Author's response to reviews

Title: Socioeconomic inequalities in cause specific mortality among older subjects in France

Authors:

Gwenn Menvielle (Gwenn.Menvielle@inserm.fr)
Annette Leclerc (Annette.Leclerc@inserm.fr)
Jean-François Chastang (jean-francois.chastang@inserm.fr)
Danièle Luce (Daniele.Luce@inserm.fr)

Version: 2 Date: 12 March 2010

Author's response to reviews: see over
We would like to thank the reviewers for their comments that helped us to improve the manuscript. We below address and reply to each comment.

Referee 1: Bjorn Heine Strand
- Major Compulsory Revisions
This is a well written manuscript investigating educational inequalities in cause specific mortality in France with focus on the older population. The longitudinal data have high quality and the investigators use sound and traditional methods, focusing both on relative and absolute inequalities.
I have some concerns though.
1. It is somewhat hard to grasp the main intention of the paper. Is it to show that inequalities changes with age, or is it to show that cancer is not so important explaining the absolute mortality inequalities among the old? And what is most important to consider; the decreasing relative inequalities or the increasing absolute inequalities? What do the large increasing absolute inequalities with age mean - how should we interpret them? All this might be hard to grasp. It is complex to compare inequalities across age groups because the mortality rate differs so dramatically. And it is almost mathematically guaranteed that the relative differences will decrease as the nominator and denominator increase so much. This has been much debated in the inequalities literature. I would welcome a clearer description of these issues in the introduction. It could also be worth looking at the method used by Leyland et al, where the SII is divided by the mean mortality rate so comparing inequalities across age groups makes more sense. (Leyland AH, Dundas R, McLoone P, Boddy FA. Cause-specific inequalities in mortality in Scotland: two decades of change. A population-based study. BMC Public Health. 2007; 7: 172). See Fig 1 for this illustrated nicely.
[OUR ANSWER]
Our main objective is to describe socioeconomic inequalities among older people. As mentioned by the reviewer, we expect relative inequalities to decrease and absolute inequalities to increase. However, we are interested in differences between causes of death within this general pattern. Even though absolute inequalities are expected to increase with age, will the relative contribution of each cause of death remain the same among older subjects? What are the main causes of death that contribute most to absolute inequalities in this age group?

We modified the introduction to account for the reviewer's remark and also the point 1 of reviewer 3. The second paragraph is now more focused, and we mention the relative/absolute issue. We clearly mention that we are interested in investigating the socioeconomic pattern in cause specific mortality among people aged 75+ and any difference with what is observed among younger subjects.

We know the reference mentioned by the reviewer. By dividing the SII by the mean mortality, the authors get a relative measure of inequalities. This relative measure is less sensitive to the level of mortality rates, as all relative measures of socioeconomic inequalities. We wanted to measure both relative and absolute socioeconomic inequalities. That is why we computed the SII. We already have a measure of relative inequalities (the RII), so we did not compute the indicator suggested by the reviewer for sake of simplicity and to avoid redundant information.

2. Possibly the most important output from this paper is the distribution of causes summing up the SII at the different ages; cancer reducing importance 40% to 33%, to 15% among men and from 28, to 19 to 3% among women. At the same time there was an increase for CVD till 31% in men and 45% in women. I would welcome a broader discussion around these findings. For example, what are the public health implications of these findings? Is it important to know that cancer falls in importance with increasing age explaining mortality inequalities? And what are the explanations for this falling importance? Are there other mechanisms than alcohol and the size of the rates themselves?
[OUR ANSWER]
We added a paragraph at the end of the discussion (paragraph 1 page 12) to mention the implication of this finding in terms of public health. Policies aiming at decreasing socioeconomic inequalities should be focused and efficient. To do so, It is important to document which cause of death
contributes to socioeconomic inequalities in total mortality for the different age groups in order to
define what is the target group.
The explanations for the falling importance of cancer in explaining socioeconomic inequalities in total
mortality are not straightforward. We expanded the discussion and mentioned other risk factors that
may play a role, mainly lower prevalence and modest socioeconomic inequalities for overweight and
obesity and smoking in the past in France (end of page 11).

