PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Mobility Study of Young Women who Exchange Sex for Money or Commodities using Google Maps and Qualitative Methods in Kampala, Uganda
AUTHORS	King, Rachel; Muhanguzi, Eva; Nakitto, Miriam; Mirembe, Miriam; Kasujja, Francis; Bagiire, Daniel; Seeley, Janet

VERSION 1 – REVIEW

REVIEWER	Laura McCloskey School of Public Health Indiana University USA
REVIEW RETURNED	05-Oct-2020

GENERAL COMMENTS	This paper is on a promising topic linking sex work with mobility in sub-Saharan Africa. The shortcomings in the write-up and especially Methods and Results sections are extensive with insufficient detail and inconclusive findings. The absence of tables or figures is surprising. It is unlikely the manuscript in its present form would make a contribution. ABSTRACT - Study is about (26) young women but interviews are with men partners (n=10) as well which is immediately confusing. The authors state that the paper is about women sex workers; how were the interviews different for the men? - Edit: distant…add "locations" or "points" or a noun. - YWHR…acronym appears without a gloss, but should always follow first expression (ie, young women with HIV risk…or whatever). Also be careful to vary the text and avoid excessive use of acronyms that are not widely recognized. INTRODUCTION The literature review fails to present organizing themes for the analysis. There appears to be some confusion about the classification of women as engaging in sex work or transactional sex. Most studies distinguish commercial sex work from "transactional" sex but here the authors collapse the two categories without justification. For instance the World Health Organization offers the following definition: - Commercial sex is the exchange of money or goods for sexual services. It always involves a sex worker and a client and it frequently also involves a third party. - Sex work is the provision of sexual services for money or goods.

	Transactional sex is marked by different relationships from sex work (see Wamoyi, 2019). In any event clarification is warranted. It seems that mobility may be tied to sex work but it's not exactly clear why. Is high mobility a potential marker of trafficking? Can that be assessed? It's not clear from the summary what the motives are to move. If the women are poor it's hard to understand where they would get the money to go far (unless sponsored). There is also the implication that mobility is associated with HIV. Men's work mobility, as observed early on in the African pandemic with truckers, affording the chance to hire sex workers which is apparently one reason they are at risk, but why would mobility be a major risk factor for women already working as sex workers? Is it because they are travelling to hotspots of infection, or that they are forced to take on more clients, etc? These are important questions to resolve. There is a distracting overuse of acronyms in the paper which slows the reading rather than making it easier. I counted: AGYW, FSW, HIV, YWHR, GHWP, RCT, GHWP. The only ones I would retain are HIV and RCT, which are widely used. The others are just jargon and they obfuscate the text. As an example "FSW" can be spelled out as "female sex workers" or "women and girls engaged in commercial sex" or "women sex workers" or just "sex workers" since their sex is indicated at the outset of the paper or "study participants" (and not always define them by their sexual activities). METHODS There are several areas of ambiguity in the Methods section: (1) p. 8…how were subjects recruited? The research site has a large pool of subjects, but how were these enlisted? If through the same method as the large sample further detail is required. (2) p. 8…women provide a self-report of their locations, but no mention is made of repeat visits, back and forth – in other words how often they are on the road? (3) Why are the "coordinates" important? It would seem that for purposes of HIV tracking the size and profile of the communities together with their prevalence rates if available would be of interest, not coordinates; indeed reducing the data to "coordinates" probably misses anything meaningful about the locations. And indeed while the coordinates appear to be collected, the actual locations are missing (like "parents' home" etc). (4) p. 8…what are the "important variables"? (5) p…8-9 From what source was the "hotspot" information derived and at what time points? (6) p. 9…The authors recite the technical method of their coding without providing any information on the codes: Coding of data was conducted using NVIVO12 for Mac by two coders and focused on descriptive thematic coding.41 Analysis focused on both apriori and emerging content, identifying the dominant and the range of explanations and comparisons across clients. (7) "Multiple interactions" to discuss coding occurred with the research team introducing the potential for bias. No metrics were applied to assess rater inter-reliability (e.g, Cohen's kappa, etc). (8) p. 9…a long paragraph about recruitment without essential information such as from where were they recruited, what were the

