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High Mobility of Young Women who Exchange Sex for Money or Commodities and HIV Risk in Kampala, Uganda

Running Head

High Mobility Among Young Sex Workers in Uganda

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ABSTRACT

Introduction:

Adolescent girls and young women (AGYW) engaged in sex in exchange for money and/or commodities are at particular risk in countries with high HIV prevalence and high fertility rates. High mobility increases exposures to HIV risk. We aimed to map mobility patterns amongst young women engaged in sex work within a randomized controlled trial (RCT) to assess how mobility exposes and enhances HIV risk in a highly vulnerable population.

Methods:

Participants were eligible if 15-24 years-old, HIV-negative and engaged in sex work. They were randomized to a cognitive-behavioral therapy intervention focusing on health literacy and social media skills, or standard of care at specialized clinic for high-risk women. At study visits, participants used Google maps to identify work-venues, and we conducted 30 interviews on mobility with: high-risk women, bar owners/managers, male partners and sex-worker managers on distance, frequency and reasons for mobility. We used Python software to analyze mapping data.

Results:

Of 644 participants, 56% had primary or no education. By mid-March 2020, 236 had attended both 12 and 18-month study visits. Participants mapped 1198 work venues. 81% identified different work sites across time points. For 11% of participants, work venues extended to distant (> 40km) including 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.

Conclusions:

YWHR are highly mobile. Study and care retention strategies should be cognizant and tailored to suit YWHR mobility patterns. Peers, bar and lodge managers who have influence on YWHR lives and mobility, should be involved in research and health care service activities. A mobile clinic at work venues offering diagnosis and treatment and study activities is currently being piloted to assess its feasibility for retaining YWHR in care.

Strengths and limitations of this study

- This study investigates behavior of one of the most vulnerable populations to HIV, STI and unwanted pregnancy in sub-Saharan Africa; young sex workers aged 15-24 years old.
- This study illuminates detailed factors that motivate young sex worker mobility over time and the relationships between mobility and high risk sexual behavior
- This study employed both qualitative and a mapping methodology to explore participants' own descriptions of distance, frequency and reasons for mobility as well as mapped locations that highlight very high levels of mobility
- The data gathered here are highly contextual and specific to the study context; the findings may not translate to other regions of sub-Saharan Africa or elsewhere
- In this analysis, we have not combined the STI results with the mobility data as the study follow-up is not yet concluded

INTRODUCTION

Adolescent girls and young women (AGYW) engaged in sex in exchange for money and/or commodities are at particular risk in countries with high HIV prevalence and high fertility rates.[1-3] Young women may differentiate between commercial and transactional sex work based on stigma or relationship status.[4,6] In some cases, sex work is the only source of family income, and in others, women use transactional sex to supplement income.[7] Transactional sex may thus be situational or temporary, and associated with acute shortfalls in cash, need for school fees or food insecurity.[8,9] Sex work is often socially stigmatizing[10] whereas informal transactional sex may be socially accepted in some, situations, or contexts.[11] Globally, female sex workers (FSW) of all ages are over 10 times more likely to be living with HIV than women in the general population.[12] In sub-Saharan Africa in 2012, the average HIV prevalence among FSW was greater than 35%,[12] with 20-40% of FSW entering sex work as adolescents with a mean age of entry of 16 years or younger.

In Uganda, about 12% of adolescent girls and young women (AGYW) report transactional sex,[13-15] Young people in Uganda have an HIV prevalence of 3.7% nationally, yet younger FSW have about a four to seven times higher prevalence of HIV,[16 17] with FSW over 15 years old in Kampala reported to have between 33%-37% HIV infection.[18,19] In addition, FSW under 16 years old, new to sex work are dramatically more vulnerable than older colleagues to violence, STIs and HIV and poorer access to services.[20-26] Yet, despite rising numbers of young FSW and their recognized vulnerability, there have been few interventions to date that have targeted this group.[3,26]

High mobility increases young FSW exposure to risk.[27,28] Mobility can place people in situations that increase their risk of acquiring STIs, HIV and other infections. [27,29-31] Studies have reported that mobility is associated with concurrent sexual partners which further increases risk to HIV and other STIs.[32] Studies from Europe have shown that migrants diagnosed with HIV are more likely to present late for treatment and care than nationals.[33] Settling into a new place also presents challenges and instability affecting finding food and medical care[34]; these include irregular housing status, language and cultural barriers, cost of services, a lack of youth-inclusive health policies and accessible services.[28] 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.

METHODS

Setting:

This study was based within the Good Health for Women Project (GHWP) clinic in Kampala, Uganda. 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. Since inception, GHWP has been a site for conducting research on the context and underlying factors of HIV risk.[7,19,35-40] To protect the confidentiality and safety of participants, GHWP is located in an accessible area of central Kampala not identifiable to the general public as a place frequented specifically by participants at high risk of HIV infection.

Procedures:

Mapping of work venues

The first aim of this sub-study was to explore the dynamics of the social and sexual networks, mobility and context of YWHR in Kampala. Work venues of our RCT participants have been mapped in two ways: qualitative and quantitative data collection using key informant interviews of four categories of participants in urban Kampala: YWHR, peer educators, sex worker managers and male partners. In-depth interviews of YWHR study participants explored where, why, how, when, how frequently and for how long they move using interview guides. In addition, together with a staff member, the participant used Google maps to point out the location and improve the accuracy of the work venues' latitude and longitude coordinates at two time points. An exploratory

analysis using Python and Pandas library was conducted to gain a better understanding of the data aspects such as the main features of the data, identifying the important variables. This was then used to store the data after pre-processing. Finally, descriptive statistics were tabulated.

