

PEER REVIEW HISTORY

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This paper was submitted to a another journal from BMJ but declined for publication following peer review. The authors addressed the reviewers' comments and submitted the revised paper to BMJ Open. The paper was subsequently accepted for publication at BMJ Open.

(This paper received three reviews from its previous journal but only two reviewers agreed to published their review.)

ARTICLE DETAILS

TITLE (PROVISIONAL)	Predictive and Spatial analysis for estimating the impact of Sociodemographic factors on Contraceptive use among Women Living with HIV/AIDS (WLWHA) in Kenya: Implications for Policies and Practice
AUTHORS	Okoli, Menkeoma Laura; Alao, Samuel; Ojukwu, Somtochukwu; Emechebe, Nnadozie C; Ikhuoria, Asuelimen; Kip, Kevin E

VERSION 1 – REVIEW

REVIEWER	Silviya Nikolova Medical University Varna, Bulgaria
REVIEW RETURNED	18-Jul-2018

GENERAL COMMENTS	<p>First, let me congratulate the authors on a very interesting manuscript that employed spatial methods to study HIV and related variables. Using an innovative data analysis approach, this study highlights the geographical clustering of sociodemographic and behavioral factors that impact HIV risk. I am confident that after a few additions/edits this study stands to make a contribution in understanding HIV in Kenya.</p> <p>Abstract: what are "these groups?" please make it clear</p> <p>Introduction</p> <p>The author/s mention in the abstract the potential implications for policy and their health impact of non-condome use on WLWHA in Kenya. However, what is missing in the background section of the paper is some discussion on what is being done by the Kenya national HIV program, using UNAIDS EPP models to estimate national and county HIV prevention and treatment needs. This might give a better picture of the context in order to understand the existing gap.</p> <p>Methods:</p> <ul style="list-style-type: none"> -Does the study have IRB? -The KDHS 2008/9 is too old data (almost 10 years). A newer DHS dataset is available for KAIS 2012. Please provide a better justification for using KDHS 2008/9. - Why have the author/s chosen Getis-Ord General G and not other methods fro special clustering? <p>Implications</p> <p>This is the section of the paper where I think authors should invest time and discuss and compare their findings with similar studies done in SSA.</p>
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	<p>Waruru, A., Achia, T. N. O., Tobias, J. L., Ng'ang'a, J., Mwangi, M., Wamicwe, J., ... Tylleskär, T. (2018). Finding Hidden HIV Clusters to Support Geographic-Oriented HIV Interventions in Kenya. <i>Journal of Acquired Immune Deficiency Syndromes</i> (1999), 78(2), 144–154. http://doi.org/10.1097/QAI.0000000000001652</p> <p>Achana, F. S., Bawah, A. A., Jackson, E. F., Welaga, P., Awine, T., Asuo-Mante, E., ... Phillips, J. F. (2015). Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. <i>Reproductive Health</i>, 12, 29. http://doi.org/10.1186/s12978-015-0017-8</p> <p>Chimoyi, L. A., & Musenge, E. (2014). Spatial analysis of factors associated with HIV infection among young people in Uganda, 2011. <i>BMC Public Health</i>, 14, 555. http://doi.org/10.1186/1471-2458-14-555</p> <p>Knowing that there are other studies on the topic of research , I advise author/s to rephrase the statement on p.4, line 40: "Moreover....."</p>
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REVIEWER	Marcela Gomez-Suarez Universidad Nacional de Colombia Bogotá -Colombia
REVIEW RETURNED	16-Aug-2018