3. There are large gender differences in cancer inequalities; especially lung
cancer is interesting with positive association in women and inverse in men. I
guess this will reflect smoking patterns? More discussion is welcomed.
[OUR ANSWER]
We developed this issue (paragraph 3 page 10).

4. It is described that it is of extreme importance to study social inequalities in
mortality in the older population due to its increased size. I would like some more
justification for this importance.
[OUR ANSWER]
We justified the importance of studying inequalities among older subjects in a paragraph in the
discussion (page 12). We moved this aspect from the introduction to the discussion as this deserved
discussion that was too developed to be included in the introduction.

5. The mechanisms through which education may impact health are diverse and
some are mentioned in the paper. I wonder if some of these mechanisms are
more important at certain ages?
[OUR ANSWER]
We believe that all aspects related to the health care system (use of the system, visits to GP,
screening, comprehension of the prevention messages, compliance to treatments) are particularly
relevant among older subjects. We mentioned this on page 9 paragraph 1.

6. The confidence intervals were computed with Bootstrap. Why was this chosen? Why not use the
CI's from the Cox regression?
[OUR ANSWER]
Studies suggest that CI may be biased when computing RII. That is why we computed the CI with
Bootstrap. The results changed but the conclusions remained the same.

7. The conclusion is much built upon European comparative studies, but the
present study only includes results from France and I do not quite follow why not
a similar pattern like this one is to expect in other countries.
[OUR ANSWER]
We agree that the conclusion was not very clear. We re-wrote it. We hope the new version is clearer.

Referee 2: Bjorgulf Claussen
This is a well conducted study of a topic of a certain interest - social inequalities
in cause-specific mortality among middle-aged and old-aged persons in a
representative French population, especially focused on mortality of different
cancer groups. Here are only some proposals for discretionary revisions below.

[OUR ANSWER]
We would like to thank the reviewer for his positive comments.

1. The research questions are all well described, methods are adequate, and data
seem to be very sound. Results are all over well described and discussed. The
limitations are thoroughly considered - may be too much. Precision of death
certificates is a problem which is adequately discussed but education as a
measure of social inequality I think is too much problematised. That is a good
measure even among old people. Life time income might be better but I do not
know any study with that variable. The sentence on page 8 para 2 "education
does not have a universal meaning" is either unclear or a truism. In all age
groups level of education is well suited to compare people in the same group but
not people in another age group. This problem is elegantly solved by using RIIs and SIIs - well described - and hardly any problems is left. Hence, the present analyses are sound.

**OUR ANSWER**

The sentence noticed by the reviewer "education does not have a universal meaning" was changed. The discussion about education may seem quite long. However, we should keep in mind that not all readers are familiar with social epidemiology. We thus decided to keep this discussion as all these aspects may not be trivial for non expert readers, and this discussion is very relevant for the paper.

2. Page 3 para 2: Only one former study of social inequalities in health and age was found but another one should also be mentioned, about old aged Norwegian women:


**OUR ANSWER**

We thank the reviewer for mentioning this study that we forgot. We added a reference to this study.

3. Page 6 para 2: Lower mortality in the two lowest educational groups cannot give a U-shaped curve, it must be J-shaped? The RIIs of breast cancer is different from what was found in Norway in a middle-aged population (Strand BH, Tverdal A, Claussen B, Zahl PH. Is birth history the key to highly educated women's higher breast cancer mortality? A follow-up study of 500,000 women aged 35-54. Int J Cancer 2005; 117: 1002-6.). I think this study should be commented.

**OUR ANSWER**

The lower mortality rates are not observed in the two lowest educational groups, but in the 2nd and the 3rd educational groups. The lowest educational group is "no education". That is why we can say that there is a U-shaped relationship.

