Author's response to reviews

Title: Social inequalities in self-rated health by age: Cross-sectional study of 22 457 middle-aged men and women

Authors:

Emily C McFadden (ecm33@cam.ac.uk)
Robert Luben (robert.luben@phpc.cam.ac.uk)
Shelia A Bingham (sab@mrc-dunn.cam.ac.uk)
Nicholas J Wareham (njw1004@medschl.cam.ac.uk)
Ann-Louise Kinmonth (alk25@medschl.cam.ac.uk)
Kay-Tee Khaw (kk101@medschl.cam.ac.uk)

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Author’s response to reviews: see over
Dear Ms Pafitis,

Thank you for your letter suggesting revisions to our manuscript (MS: 9948624901835266). We found reviewers’ comments helpful and have provided point-by-point responses to these comments. As a result, we enclose a revised manuscript for consideration for publication in BMC Public Health. We are happy to clarify any comments and provide any further information required. Please do not hesitate to contact me.

I look forward to receiving your decision.

Yours sincerely,

Emily McFadden
MSc, DLSHTM, MA hons cantab
PhD research student, University of Cambridge

On behalf of all coauthors.
Responses to comments from reviewers. Our responses are in **bold**.

**Reviewer 1:**

Major compulsory

1. Adjusting for health behaviour didn’t affect on odds ratios in men at all, somewhat in women. Alcohol drinking varied differently by social class than other ‘behaviours’. Perhaps it is not proper to adjust all such factors simultaneously, some factors (behaviours) may work on the other direction. The authors should adjust health behaviours one by one to see what really happens.

   Thank you, we have now included models adjusted for each factor individually, these are displayed in additional file 1: table 5, and described in the results section.

2. Age differences are important and neglected in SES studies, the authors could concentrate on health inequalities by age.

   We thank the reviewer for this comment. Age differences are examined in table 3. This table has now been expanded to give odds ratios. These show that the social class health differential remains similar with increasing age. This is now included in the results and discussion sections.

Minor essential

1. Measuring women’s occupational class by using husbands’ class is often used but is it best way to examine women’s social class. This needs a comment.

   Yes, we believe it was the appropriate measure for social class in this cohort for reasons now commented upon in the Discussion. We apologise for our previous omission.

Table 1; when social class both in women and men is measured by men’s class, do we expect a statistically significant differences between men and women? Is that significant difference only based on large data?

   Yes we recognise that some of the significant values may be due to large data. P-values have now been removed from table 1 as suggested by reviewer 2.

2. The paper includes too much discussion on mortality, as mortality is not the topic of the paper, most sentences on mortality could be omitted.

   We thank the reviewer for this comment and have edited the manuscript accordingly.

3. I would like to see some more about data, response rate etc.

   The number of individuals invited and response rate are now stated in the methods section.

4. Why SES of the unemployed was not measured using the last occupation?

   The number of unemployed participants was actually small (n=77) and thus would not allow for stable estimates. However estimates seem unlikely to be meaningful as in the UK the unemployed category includes aristocracy as well as those who are no longer in employment.

5. In the Discussion there is a comment on qualitative studies and references (41, 43), I think those are not qualitative studies. Next sentence on that page needs a reference.

   Sorry we had trouble with the referencing number system, this has now been corrected.
Disc... revisions
1. Table 4; Confidence intervals are enough, p-values are not needed
These have been deleted.

2. Table 3, no decimals needed (12.6 -> 13 etc.)
This has been changed.

3. Large data, almost all minor differences are statistically significant, it’s proper to look what differences are substantially significant.
Yes, we recognize this issue. We have now included Odds Ratios in table 3 to give an estimate of the effect size. Table 4 also gives odds ratios, illustrating the magnitude of the relationship between social class and odds of poor self-rated health.

4. ‘Active & moderately...’ should be ‘active and moderately...’.
This has been amended.

5. I missed the page numbers.
These are now inserted.

Reviewer 2:

1.0
General comment
The manuscript studies SRH related to three variables – social class, gender and age. These three variables are not systematically present in the relevant parts of the manuscript; authors are suggested to go through the manuscript and improve this at every relevant place in the manuscript.
Thank you, we have amended the manuscript where appropriate.

