Reviewer’s report

Title: The Associations of Multimorbidity with the Sum of Annual Medical and Long-Term Care Expenditures in Japan

Version: 0 Date: 15 Nov 2018

Reviewer: Xiaoyin Li

Reviewer’s report:

This study was aimed to examine the association between the multimorbidity and the sum of medical and (long-term care) LTC expenditure. The author also introduced the medical insurance system and different levels of LTC in Japan. The main findings indicate better ways to evaluate the economic burden caused by multimorbidity on a rapidly aging society. The manuscript is well-written and this reviewer only has the following concerns:

1. First paragraph: Please spell out OECD in the first sentence, so people will know what is OECD countries.

2. On page 5, the "overview of healthcare and long-term care insurance systems" should be moved ahead to the introduction session.

3. On page 8, why age was dichotomized into two categories? Why age 86 is the cutoff age? Why examine household income? How to define low-income v.s. middle-to-high income group? Rationales for examining age and household income need to be introduced.

4. On page 9, "The mean medical expenditures, LTC expenditures, and the sum of these expenditures for 12 months were ¥1,086,000 ($12,340), ¥ 716,000 ($8140), and ¥370,000 ($4200), respectively (n=30,042; Figure 1, Table 2)." First of all, the order for the mean expenditures is incorrect. This sentence is redundant because the statistics were reported in table 2.

5. For the majority of participants (even when they have CCI score of 5 or higher), LTC was not required. This issue raises some questions. For example, who and how were levels of LTC evaluated and designated? Is there any evaluating scale in addition to CCI? Maybe the occurrence of multimorbidity is not the best way to determine medical expenditures. The severity of chronic diseases should also be considered.

6. For the analysis examining the association between CCI scores and 7 levels of LTC, the outcome is zero-inflated. Zero-inflated Poisson regression might be a better approach.

7. In the discussion session, it will be helpful to know whether there is any debate on whether LTC is beneficial to society and whether it should be introduced to other countries.
8. Please double check the number in table 2 the US dollars for inpatient care and outpatient care don't add up to 8140.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

**Declaration of competing interests**
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?
5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal