Reviewer’s report

Title: An exploratory spatial analysis of geographical inequalities of birth intervals among young women in the Democratic Republic of Congo (DRC): a cross-sectional study

Version: 2 Date: 12 March 2014

Reviewer: Nicola Wardrop

Reviewer’s report:

I am not familiar with the literature within the field of maternal health and contraception, so I can’t comment explicitly on how this paper will fit with the existing literature in this field. I found it an interesting paper, although there are some areas which need further work as detailed below.

The background sets up the paper well in terms of the importance of the topic and also the requirement for a spatial approach, although a bit more proof reading and editing might help to clarify the overall structure and information. The description of how birth intervals (and contraceptive use) can vary geographically, the potential reasons for this, and the importance of an understanding of this for better design of family planning facilities, could be strengthened.

In terms of the methods and results sections, I feel that the use of the terms “spatial analysis” and “spatial modelling” are overstating what has actually been done, and the work may be better framed as an epidemiological analysis which also accounts for the region of residence. In general, the statistical methodology is unclear and needs to be rewritten to ensure that readers understand clearly what statistical methodology has been used and how it was implemented. This is also necessary in the results section as it is currently unclear what methods were used to generate each of the results presented. As far as I understand what has been done, the methodology seems to be robust, but it is difficult to accurately assess this without a clearer description of the methods.

The discussion section could also benefit from some restructuring to ensure that the main points stand out – as it is, it is difficult to assess which are the main findings of the paper. The title indicates that the geographical aspect is the main point, but in terms of the methodology and results this is really only a small part of the overall analysis, so perhaps needs to be put a little more into context with the other information. The discussion has not considered the limitations of this work – a section should be added considering, for example, how representative the sample population was of each of the provinces.

Overall, the paper needs a thorough edit to make sure (1) logical structure and flow of the work and (2) clear description of the statistical methods and results.

Major corrections
1. Methods, study population, page 5: as this research draws attention to spatial aspects, it would be beneficial to include a brief description of the study area – e.g. is it the whole of the DRC? Describe some major factors of relevance such as broad socio-economic patterns or ethnic variability that might impact on contraceptive use. Also some information on the spatial distribution of the women included in the study would be useful either here or at the start of the results section (i.e. sample size per province and how spatially distributed they are across the provinces). I am a bit concerned at the lack of information on the spatial distribution of survey participants – how many locations were used per province? If this was a small number then it is more likely that the results would be non-representative of the province as a whole. Information on this is required in the methods or result, and some discussion on the impact of this on the representativeness of the data should be added to the discussion section.

2. Methods, statistical analysis: The statistical approach is not clearly described and needs to have some re-structuring and rewording to ensure clarity in the analysis. The description of clustering in the data may be better if it was moved earlier in the methods section (study population part), with the statistical analysis section only providing the detail of the statistical methods used. The description of the statistical model used should be much clearer, and this may be aided by including the model formula in statistical notation. It is difficult to understand the order in which parts of the statistical analysis were carried out – e.g. the chi-squared and Mann Whitney tests and standard logistic regressions are described last, although it seems that these would have been performed prior to the geo-additive model. In addition, there needs to be more clarification on the use of Bayesian versus non Bayesian analysis – this is briefly mentioned, but I am unclear why both approaches were used, and how (or if) they differed other than in the inference method.

3. Results: The order of the results reported should match the order of the methods described in the methods section, which doesn’t appear to be the case, making it more difficult for the reader to understand which methods the results are coming from. I am also uncertain where the results from the Chi-squared and Mann-Whitney tests are. These need to be included if they are not already.

Minor corrections

4. Background, page 3, 2nd paragraph: “Women in developing countries have shorter birth intervals than they would prefer” – do you mean shorter than would preferable in terms of health, or shorter than the women would (personally) prefer? This is a little confusing and could be reworded for clarity.

5. Background, page 3: “an analysis of 52 Demographic Health Survey data (DHS)” – consider rewording as “an analysis of data from 52 Demographic Health Surveys (DHS)”. And I assume this is from 52 different countries? If not, please clarify.

