Author's response to reviews

Title: Sex and the city: differences in disease- and disability-free life years, and active community participation of elderly men and women in 7 cities in Latin America and the Caribbean

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Author's response to reviews: see over
Rose et al Covering letter and Response to reviewers

Many thanks for the valuable comments provided by reviewers. We respond to each individually below, but in general the paper has changed in the following major ways:

1) We have added a seventh “chronic disease/condition” and re-analysed the data (including re-modeling) for our disease indicator (presence of at least one of the seven) accordingly

2) We now include another disease indicator, that of “co-morbidity” (presence of two or more of these seven chronic diseases/conditions)

3) We also added “self-reported health status” to Table 1

As a result the Tables and Figures have changed, and significant portions of the text (Results, Discussion, Abstract, Methods) have been altered. The text, and especially the Abstract, are longer than before.
Reviewer 1: Peter R. Croft

1. Include survey response rates plus summary of the range of responses by city and by gender and by age

Thank you for your positive comments. Table 1 already details the summary you suggest (age and sex distribution of respondents by city) and a sentence has now been added to the beginning of the Results detailing the survey response rates by city (page 10, line 3). The first paragraph of the Results therefore now reads as follows:

The SABE questionnaire response rates were 63% in Buenos Aires, 65% in Montevideo, 80% in Bridgetown, 84% in Santiago, 85% in Sao Paulo and Mexico City, and 95% in Havana.[15] Table 1 details characteristics of the respondents in each of the seven capital cities. Overall, the mean age of participants was 70 years, with about 74% aged between 60 and 74 years; the majority (60%) were women.
Reviewer 2: Maria Victoria Zunzunegui

Thank you for your constructive and helpful comments. We respond to each individually below:

1. Every sentence using “effect” to be replaced by “association”

This has now been done throughout the article.

2. Authors should specify if questions phrased as “difficulty” (disability) or “needing help of a person” (dependency); and should specify how this was measured/categorized. Note that difficulty in performing IADLs is usually disability not limitations.

As stated in the section “Functional status” on page 7, we defined “disability” as those “having difficulty with” at least one ADL. This was compiled from all those who responded in the affirmative to the question of whether they “had difficulty with performing” at least one of the six ADLs. We have tried to make this clearer in the text. In addition, in response to the second part of this reviewer comment (as well as a comment by another reviewer), we removed the subsequent paragraph relating to IADLs (and all references to IADLs subsequent to this, including one entire paragraph in the Discussion, and Figure 1b). Our analysis now considers only ADL limitations. The paragraph describing Functional status on page 7 now reads as follows:

**Functional status**

We investigated limitations using six basic activities of daily living (ADL). These measure the independent performance of personal care tasks (dressing, eating, bathing, walking across a room, getting into/out of bed and using the toilet). They are useful for guiding clinical management decisions and care policies for the elderly[12], and are often used to measure lack of physical disability in the elderly. We created a summary “disability” indicator, defined as those who responded that they had had “difficulty in performing” at least one of the ADLs. This disability indicator was used to calculate disability-free LE.

3. Title suggests sex and gender perspective on disability; remove ‘gender’ from title or further develop paper to include gender-related variables.

The title has now been changed to:

Sex and the city: Disease- and disability-free life years, and active community participation of elderly men and women in 7 cities in Latin America and the Caribbean

In addition, “gender” has been replaced by “sex” throughout the paper, where it refers only to the sex of the participants.
4. Better to use “co-morbidity” (defined as presence of at least 2 chronic diseases) as an indicator of burden of disease in gerontology, as having just one chronic disease is the norm in people over 60 and is not sensitive enough to discriminate among those who are sick and those who are healthy.

We agree that a high proportion of those over 60 will have at least one chronic disease. However, there are difficulties in interpreting the analyses you suggest from this study. Firstly, as described by Guralnik in 1996, depending on which diseases are experienced together, different levels of functional limitation may be more, or less evident. Secondly, as a result of this, the whole (the effect of the two diseases experienced together) is often greater than just the sum of its parts (an interaction in statistical terminology). Finally, and importantly, the SABE study was a large cross-sectional survey which was not powered to investigate such interactions.

What we have done, rather than not presenting the analyses for “at least one disease”, we have kept our original analyses but have now included calculations for “at least two diseases” (co-morbidity). Tables 1, 3 and 4 therefore remain the same. Table 2 now includes an additional 2 lines (one for prevalence of “Co-morbidity”, and one for prevalence of “Both disability and Co-morbidity”). Table 5 now includes another line for active engagement for those with “Co-morbidity”. In addition, in response to another reviewer, we have also added a seventh chronic disease (chronic lung disease).