In the discussion, we briefly discuss the difference between our results and the European findings.

4. The conclusion in the Abstract seems to be too modest - the article gives much more, but maybe it is wise to be focused.

**OUR ANSWER**

We preferred to keep the conclusion focused so left it as it was.

5. Page 3 para 2: I spend a little time to grasp the sentence "did not provide results by cause of death, age and country", and will propose "did not provide results by cause of death and age across countries".

**OUR ANSWER**

We agree that the sentence was not clear. This was also noticed by reviewer 3 (point 1). We clarified the text. The second paragraph of the introduction was also substantially changed to account for reviewer 1’s and reviewer 3’s comments.

6. Page 6 para 1: Here Table 3 is used but Table 2 gives the same information and should be preferred for the mere reason of ordered number of tables. Graph 1 is actually three figures, and as far as I can see only the second in commented in the text.

**OUR ANSWER**

We followed the reviewer’s suggestion and now mention table 2 instead of table 3. We comment all graphs, although we discuss more the second one presenting the cancer mortality rates. We added confidence intervals to the graph to support our comments.

7. Page 9 para 4: ":- is in favour of a selection effect." is misleading - right but not only selection, as the authors comment later (page10 para 1).

**OUR ANSWER**

We modified the text to avoid any misleading sentence.
8. Discussion should mostly be in verbal present but from page 10 on much in verbal past.

**OUR ANSWER**
Before page 10, we used verbal present for general discussion but past tense when we commented additional analyses.

9. The English language is mostly good, only minor points should be changed: Skip all "however". Page 4 para5: write "both relative and absolute measures", and some similar small cleanings.

**OUR ANSWER**
We checked the English language throughout the manuscript.

Referee 3: Alberto Quaglia

General comments (Major Compulsory Revisions).

The present paper is a classical analysis of the relationships between educational level attained and mortality rates. It is not markedly original but some points reach a good degree of interest. In particular, it is noteworthy the special focus on elderly people.

From a general point of view, the text should be implemented through a larger and less cryptic development of some items. More specifically, the part of methods must describe more clearly the statistical procedures carried out, while the discussion would benefit from a wider interpretation of results. It must taken in mind that the paper has to be understood also by a not very expert reader.

Introduction

1. In the second paragraph which deals with the background on socio-economic factors and the elderly, there is a contradiction. In a first time the author affirms that a previous study investigated the matter by age and cause of death (To our knowledge, only one study investigated socioeconomic inequalities in mortality by age and cause of death.[7]), but only some lines under, the preceding sentence is denied by its contrary (This study included data from several European countries from North to South Europe but did not provide results by cause of death, age and country). (Minor Essential Revisions)

**OUR ANSWER**
There is no contradiction in the second paragraph. However, the second sentence noticed by the reviewer was not clear and certainly misleading. The study mentioned computed mortality rates by age and cause of death for all countries together but mortality rates by age and cause of death were not available for each country separately.

We substantially changed the introduction to take into account the next comment as well as the first comment of reviewer 1. This sentence does not appear any more, and we mentioned this limit more clearly to avoid any misunderstanding.

2. Owing to the importance of this reference, it would be better to move the comparison from the introduction to the discussion and only mention it here as background (obviously, after solving the inconsistency). (Discretionary Revisions)

**OUR ANSWER**
We followed this suggestion. We now briefly mention this study in the introduction and discussed these results in the discussion part (page 11 paragraph 1)

3. Methods. (Major Compulsory Revisions)

General remarks.

It is not clear how the ranked variable of education was obtained. The complete formulation should be expressed with clear indication of the involved dimensions.

There is some confusion in the proposed example: it is not clear what should be intended for "highest" and "next highest" level of education: a more explicit formulation is needed.

It is not so clear the role of SII and how it should be interpreted with respect to inequality.

**OUR ANSWER**
We clarified the example. We defined more clearly the coding used for education (page 5 paragraph 2).

On page 5 paragraph 1, we explain why it is important to quantify inequalities with relative and absolute measures. We explain what absolute measures of inequalities such as SII represent, what information they give and how they can be interpreted.

