Author’s response to reviews

Title: Stable socioeconomic inequalities in ischaemic heart disease mortality during the economic crisis: A time trend analysis in 2 Spanish settings

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Author’s response to reviews:

Dear Editor Herman Van Oyen,

Our paper with number AOPH-D-18-00202 entitled: “Stable socioeconomic inequalities in ischaemic heart disease mortality during the economic crisis: A time trend analysis in 2 Spanish settings” has greatly been improved by the comments raised by the referees. Please find a point by point replay and the proposed changes highlighted in red in the text.

REPLAY TO THE REVIEWERS:

Reviewer #1: Review of article "Stable socioeconomic inequalities in ischemic heart disease mortality during the economic crisis: A time trend analysis in 2 Spanish settings ".

The article addresses a very interesting topic; actually, the literature has shown a paradoxical impact of economic crisis on health, and particularly on cardiovascular mortality. It is crucial to examine how the poorest people are affected by the crisis.

However, in my opinion, the article should need major improvement before being published. It should also be reviewed for English by a native speaker. Deaths rates by EL should definitely be compared after age-standardization.
Major remarks

The method section is not sufficiently described.

If I understand in Barcelona you linked only the people who died, it was not a follow up study, while in Basque country it was a follow up study.

- Why did you proceed differently in the 2 settings?
- What is the proportion of linked cases?

This is right, the Barcelona and the Basque country have two distinct and independent information systems. Both systems are different no other reason than the historical and funding reasons. We have added a sentence at the beginning of the 3rd paragraph in 2.1. Design section.

“Barcelona and the Basque country have two different register information. In Barcelona it is possible to link cases of the people who died, while in Basque country uses a follow up linkage.”

We have also now included the proportion of excluded cases due to the linkage, for Barcelona and Basque country, at the end of the 3rd and 4th paragraph in 2.1

We have added for Barcelona:

Due to a lack of linkage, we excluded 401 IHD deaths for men (4.4%) and 332 for women (4.7%).

For the Basque country:

The percentages of male and female IHD deaths for whom no information on educational level was available due to a lack of linkage were 3.3% and 4.8% for the 2001–2004 period, 2.8% and 3.3% for the 2005–2008 period, and 4.8 and 2.7% for the 2009-2012 period, respectively.

Could you show the EL distribution of the population in the 3 periods in the census, including the missing EL?

Please, in the following table there is the distribution of educational level. The distribution shows a decreasing of population without education and an increase among those with an university degree. Fortunately, the RII and SII take into account the proportion of population in each education level.

<table>
<thead>
<tr>
<th>Education level</th>
<th>Men</th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
You broke down the EL in 5, which is quite unusual in recent years, since the proportion of people in the first level has dramatically declined over time. This leads to very small groups in youngest age groups, but moreover, it hinders comparisons with other studies. Could you justify your choice?

In Spain there was an important inter-region immigration from the southern less development regions to the more developed ones during the 60’s. So that, a significant proportion of the population remains today without a scholar certificate. For instance, in Barcelona, according to the census information in 2001 there was 11.6% of the population illiterate and 19.5% had incomplete primary schooling; in 2012 these figures were 8.1% and 20%, respectively. So, there is still substantial population in first and second education levels. Moreover, as it is shown in the figure 1, theses first groups are among the moderately highest mortality rates in IHD, which is interesting to show.

How was the age variable introduced into the Poisson model? Was it a 1 or 5 year variable, or was it with the large age groups that are presented?

It was a 5 year variable. To be clearer we have included:
“The regression models are adjusted by the 5-year variable.”

Which software did you use?

We have used R.

Results

Table 1 : please specify deaths rates are crude.

Could you show the Person-years of observation in the table?

Table 1 is already a large table, maybe adding person-years would difficult the reading and editing of the table. So that we finely decided to show the relevant information on number of death and rate, with the idea that the interested reader could retrieve persons-year by diving both. However, if it was considered necessary we could manage to do so: change rates for population figures.

The comparison of deaths rate should definitely be done on age-standardized rates, because age is a powerful confounding in mortality by EL!

So I cannot agree with the figure 1 and its comment, since it is based on crude rates comparison.

Please could you calculate and display in your figure age-standardized rates? This can easily be done in STATA with the command dstdize; (nb: it is also possible to get it as a result of a Poisson regression but more difficult).

Thank you for rising this point. We have specified “crude” rates in Table 1 and created a new Table 2 for the standardized all ages group. Figure 1 has been changed to age-standardized mortality rates.

All the descriptions in the beginning of the results sections for all-ages EL specific rates should be done on age-standardized rates.

The aggregate data for “all ages” in Figure 1 has been now age-standardized.

