Author's response to reviews

Title: Information for decision making from imperfect national data: tracking major changes in health care use in Kenya using geostatistics

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Author's response to reviews: see over
Dear Editors,

Thank you for your response to our second submission of the above manuscript. I attach a further revised version. In line with the further recommendations of the reviewer and editors we have made a series of modifications and additions throughout the text and these are listed below.

“please can you clarify if ethical approval was obtained for the use of the source of the data”

We have added the following statement in the Data section of the manuscript:

“Ethical approval for this study was provided by the Kenya Medical Research Institute (KEMRI SSC 659).”

“the referee expressed concern that for comments 2, 3 and 5, although the answers were discussed in the cover letter, they are not fully addressed in the text of the manuscript. We would appreciate if this could be implemented.”

(2) Question from reviewer: Would the best approach be to combine a multiple imputation approach with the geostatistical paradigm? Would it be possible to make a prediction based on both the characteristics of the facility and its space-time position?

(3) Question from reviewer: Was the size of the facility directly taken into account to predict the number of cases?

We have further responded to points 2 and 3 as follows:

As stated in our original response, and in the original manuscript itself, the data were not available to support any incorporation of a multiple imputation approach. We did know the facility type and this was incorporated in our approach by building separate geostatistical models for each type. In order to stress these points added to and modified the third paragraph of the Methods section as follows (additions underlined):

“Although the class of each facility was known (e.g. hospital, health centre, dispensary), reliable and consistent nationwide data on service provision levels at each facility (such as number of beds and practitioners, services provided, financial data) were not available. However, the location in space (georeferenced coordinates of each facility) and time (indexed by month) of both data and missing data was known and this allowed the prediction problem to be set in a space-time modelling context, with separate models developed for each of the three facility classes.”
(5) Question from reviewer: Of course there is temporal autocorrelation in the number of cases for a given facility (which is probably explained by the facility size). But was there some spatial autocorrelation? On what spatial scale (in kms)? What was the range of correlation? In case of absence of spatial autocorrelation, borrowing strength from the neighbours would be inefficient.

We have further responded to point 5 as follows:

In addition to the text added previously in the fourth paragraph of the Methods section (clarifying that space-time geostatistical techniques rely on the presence of spatial and temporal autocorrelation in the variable of interest), we have added further text in the fifth paragraph to confirm that both spatial and temporal autocorrelation were indeed observed, and to explicitly direct the reader to the appropriate reference:

“This approach exploited spatial and temporal autocorrelation present in the observed outpatient counts. Full details of this geostatistical analysis and variography has been presented previously [28].”

We agree that details such as the spatial scale of autocorrelation are important, but believe that, since these are presented formally elsewhere, an explicit signpost to the relevant publication is both sufficient and appropriate.

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We hope that these responses meet your requirements and we very much look forward to hearing from you in due course.

Yours sincerely,

Dr Peter Gething