Specific points.
4. In the first paragraph, page 4, the characteristics of the sample must be shortly described because the reader difficultly knows the specific reference and the paper has to be independent. (Major Compulsory Revisions).

[OUR ANSWER]
We added a short description of the sample (first paragraph of the results section). There is also table 1 that gives the educational distribution of the sample by age group and gender and that is commented in the first paragraph of the results section. Lastly, Graph 1 displays basic information for mortality by education, age and gender for total mortality and cause specific mortality. It is also commented in the first paragraph of the methods section. We believe all this information gives the reader a good description of the sample.

5. As regards the follow up it is sufficient to indicate: “Subjects were followed up for mortality from 1990 till the end of 1999”. The remaining details are obvious. (Discretionary Revisions)

[OUR ANSWER]
We decided to keep the remaining details. We believe this is not obvious for all readers. More social inequalities experts do not always feel very comfortable with computational aspects.

6. In the last paragraph at page 5 there is an important sentence “We also computed mortality rates by sex and age group, and by sex, age group and education level.” Unfortunately, in no other part of the paper these data are shown and there is a clear lack of a figure displaying this basic information. Such a figure would have the finality to connect the description of statistical methods and the results given in tables 2 and 3. Otherwise, the two tables would remain too much isolated, without a solid basis. (Major Compulsory Revisions).

[OUR ANSWER]
We agree that this basic information is important a better understanding of the results. The mortality rates by sex and age group are presented in Table 3 and the rates by sex, age group and education are presented in Graph 1.

7. The author computed crude mortality rates without any adjustment. Age specific crude rates can be used when the age groups are small and the age structure within each group does not influence the disease distribution. However in the present study three large age groups are considered (45-59, 60-74 and 75 or more years) and it is better to standardise by age mortality rates within each group in order to make possible the comparison with other similar studies. (Major Compulsory Revisions).

[OUR ANSWER]
We age-standardised the mortality rates, using the 1995 European population as standard.

Results.
8. First paragraph, page 6: the considered age group is not 40-59 but 45-59 years. (Minor Essential Revisions)

[OUR ANSWER]
We corrected the age-group.

9. The author affirms “For total cancer mortality, this gradient was observed in the oldest age group neither for men nor for women, with a higher mortality rate among individuals with vocational secondary education than among individuals with primary education.” But in graph 1 (total cancer mortality) the distribution of educational level by age could differ in the oldest age group only by chance; for this reason it is suggested to include the confidence intervals by each bar. (Major
Compulsory Revisions)  
[OUR ANSWER]  
We added confidence intervals by each bar. There is some overlap between the different educational levels but the main conclusions do not change.

10. • Last paragraph, page 6: “A large increase was also observed for non cancer-non CVD deaths both in men (from 276 to 675 to 3642) and women (from 113 to 317 to 2989).” Please, check carefully the figures in table 3 with respect the text of results. (Minor Essential Revisions)  
[OUR ANSWER]  
We corrected the figures.

11. • Third paragraph, page 7: in order to demonstrate the absence of any particular bias due to the choice of the last open age group (75 or more years), it would be sufficient discuss this issue in the first three lines and excluding the detailed description of specific data not shown. “Additional analyses conducted in the age group 75-84 supported the results observed among subjects aged 75+. Relative inequalities were slightly higher and absolute inequalities slightly smaller than those found in the age group 75+” (Discretionary Revisions)  
[OUR ANSWER]  
We shortened the paragraph following the reviewer’s suggestion.

Discussion.  
12. This part is well developed, however it could be improved by a paragraph dealing with the possible relevance and spin-off of such type of analyses for health care systems and social policies. (Discretionary Revisions)  
[OUR ANSWER]  
We added a paragraph at the end of the discussion to discuss this issue. This was also a comment of reviewer 1 (point2 & point 4).