These have resulted in several additions to (or changes in) the text in the Results and Discussion sections.

5. Introduction

5.1. Sex differences in disability LE should be explored.

Thank you for the reference you provided. Sex differences in disability LE were explored and all articles reviewed showed similar results to ours, namely that women, although they may live longer, will spend a greater proportion of their older life with a disability than men. We have now added 3 additional references to the Discussion on this topic (Refs 18-20 in the second paragraph on page 14).

5.2. Review community engagement and disability e.g. longitudinal studies on aging populations.

Thank you for the 2 references you provided. Four additional references have now been added to the text of the Discussion and the following sentence has been added to page 15:

We show similar findings (more social networking associated with less disability) to those of longitudinal studies investigating social networking and disability in the elderly in different communities.[29-32]
6. Methods

6.1. More detail on the total SABE sample size and final sample size for analysis (e.g. excluded subjects due to missing data on GDS; if large, discuss selection bias in Discussion)

We have now included “missing data” as a footnote to each table. Non-response was 0 for age and sex, less than 2% for presence of individual diseases or disability and 6.2% for self-reported health status.

See below (response to comment 6.2) for our detailed response on GDS calculations, including non-response, and see response to comment 6.4 for our discussion on limitations, including selection bias.

6.2. Is GDS a continuous score of symptoms or dichotomous variable?

The Geriatric Depression Scale (GDS)

SABE administered the Geriatric Depression Scale (GDS) to assess levels of depression among participants. The GDS score can be between 0-15, with a score of 5 or more regularly considered to be indicative of depression.

We have used the GDS score as an adjustment factor when modelling the effect of disease or disability on ‘engagement with life’. In our analysis, we always used the GDS score as a continuous variable.

The GDS score suffers from high levels of item non-response. From the Table below, we see that 73% answered all 15 items, 17% answered 14/15 items, 10% answered 13/15 items, and so on. Of those that missed one or more items, the majority (2727/2897 or 94%) missed just 1, 2, or 3 items.

<table>
<thead>
<tr>
<th>Items</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
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<td>0.31</td>
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<td>35</td>
<td>0.33</td>
<td>0.95</td>
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<tr>
<td>11</td>
<td>69</td>
<td>0.65</td>
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<td>12</td>
<td>186</td>
<td>1.76</td>
<td>3.36</td>
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<td>10.13</td>
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<tr>
<td>14</td>
<td>1,824</td>
<td>17.21</td>
<td>27.34</td>
</tr>
<tr>
<td>15</td>
<td>7,700</td>
<td>72.66</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Total | 10,597 | 100.00
Our joint priority for our regression of ‘active engagement’ was to maximize information use, whilst minimizing bias. Among those participants missing 1, 2, or 3 GDS items, we scaled their scores according the number of items they did not answer. We arbitrarily chose “3 items” as the maximum acceptable level of item non-response, following a ‘scree-slope’ approach of missingness greater than 1%. So, for participants missing a single item, their scaled GDS score became:

\[(\text{Scaled GDS}) = (\text{original GDS}) + (\text{original GDS}) \times (15/14),\] and so on.

We used the scaled GDS in our regression models.

To assess the effect of this scaling on results, we performed a sensitivity analysis on the ‘active engagement’ regressions (men and women), using (i) the original GDS and (ii) all respondents answering 12 or more items, without scaling their GDS score.

The results of this sensitivity analysis are presented below, and they showed minor changes in regression coefficients. Moreover, these small changes lead to more conservative point estimates among our main variables of interest (disease, disability). Thus, our GDS scaling was able to increase numbers (and so offer increased precision) without adversely affecting point estimates.

**Table.** Sensitivity analysis of GDS scaling

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full information (N=7,759)</th>
<th>Unscaled GDS (N=10,206)</th>
<th>Scaled GDS (N=10,206)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or more Disease</td>
<td>1</td>
<td>1.091</td>
<td>1.094</td>
</tr>
<tr>
<td>Two or more diseases</td>
<td>1</td>
<td>1.061</td>
<td>1.063</td>
</tr>
<tr>
<td>ADL</td>
<td>1</td>
<td>1.208</td>
<td>1.212</td>
</tr>
</tbody>
</table>

6.3. More detail should be given on the construction of the community participation variable (how is weekly community contact measured? Does it include visiting a religious centre? Any evidence for ordinal nature of scale?)

