Reviewer's report

Title: Multimorbidity and the inequalities of global ageing: a cross-sectional study of 28 countries using the World Health Surveys

Version: 2 Date: 3 May 2015

Reviewer: Eva Grill

Reviewer's report:

Thank you for giving me the opportunity to review this manuscript. This study investigates the global differences of the prevalence of multimorbidity among countries and world regions, a topic which is timely and of increasing global relevance. The study is well planned and based on sound data, and I congratulate the authors for approaching this problem.

My main concerns pertain to the presentation of background, methods and results, and to the methods of multivariable statistical analysis. Both could benefit from a more stringent focus on the main objectives of the study.

Major Compulsory Revisions

1. I propose streamlining the introduction section more along these lines, avoiding general statements such as “multimorbidity is a consequence of both the demographic and epidemiologic transition”. This sentence is obviously too general to be true. Multimorbidity on an individual level can be a consequence of increasing frailty, age, health services characteristics, lifestyle and many more; the increasing prevalence of multimorbidity on a societal level may indeed be caused by demographic and epidemiologic transitions. It is not surprising that the prevalence of multimorbidity varies with age and therefore differs among countries and regions with differing age structures. How these differences are modified by social status and GDP, however, is the main point and asset of this study. It might therefore be advisable to contrast factors that affect the presence of multimorbidity on the individual level (such as age, sex, education) with factors that may cause variation of the prevalence of multimorbidity among countries (such as GDP) in the narrative of the introduction and equally by considering this in the subsequent analysis.

Methods:

2. Please explain why this definition of multimorbidity was used and give an appropriate reference.

3. Please explain why data from the ELSA study was additionally used - if the purpose was to add data from other Western European countries you could also have used data from other comparable sources. It is obvious that different definitions of multimorbidity could result in other prevalence estimates. Showing this for the ELSA study is probably not informative for the overall objectives of the study.

4. SES is operationalized by using one single variable, education. It would
probably be more transparent not to talk about SES but about education.

5. Comparison of age-standardized prevalences could be compared and ranked more easily by calculating standardized ratios, e.g. by dividing each standardized prevalence by the overall world prevalence; analogous to the standardized mortality ratio, confidence intervals for these ratios could be calculated.

6. The authors report having calculated “prevalence ratios” to compare prevalences between SES groups per country. However, they also calculated univariate (logistic?) regression models for age, sex and SES, and report the resulting Odds Ratios in table 3. One is a ratio of percentages, the other a ratio of odds. Please explain why you would need both.

7. From the description it is difficult to see how the models were fitted taking into account the different levels of analysis, i.e. individual, country and region. Please consider using multilevel models for adjustment. This might lead to a more parsimonious analysis and to estimates that are more likely to be interpreted correctly.

Table 1: the second column of the variable sex is redundant, same for residence.

Table 3: what is the meaning of “empty”? The estimates presented here are Odds Ratios. So it would be more consistent to indicate the reference category instead of the column subheading “m:f”

Table 4: the column for the reference category is redundant.

Minor Essential Revisions
1. Urbanization is mentioned briefly as an additional factor; since this variable is not of consequence for further analyses, I propose leaving this factor aside.

2. Please check consistency of abbreviations (3rd paragraph of methods section: what is MM? 2nd paragraph of discussion: what is LMIC?) and reported decimal places (one is generally sufficient).

3. “Multivariate” is used for analysis methods such as factor analysis, in a regression context I recommend using “multivariable”.

4. Please explain all abbreviations (table 3: AOR)

Discretionary Revisions
1. Please give a reference for the calculation of confidence intervals of prevalences.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
I declare that I have no competing interests