

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Determinants of continued maternal care-seeking during pregnancy, birth and postnatal and associated neonatal survival outcomes in Kenya and Uganda: analysis of cross-sectional, demographic and health survey data.
<b>AUTHORS</b>	Arunda , Malachi; Agardh, Anette; Asamoah, Benedict

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Ochieng, Caroline Stockholm Environment Institute
<b>REVIEW RETURNED</b>	28-Jun-2021

<b>GENERAL COMMENTS</b>	<p>This is a good paper that takes the unique approach of analysing the barriers to maternal healthcare seeking across the entire continuum of ANC, facility delivery and postnatal care.</p> <p><b>Background</b> The motivation of the study and gaps it aims to address. The authors should acknowledge here that removal of users fees does not remove financial costs of the visits, and add some references to this.</p> <p><b>Methods</b> The methods are reasonable but some of the exceptional decisions taken by the authors should be justified better, for example:</p> <ul style="list-style-type: none"><li>- Reason for variation in the choice of years for the DHS datasets for Kenya (2014) and Uganda (2016)</li><li>- You have a comprehensive set of independent variables. Clarify if all these were obtained from the DHS, and if there was any further processing of those variables for your analysis</li><li>- The argument that both countries are similar hence the need to combine their datasets does not seem strong. I would expect many differences in policies, wealth status, culture and other variables that would impact of health visits, and the recommendations. It would have been better to present them separately.</li><li>- The analytical approach of collapsing and re-categorising the visits into high, moderate, low etc makes the paper unnecessarily complicated and difficult to follow. It would have been much easier making number of visits the outcome of your first level analysis, followed by a second level analysis that refers to the stage of care (standard categories of visits).</li></ul> <p><b>Discussion</b> - The study could have brought forth some unique findings by exploring them further in the discussion, so that it is less of a</p>
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	<p>repeat of what we already know, that has been covered in extensive systematic reviews. For instance since you find both woman's and husband's education to be important determinants, exploring them jointly (and applying the same approach to other variables you identified) would have been a unique contribution of the study</p> <ul style="list-style-type: none"> <li>- Line 40: You mention lack of autonomy in decisions. Is this in your results?</li> <li>- Line 24 – the contradiction between this finding and the one on women's autonomy should be explained</li> <li>- 27 to 31 – explain the contradiction with husband's education being a positive influence</li> <li>- 50 to 51: This is a clear example why the analytical approach of collapsing all care seeking stages and developing non-standard categories is problematic. To make sense of these results one needs to know what visits are included in the categories. Is facility delivery included or not; because that is what would determine the findings.</li> <li>- Line 59 to 60 is highly speculative. There is no way of knowing from this study that they received considerable better care</li> <li>- Lines 20 to 40 – very elaborate recommendations with no supportive results or literature.</li> <li>- Line 58 (pg 2) to line 5 (page 26 of 38 - I do not understand how classifying mothers in categories used in this research could make sense for practice. How do you categorise a woman as a low service user at her first or second visit to then be able to tailor communication on service utilisation?</li> </ul> <p>The authors should try and limit themselves to recommendations that are strongly grounded in evidence and minimise their personal opinions.</p> <p>Limitations Beyond limitations of cross-sectional surveys, the authors should acknowledge the limitations of studies that rely on DHS.</p> <p>Other comments - The title should refer to DHS surveys</p>
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<b>REVIEWER</b>	Shah, Rashed Save the Children Federation Inc, Global Health
<b>REVIEW RETURNED</b>	09-Aug-2021

<b>GENERAL COMMENTS</b>	I found this manuscript with substantial results to contribute and enrich the existing knowledge on this topic. I recommend to accept and publish this manuscript.
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**VERSION 1 – AUTHOR RESPONSE**

Reviewer 1  
 Comment#1. This is a good paper that takes the unique approach of analysing the barriers to maternal healthcare seeking across the entire continuum of ANC, facility delivery and postnatal care  
 Response: Thank you

Background  
 Comment#2. The motivation of the study and gaps it aims to address. The authors should acknowledge here that removal of user fees does not remove financial costs of the visits and add some references to

this.