	criteria, and why were only HIV negative women selected – what was the endpoint? (9) p.9…."Interviews were recorded and field notes taken…" Were they transcribed? Back-translated and coded in English or in Luganda. When researchers coded the interviews were they coding from transcripts or from the tapes? (10) p. 9…it's unclear what is meant by bringing the subjects back to validate the results…is this to "clean" the original data by identifying errors, or what exactly? How do these consults affect the data itself? (11) Three women and one man interviewed. Who did the man interview? Was the man assigned to interview the women or only the male partners? Clarification is important because response bias is likely heightened when the interviewer is a male in this context. (12) The subject characteristics are strange. Why would 21 peer educators be working as commercial sex workers? How was it confirmed that they were indeed working as sex workers? Since almost half the sample were under 20, where they living at home? In school? Methods In summary there is no described sampling plan, the criteria for participation are not presented, without explanation many of the participants are identified as "peer educators" which seems in contrast to sex workers, there are five bar owners who seem unlikely to travel since they are managing sex workers at their homesite, and ten male partners without specification of what information they are invited to provide. Half the sample is under 20 so probably are living at home, but not details about residence or schooling. Also there is no "Ethics" section explaining how the study conforms to the Belmont report or standards of ethical research. Did the women provide written informed consent, for instance? Findings (or Results) p. 11…Figure 1 is not included. p. 12…Reasons for mobility were given by some informants as "employment opportunities, violence, lack of agency, social/sexual/familial networks and poverty." which most people would have guessed on their own. No specifics about these revelations are offered, how the responses were organized to reflect these albeit obvious themes. p. 11…Since most of the subjects only travelled within 15 miles of Kampala (85%), there are only 3-4 outliers who went beyond those boundaries which is an insufficient number to derive a pattern without in-depth qualitative information. Moreover the authors lose a chance to identify the sorts of moves reflected by the women's experiences (from one boyfriend to another?), and the paper misses the chance to obtain more information about the motives of the women themselves. The main findings are presented in a series of quotes from participants to corroborate the "reasons for mobility" given above, without any rationale for how study personnel arrived at these classifications. Some of the quotes are hard to interpret outside of any context, such as a woman saying she was "chased from school." Because there are only brief quotes and no surrounding narrative included in this paper the findings seem superficial. The

	authors tend to rely on generalities without back-up of credible evidence, and fail to convince this reader that they have discovered anything of value.

REVIEWER	Lise Jamieson Health Economics and Epidemiology Research Office
REVIEW RETURNED	13-Oct-2020

GENERAL COMMENTS	This is an interesting evaluation of sex worker/transactional sex populations mobility with an extensive qualitative research component which aims to better understand some of the challenges and reasons surrounding increased mobility for this vulnerable, key population. 1) My biggest criticism of this manuscript is that it sets the reader up to believe that it will assess the impact mobility has on HIV risk in this population, yet it stops short of that. Clearly because follow-up is not yet completed, as stated in the limitations of this study. My suggestion would be to change the context of the manuscript which makes it seem as if this will assess HIV risk. For example, in the abstract, the last sentence, essentially. Rather focus on the qualitative research aspect, which is ultimately what this manuscript is about. Similarly, the introduction to this paper speaks a lot about the link between mobility and HIV risk, but none of the results are included. Specifically, it reads (page 7, paragraph 2): "we report patterns of, and reasons for, young women at higher risk (YWHR) mobility and the links between mobility and HIV risk among YWHR..." - again, this link is between HIV and mobility are never reported on. 2) In the Discussion the authors state "over 80% of the participants were mobile, so it is difficult to correlate a statistical relationship between mobility with higher-risk behavior". There does appear to be some variation with respect distances participants travelled and I wonder there was some differences in high risk behaviour for women who travelled further, compared to those who remained within a, say, 4km radius (ie the median). 3) Minor point, it would be interesting to understand whether and how mobility has changed over the course of follow-up, and/or whether there were any seasonal trends and how this could possibly add some additional challenge to the YWHR with respect to their increased risk. 4) Minor point, but Figure 1 was not available in my proof version so I was unable to review that.

REVIEWER	Jillian Pintye University of Washington, United States
REVIEW RETURNED	31-Oct-2020

GENERAL COMMENTS	This is a very well-written and timely paper about young women who exchange sex for money or commodities in Uganda. This study

	leverages data and infrastructure from the long-standing Good Health for Women Project (GHWP) clinic in Kampala, which is a strength. The study is scientifically sound and it contributes new evidence to the body of literature on mobility among a population with high risk for HIV acquisition risk. Specifically, these novel contributions include the use of an innovative design which combines quantitative/qualitative and GPS mapping methods and evaluating/tracking mobility across multi-national geographical areas. There are some weaknesses that could be addressed to strength the rigor and impact (potential citability) of this work. This includes more completely describing the methods (especially sampling procedures and data analysis for the qualitative component), contextualizing the results within the broader literature on adolescent girls and young women (AGYW) with HIV risk, and more clearly highlighting the implications of findings. Specific comments are details below. Abstract • In the results section of the abstract, the authors state, “Of 644 participants, 56% had primary or no education. By mid-March 2020, 236 had attended both 12 and 18-month study visits”. The drop-off from 644 to 236 participants and the rationale for only including participants with both completed visits is not clear. Are the rest of the results in the abstract among the 236 participants or is the denominator the total 644? • The methods and results could be strengthened to more clearly call out the 3 unique study components/populations: 644 in the RCT that contributed quantitative data; 30 individuals who contributed qualitative data; (n size?) mapping data. Background • The introduction provides an excellent overview of the current literature in a succinct summary. There is a clear overview of the nuances re: distinguishing sex work vs. transactional sex in this population and which factors may influence how these concepts are perceived by AGYW (and stigmatized). There is a key point that I think was missed that could highlight the impact of this paper a bit more. The authors state, “Mobility can place people in situations that increase their risk of acquiring STIs, HIV and other infections” as a factor contributing to HIV acquisition. The other side to this is that current HIV prevention programs (and biomedical prevention options) for AGYW are not designed or well-suited for highly mobile populations. For example, currently only daily oral PrEP is approved/recommended for cisgender AGYW with substantial HIV risk. Within in East African settings, PrEP is mostly delivered among AGYW via facility-based approaches which require multiple follow-up visits, longer-term engagement with health systems, etc, which could be especially challenging for highly mobile populations. This gap could be highlighted to demonstrate how understanding mobility patterns among AGYW as a way of informing/tailoring future PrEP or other HIV prevention interventions is still very much an urgent global health issue. • In the last paragraph of the intro, the authors state, “In this paper, we report patterns of, and reasons for, young women at higher risk (YWHR) mobility and the links between mobility and HIV risk among YWHR participating in a randomized controlled trial (RCT) that aims

