Author's response to reviews

**Title:** Is the health of people living in rural areas different from those in cities?
Evidence from routine data linked with the Scottish Health Survey

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**Version:** 2 **Date:** 28 December 2011

**Author's response to reviews:** see over
Dear Dr. Flory Mae Calumpita,

Ref: Is the health of people living in rural areas different from those in cities?
Evidence from routine data linked with the Scottish Health Survey

We would like to thank you for considering our manuscript, and for providing such useful and constructive comments. We have carefully considered the points raised, and have modified the paper to address each of them as follows:

**Comments from Reviewer 1**

**Title:** Is the health of people living in rural areas different from those in cities?
Evidence from routine data linked with the Scottish Health Survey

**Version:** 1  **Date:** 1 December 2011

**Reviewer:** Sarah-Anne Munoz

**Reviewer's report:**

Minor Essential Revisions

1. In the background section it would be useful to make more explicit comment about why it matters to know whether there are urban-rural health differences.

**Authors’ Response:** We have made this explicit in the revised manuscript. We have added the following text in the Background section.

The Scottish NHS resources allocation formula (The Arbuthnott Allocation Formula) is the first in the UK to include a cost adjustment for remoteness and rurality [28]. And the Kerr report highlighted that the rural population tends to have a significant proportion of older people who often have chronic diseases and do require more health care [29]. There is however, limited empirical evidence to indicate whether health outcomes are significantly different between rural and urban Scotland. Using objective health outcome measures, this study will shed light if there are significant differences between people living in rural and urban areas in Scotland.
2. In the final paragraph on page 4 can you say why these are the outcome measures?

Authors’ Response: In Methods section under Data Sources sub-section, we presented that the main focus of the Scottish Health Survey (SHS) was on cardiovascular disease. We therefore included admissions due to coronary heart disease (CHD) and hypertension as health outcome measures. The SHS is linked to death records from the General Register Office for Scotland. We therefore included mortality which is usually used as an overall health outcome indicator. We have edited the following text in the Background section. (In the final paragraph on page 4)

The main focus of the Scottish Health Survey (SHS) was on cardiovascular disease. We therefore included admissions due to coronary heart disease (CHD), total hospital stays and hypertension as health outcome measures. The SHS is linked to death records from the General Register Office for Scotland. We therefore included mortality which is usually used as an overall health outcome indicator. The outcome measures were hypertension, all-cause mortality, hospital admissions due to CHD and total hospital stays.

3. Did you find the SEURC appropriate to your study? Can you make comment about how it influenced the results that you present? Would other boundaries have produced different results?

Authors’ Response: We believe that the SEURC was selected as a pragmatic definition of rurality in this study [1]. The advantages of using this classification included:

- It takes on board several indicators that are likely to be associated with economic issues, such as the dispersed nature of the population lacking economies of scale and large travelling times affecting access to care);
- Its availability at national level enabling linkage to other routinely collected national datasets base to examine the relationship between rurality, health, health care provision and utilisation;
- It is being increasingly used in many studies [2-7];
- It is an appropriate generic definition to describe the variance in the characteristics of the populations living in remote rural areas, the practices serving them, and variations in health and health care between rural and urban areas; The
classification enabled to analyse individuals in terms of their rurality and urbanity versus their remoteness and accessibility (Scottish Executive, 2003).

Due to space limitations we could not discuss in detail such advantages of using SEURC. We included the following statement in Data Sources: Definition of Rurality section.

The SEURC was selected as a pragmatic definition of rurality in this study. Its advantages include: it takes on board several indicators that are likely to be associated with economic issues, such as the dispersed nature of the population lacking economies of scale and large travelling times affecting access to care; it is available at national level enabling linkage to other routinely collected national datasets base to examine the relationship between rurality, health, health care provision and utilization; it is an appropriate generic definition to describe the variance in the characteristics of the populations living in remote rural areas, the practices serving them, and variations in health and health care between rural and urban areas; it enables analyzing individuals in terms of their rurality and urbanity versus their remoteness and accessibility [57]. The SEURC is being increasingly used in many studies [6;8;9;22;58;59].

Can you make comment about how it influenced the results that you present?
We have included the following text in the Discussion Section.

The SHS linked to the SEURC over-sampled rural areas in order to provide sufficient sample sizes within each region. The SHS also provided Sampling weights to account for the sampling design and non-response bias. These gave us enough population in remote rural areas and made our results robust. Both surveys over-sampled rural areas in order to provide sufficiently large sample sizes within each Local Authority. Our analysis used weights provided by the surveys to account for the sampling design and non response bias. We overcame the limitation of area-based analyses by looking at individual-based socio-economic characteristics.
Would other boundaries have produced different results?

We have not compared our results to another urban rural classification used in Scotland. To the best of our knowledge, this is the only national urban-rural classification widely used in Scotland. Other rural-urban classifications designed for different study-purposes will be too narrow to be compared with national measures.

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests: I declare that I have no competing interests.