Response: Thank you for this observation. Yes, we agree that there are indirect costs associated with the visits such as costs associated with transportation to the health facility but also costs of health care services not directly covered by the free maternity programmes. Although the free maternity policy or abolition of user fees (as government policy documents call it) in Kenya(1,2) , and Uganda(3) are meant to exempt women from paying maternal care services at public health facilities, some components have not been fully implemented due to resource limitations that has led to hidden hospital charges in addition to transportation costs(1,2,3). Further, in Kenya by 2013 some components of maternal care were only subsidized while others such as delivery services were free. We have now added (with references) detailed information to clarify this in different sections of the manuscript.

Introduction, page 5, Line 21, the wording “relatively free or subsidized” has been added. Further in the “study settings” sub-section page 6 lines 6-12, the following information has been added with references “Although the goal of the free maternity programmes in Kenya and Uganda is to eliminate all maternity-related costs, however, due to inadequate or slow distribution of funding in some health facilities, certain hidden costs such as for ultrasound, access to hospital card and laboratory services among others are still incurred out-of-pocket. Additionally, challenges of transportation to the health facility are still common among poor households. Further, in Kenya, prior to June 2013 maternal services were partly free and partly subsidized”

#### Methods

Comment#3. The methods are reasonable but some of the exceptional decisions taken by the authors should be justified better, for example (a)-(d):

(a) Reason for variation in the choice of years for the DHS datasets for Kenya (2014) and Uganda (2016).

Response: Thank you. Kenya and Uganda are at relatively similar state of maternal health care policy and at similar stages in the pathway towards achieving universal coverage. Given the fact that changes in peoples' care-seeking behaviour takes place very slowly or gradually, the 2-years difference between the years would not generate any substantial differences in any component of this study. Moreover, the period for inclusion criteria i.e., 5 years prior to data collection period, largely overlap between 2014 and 2016. Additionally, the DHS used the same Model questionnaire for Phase VII to collect both Kenya, 2014 and Uganda, 2016.

It can also be observed that key outcome indicators for maternal and newborn health situations such as neonatal and maternal mortality rates are very comparable. For instance, The World bank estimates indicate neonatal mortality rates (NMRs) in Kenya (2014) and Uganda (2016) at about 23 and 21 per 1000 live births respectively (4). The DHS reports also indicate, NMR 22 vs 27 deaths per 1000 live births with overlapping confidence intervals for Kenya (2014)(5) and Uganda (2016) (6) respectively. Further, estimated maternal mortality rate (MMR) in Uganda (2016)5 was 336 deaths per 100,000 live births while in Kenya (2014) MMR6, 364 deaths per 100,000 live births with overlapping confidence intervals. The major causes of neonatal deaths and their proportions are almost the same (7,8). The statement “Kenya and Uganda have closely comparable demographics and are in relatively similar state of maternal health care policy and pathway towards achieving universal coverage” has been added to the methods-study setting section, page 5, line 31-32 and further discussion about this has also ensued in page 6, lines 1-12.

(b) You have a comprehensive set of independent variables. Clarify if all these were obtained from the DHS, and if there was any further processing of those variables for your analysis

Response: Yes, all the variables were obtained from the DHS. The DHS already categorized the variables in analysable format, however, to fit our analytical objectives, we readjusted the groupings or categorizations. For instance, DHS provided maternal age categorized as 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49. However, for our analysis, being guided by previous study categorizations and findings on risk factors associated with certain maternal groups, we recategorized the age-data accordingly to 15-

24, 25-34, 35-49 years old. The statement “, ...the categorization of these variables was also informed by a number of maternal and child health studies previously conducted in SSA” is included in page 7, lines 25-28. Further statements added include “maternal age which was initially grouped as 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49 years old and we recategorized it into 15–24, 25–34 and 35–49 years, while Place of residence remained as rural and urban. Page 7, lines 27-28, page 8 line 1. Supporting references are provided.

Similarly, the wealth status variable was recategorized as poor (to include poor and poorest), middle and rich (to comprise rich and richest) and references have been provided in independent variable subsection. Thus, in methods section, data source and study design. Page 6, line 17, we have modified to read, “DHS collects sociodemographic, maternal and child health data...”