	to assess the effectiveness of a cognitive behavioral and structural HIV prevention intervention on reducing the frequency of unprotected sex in Kampala, Uganda". This sentence states the aim of the parent RCT clearly, however the rationale for the current analysis is less clear. What is the specific rationale for reporting patterns of/reasons for mobility and how does this complement the RCT (if that is the intent) or inform future work? Methods • The authors state, "GHWP is an independent clinic established in 2008 to provide HIV and other STI prevention, care and treatment to FSW, their partners and their children in a confidentially-located, safe location" and there are several citations from prior GHWP-related studies. However, it would be helpful to include a few key background characteristics to help the reader contexualize the study population. For example, approximately how many clients does GHWP see in a month? How representative are GHWP clients of the underlying population of FSW in Kampala? Do clients receive routine care at GHWP? • The study design is novel and includes multiple components (quantitative, qualitative, and mapping), but the methods section could benefit by including more aspects of the STROBE and COREQ guidelines (for qualitative work). For example, the authors state that, "Coding of data was conducted using NVIVO12 for Mac by two coders and focused on descriptive thematic coding". Were the coders based in Kampala? Did they know the local context? Were they involved in the interviewing? Was there any member checking to confirm results? Please review the COREQ guidelines for reporting qualitative work to ensure required elements are covered to establish rigor: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349-357. I see the COREQ checklist was included with corresponding page numbers, but the details provided in the text are very thin and could be expanded to increase the clarity and rigor of the methods. • In the results section, the authors state, "We recruited 644 YWHR participants for the RCT. All participants were HIV-negative at enrolment. For this sub-study, 21 peer educators, five 'queen mothers' or bar owners and 10 male partners were recruited for qualitative interviews". In the methods section, there is no mention of how these individuals were selected, what was the rationale for the sample size, how these individuals were related (or not) to the 644 YWHR participants. These components (and other aspects of the COREQ guidelines) should be included in the methods. As is, the methods set up only the RCT study participants, but not really the others (unless the qualitative participants are also enrolled in the parent RCT)? • The section on participant involvement is appreciated, but it is unclear how exactly participants were engaged in the current study. For example, the authors state, "In other studies at the research site, we have brought study participants together to discuss and validate preliminary results. The same will be done for these results when the study follow-up is completed". Does this mean that participants were not consulted on the results of the current study under review? Does this mean that study follow-up is NOT completed for the study under

	review or are they talking about the parent RCT? It would be more informative to describe specifics. For example, “Following data analysis, we conducted XX member-checking meetings with XX participants who were interviewed to review preliminary findings. Final results incorporated input and were reviewed by participants who attended member checking prior to submission”. Without the specific details about the current study, it is unclear how participants were engaged. Results • Similar to my comment from the abstract - the authors state, “By 15 March 2020, of the 236 participants who attended both 12- and18-month follow-up visits…” – it is unclear what this refers to or why this is important for the current study. Is the mapping data only from the 236 participants? • The authors state, “The median age of YWHR sample at baseline was 20 years, 46% of whom were 15-19 years old. With regards to educational level, 7% of YWHR had reached A-level or beyond and about half had some primary education. Nobody refused to be interviewed”. Were the YWHR interviewed for the qualitative component as well? From other sections of the results, it sounded like the 30 interviews were not among the YWHR but male partners and queen mothers. I think the methods and results could be clearer if they are broken down by study component/population. Only the YWHR are described in the results, but then qualitative results are reported from interviews with male partners, bar managers and owners, and “queen mothers”. • In the submission package reviewed, there are no tables or figures. Given the complexity of incorporating data from multiple groups (quantitative from all or a subset of the >600 YWHR from the RCT, and qualitative interviews with a mixed group), a flow diagram of who contributes data to each group/component would be helpful. Additionally, a table of demographic/background characteristics of the participants (incl. those only involved in the qualitative part) would strengthen the results. If the data presented in this paper are somehow preliminary to or part of a larger RCT analyses, it would be helpful to present the overall study timeline and how this particular study fits/complements. This piece is a bit confusing in the current paper. Lastly, a figure that present the mapping data would also be more effective than the narrative text. • As a note, there are references to figures in the text, but there does not appear to be any included in the review package. Perhaps this is an error within the editorial management system? Discussion • The discussion section posits the current study within the context of current literature very nicely and raises important implications of the study findings on study retention, etc. However, there is a lack of discussion re: the broader implications on the field of HIV prevention for YWHR. A missed opportunity here would be how frequent high mobility is among YWHR in African settings and how HIV prevention programs/interventions may need to respond to meet the needs of this population (see comment above re: how current PrEP models do not fit well within this context of high mobility). • There is no limitations paragraph included in the discussion. Please add this.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Comments to the Author

ABSTRACT

- Study is about young women but interviews are with men partners as well which

  is immediately confusing. The authors state that the paper is about women sex workers; how were the interviews different for the men?