1.1
Abstract
* In Background gender should be mentioned.
This has been altered to include gender.
* Methods part is too short; it describes only the sample.
The method section has been expanded to include statistical techniques used.
* In Conclusions Age and Gender are not mentioned.
Age and gender are now mentioned in the conclusion.

1.2
Background
In the Aim of the study gender should be included.
This has now been amended.

1.3
Methods

1.3.1 Sample
25 639 men and women aged 39-79 years attended; how many were invited?
• 77,630 were invited to participate
• 30,445 completed the Health and Lifestyle Questionnaire
• of these 25,639 attended the health check.
We apologise for this omission, this information is now included in the methods section.
1.3.2 Measures
* Please give a reference for the SRH question, as it differs from the SF-36 SRH question.
* Please give a reference for the Health and Lifestyle Questionnaire.

References are now given.

1.3.3 Statistical Analysis
I will come to that later, but t-test, chi square and F-test are dependent from the sample size, which is large here. Additional analyses should be added to have a better picture to be able to assess the magnitude of the statistically significant differences.

1.4 Results
* Are there age and gender differences between the unknown number of non-participants (invited minus attendants) and the 25 639 participants?

4806 participants completed the initial questionnaire but did not attend the 1st health check. Some basic descriptive data is displayed in table 6 below. As expected there were some differences. Non-attendees were of a similar age to attendees. There were slightly more current smokers in the non-attendee group, as well as more manual class men and women. Self-rated health was generally lower in the non-attendee group.

Table 6: Descriptive characteristics of the 2094 men and 2712 women excluded from analyses for not attending the first health check

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable distribution</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td>2094</td>
<td>2712</td>
</tr>
<tr>
<td>Age in years, mean (s.d.)</td>
<td></td>
<td>59.0 (9.9)</td>
<td>59.8 (10.1)</td>
</tr>
<tr>
<td>Cigarette smoking habit - % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td></td>
<td>30.5 (631)</td>
<td>53.1 (1416)</td>
</tr>
<tr>
<td>Former</td>
<td></td>
<td>53.0 (1097)</td>
<td>31.8 (848)</td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td>16.6 (343)</td>
<td>15.1 (404)</td>
</tr>
<tr>
<td>Social Class, % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td></td>
<td>6.8 (139)</td>
<td>4.4 (112)</td>
</tr>
<tr>
<td>Manager</td>
<td></td>
<td>30.0 (610)</td>
<td>27.0 (694)</td>
</tr>
<tr>
<td>Skilled non manual</td>
<td></td>
<td>10.7 (218)</td>
<td>21.0 (539)</td>
</tr>
<tr>
<td>Skilled manual</td>
<td></td>
<td>31.3 (637)</td>
<td>23.5 (603)</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td></td>
<td>16.9 (345)</td>
<td>17.0 (436)</td>
</tr>
<tr>
<td>Unskilled</td>
<td></td>
<td>4.3 (88)</td>
<td>7.1 (183)</td>
</tr>
<tr>
<td>Self rate health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td>15.2 (314)</td>
<td>13.6 (363)</td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td>59.5 (1128)</td>
<td>57.3 (1527)</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>21.4 (441)</td>
<td>25.6 (682)</td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td>3.9 (80)</td>
<td>3.5 (92)</td>
</tr>
</tbody>
</table>
These tables show a lot of statistically significant differences; there are two main problems in these tables: which differences are statistically significant, and what is the size of these differences?

**The first problem is, that the authors do not provide us with information which differences (as an example) across social class groups are statistically significant (in table 1 within the group `social class` with its 6 paired different categories there is at least one significant difference between males and females). Additional analysis should be done here to provide the readers with a better understanding of the information in the table.

As due to the large sample size very small differences are likely to give small P-values, we would suggest to use 95% Confidence Intervals to present the outcomes as estimates of differences in the population instead of differences in the sample.

Example: The difference in the proportion of semi-skilled across gender is statistically not significant as the 95% confidence interval of the difference in proportion ranges from -.009 - .009. Although other differences seem significant at eye-ball evaluation, it is questionable whether they reach the suggested level of p < 0.001 as indicated in the tables.

à We strongly suggest to use the difference of proportions test for each category of social class, and categories of other variables. (see: e.g. http://www.answersresearch.com/proportions.php) or a calculator belonging to Statistics with Confidence.(3)

Differences in mean scores (age, body mass index) between social classes are obscured by representing one P-value. First, it is unclear where the statistically significant differences are allocated: between Professional and Semi-skilled? Or between Professional and Unskilled?  
à We strongly suggest to utilize MANOVA post hoc analysis with Bonferroni correction to avoid chance capitalization.

**As the tests performed in t1, t2a, t2b and t3 are dependent from the sample size, it is necessary to have a closer view on what is behind ‘statistically significant differences’. Where possible an Effect Size should be calculated to distinguish between ‘although statistically significant but trivial in size’ and ‘statistically significant and (larger than trivial)’. Apart from reasons of the sample size this type of analysis is also important because the authors state in their background: ‘Previous studies have reported a social class gradient in SRH but have not explored in detail the magnitude of this difference across classes (…)’, suggesting that they would go into this magnitude and calculate the Effect Sizes. In order to estimate the magnitude of the differences, we refer to the work of J. Cohen, especially the following chapters (1;2) 
à We strongly recommend to use the appropriate effect size estimates in tables 1, 2a, 2b and 3. As a result of such a additional analyses the text of the Results section related to these tables and in the Abstract, and possibly also in the Discussion will change.


We thank the reviewer for this comment. The aim of tables 1, 2a and 2b was to give descriptive details of the cohort in this study, not to compare characteristics by sex or social class, and P-values have now been removed from Table 1 as requested. Social class is an overall categorisation, it would be inappropriate to perform separate tests for each category. Where there are several categories, the appropriate statistical test is an overall chi-squared test, as included in tables 2a and 2b. Effect sizes are given as odds ratios in tables 3 and 4. These illustrate the magnitude of the association. For example table 4 shows that after adjusting for age, BMI, smoking, alcohol intake, physical
activity and education, unskilled workers were still more than twice as likely to report poor or moderate SRH compared to professionals (OR \(_{\text{men}} = 2.44\) (95%CI 1.69, 3.50); OR \(_{\text{women}} = 1.97\) (95%CI 1.45, 2.68).

**Discussion**

Please include gender in the very first sentences of the Discussion.

Thank you, gender has now been included.

**Limitations**

To overcome the last mentioned limitation it is necessary to know more about age and gender differences between the unknown number of non-participants (invited minus attendants) and the 25 639 participants.

Basic characteristics of those excluded due to non-attendance of the first health check are displayed in table 6 above. While there were some differences between these individuals and those who participated in the health check, we do not feel this is likely to cause bias as it seems unlikely that these people differ to those included in the study with respect to the relationship between social class and SRH.

2 Minor Essential Revisions

2.1 Title

The title is too long and should be shortened; furthermore I prefer to have ‘age’ in the title.

The title has been abbreviated.

2.2 Abstract

‘Background’ should be ‘Aim’

The instructions for authors specifically say to use Background, so we have left this as background, but are more than happy to amend if requested.

2.3 Results, text on Table 4

Please make clear for not-English persons what is Class I and Class V.

The Registrar General’s occupation based classification scheme has been defined more fully in the methods section of the text, and the classes have also now been labeled within Table 4.

3 Discretionary Revisions

3.1 Abstract

In S1 in the Results section a verb is missing.

Thank you, this has been amended.

3.2 Methods

Please add ‘Sample’ and ‘Measures’

Thank you, we agree this is clearer and have made the appropriate changes.

3.3 Measures

For the reviewer it is not clear why somebody who is unemployed is categorized as ‘unclassified’ and not categorised according to his former job; for women a similar question can be put – but in the end this is just curiosity.
This is discussed above in point 4 from referee 1, duplicated below:

The number of unemployed participants was actually small (77) and thus would not allow for stable estimates. However estimates seem unlikely to be meaningful as in the UK the unemployed category includes aristocracy as well as those who are no longer in employment.

3.4
Tables
Table 1
Remove ‘p’ from the last column (it is inconsistently used)
This has been removed.