2011-2016. For the census 2001, the best waves for the follow up were years 2001 and 2004. For the census 2011, we ideally should have used data from 2011 and 2014 if they had existed, but there was no HIS in those years, as Health Interview Surveys only occur every 3 to 5 years. We then used data from HIS waves that were most close to those ideal years, that were waves 2008 and 2013. We have added this point to the discussion “As health interview surveys only take place every 3 to 5 years in Belgium, we used data from the two HIS waves that were the closest to the follow up periods. The use of the HIS 2008 data can however be questionable, as this survey took place before the follow up period. However, as health status only slowly changes over time, we assume that this would have little impact on the results.”
Page 6 Lines 15 through 17: Please revise this sentence

Ans: OK, we reformulated it

Page 6 Lines 22 through 26: Regional trends would have been useful for the case of Belgium because we know that there are north south differences in these inequalities. Any comments on this?

Answer: As said before, it has not been possible to calculate regional inequalities in the scope of this work. However, as far as I know, although regional differences in health/mortality/life expectancy, are very strong and well documented, regional comparisons in health inequalities are still scarce; in my previous analysis of inequalities in mortality they were relatively moderate. https://archpublichealth.biomedcentral.com/articles/10.1186/s13690-017-0212-x

Page 6 Lines 34 through 36: Is there a statistical theory that allows the summing of these two variances sources? It will be good to mention it.

Answer: the formula for the variance is given in the same Sullivan guideline, and we now mentioned the reference also for the variance.

Results:

Page 8 lines 10 to 14: Are there any possible explanations why there is a moderate upward shift in the educational distribution in 2011 compared to 2001? It seems natural that over the years more and more people will get highly educated because of job and societal demands.

Answer: yes, the explanations you give are correct, and also the fact that education is mandatory until age 18 years since the eighties.

Page 8 line 54: LE25==LE25

Answer: Ok thanks

Page 9: All instances of DFLE25 should be replaced with DFLE25

Answer: Ok thanks

Discussion:

In comparing with other studies did authors ensure that the same data types and methods were used across the studies?

Answer: Deboosere and Van Oyen used the same database as ours but at an earlier stage (census 1991 and 2001 linked with mortality follow up); Eggericks used the same data as ours. At the
contrary, OECD used another methodology, that leaded to numerator-denominator bias. This has been described in the article.

What are future perspectives following this research?

Answer: it would be great if a comprehensive plan was set up to tackle inequality in Belgium, as there is already a commitment from all authorities. However, health inequalities impact assessment research should first occur to support those policies.

we have added a & in the discussion.

Conclusion:

Page 13 line 47: What additional efforts for example? Are there already some ongoing efforts? Are they effective? It will be good to get a sense of how the very important results of this study can inform policy makers. Is it possible to indicate regional trends? The gaps observed in this study could be more regional than national. It will be good to know where to prioritize.

Answer:

For the regional trends, please see above.

We have added a paragraph on possible policies in the discussion, and this in the conclusion:

“A general plan to tackle health inequality should be set up, with particular efforts to improve the health of the low educated women.”