The main topic of mobility was asked of all groups as seen in Table 1 above. Other topics were more specific to each group as described in the table.

- Edit: distant…add “locations” or “points” or a noun. o *This was corrected.*

- YWHR…acronym appears without a gloss, but should always follow first expression (ie, young women with HIV risk…or whatever).
    - *This was corrected.*

Also be careful to vary the text and avoid excessive use of acronyms that are not widely recognized.

- *We have re-read and eliminated many of the acronyms.*

INTRODUCTION

- The literature review fails to present organizing themes for the analysis.

    - *The main themes for analysis were: frequency and distance as well as reasons for mobility, how mobility may be related to risk of STI and HIV.*

- Classification of women as engaging in sex work or transactional sex.

    - *We discuss the classification of sex work and transactional sex in paragraph one of the introduction. In the methods we have added a discussion of the sample and how the participants classify themselves.*

- It seems that mobility may be tied to sex work but it’s not exactly clear why.

    - *We added a small section in the introduction citing studies that show sex-work-related mobility is undertaken to maximize the trade opportunity*

There is a distracting overuse of acronyms in the paper which slows the reading rather than making it easier. I counted: AGYW, FSW, HIV, YWHR, GHWP, RCT, GHWP. The only ones I would retain are HIV and RCT, which are widely used. The others are just jargon and they obfuscate the text. As an example “FSW” can be spelled out as “female sex workers” or “women and girls engaged in commercial sex” or “women sex workers” or just “sex workers” since their sex is indicated at the outset of the paper or “study participants” (and not always define them by their sexual activities).

- *We have eliminated the excess acronyms as noted above.*

METHODS There are several areas of ambiguity in the Methods section: (1) p. 8…how were subjects recruited? The research site has a large pool of subjects, but how were these enlisted?

Participant enrolment

Randomized parent study. Participants were recruited from a specialized clinic in Kampala called the “Good Health for Women Project” clinic. Women were recruited for this clinic by field workers who conducted mobilization activities with community peer sex worker-leaders to identify sex workers from commercial hotspots who were then enrolled at the clinic irrespective of HIV status as has been described by Vandepitte et al. (). All enrolled women attended quarterly follow-up visits

including comprehensive HIV prevention and treatment services Inclusion criteria for our parent study included: HIV- negative women, aged 15-24 years, being sexually active and having engaged in any form of transactional sex at least once in the last 3 months, agreeing to participate in all intervention sessions and to all study procedures and interviews planned over 18 months of follow-up. Qualitative sub-study on mobility: Participant groups were purposefully selected as follows in order to access opinions, experiences, perceptions on the research question from a wide range of possible angles:

(2) p. 8…women provide a self-report of their locations, but no mention is made of repeat visits, back and forth – in other words how often they are on the road?

Participants were asked at study visits M12 and M18 of their work locations since the last study visit. This was how the study team was able to assess in how many different locations participants were working in a 6 month time period.

(3) Why are the "coordinates" important? It would seem that for purposes of HIV tracking the size and profile of the communities together with their prevalence rates if available would be of interest, not coordinates; indeed reducing the data to "coordinates" probably misses anything meaningful about the locations. And indeed while the coordinates appear to be collected, the actual locations are missing (like "parents' home" etc).

Both coordinates and qualitative descriptions of the locations were asked and recorded. For ethical issues, we did not want to ask about homes or parents homes.

(4) p. 8…what are the "important variables"?

Thank you. That was not clear and was removed.

(5) p…8-9 From what source was the "hotspot" information derived and at what time points?

Hotspot information was derived from all sources interviewed: peer educators, study participants, male partners and queen mothers. This information was qualitatively asked at every study visit, but was mapped with coordinates at M12 and M18.

(6) p. 9…The authors recite the technical method of their coding without providing any information on the codes: Coding of data was conducted using NVIVO12 for Mac by two coders and focused on descriptive thematic coding.41 Analysis focused on both apriori and emerging content, identifying the dominant and the range of explanations and comparisons across clients.

The main codes that were asked about included: frequency, distance and reasons

for travel. The codes that emerged under reasons included: lack of education and employment, violence, lack of agency, influence of social networks, poverty.

(7) "Multiple interactions" to discuss coding occurred with the research team introducing the potential for bias. No metrics were applied to assess rater inter-reliability (e.g, Cohen's kappa, etc).

We did not use metrics. We ensured that the range of the discussions with the study team during team meetings, which are held weekly, ensured the comparison and comparability across the team.

(8) p. 9…a long paragraph about recruitment without essential information such as from where were they recruited, what were the criteria, and why were only HIV negative women selected – what was the endpoint?

For the parent randomized controlled trial; only HIV negative women were selected as the primary endpoint of the study was unprotected sex. Study participants were recruited from the study clinic pool of participants.

(9) p.9…."Interviews were recorded and field notes taken…" Were they transcribed? Backtranslated and coded in English or in Luganda. When researchers coded the interviews were they coding from transcripts or from the tapes?