(c) The argument that both countries are similar hence the need to combine their datasets does not seem strong. I would expect many differences in policies, wealth status, culture and other variables that would impact of health visits, and the recommendations. It would have been better to present them separately.

Response: Please see response to comment#3(a) above as complementary to this response. Again, Kenya and Uganda are at relatively similar state of maternal health care policy and at similar stages in the pathway towards achieving universal coverage. Further, even though Kenya has a slightly higher per capita Gross Domestic Product (9), the proportion of the population living below the international poverty line is quite similar i.e., 42%(10) and 37% (11) for Kenya and Uganda respectively. Health expenditure accounted for about 5.5 – 6.5 % (slightly higher in Uganda) of total government expenditure in each country in the 2014-2016 period (12) . Maternal and child health has always been free or subsidized in both countries, although both countries still experience out-of-pocket payment due to inadequate or delayed government funding. However, Uganda’s journey to abolish the user fees abt earlier than Kenya. Again, the statement “Kenya and Uganda have closely comparable demographics and are in relatively similar state of maternal health care policy and pathway towards achieving universal coverage” has been included in the revised manuscript, page 5, line 31-32 and further discussion about this has also ensued in page 6, lines 1-12.

Notwithstanding, the main reasons for combining the datasets was for pooling purposes to improve analytical power because the sample sizes for the respective countries, although relatively large was not sufficient for our objectives of interest. Nonetheless, we explored further the possibilities of conducting country-specific analysis and where it was analytically plausible in mortality analysis, we reclassified our care-seeking categories and conducted further analysis. We have now added country-specific findings in table 5. Accordingly, this has been further discussed.

Certainly, given the fact that private health sector, both for profit and non-profit also play a key role in both countries, there are surely some differences in the service provision, but these differences cut across in both countries. Even within-country variations in care provision – regional or county or districts or even between facilities do exist.

Culturally speaking, Kenya and Uganda are neighbouring countries. the 56 (Uganda) and 42 (Kenya) tribes are very comparable since the corresponding tribes in both countries almost all have a similar origin and migratory history and speak languages from common roots. These differences cut across and there are no major distinct differences in health service utilization due to culture. For instance, the Karamojong/pokots of Uganda have very similar livelihood to Masai/pokot /Turkana of Kenya. Major tribes such as Baganda and Basoga of Uganda and Luhya and Kikuyus of Kenya etc. are all bantu speakers.

The Luos of Uganda (Acholi, padhola) and Luos of Kenya have quite similar cultures to a large extent. Further, primary education has been free in government schools in both countries for quite a long time (although private sector also plays a key role). The list of similarities that directly impact maternal health seeking behaviour is long.

(d) The analytical approach of collapsing and re-categorising the visits into high, moderate, low etc makes the paper unnecessarily complicated and difficult to follow. It would have been much easier making number of visits the outcome of your first level analysis, followed by a second level analysis that refers to the stage of care (standard categories of visits).

Response: Thank you. Yes, we do have ANC as the first level of categorization but not the first level of analysis, rather a combination of all the three components (ANC, place of birth and PNC) form the level of analysis. The flexibility of Stata enabled us to do these categorizations at once. We see that by making the number of visits as the first level of analysis followed by 2nd(birth) and 3rd(PNC) levels of analyses would only lead to repetitions of independent variable analyses and extra tables and end up obtaining similar overall results as we obtained when considering all the three care components (ANC, facility birth, PNC). Additionally, to have different levels of analyses with regards to care means that we would lose the core objective of this paper which was to examine how these independent factors influence the 'whole' care-seeking continuum and not one/components at a time.

We have also made corrections and eliminated the unclear areas, by reclassifying to standardize the categories of care to clearly show whether a given care component was included or not. This meant additional more columns were added, we conducted re-analysis and revised tables 1 and 2. Furthermore, to make it easy to follow, we have added, a forest plot to show aOR for variable-classes vs the references across selected 8 extreme categories to highlight the visual patterns in the associations. Please see study variable sub-section, page 6, lines 26-34, page 7, lines 1-14. Similarly, table 3, pages 11-14, table 4, pages 17-19 corrected.