Table 1 refer to crude rates, but we have created a new table to show standardized rates for all ages group. Accordingly, comments in Results refer now to crude and all age standardized rates.

Could you show the results of your regression stratified by setting and sex for all ages? how is age included in this regression?

We are not sure to fully understand this point. Table 2 shows the results of the regression stratified by setting sex for all ages. The regression models are adjusted by the 5-year variable. To be clearer we have included:
“The regression models are adjusted by the 5-year variable.”

I would suggest that, above the Poisson regression for RII calculations, you run and display the results of a Poisson regression (only stratified by sex and settings), and modelling the mortality rate examining the effects of age, period, EL and their interaction. To do so, you could model deaths in fct of:

- the educational level (in simple class, not on relative scaled), the period and the age group, first as main effects only.

- Then you introduce interaction terms in another model, so age group*period, EL*period.

- Then, stratified by period also, interaction EL*age, which seems interesting! actually in males of Barcelona, there is no inequality in oldest men, but quite large in younger! This could explain maybe the important difference with Mackenbach 2015 for Barcelona at the same period, since Mackenbach showed inequality in premature (<75) mortality.

- It would probably be easier to describe your results starting from this output.

Thank you for the comment. We see that your suggesting to check changes through period of age and education level. Certainly, there have changes in the education level by period, with low or no education decreasing through time and the highest educated level increasing. However, the aim of our study is to analyse trends in socioeconomic inequalities of IHD mortality before (periods 2001-04 and 2005-08) and during the Great Recession (2009-12). The statistical methods applied respond to this objective. In order to take these changes into account, we have calculated the relative index of inequalities (RII) and the slope index of inequalities (SII). These measures take into account the size of the population in each socioeconomic level group, and therefore also they take into account changes in the distribution of the level of studies. In addition, these two measures are widely used in studies of inequalities.

Thanks to you comment, we have now stressed this fact of low IHD inequalities at the 2nd paragraph pf the Discussion and in the middle of the same paragraph.

Could you please revise the results section for EN.

Result have been revised. However, we could request an additional revision if necessary.

Discussion: maybe, before discussing the trends, you could first comment on the size of IHD inequalities (relative, absolute). Particularly low in men in Barcelona; but due to oldest men only. Any explanation for this?

Thank you for noticing this. Now the discussion begins with a comment of the IHD inequalities in the second paragraph and it’s nicely connected in the middle of the same paragraph.
Minor comments

L 101-104 please reformulate because unemployment rate in 2001 lower in Basque country.

Basque unemployment refers to the lowest in Spain. It is now clearly stated in the text.

L 142-143 and L 148-150 please review for EN

It has been revised. However, we could request an additional revision if necessary.

L164 for age-adjusted education level specific mortality

It has been corrected.


https://www.bmj.com/content/353/bmj.i1732

Thank you very much for the recommended references. There have been actualized.

Reviewer #2: In this manuscript results are presented from a study examining trends in socio-economic inequalities in mortality due to ischemic heart disease. The study is well described and the results are well presented.

I have only one minor remark: did the study populations differ in age and gender distribution between 2001 and 2012? Age-specific statistics are presented but for the interpretation of the 'all age' results and of the figure it would be of interest to know if changes were affected by changes in age and/or gender distribution in the study populations.

Certainly, “all ages” have been age-standardized in a new Table 2 and Figure 1 has been now also changed to age-standardized. Results changed accordingly.

Reviewer #3: This is an interesting article exploring mortality trends due to ischemic heart disease in a time period before and after the great recession of 2008 in Spain, and inequities in mortality by level of education. It is succinctly written and provides valuable data for researchers in this space.

Some suggestions for minor revisions:

-The introduction section could be shortened - many of these citations, particularly those in the first two paragraphs, could be discussed in more detail in the discussion section.
The introduction has been shortened and some of these references moved to the last paragraph in the discussion.

- Consider line graphs rather than bar graphs to represent your results.

We tried with line connectors, however with so many groups it was not so easily readable, and we finally choose to leave the original graph.

- Avoid using the word "accomplish" to describe the transition of smoking from upper to lower SES groups. (p 10, line 258)

We have changed “accomplished” for “realized”

“The transition of smoking from upper to lower socioeconomic groups has been realized earlier for men than for women.”

- The authors have completed what seems to be a relatively extensive review of the literature on inequities in mortality trends over time across many countries. I would encourage you to consider placing these in a table, this would be a nice resource for readers.

Thank you very much for this suggestion, however we are a little bit conditioned by the limiting of space. In fact, as suggested in the first point we have simplified some of the references in the introduction and moved to the discussion.