We have added some clarity to this section of the methods as follows:

"Interview recordings and notes were transcribed and translated into English. Each audio transcript was quality controlled by the study coordinator who listened to the audio and read the transcript to add any missing information or correct and mis-typed data in the transcript. Coding was conducted using the English translation of the transcripts; not directly from the audio tapes. Coding was conducted using NVIVO12 for Mac by two coders and focused on descriptive thematic coding.[41] Analysis focused on both apriori and emerging content, identifying the dominant and the range of explanations and comparisons across clients. Multiple interactive discussions during team meetings were held with the analysis team and senior researchers to validate data interpretation."

(10) p. 9…it's unclear what is meant by bringing the subjects back to validate the results…is this to "clean" the original data by identifying errors, or what exactly? How do these consults affect the data itself?

This is a form of 'member-checking' and used to check on the researcher's interpretation of the findings.

(11) Three women and one man interviewed. Who did the man interview? Was the man assigned to interview the women or only the male partners? Clarification is 3 important because response bias is likely heightened when the interviewer is a male in this context.

The male interviewer mainly interviewed the male participants; but we have extensive experience of both gender matched and unmatched interviewing over the 12 years of the study clinic

(GHWP) existence and we find that it is the skill and approach of the individual interviewer which is often more important than the gender. Thus, the male interviewer did interview a few of the female participants, but no loss of data quality was observed.

(12) The subject characteristics are strange. Why would peer educators be working as commercial sex workers? How was it confirmed that they were indeed working as sex workers?

These "peer educators" were sex worker-opinion leaders who know the participant sex workers well. The GHWP clinic has worked with peer-educator sex workers since initiation of the clinic. We have added the inclusion criteria used in the study for peer educators:

"The inclusion criteria for peer educators were: must be a sex worker who was influential in the sex worker community,knew the sex worker within her community (hot spot), has been working within the hot spot for at least a year, knew how to communicate well to participants and study staff."

*In addition, from the first manuscript written from the study site (Van de Pitte, 2011): "*Collaboration was established with a local NGO, Women at Work International (WAWI), who have been offering health education and condom promotion to female sex workers in the target area since 2004. WAWI-trained peer-educators (PE) were invited to join the project and were enrolled as the first cohort participants. These PE subsequently mobilized other women involved in commercial sex or employed in surrounding entertainment facilities. The project field workers re-visited the newly mobilized women at their workplace to confirm that they belonged to the eligible study population (pre-screening) and invited them for an information meeting at the GHWP clinic. This meeting provided detailed information about the research programme, addressed questions and queries, and gave the women the opportunity to see the clinic. Women willing to join the study were scheduled for their screening visit. As the number of study participants increased, additional PE were selected among the enrolled women, based on their communication skills, commitment to the project and peer recommendation."

Since almost half the sample were under 20, where they living at home? In school?

Regarding residence: We had very few participants in school (n=10); and very few with parents. Most lived with their friends and work colleagues (other sex workers in a communal living arrangement).

Methods In summary there is no described sampling plan, the criteria for participation are not presented, without explanation many of the participants are identified as "peer educators" which seems in contrast to sex workers, there are five bar owners who seem unlikely to travel since they are managing sex workers at their homesite, and ten male partners without specification of what information they are invited to provide. Half the sample is under 20 so probably are living at home, but not details about residence or schooling.

We have added detail on the recruitment and the topics asked about for each category of participants in Table 1 above and in the manuscript. We have added a small section on residence and an explanation on what we have termed 'peer educator'; who are sex workers. With regards to bar owners, the reason for asking them about mobility is that they often are responsible for the young sex workers movements. They hire sex workers to work in their establishments and they can send sex workers to another location.

Also there is no "Ethics" section explaining how the study conforms to the Belmont report or standards of ethical research.

Did the women provide written informed consent, for instance?

The ethics section is added just before findings.

Findings (or Results) p. 11…Figure 1 is not included.

The editor suggested that the figure is removed.

p. 12…Reasons for mobility were given by some informants as "employment opportunities, violence, lack of agency, social/sexual/familial networks and poverty." No specifics about these revelations are offered, how the responses were organized to reflect these themes.

We believe that the quotes and explanations associated with the quotes give clarification on these reasons as noted in this example of violence as a reason for mobility:

"Other YWHR describe how when regular partners find them in bars unexpectedly and beat them for that.

> *You may sometimes be at work and he finds you, "What are you doing here at night?" he asks. He beats you up... You are definitely forced to leave that place because he has embarrassed you before your customers. (YWHR, early 20s)"*

p. 11…Since most of the subjects only travelled within 15 miles of Kampala (85%), there are only 3-4 outliers who went beyond those boundaries which is an insufficient number to derive a pattern without in-depth qualitative information.

The point we were trying to make is that participants move frequently, but not necessarily great distances, though a few do travel quite far.

Moreover the authors lose a chance to identify the sorts of moves reflected by the women's experiences (from one boyfriend to another?), and the paper misses the chance to obtain more information about the motives of the women themselves.