#### Discussion

Comment#4. The study could have brought forth some unique findings by exploring them further in the discussion, so that it is less of a repeat of what we already know, that has been covered in extensive systematic reviews. For instance since you find both woman's and husband's education to be important determinants, exploring them jointly (and applying the same approach to other variables you identified) would have been a unique contribution of the study

Response: This kind of combination was explored in our analysis and the results were not any different to when analysed alone. There was no new or peculiar information. Thus, such findings are deducible from the current existing findings. For instance, combining the education levels of the woman and husband brings a multiplier effect. The higher the levels of education for both woman or the husband/partner, the more the care-seeking tendency. The decision making for care-seeking revolves largely around financial support and knowledge about pregnancy complications. Higher levels of education are associated with better economic prospects and financial ability to facilitate care-seeking. Similarly, higher education is also associated with more knowledge about pregnancy complications and generally, the higher the education level, the higher care-seeking tendency. This has been discussed in the discussion section, page 21, lines 24-31.

We recognize that knowledge is cumulative and given that studies of this kind are rare to none in East Africa, we hope that the unique perspectives that our findings will enlighten the policy process for the betterment neonatal health in East Africa. For instance, Postnatal care (PNC) is not well attended in East

Africa, and it is relatively neglected in many LMIC. Our findings highlight this, but we go further to assess its effects in Table 5 (page 20) to clearly show how it impacts neonatal survival (Comparing moderately high and higher care-seeking classes with PNC as the only difference). To our knowledge, few to no studies in East Africa have examined this in a continuum of care model of analysis.

Comment#5. Line 40: You mention lack of autonomy in decisions. Is this in your results?

Response: Yes, woman's autonomy in decisions making for care-seeking is represented by the variable "Who ultimately makes care-seeking decisions". Again, this dependency revolves mainly around financial support to seek care. For example, a stay-at-home mother "housewife" depends on the husband to cater for her repeated transportation costs/other hospital costs when visiting the health facility, but this can hinder her autonomy in decision making to seek care. It is especially true if she has no direct source of income or the husband/partner is not able financial and has to prioritize food for the family or pay transport costs and small hospital charges that may arise. The statement "Over 80% of the mothers in this study were married and over 70% lived in rural areas, meaning most women are housewives with subsistence farming as source of livelihood. Thus maternal dependency on the husbands to seek care revolves mainly around financial support for repeated transportation and minor hospital expenses and this can hinder a woman's decision to seek care" has been added to the discussion, Page 22, line 9–13, lines 16-25.

Comment#6. Line 24 – the contradiction between this finding and the one on women's autonomy should be explained.

Response: Thank you for this observation. In our expanded re-analysis results, Page17-19 table 4 results, being married versus single indicated association with care-seeking (statistically significant RRR) only among relatively higher-care seekers, i.e., 4 out of 15 classes. And less supportive to care-seeking (statistically significant RRR) among lower care-seekers in 2 out of 15 classes. The rest 8/15 indicated no statistical significance. This indicates that marriage is not consistent or reliable determinant of care-seeking, and this resonates well with interaction of factors such as education level and autonomy in care-seeking decision making. Page 22, lines 13-14 has been added in support of this statement.

The degree to which a mother or mother-to-be would seek care if she had no external influence to make care-seeking decisions. In our study, over 80% of the mothers in this study were married and over 70% lived in rural areas. Generally, a married housewife (with subsistence farming as her main occupation) would obtain (joint) financial support from her husband to seek care. A single mother (with subsistence farming as her source of livelihood) has much less support financially to seek care i.e., for transportation and minor hospital expenses. In this case, the married would have higher care-seeking tendency compared to a single mother. On the other hand, a married women with a stable source of financial income can execute her own decisions to seek maternity care even with minimal or without the husband/partners financial support, in this case because of her financial independence. Such would seek more maternity care than a married woman who is financially dependent on her partner. But still the financially dependent wife would still seek more care than a single mother with no direct income. Thus, there is minimal controversy, it is the degree to which each factor influences maternity care-seeking. Although there are also sociocultural undertones that can influence care-seeking, the financial ability especially of the woman generally overrules. The statement "Over 80% of the mothers in this study were married and over 70% lived in rural areas, meaning most women are housewives with subsistence farming as source of livelihood. Thus maternal dependency on the husbands to seek care revolves mainly around financial support for repeated transportation and minor hospital expenses and this can hinder a woman's decision to seek care" has been added to the discussion, Page 22, line 9–13 and 16-25.