GENERAL COMMENTS	<p>In this paper the authors present a novel and interesting approach for estimating the impact of sociodemographic factors on Contraceptive use among Women Living with HIV/AIDS in Kenya by using statistical and spatial analysis to explore cluster tendencies of these factors on contraceptive use.</p> <p>The manuscript is well-written, clear and easy to follow even though technical language is frequently used.</p> <p>Comments: In the summary, the authors state that one of the main focus of the study is to "create a robust model to identify clustering tendencies". I couldn't find in the article's text any additional information regarding the proposed model.</p> <p>Limitations of the study could improve in the summary and the discussion. Although the KDHS was the only reliable source for the study, cross-sectional designs, when used as sources of information, have more limitations than just the direction of causality.</p> <p>The discussion section could also improve by giving additional information that justifies affirmations such as:</p> <ul style="list-style-type: none"> - "Decreased use of contraceptives might suggest lack of accessibility and affordability of contraceptives in relation to those with high income" (P 9, L50). Are there no Public Health Policies in Kenya to insure some or all contraceptives free of charge for WLHIV, like in many other high HIV prevalence settings? - "Thus, these results may reflect the effect of educational level and its correlate on quality of life" (P10, L7-8). It is not clear In which direction and to what extent is the correlation of educational level and quality of life going here
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	<p>- “This important finding further elucidates the need for the incorporation of sexuality and reproductive health into school curriculum” (P 10, L32). There is not sufficient information in the previous paragraph to support this affirmation</p> <p>Consider replacing the word “discovered” (P10, L48) for “disclosed”</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1: Silviya Nikolova

1. Abstract: what are “these groups?” please make it clear

Author Response: Adjusted to reflect what these groups represent.

2. Introduction

The author/s mention in the abstract the potential implications for policy and their health impact of non-condom use on WLWHA in Kenya. However, what is missing in the background section of the paper is some discussion on what is being done by the Kenya national HIV program, using UNAIDS EPP models to estimate national and county HIV prevention and treatment needs. This might give a better picture of the context to understand the existing gap.

Author Response: Revised as Recommended

3. Methods:

-Does the study have IRB?

-The KDHS 2008/9 is too old data (almost 10 years). A newer DHS dataset is available for KAIS 2012. Please provide a better justification for using KDHS 2008/9.

Author Response: Yes, this study has IRB (The original study was approved by Kenya Medical Research institute (KEMRI), however for this secondary data analysis, we obtained permission by written request and subsequent approval from the DHS USAID Data Division. This has now been added to the method section.

For the date of the data used, we did consider using more recent data, but we were constrained by availability of a dataset with demographic, HIV and geospatial data. The 2008-2009 KDHS was the only available dataset with all three components (Survey, HIV, GPS data) required for our analysis. We were able to access these data after a written request was granted. To verify that no other publicly available data exist for Kenya with all the components required for this study, we recently corresponded with DHS data division via mail and a response was received with the list of available data. The response verified that the 2008-2009 data is the most recent comprehensive and available data. We also contacted the Kenyan National AIDS Council Control via email to source for the KAIS 2012 data for possible analysis but did not receive a response. These correspondences can be made available upon request, if needed. Also, to ensure that results of these analysis are reflective of current conditions, we conducted additional research and found that our results are comparable with the most current data reports including the KAIS 2012 final report which stressed the need for provision of contraceptives in women of reproductive age group living with HIV/AIDS (“Prevention of unintended pregnancies is an essential element in reducing MTCT and overall reduction in maternal mortality, yet contraceptive use remains a sub-optimal intervention of PMTCT”-KAIS 2012).

See manuscript for a revised version.

4. Why have the author/s chosen Getis-Ord General G and not other methods for spatial clustering?

Author response:

Getis Ord General G spatial clustering method was selected among all other spatial modelling tool to illustrate the global overview of the spatial distribution, intensity and concentrated areas of people with HIV that did not use contraception. In addition, we employed a Local Anselin Moran's Index, for mapping cluster locations and to quantify the degree of clustering; and also, Getis Ord Gi*(Hotspots) to explore local phenomenon within regions of Kenya that do not conform to the global pattern noticed within the HIV related dataset.

5. Implications

This is the section of the paper where I think authors should invest time and discuss and compare their findings with similar studies done in SSA.