The motives identified out of the data were motives of the women themselves as well as other study participants and revolved around the themes:

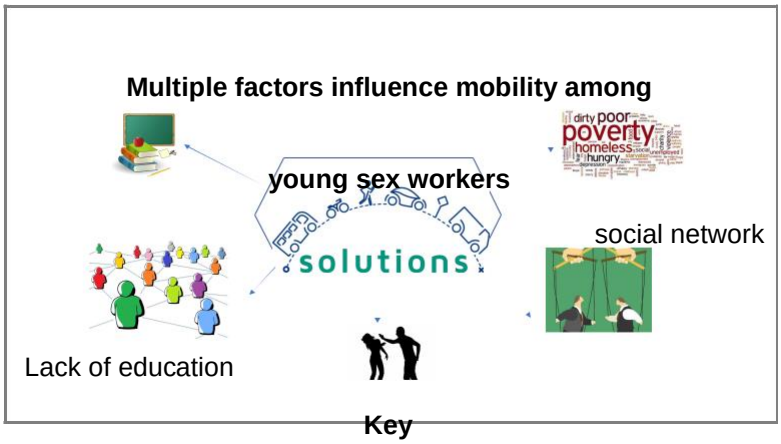
- *Lack of education and employment, violence, lack of agency, importance of social network and social support, and poverty*

The main findings are presented in a series of quotes from participants to corroborate the "reasons for mobility" given above, without any rationale for how study personnel arrived at these classifications.

We have clarified the rationale for the reasons for mobility as follows:

As questions around mobility was not one of the original study objectives, this was a finding that emerged as the study was being implemented, we quickly designed a sub-study and that is where these findings have come from.

We have added this figure to help explain the reasons for mobility:



	Lack of Agency; bar owners,
Extreme poverty	queen mothers, police,
	clients

Some of the quotes are hard to interpret outside of any context, such as a woman saying she was "chased from school."

We have added an explanation to the quote so that it reads:

"She said: [when teachers], "*chase you from school (meaning force you to leave school due to lack of school fees) and you spend a week at home*" it was very difficult on the whole family"

Reviewer: 2

Comments to the Author

This is an interesting evaluation of sex worker/transactional sex populations mobility with an extensive qualitative research component which aims to better understand some of the challenges and reasons surrounding increased mobility for this vulnerable, key population.

1) My biggest criticism of this manuscript is that it sets the reader up to believe that it will assess the impact mobility has on HIV risk in this population, yet it stops short of that. Clearly because follow-up is not yet completed, as stated in the limitations of this study. My suggestion would be to change the context of the manuscript which makes it seem as if this will assess HIV risk.

For example, in the abstract, the last sentence, essentially. Rather focus on the qualitative research aspect, which is ultimately what this manuscript is about.

The first section of the abstract now reads:

Introduction:

Adolescent girls and young women engaged in sex for money and/or commodities are at particular risk in countries with high HIV prevalence and high fertility rates. We aimed to map mobility patterns amongst young women engaged in sex work within a randomized controlled trial (RCT) to assess frequency and reasons for high mobility among this highly vulnerable population.

Similarly, the introduction to this paper speaks a lot about the link between mobility and HIV risk, but none of the results are included. Specifically, it reads (page 7, paragraph 2): "we report patterns of, and reasons for, young women at higher risk (YWHR) mobility and the links between mobility and HIV risk among YWHR..." - again, this link is between HIV and mobility are never reported on.

Thank you for the comment. We have refocused on the reasons for mobility as suggested.

This sentence now reads:

"In this paper, we report reasons for mobility among young women at higher risk (YWHR) and the potential links between mobility and HIV risk among YWHR participating in a randomized controlled trial (RCT) that aims to assess the effectiveness of a cognitive behavioral and structural HIV prevention intervention on reducing the frequency of unprotected sex in Kampala, Uganda."

2) In the Discussion the authors state "over 80% of the participants were mobile, so it is difficult to correlate a statistical relationship between mobility with higher-risk behavior". There does appear to be some variation with respect distances participants travelled and I wonder there was some differences in high risk behaviour for women who travelled further, compared to those who remained within a, say, 4km radius (ie the median).

Thanks for this comment. We have split up the data so that the quantitative and the qualitative results on mobility. The quantitative analysis is still being done and will be presented in an upcoming manuscript and we present the qualitative data in this paper. We have changed the sentence about over 80% mobile. "In our study, over 80% of the participants were mobile, and we do note that reasons for mobility are all similar to the reasons for entering into sex work and are qualitatively related to high-risk sexual behavior."

3) Minor point, it would be interesting to understand whether and how mobility has changed over the course of follow-up, and/or whether there were any seasonal trends and how this could possibly add some additional challenge to the YWHR with respect to their increased risk.

Qualitatively we have not seen a change of rates of mobility over the course of the study, but with regards to reasons, there have been findings about seasonality. We have added a sentence to that effect in the findings.

4) Minor point, but Figure 1 was not available in my proof version so I was unable to review that.

- *the editor asked us to remove the 2 figures*

Reviewer: 3

Please state any competing interests or state 'None declared':

None declared

Comments to the Author

This is a very well-written and timely paper about young women who exchange sex for money or commodities in Uganda. This study leverages data and infrastructure from the long-standing Good Health for Women Project (GHWP) clinic in Kampala, which is a strength. The study is scientifically sound and it contributes new evidence to the body of literature on mobility among a population with high risk for HIV acquisition risk. Specifically, these novel contributions include the use of an innovative design which combines quantitative/qualitative and GPS mapping methods and evaluating/tracking mobility across multi-national geographical areas. There are some weaknesses that could be addressed to strength the rigor and impact (potential citability) of this work.

