Reviewer’s report

Title: Geographic variation in sexual behavior can explain geospatial heterogeneity in the severity of the HIV epidemic in Malawi

Version: 0 Date: 15 Nov 2017

Reviewer: Henry Mwambi

Reviewer’s report:

The paper addresses a very interesting phenomenon related to the spread of HIV in Malawi and Sub-Saharan Africa as whole where the transmission is primarily heterosexual. The authors used geo-referenced HIV testing behaviour data from the Malawi Demographic and Health survey data of 2010 to spatially model HIV prevalence to help explain spatial heterogeneity in the severity of HIV epidemic in Malawi as a function of a variable which the authors call the high-risk group (HRG) that the group with the highest number of sex partners. The model was very informative giving insight on some hidden drivers of the epidemic. The spatial model is sound including the use of spatial error regression to evaluate the performance of the model. I this commend the authors for coming with such a clear easy to read paper yet very key in addressing key questions that drive the HIV epidemic in the sub-Saharan Africa region.

A minor but important comment which I would like the authors to address relates to model equations Eq. 2 and Eq. 3. It is important to note we are modelling a probability and if you ask me I would propose using a logistic regression for a probability such prevalence. My concern is that how do can one ensure the models as formulated cannot lead to ill conditioned (negative) predicted prevalence that p < 0. With logistic regression one is always sure that p greater than or equal to zero.

An additional comment is the inclusion of other covariates apart from HRG nonetheless I commend the authors because they did carry out a stratifies analysis with gender, against HRG and prevalence including spatial error regression maps separately for males and females.

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

Yes

Does the work include the necessary controls?
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Unable to assess

Are the conclusions drawn adequately supported by the data shown?
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Yes

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I am able to assess the statistics

Quality of written English
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