Author response: We did find these articles very useful and integrated some of the most relevant findings to the discussion and reference section of our manuscript. We also did include other related articles. Thank you!

6. Waruru, A., Achia, T. N. O., Tobias, J. L., Ng'ang'a, J., Mwangi, M., Wamicwe, J., ... Tyllskär, T. (2018). Finding Hidden HIV Clusters to Support Geographic-Oriented HIV Interventions in Kenya. *Journal of Acquired Immune Deficiency Syndromes* (1999), 78(2), 144–154. <http://doi.org/10.1097/QAI.0000000000001652>

Achana, F. S., Bawah, A. A., Jackson, E. F., Welaga, P., Awine, T., Asuo-Mante, E., ... Phillips, J. F. (2015). Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. *Reproductive Health*, 12, 29. <http://doi.org/10.1186/s12978-015-0017-8>

Chimoyi, L. A., & Musenge, E. (2014). Spatial analysis of factors associated with HIV infection among young people in Uganda, 2011. *BMC Public Health*, 14, 555. <http://doi.org/10.1186/1471-2458-14-555>

Knowing that there are other studies on the topic of research, I advise author/s to rephrase the statement on p.4, line 40: "Moreover....."

Author response: Thank you for this recommendation. Having gone through these articles listed, we did observe some similarities with our manuscript, as they touched upon some aspects of our study. However, none of these studies discussed comprehensively all the areas of our study: (Sociodemographic factors affecting contraceptive use in Women living with HIV/AIDS (WLWHA) in Kenya).

Waruru, A., Achia, T. N. O., Tobias, J. L., Ng'ang'a, J., Mwangi, M., Wamicwe, J., ... Tyllskär, T. (2018). Finding Hidden HIV Clusters to Support Geographic-Oriented HIV Interventions in Kenya. *Journal of Acquired Immune Deficiency Syndromes* (1999), 78(2), 144–154. <http://doi.org/10.1097/QAI.0000000000001652> (*This article discussed the use of spatial analysis in generating HIV clusters for evaluating areas with high/low HIV prevalence---Nothing pertaining to contraceptive use in women living with HIV/AIDS was addressed here*).

Achana, F. S., Bawah, A. A., Jackson, E. F., Welaga, P., Awine, T., Asuo-Mante, E., ... Phillips, J. F. (2015). Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. *Reproductive Health*, 12, 29. <http://doi.org/10.1186/s12978-015-0017-8> (*This article discussed the social determinants of contraceptive use of women in different regions in Ghana in relation to spatial analysis of proximity to service points in these women undergoing an intervention program----Nothing on spatial analysis or cluster analysis of contraceptive use in WLWHA was captured here*).

Chimoyi, L. A., & Musenge, E. (2014). Spatial analysis of factors associated with HIV infection among young people in Uganda, 2011. *BMC Public Health*, 14, 555. <http://doi.org/10.1186/1471-2458-14-555> (*This article focused on the spatial analysis of factors associated with HIV acquisition/infection among all sexes and the use of spatial clusters was used to identify geographical clusters of increased HIV infections---However, no information on spatial analysis of factors affecting contraceptive use in WLWHA was captured here*).

Our study had a different target group and study location: Women living with HIV/AIDS in Kenya and this alone contrasts our study with other studies. Nonetheless, we recognize that the use of spatial analysis in the analysis of HIV data is not unique to our study, but rather what is unique is our target population as well as location, hence the statement above has been revised in the manuscript.

Reviewer 2- Marcela Gomez-Suarez

7. In the summary, the authors state that one of the main focus of the study is to “create a robust model to identify clustering tendencies”. I couldn’t find in the article’s text any additional information regarding the proposed model.