Comment#7. 27 to 31 – explain the contradiction with husband’s education being a positive influence

Response: Please see also responses to comment#4 and #6. Additionally, the decision to seek maternity care revolves largely around financial (for transportation and any hospital charges) and knowledge about pregnancy complications. It is not a contradiction, just the difference in the degree to which they both impact maternal care-seeking. Generally, a more educated husband is more aware of his responsibilities and would strive to support, maternity care-seeking than one without any formal education. In our findings this provides much higher impact e.g., in table 4 (pages 17-19), among highest care-seekers, 8 times more compared to those formally uneducated. In comparison (among highest class), having a husband as a major decision maker on when a woman should seek maternity care decrease the care-seeking by 50%. We see that education level outweighs by far the impact of level of decision making by a woman to seek care. It also means that if married woman could decide and support herself financially and the husband is also more educated, the impact would be much highly positive to care-seeking. Lines 24-31 (page 21) in the discussions highlight this perspective.

Comment#8. 50 to 51: This is a clear example why the analytical approach of collapsing all care seeking stages and developing non-standard categories is problematic. To make sense of these results one needs to know what visits are included in the categories. Is facility delivery included or not; because that is what would determine the findings.

Response: The non-standard category has been corrected and classes revised to clearly indicate whether a care component was included or not and the approach clarified. Please see study variable sub-section, page 6, lines 26-34, page 7, lines 1-14. Similarly, table 3, pages 11-14, table 4, pages 17-19 corrected. Also refer to response in comment#1(d) above.

Comment#9. Line 59 to 60 is highly speculative. There is no way of knowing from this study that they received considerable better care

Response: The combined categorization from which this comment was made no longer exists. Thus, the mentioned statement has been removed from the revised manuscript. Nonetheless, we agree, instead of the wording “received better care” we could have used the sentence “better care utilization.” since the group had more care visits than the two lowest classes.

Comment#10. Lines 20 to 40 – very elaborate recommendations with no supportive results or literature.

Response: This section has been revised. Here the woman’s autonomy to care-seeking decision meant variable “Who ultimately makes (maternal) care-seeking decisions” (Table 4 page 18), other articles that have researched on women autonomy in care decisions were referenced to broaden understanding around the role of husband in care-seeking. This section has also been revised to be in line with the new findings after re-analysis. Please see discussion section page 22, lines 4-25.

Comment#11. Line 58 (pg 2) to line 5 (page 26 of 38 - I do not understand how classifying mothers in categories used in this research could make sense for practice. How do you categorise a woman as a low service user at her first or second visit to then be able to tailor communication on service utilisation?

Response: We have further elaborated the feasibility of this approach. We have also referenced examples of questionnaire approach that has been applied to examine care-seeking behaviour in sexual transmitted diseases and arthritis. Please see revision in page 25, lines 20-31.

Comment#12. The authors should try and limit themselves to recommendations that are strongly grounded in evidence and minimise their personal opinions.

Response: Thank you. All our recommendations have been grounded on evidence, both those revealed by our findings and supported in literature. Suitable references have been added to align with our findings

and train of thoughts.

Comment#13. Beyond limitations of cross-sectional surveys, the authors should acknowledge the limitations of studies that rely on DHS.

Response: Two limitations have been added in the methodological consideration section Page 25-26, one of which is specific to DHS.

Comment#14. Other comments. The title should refer to DHS surveys

Response: DHS has been added to the title. Page 1, line 3.

Reviewer 2

Comment#1. I found this manuscript with substantial results to contribute and enrich the existing knowledge on this topic. I recommend to accept and publish this manuscript.

Response: Thank you