We constructed a new variable, which we called ‘active engagement with community life’. The variable was designed to assess the participants’ level of contact with people beyond the immediate household. The variable has 4 categories or levels:

- **Level 1:** No weekly contact with other people
- **Level 2:** Weekly contact with other people
- **Level 3:** Regularly helping others with money or things (passive help)
- **Level 4:** Regularly helping others with services (active help)
- **Level 5:** Regular paid employment or voluntary work

The variable was defined and constructed as follows:

**Level 1: (no contact or infrequent contact)**
See or speak with offspring, siblings, other family, or friends less than once a week.
Level 2: (weekly contact)
See or speak with offspring, siblings, other family, or friends at least once a week.

Level 3: (passive help)
Giving money, or giving things (like food, clothing etc) to offspring, siblings, other family, or friends; ± Level 2.

Level 4: (active help)
Helping offspring, siblings, other family, or friends with services (such as transportation, housework etc), or childcare; ± Level 2 ± Level 3.

Level 5 (voluntary work or paid employment)
Provided services for free (to social services, children’s home, senior citizen’s centre, college or university, health centre, church, hospital, or other place), or worked for free or for payment in the past week; ± Level 2 ± Level 3 ± Level 4.

The variable was constructed such that Levels 1 and 2 were mutually exclusive, but additional levels may (or may not) include lower levels. This was unavoidable. We tried to create it so that there was a definite progression in active engagement from Level 1 to Level 5.

6.4. Life tables: WHO’s refer to countries but SABE data refer to urban areas; thus resulting DFLE calculations will be biased towards over-estimation of proportion of DFLE. Discuss this limitation in Discussion

This has now been done. The following 2 paragraphs have been added to the Discussion on page 16:

Our analyses had several limitations. Firstly, the data we used were from a cross-sectional study which was not powered to investigate interactions between variables. In addition, there could have been selection bias from non-response to the survey, which was below 17% for all but two of the cities, or from item non-response, although in general this was very low: below 2% for all variables analysed except self-reported health status (6%) and depression, which was adjusted by scaling for non-response; discussed in detail in the Methods. A sensitivity analysis (to assess the effect of this scaling on our results) led us to conclude that our GDS scaling was able to increase numbers used on the model (and so offer increased precision) without adversely affecting the point estimates.

In addition, to calculate disability-free, disease-free and co-morbidity-free LE, we used WHO life tables. These are created from WHO’s World Health Report data, using country-wide population estimates, while the data used in our analyses were taken from the elderly population in large urban centres (i.e. not including rural areas). Depending on the proportion of rural to urban elderly, and on whether rural elderly populations have longer or shorter disease-free (and other) LE than those in cities, this could have either resulted in an over- or underestimation of LE projections. Finally, our measure of community engagement has not been validated.
6.5. Why log-linear instead of linear model chosen for analysis of associations?

The dependent variable in our regression on disability-free LE was a count in years (number of years without disability). We were only able to calculate LE using aggregate data (country level official statistics). Thus we used a log-linear model. (In all of these models, we adjusted for the relative size of the population sub-groups by including the total number of years of life remaining.)

6.6. How are IRRs estimated for DFLE (as continuous variable?)? Please clarify title of Table 3; note that continuous dependant variables should be treated with multiple linear regression

We exponentiated natural logarithm regression coefficients from our log-linear model to arrive at our IRRs. We have clarified the title of Table 3 as suggested.

6.7. Test interactions between sex and depression and sex and disability (since consequences of disability and depression on community participation may be stronger for men than for women)

We agree that there may be different consequences of disability and depression in men and women which in turn affect their community participation. We have now re-analysed active engagement regression model separately for men and women (shown in Table 3). Note that we have also now included co-morbidity in this table.

7. Results

7.1. Is it possible that Mexico and Santiago have highest ADL prevalence and at same time longer DFLE (paragraph at top of page 10)?

The prevalence of ADL in Mexico City is only slightly higher than the regional average. The complication with Santiago is due to the interactions of sex and age. However, we realise that we made an error in our statement at the top of page 10, which now reads as follows:

Montevideo, Buenos Aires and Bridgetown were the only cities with longer disease-free LE than the regional average (and only for Bridgetown was this statistically significant). Santiago has statistically significantly less disease-free LE than the regional average.