Author response: Thank you for your observation regarding additional information on our robust model. As background, few studies have used HIV related datasets for spatial autocorrelation, especially local indicators of spatial association(LISA) for determining spatial clustering. In our study, we utilized Getis- Ord General G to provide a global overview of spatial clustering of non-contraceptive use within the study population of women living with HIV/AIDS in the context of wealth index and level of education. We also employed a Local Anselin Moran's Index to map cluster locations and to quantify concentrations of clustering in ArcMap (P.6 L27). Furthermore, Getis Ord Gi*(Hotspots) was used to complement Local Anselin Moran's Index to explore local phenomenon within regions of Kenya that do not follow global patterns. The cluster and outlier analysis with rendering tool is an optimized procedure in ArcMap that allows us to appreciate the impact of spatial outliers at the local level for our predictor variables. These methods allowed us to generate robust estimates of local features when compared to Getis- Ord General.

8. Limitations of the study could improve in the summary and the discussion. Although the KDHS was the only reliable source for the study, cross-sectional designs, when used as sources of information, have more limitations than just the direction of causality.

Author response: These sections has been revised in the manuscript to further describe the study limitations.

9. The discussion section could also improve by giving additional information that justifies affirmations such as:

- “Decreased use of contraceptives might suggest lack of accessibility and affordability of contraceptives in relation to those with high income” (P 9, L50). -----

Are there no Public Health Policies in Kenya to insure some or all contraceptives are free of charge for WLHIV, like in many other high HIV prevalence settings?

Author response:

Thank you for your comments and question. We have revised our previous description in the manuscript by providing more depth and details in the manuscript. Regarding your question, to the best of our knowledge, the Government of Kenya (GoK) does not have a program that explicitly targets WLWHA through the provision of low cost or free insurance. Nonetheless, the uptake of health insurance is considered low in Kenya. About 17% of Kenyans have health insurance and this number plummets to 3% among less wealthy Kenyans. So, it is unlikely that the GoK’s current insurance program will have a significant impact in the lives of WLWHA. However, the GoK does have a program that waives service fees at government owned hospitals, pharmacies and clinics that provide maternal care. However, this waiver does not cover prescription costs nor solve the need for transportation to these facilities.

Please see revised text in manuscript.

10. “Thus, these results may reflect the effect of educational level and its correlate on quality of life” (P10, L7-8).

It is not clear in which direction and to what extent is the correlation of educational level and quality of life going here.

Author response:

We appreciate your comment on this. Please see our revised text below:

INTEXT: "This might not necessarily translate to lack of contraception awareness as studies have shown knowledge of contraception among women across all educational levels to be nearly universal and yet, does not imply usage.^{11,27} **Thus, our findings may reflect the association of lower educational attainment with established social determinants of health such as poverty and unemployment that could impede access to primary health facilities and subsequent contraceptive use. Furthermore, the influence of male decision making and power dynamics in couple relationships could also explain the association between low educational level and contraceptive use among WLWHA. A recent qualitative study of married men in the Nyanza province of Kenya found that men may disapprove the use of contraceptives by their spouses due to fear of losing their position of authority in the relationship and promotion of promiscuous behavior.³¹ Given the importance of education to enhance women empowerment and autonomy, it is plausible that such power dynamics among low educated WLWHA may negatively influence contraceptive use.**

11. "This important finding further elucidates the need for the incorporation of sexuality and reproductive health into school curriculum" (P 10, L32).

There is not sufficient information in the previous paragraph to support this affirmation.

Author response: Our literature search identified several essential gaps such as funding, teachers' training, and government bureaucracies in the implementation of sex education into public school curriculum. Many reports have posited that sexuality education can improve reproductive health outcomes among adolescents.

Please see adjusted response in the manuscript.

12. Consider replacing the word "discovered" (P10, L48) for "disclosed"

Author response: Revised as recommended.

VERSION 2 – REVIEW

REVIEWER	Silviya Pavlova Nikolova Medical University - Varna, Bulgaria
REVIEW RETURNED	10-Oct-2018
GENERAL COMMENTS	I would like to thank the authors for the well-taken points and I'm pleased with the current content of the article.