This includes more completely describing the methods (especially sampling procedures and data analysis for the qualitative component), contextualizing the results within the broader literature on adolescent girls and young women (AGYW) with HIV risk, and more clearly highlighting the implications of findings. Specific comments are details below.

Abstract

- In the results section of the abstract, the authors state, "Of 644 participants, 56% had primary or no education. By mid-March 2020, 236 had attended both 12 and 18-month study visits". The drop-off from 644 to 236 participants and the rationale for only including participants with both completed visits is not clear. Are the rest of the results in the abstract among the 236 participants or is the denominator the total 644?

- *The reason to include only participants who had both M12 and M18 visits is so that we could compare locations between visits to see mobility.*

We have clarified results to read:

"Of the total 644 participants, 360 (56%) had primary or no education. By mid-March 2020, 236 had attended both 12 and 18-month study visits. These participants mapped 1198 work venues. 522 (81%) identified different work sites across time points. For seven (11%) participants, work venues extended to distant (> 40km) islands on Lake Victoria and as far as Canada. Interviews found lack of education, violence, lack of agency, social support networks and poverty as reasons for mobility."

- The methods and results could be strengthened to more clearly call out the 3 unique study components/populations: 644 in the RCT that contributed quantitative data; 30 individuals who contributed qualitative data; (n size?) mapping data.

We have added that specific clarification as the first sentence of the findings.

Background

The introduction provides an excellent overview of the current literature in a succinct summary. There is a clear overview of the nuances re: distinguishing sex work vs. transactional sex in this population and which factors may influence how these concepts are perceived by AGYW (and stigmatized). There is a key point that I think was missed that could highlight the impact of this paper a bit more. The authors state, "Mobility can place people in situations that increase their risk of acquiring STIs, HIV and other infections" as a factor contributing to HIV acquisition. The other side to this is that current HIV prevention programs (and biomedical prevention options) for AGYW are not designed or well-suited for highly mobile populations. For example, currently only daily oral PrEP is approved/recommended for cisgender AGYW with substantial HIV risk. Within in East African settings, PrEP is mostly delivered among AGYW via facility-based approaches which require multiple follow-up visits, longer-term engagement with health systems, etc, which could be especially challenging for highly mobile populations. This gap could be highlighted to demonstrate how understanding mobility patterns among AGYW as a way of informing/tailoring future PrEP or other HIV prevention interventions is still very much an urgent global health issue.

- *We have added to the discussion greater detail on how PrEP could be delivered to mobile populations.*

- In the last paragraph of the intro, the authors state, "In this paper, we report patterns of, and reasons for, young women at higher risk (YWHR) mobility and the links between mobility and HIV risk among YWHR participating in a randomized controlled trial (RCT) that aims to assess the effectiveness of a cognitive behavioral and structural HIV prevention intervention on reducing the frequency of unprotected sex in Kampala, Uganda". This sentence states the aim of the parent RCT clearly, however the rationale for the current analysis is less clear. What is the specific rationale for reporting patterns of/reasons for mobility and how does this complement the RCT (if that is the intent) or inform future work?

- *The goal of this analysis was to understand the main factors leading to poor clinic retention as we know that poor retention in care leads to poor health care outcomes and pilot a multi-component approach targeting HIV-negative young women (15-24 years old) who engage in high-risk sexual*

activity in Kampala, Uganda to increase retention in care and research. This goal is stated in the last sentence of the introduction.

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The authors state, “GHWP is an independent clinic established in 2008 to provide HIV and other STI prevention, care and treatment to FSW, their partners and their children in a confidentially-located, safe location” and there are several citations from prior GHWP-related studies. However, it would be helpful to include a few key background characteristics to help the reader contexualize the study population. For example, approximately how many clients does GHWP see in a month?

We have added: On average, the GHWP clinic would see between 20-80 clients a day. During the busiest time; between 50-80 a day and during the slow time; about 20-25 a day. We have added this to the section on ‘setting’ in methods.

How representative are GHWP clients of the underlying population of FSW in Kampala? *The clients of GHWP may be fairly representative of sex workers in Kampala based on a*

key variables such as education level, sex work as main income.

53% had secondary level education or higher in another sex worker surveillance study in Kampala (Hladik, 2017). In GHWP, 43% had some secondary education or higher (Mayanja, 2019). Both studies reported that over 85% of their participants cited sex work as their main source of income

Do clients receive routine care at GHWP?

Yes, all clients can receive routine care at GHWP for free.

- The study design is novel and includes multiple components (quantitative, qualitative, and mapping), but the methods section could benefit by including more aspects of the STROBE and COREQ guidelines (for qualitative work). For example, the authors state that, “Coding of data was conducted using NVIVO12 for Mac by two coders and focused on descriptive thematic coding”. Were the coders based in Kampala?

Yes; all authors, including coders are Kampala-based and know the context very well.

Did they know the local context?

Yes, all are based in Kampala and working with the study population for over 5 years. Were they involved in the interviewing?

Interviewers were part of the manuscript writing team.

Was there any member checking to confirm results?

Yes; The final analysis of the RCT will be completed in September of this year. However, the member-checking of the analysis for this paper and two other papers was conducted in January 2021.