8. Tables

8.1. Descriptive table of community participation hard to understand as assumes mutually exclusive items (is implicit ordering true?); comment on gender-specific distribution in Discussion (higher involvement of women in active help and men in active work)
Please refer to our response to query 6.3 for a comprehensive description of the community participation variable. We have added a further description of the items as a footnote to the table. A comment on higher involvement in women has been added to the Discussion (see response to query 9.2 below)

9. Discussion:

9.1. Re-write in terms of associations

“Effect” now replaced with “association” throughout.

9.2. Summary of main results (including community participation distributions and association factors) needed at beginning of Discussion

We agree that we had omitted to include a summary of community participation results in the Discussion. The first paragraph of the Discussion now includes sex distribution of community participation, as follows (page 14):

Although overall prevalence of active engagement was similar for men (77%) and women (74%), a greater proportion of men were involved in voluntary or paid work (46% vs 25%), while more women were actively helping others in the community (49% vs 32%). Active engagement diminished with increasing age and was limited by disability, any disease and co-morbidity. These associations were weakened by depression, although only for men did all associations remain statistically significant after adjustment for depression (for women, only disability retained statistical significance).

In addition, the following sentence has been added to the end of the first paragraph under the heading “Community engagement” in the Results section on page 12:

In all cities approximately one-third to one-half of all men maintained the highest level of active engagement (having paid or voluntary employment). In contrast, this level of engagement was maintained by about one-fifth of women in all cities except Havana, where fewer than one-tenth had paid or voluntary employment.

9.3. Section on methodological limitations (specifically selection and measurement bias) needed

This has now been done (see earlier response to comment 6.4).

9.4. Evidence of low social integration as RF for disability available from longitudinal studies on ADL incidence; in addition disability is an outcome of depression (Pennix et al, using EPESE data)

Thank you for providing this reference. We have now included it and have altered the paragraph at the top of page 16 to read as follows:
Depression increases the risk of functional ability in the elderly, due to decreased physical activity and less community engagement[34,35]. However, depression might also occur as a result of disease-related disability. It is also possible that this condition plays a part in modifying survey responses.

9.5. IADLs strongly influenced by gender; are they comparable across countries? More clarification needed.

Based on this and an earlier comment by the reviewer, as well as another reviewer’s comments on confusion between “disability” (ADL) and “IADL” measures, we have decided to remove the analysis of IADLs (described in earlier response to comment 2 of this reviewer).
Reviewer 3: Shahin Shooshtari

Thank you for your constructive and helpful comments. We respond to each individually below:

1. Both “sex” and “gender” used in the title – confusing.

The title has now been changed to:

Sex and the city: Disease- and disability-free life years, and active community participation of elderly men and women in 7 cities in Latin America and the Caribbean

In addition, “gender” has been replaced by “sex” throughout the paper, where it refers only to the sex of the participants.

2. Background

2.1. At the end of the section, authors mention investigating two aspects of active aging; not clear what these are. Should be clearly stated.

You are right; we have tried to clarify this by stating the aspects, and have re-written the last paragraph of the Background on page 5 as follows:

Taking as a framework the Rowe and Kahn model, and the WHO definition, we investigate two aspects of active ageing in the LAC region using data from seven urban centres: levels of (1) disease and disability; and (2) active engagement in the community.

2.2. This paper is lacking information on similar research outside the LAC region.

We have added 6 further references and included these in the Discussion which has been amended and now reads as follows (page 15):

Our results confirm those of others which have shown that, despite their longer expected life, women could expect to spend more of it with reduced functional capacity than men[16-20]. Although not much is known about disability rates in LAC countries at the national or regional level, some preliminary data on ADL levels in the region have been published[21], and similar results to ours were demonstrated for Brazil, using the SABE dataset[22].

Other studies on LAC elderly, while not considering LE, have investigated disability[23] or disease, finding sex differences in functional impairment[24,25], and association of disability with some chronic diseases[26-28]. Few of these studies, however, considered all countries involved in the SABE study[23,26] and ours is the only analysis of disability-free LE that includes the whole LAC region. We show similar findings (more social networking associated with less disability) to those of longitudinal studies investigating social networking and disability in the elderly in
However, to our knowledge, this paper is the first to estimate community engagement as part of a definition of active ageing in the LAC region.

