Author's response to reviews

Title: Prevalence and pattern of cognitive impairment in rural and urban populations from Northern Portugal

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Version: 2 Date: 12 May 2010

Author's response to reviews: see over
First we would like to thank both reviewers comments. They were helpful to clarify and improve some aspects of the manuscript. Nevertheless to correct the text according to reviewer Paulo R Menezes comments, tables and text were somehow changed and we added one more figure to portray sample and participants distribution by age and sex. We hope with these modifications the manuscript will conform to both reviewers perspective.

The answers to reviewers are:

**Reviewer Monique Williams**

Minor revisions
1) We have replaced “cognitive impairment without dementia” throughout the text by “cognitive impairment no dementia”.
2) indeed the adequate word was formally and it was replaced
3) It was replaced by “decreased in persons with higher levels of education”

**Reviewer Paulo R Menezes**

Major compulsory revisions
1. All the figures shown in the abstract were included in the text (see page 6), but not in tables. Table 1 was modified and now shows in the rural and urban areas – population, No of cases, prevalence and prevalence ratios. The conclusion was changed to follow directly from the results.
2. The estimate of prevalence used for determining the minimum sample size (mss) is now adequately stated in the text - 16% includes CIND and dementia. The procedure to calculate sample sizes in the two communities was: To estimate the mss in the rural population (n=710) and then to apply the urban/rural balance (38.4% and 61.6%) giving n=450 in the urban population. What we were trying to say is that with n=450 in the urban population we would have the same precision (2.5%) if the prevalence found was approximately 9%. We hope the text is now more clear.
3. The reasoning for the age range choice was added and is shown in the last sentence of the background when it is mentioned the objective of the study.
4. The chi-square text used was not the chi-square for association but the chi-square goodness-of-fit test. We wanted to test if after accounting for non-participation the distribution of the sample elements were not significantly different from the population, that is, the sample would continue to be “representative” of the population. If the sampling frame is adequate (health centres lists universal) the conclusion is identical to that obtained when comparing participants with non-participants, as you mentioned in the end of remark 10. We have substituted the previous comparison with that of participants and non-participants with respect to gender and age in the samples of each community. The text was changed in the data analysis paragraph and we decided to add Figure 3 to show the random sample and the participants within each community by gender and age. We hope now the comparison is more straightforward -
anyhow the conclusion is the same - in the urban environment women are overrepresented. This is further discussed in the discussion.

5. The comparison of rural and urban samples was deleted.

6. Both Table 1 and Table 2 were changed to accommodate the number of cases. Table 2 shows the number of cases of CIND and dementia in the total sample. Results on Table 1 represent the major objective of the study - CIND+dementia - in rural and urban populations (see abstract). Table 2 shows the pattern of severity for the overall sample and, given the results in Table 1, one might expect a similar rural/urban trend…. It would not be feasible to show a table full of rather small numbers (and probably with a lot of zeros for dementia). The objective of Table 2 is to show prevalence estimates that would be obtained in a Portuguese region resembling the rural/urban balance found in the country.

7. In general the pattern of association between cognitive impairment and socio-demographic and clinical characteristics is “identical” in both settings. Exceptions are represented in terms of prevalence ratios – the measure used to comment upon differences in the prevalence in the two communities. We added some comments on the specific population strata for which the measure deviates from the expected trend - a moderately higher prevalence ratio.

8. In the paragraph “data analysis” it was stated that “the importance of the rural/urban environment was tested by including interaction terms in the models using a stepwise procedure”. The text was modified to show that all interactions terms with the rural/urban variable were candidates in the stepwise procedure, but the only significant interaction was with age. Instead of a main effect of environment (rural always worst than urban), the synergy between age and rural/urban setting indicates that the contrast between the rural and urban environments varies with age, and the estimate of the relative risk attains the highest values in the oldest.

9. In this point we have kept more or less the whole text.

10. As mentioned previously we have added a comparison between participants and non-participants in terms of age and gender, the only information available in non-participants. The text has now a paragraph addressing a possible non-participating bias. But it is more likely that specially after 65 years of age, non-participants tend to be more cognitively impaired than participants. Anyhow as age is the more important predictor of cognitive impairment and the age distributions in both samples are not significantly from the Census population, the prevalence is more likely be underestimated instead of overestimated. But, as mentioned by Boersma F (International Journal of Epidemiology, 1997, vol 26:1055-62), the prevalence in the target population will hopefully be within the limits of the 95% confidence interval for the prevalence.