6. Background, page 3: “54.3% of the previous intervals between births” – I’m not quite clear what you mean by “previous” intervals here. Do you mean prior to 2008?
7. Background, page 4: “However, for the same countries, for example in Uganda,” – this statement doesn’t follow on well from the preceding information. E.g. the 25% of women with short birth intervals could be different from the 34% of women who would like to delay pregnancy. This could be reworded.

8. Background, page 4: “births which are either early, late or too close together” – it is not clear what early or late births relate to, when previously it was only short birth interval that was being considered. Also, here it would be good to compare the maternal and infant mortality rates with comparable rates with long birth intervals.

9. Background, page 4: There are quite a few points where references are needed in the text – e.g. “Latest DHS results published in 2012 still show high levels of short birth intervals in many African countries (Uganda: 25.3%; Ethiopia: 20.4%; Rwanda: 20.0% and Cameroon: 21.3%)”. “34.3% of women aged 15-49 years want to delay the time to have a child or more children but are not using any method of contraception”. “The last 2007 DHS result have revealed that births”…etc

10. Background, page 4: “Although the DRC, for example, is covered by many different cultures with different geographic characteristics” could be reworded as “Although geographical variations in demographic and socio-economic factors exist in the DRC…” or something similar

11. Methods, covariates, page 6: The map of DRC should be Figure 1, not Figure 2.

12. Methods, covariates, page 6: “We experimented with interaction terms which proved non-significant.” This should come after a description of the statistical analysis methods rather than in the covariates section and more details are required.

13. Methods, statistical analysis, page 6: DMPA needs to be defined on first use.

14. Methods: “To account for spatial autocorrelation” – do you really mean spatial autocorrelation, or do you mean lack of independence due to the cluster sample design, as these are different things.

15. Methods: “Adjusted (marginal) ORs of short birth intervals” it is not entirely clear here what is meant be adjusted – adjusted for what? The cluster sample design, or other covariates?

16. Results, page 8: “The results in Table 1 shows that there was a statistical significant association” – it is not clear which analysis these results come from.

17. Results: some tidying up of the results section is needed e.g. there are several paragraphs which are only one or two sentences.

18. Results, table 1 and 2: It is not clear why Bayesian and non-Bayesian results are both displayed, nor why for each of these the covariates for which ORs are presented is different. This needs to be better described in the methods section.

19. Discussion: “The study does not show an association between the use of modern contraception and birth spacing, which is not surprising for this sample because the proportion of users of traditional contraceptive methods are similar
to those using modern contraceptives.” This sentence does not make sense to me – why would the proportion of women using modern vs traditional contraceptive methods being similar make any difference? This needs to be reworded to make your point clearer.

20. Discussion: “The study shows that short birth intervals are equally the same for women in rural and urban areas” – this contradicts what is reported at the start of the results section (relating to table 1).

21. Discussion: “which point to the importance of the spatial analysis for the DRC with an on-going conflict and a generalised poverty” – this is an unclear statement. It is not clear what the on-going conflict or generalised poverty have to do with the importance of spatial analysis.

22. Discussion: “The study is in contrast to the existing literature, which shows that better social services and access to information, education and employment opportunities have brought about a variation birth in spacing by residence” – This needs clarification that you are now specifically talking about better services, education etc available in urban areas.

23. Discussion, page 13: “On the other hand, as the mothers get older, the proportion with short birth intervals decreases, which is expected but clearly depicted by a nonlinear curve in this study.” – this is restating the same information as the previous sentence and can be removed.

24. Discussion, page 13: “As opposed to results for all women, the young women’s short birth intervals are associated with the region of residence, household economic status and age. In fact, education is not associated with birth intervals among young mothers.” – this paragraph does not stand up on its own and would be better integrated with the discussion of results for all women, highlighting where the difference is. It would also be interesting to consider potential reasons for the difference between all women and young women results.

25. Discussion, page 13: “What is new and novel, using the spatial modelling, is the quantification of the spatial effects by highlighting provinces” – I think the description of the spatial aspects of this work have been over-stated. I wouldn’t describe this as spatial modelling or spatial effects.

26. Need to check for consistency in use of terminology throughout (e.g. province versus region).

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
I declare that I have no competing interests