3. Methods

3.1. More detail needed on data source, e.g. who conducted the survey, how were participants recruited?

We have explained that the methodology (which includes participant recruitment) is described in detail in other publications. However we now add the following sentence about who conducted the survey to the first paragraph of the Methods on page 6:

The study, which received technical support from the Pan American Health Organisation (PAHO), comprised a research team which included members from PAHO, the University of Wisconsin–Madison, and local investigators from each collaborating city.

3.2. Questions and concerns about measures used:

• Why is arthritis studied separate from the other 5 chronic conditions?

Arthritis was not studied separately. We simply listed it separately as “5 chronic diseases and arthritis”, because of semantics. However, hypertension could similarly be queried as a disease vs a risk factor, or a ‘condition’. We have therefore changed part of the last paragraph on page 6, also adding a further chronic condition (see response to next query below), as follows:

Participants had been asked whether a doctor or nurse had ever told them that they had any of seven chronic diseases or conditions (diabetes, cancer, hypertension, heart problems, stroke, arthritis or chronic lung disease). We then created two summary disease indicators, which recorded whether a participant had reported having (a) at least one of these (‘disease’); or (b) at least two of these (co-morbidity).

(Note that we have now also included analyses for “Co-morbidity” [at least two diseases], as requested by another reviewer.)

• What is the rationale for the chronic conditions selected?

Heart disease, cancer, stroke and diabetes are the four major chronic diseases in the LAC region, according to PAHO. We added arthritis because we were investigating association with disability. Hypertension was selected due to its high prevalence in LAC and because it is a risk factor for many of the other chronic conditions.

• Are any important chronic conditions missing? (e.g. dementia) What is the rationale for not including dementia?
By ‘missing’, if you mean that data for this condition were collected but not analysed by us in this study, then yes, one important chronic condition was missing: respiratory disease. However, after your comment, we have also now decided to include chronic lung disease (one of the top 5 chronic conditions in the LAC region, according to PAHO) and have re-analysed all data accordingly.

A cognitive evaluation was made by the interviewer prior to starting the survey (which could indicate dementia). We did not intend this to be a comprehensive investigation of all chronic conditions of the LAC elderly, and had selected the main chronic conditions which could lead to disability (which is why we had not included dementia).

- Is there another health measure (e.g. self-rated general health status) which could be reported for study participants? (Rather than health as a summary of ‘disease’ indicator.)

Yes, information was collected on self-rated general health status. This has now been added to Table 2.

3.3. “Disability-free” and “IADL-free” LE terms are confusing

This is now no longer an issue as we have removed all analyses including IADLs and retain only ADL analyses in the paper.

3.4. Community engagement: more information on validity/reliability of this scale should be included

Please see our response to query 6.3 from the previous reviewer.

3.5. Why have researchers only controlled for depression? Are there any other important factors to be controlled for? (e.g. social support and network)

Social support and network are part of our dependent variable (active community engagement) so it would be confusing to also control for these in the dependent variable.

4. Results

4.1. Revise if you use other measures of health status or chronic disease

We have now revised our Results to include (a) self-reported health status (line added to Table 2); (b) seven (rather than 6) chronic conditions (all analyses re-done); and (c) co-morbidity (two or more diseases/conditions) (additional analyses).

5. Discussion

5.1. Findings need to be better discussed in relation to prior research on the topic in countries outside the region; further discussion in relation to scales used to
measure the same concepts, e.g. community engagement or choice of chronic disease

Additional references added (see earlier response). Chronic disease choice now reflects all seven chronic conditions asked about in the survey (apart from dementia; see response to earlier query). Further detail on construction of community engagement variable added to footnote to Table 4.

6. Minor essential revisions
   6.1. Spell out LE first time it’s used

   This has now been done, both in the Abstract (page 2) and the Background (page 7).

   6.2. Inconsistencies in the reference list: titles in brackets []

   This is standard format (when using Reference Manager) for articles which are in language other than English (BMC prefers us to use Reference Manager, and this format is created automatically).

   6.3. On page 10, last paragraph, OR for age-groups, the last one should be “85 years and over”

   Thank you – this has now been done.

   6.4. On page 12, last line, add year to McGuire et al.

   This reference was removed, as it referred to IADLs and these analyses have now been taken out of the paper (see section 3.3 earlier).
Reviewer 4: Kyriakos Markides

Thank you for your very supportive and positive comments. We respond to each individually below:

1. Change sentence to read “… both disability-free and disease-free” to avoid confusion.

   This has now been done.

2. Change “functional limitation” to “disability” on page 10

   This has now been done.