We have added this section in the methods: “The current studies have benefitted from two community advisory boards, one that was set up for the clinic and one that is a youth -specific community advisory board set up for this study. The groups both meet every quarter during the study implementation and ask for guidance on both implementation and interpretation of study results.” Thus, the groups have met 4 times per year since 2017.

Please review the COREQ guidelines for reporting qualitative work to ensure required elements are covered to establish rigor: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349-357. I see the COREQ checklist was included with corresponding page numbers, but the details provided in the text are very thin and could be expanded to increase the clarity and rigor of the methods.

We have strengthened the methods section with much more detail regarding recruitment, and analysis.

- In the results section, the authors state, “We recruited 644 YWHR participants for the RCT. All participants were HIV-negative at enrolment. For this sub-study, 21 peer educators, five ‘queen mothers’ or bar owners and 10 male partners were recruited for qualitative interviews”. In the methods section, there is no mention of how these individuals were selected, what was the rationale for the sample size,

how these individuals were related (or not) to the 644 YWHR participants. These components (and other aspects of the COREQ guidelines) should be included in the methods. As is, the methods set up only the RCT study participants, but not really the others (unless the qualitative participants are also enrolled in the parent RCT)?

The HIV-negative YWHR were also participants in the RCT

The other categories of participants were purposively sampled based on a sampling strategy, which was designed to answer the objectives of our questions on mobility. For the HIV positive young women, we sampled from the clinic database young women who were within our age category, were due for follow-up during the interviewing months of the study. For the male partners, we sampled all available male partners within the clinic database due for follow-up

visit. For queen mothers, bar owners we asked all who were available and for policy makers, we interviewed the policy makers who were associated with our study population; those who would be able to answer the study question.

- The section on participant involvement is appreciated, but it is unclear how exactly participants were engaged in the current study. For example, the authors state, "In other studies at the research site, we have brought study participants together to discuss and validate preliminary results. The same will be done for these results when the study follow-up is completed". Does this mean that participants were not consulted on the results of the current study under review? Does this mean that study follow-up is NOT completed for the study under review or are they talking about the parent RCT? It would be more informative to describe specifics. For example, "Following data analysis, we conducted XX member-checking meetings with XX participants who were interviewed to review preliminary findings. Final results incorporated input and were reviewed by participants who attended member checking prior to submission". Without the specific details about the current study, it is unclear how participants were engaged.

  - *The final analysis of the RCT will be completed in September of 2021.*

We have added a clarification. As stated above, we have added this section in the methods: "The current studies have benefitted from two community advisory boards, one that was set up for the clinic and one that is a youth-specific community advisory board set up for this study. The groups both meet every quarter during the study implementation and ask for guidance on both implementation and interpretation of study results." Thus, the groups have met 4 times per year since 2017.

Results

- Similar to my comment from the abstract - the authors state, "By 15 March 2020, of the 236 participants who attended both 12- and18- month follow-up visits…" – it is unclear what this refers to or why this is important for the current study. Is the mapping data only from the 236 participants?

This has been answered above

- The authors state, "The median age of YWHR sample at baseline was 20 years, 46% of whom were 15-19 years old. With regards to educational level, 7% of YWHR had reached A-level or beyond and about half had some primary education. Nobody refused to be interviewed".

Were the YWHR interviewed for the qualitative component as well?

Yes, YWHR were interviewed for this sub-study; both HIV positive and HIV negative.

From other sections of the results, it sounded like the interviews were not among the YWHR but male partners and queen mothers. I think the methods and results could be clearer if they are broken down by study component/population. Only the YWHR are described in the results, but then qualitative results are reported from interviews with male partners, bar managers and owners, and "queen mothers".

This is clarified above; the groups interviewed were: YWHR (both HIV positive and HIV negative), male partners, peer educators, queen mothers and policy makers.

• In the submission package reviewed, there are no tables or figures. Given the complexity of incorporating data from multiple groups (quantitative from all or a subset of the >600 YWHR from the RCT, and qualitative interviews with a mixed group), a flow diagram of who contributes data to each group/component would be helpful. Additionally, a table of

demographic/background characteristics of the participants (incl. those only involved in the qualitative part) would strengthen the results.

We have added a table to clarify the groups and the topics of inquiry.

If the data presented in this paper are somehow preliminary to or part of a larger RCT analyses, it would be helpful to present the overall study timeline and how this particular study fits/complements. This piece is a bit confusing in the current paper.

Yes, this data is part of a larger RCT and the data in this manuscript were analyzed first.

The final analysis should be available towards the end of 2021.

Lastly, a figure that present the mapping data would also be more effective than the narrative text.

- As a note, there are references to figures in the text, but there does not appear to be any included in the review package. Perhaps this is an error within the editorial management system?

The editor requested that we remove the 2 maps that were figures in the originally submitted manuscript.

Discussion

- The discussion section posits the current study within the context of current literature very nicely and raises important implications of the study findings on study retention, etc. However, there is a lack of discussion re: the broader implications on the field of HIV prevention for YWHR. A missed opportunity here would be how frequent high mobility is among YWHR in African settings and how HIV prevention programs/interventions may need to respond to meet the needs of this population (see comment above re: how current PrEP models do not fit well within this context of high mobility).

We have added a section on the broader implications of delivering HIV services to mobile populations.

- There is no limitations paragraph included in the discussion. Please add this.

We have added a limitations paragraph

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