Reviewer’s report

Title: Contribution of chronic conditions to functional limitations using a multinomial outcome: results for the older population in Belgium and Brazil

Version: 0 Date: 11 Aug 2017

Reviewer: G Wunsch

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As stated in the summary of a recent international research: "Ageing of the world's population is leading to a substantial increase in the numbers of individuals with sequelae of diseases and injuries. Rates of YLDs are declining much more slowly than mortality rates. The non-fatal dimensions of disease and injury will require more and more attention from health systems. The transition to non-fatal outcomes as the dominant source of burden of disease is occurring rapidly outside of sub-Saharan Africa" (Global Burden of Disease Study 2013 Collaborators, 2015).

The aim of the paper, namely to assess the main contributors to moderate and severe functional limitations in the older population in Belgium and in Brazil, is therefore worthy, and the results obtained interesting. In particular, this reviewer did not expect there would be such a difference among the two countries between the two categories of outcomes, i.e. that musculoskeletal conditions are the main contributors to the prevalence of functional limitations in men and women in Belgium, but only in men and women with moderate functional limitations in Brazil, while depression and heart diseases contribute most to the severe prevalence of functional limitations in men and women in the latter country. The paper is clearly written, the data and methods correctly described, the results discussed, and the consequences for public health policies pointed out in the discussion. Furthermore, limitations of the data sets are rightly stressed, such as for example the absence of longitudinal data and thus the possibility of reverse causation in some cases.

A first issue concerns the reasons for choosing Belgium and Brazil as objects of the study, which are not clearly given. Both start with a B, and the authors are either Belgian or Brazilian. But these two reasons would not, of course, be very scientific! A more substantial reason can be found in the Background section of the paper: "the burden of chronic conditions and functional limitations, common at older ages, have different impacts in high and middle income countries". The two countries would thus have been chosen as possible representatives of these two categories of countries, in order "to compare the contributions in a high and middle income country" (page 6). This reviewer would therefore appreciate knowing to what extent the choice of the two countries is relevant, possibly by comparing prevalences (e.g. of functional limitations and of chronic diseases) in Belgium and Brazil to those of other countries in these two categories. This would be helpful in knowing if the characteristics of the populations are more or less invariant or not across categories of countries, in other words if the choice of the two
countries is pertinent for the purpose of the study: Belgium as a representative case of high-income countries and Brazil as a typical example of the middle-income ones. The case for a possible generalization of some of the results of the study - one of the goals of scientific research - would be stronger in this circumstance. Still on this same subject, the population of Belgium - due i.a. to its small size - is surely much less heterogeneous than the huge population of Brazil, and policy measures in the public health field should take heterogeneity into account. Though sample size restricts the analysis, in addition to education (Table 2) more could possibly be said on population heterogeneity in the discussion, perhaps using additional sources of data too.

Another problem relates to the 'explanatory' variables, the chronic conditions themselves. The method allows for experiencing multiple chronic conditions but assumes no causal ordering among these conditions. Diabetes is a well-known factor of heart disease, depression could result from having cancer, etc. Possible interactions among diseases could in addition moderate (increase or reduce) the impact of each contributor on the dependent variable. Once again, longitudinal data would of course be useful here. The problem could be considered more thoroughly in the discussion.

A further issue is the major importance of the background contribution (see figure 2). The authors discuss (on page 8) what the background factor can represent, but - as it is by far the main contributor - could some more information be provided? What is, for example, the proportion of the population over 65 with functional limitations that does not present any of the diseases considered? How does this sub-population without disease possibly differ in other factors too, from the complement that does suffer from (at least) one of the diseases considered? Vice-versa, what is the proportion of the population suffering from disease that has possibly no functional limitations as declared? In other words, a better description - in the main text - of the sample populations, but also of the respective contexts in which they evolve, would be quite helpful indeed. It is sorely lacking in the present version.

Finally, two smaller points should be mentioned. Firstly, table 2 should not be included in the main text, as education is not incorporated into the model. The impact of this variable should be considered in the discussion section, among other possible factors not included in the model. Secondly, the older population living in institutions was included in the survey in Belgium but not in Brazil. Would it not have been preferable to exclude this population from the Belgian data set in order to improve comparability between the two populations? It does not seem to have been done here.

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