Community mapping of work venues identified areas sometimes termed 'hot spots' where HIV high-risk youth congregate. Mapping has been dynamic as new `hotspots' were discovered over time and new information built on data obtained from community members and the study field team who have strong relationships with participant community members built over more than 10 years. The interviews, lasting about one hour, took place in secure and private spaces at the GHWP clinic offices with only researcher and participant present.

All interviewed participants received UgSh 20,000 (USD $8.00) as compensation for their transport expenses as is current practice for all other studies at GHWP.

Data collection and analysis

Interviewers were university-trained social scientists and research counsellors, who conducted in-depth interviews in the local language (Luganda) and have interest in the research topic. Interviews were recorded and field notes taken. Discussions were held before and during the study regarding the sensitive (illegal) nature of sex work in Uganda and how that may affect the research as well as the safety of staff and participants. The interviewers (three women; one man) had over five years of experience working with high risk women and are known and trusted in the participant community.

Interview recordings and notes were transcribed and translated into English. 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. Multiple interactive discussions were held with the analysis team and senior researchers to validate data interpretation.

Patient and Public Involvement

Interaction with patients' in the study was done deliberately from the formative phase where they shared their priorities, experiences and preferences which informed and guided the development of the research questions, measures and intervention. Patients were not directly involved in the original study design but they were directly engaged in recruitment of study participants and gave significant input into intervention development with regards to content and form. 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.

FINDINGS

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. A "Queen mother" is the

term used by participants and can roughly translate as a sex work manager. 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.

By 15 March 2020, of the 236 participants who attended both 12- and18- month follow-up visits, 193 (82)% identified different work venues across these time points.

Work venues span distances from Sudan, Kenya and Rwanda, rural Uganda and Kampala. The median distance travelled was five kilometers (km) with an interquartile range of 4-10 in active Kampala work venues like Makindye and Bwaise, with the clinic coordinates as reference point. Most (85%) of the movement was within a radius of 15 km from Kampala. 15% of the movements were beyond 15km from Kampala. Figure 1 highlights the density of different work locations within Uganda.

More older women (20-24 year-olds) travelled farther (greater than 15km) compared to YWHR aged 15-19 years. Some participants described frequenting up to twelve workplaces in the previous month. Seven YWHR participants had seroconverted at their 6-month visit, three at 12 months and three at 18 months

In interviews we asked YWHR, male partners, bar managers and owners, and “queen mothers” reasons for high mobility. Five basic themes emerged: lack of education and

employment opportunities, violence, lack of agency, social/sexual/familial networks and poverty.

I. Lack of education and employment options leading to mobility

With little or no education or job training, participants narrated life stories that they described as 'failed dreams'. One participant, the tenth child in her family, described her dream as a young girl of wishing to become a doctor. With insufficient money to continue her education, she had a second dream of hotel management. As this dream did not materialize, she described survival strategies that included moving from place to place doing sex work. Changing dreams led to changing locations. Another participant, the ninth child in her family, recounted her story of deciding to stop school to help her parents stop worrying about her school fees. She said: [when teachers], "*chase you from school and you spend a week at home*" it was very difficult on the whole family. Some YWHR mentioned stealing money as a way to survive without a job and running from one place to another not to be caught by police or by the people they stole from.

> *""You go to a club in Wandegeya [a Kampala quarter] and meet a man who gives you 20,000/= [~6 USD] to go and buy beer... It is at that point that you get out of the club and move to another bar...You disappear ... When you go to [another bar] and meet someone who gives you 10,000/= to buy beer, you also leave ... By the end of the day, all you have done is cheat them of their money without much effort" (YWHR, early 20s)*

II. Violence between YWHR and customers and between themselves

YWHR described situations where violence was a part of their lives inflicted by customers neglecting to wear condoms. One YWHR narrating her experiences working on the Ssese Islands: "*You may ask a man to wear a condom and those are automatic punches*." 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)*

Physical violence, or the threat of violence, perpetrated by boyfriends, colleagues or pimps was reported as a reason for frequent mobility; sometimes as a response to what may have been thought of as wrongdoing:

> *. … when we steal from customers… should he find you, he can box you [Laughs heartedly]... Should he get you, he can beat you up. So, you have to be really witty. Some men have families and they budget how much they are to spend on a prostitute .. say about 5,000/= [~1.30 USD]... you come and take it all, you also take his phone. Should he find you, he can surely beat you up (YWHR, early 20s)*

A YWHR, whose parents had both died when she was under 10 years old and who was

raised by her uncle, narrated her experience of leaving that home soon after her parents died and starting sex work under 15 years old. She described how customers in bars would often give young women too much alcohol so that they would get very drunk and then force them to have sex without payment. A second YWHR recounted the story of a friend who was sold to an overseas sex worker-dealer and broke her legs when she was thrown off a balcony.

> *Sometimes you might even be put in a room with twenty men and you're to sleep with all of them in one night ... (young sex worker, HIV positive, early 20s)*

One male partner described that some relationships between YWHR may become violent.

> *They are so violent. They fight too much ...one gets to a point where they cannot live with anyone ... Alcohol and the things they use [other drugs]... fighting also causes them to move ... they are drunk full-time (*Male partner)

Drug use, tension and infighting among YWHR are all reasons for mobility.

III. Lack of agency in relation to mobility

Some participants noted that YWHR do not often have full control over their lives and the movement in their lives. They could be at the mercy of clients, queen mothers, whomever is providing housing, the police, bar owners or managers. One male partner

noted that some bars bring a group of young women, about ten, on the weekends, take them back to rural areas on Monday, and bring a new group the following weekend.

*"They have to keep on moving because it's not good when the clients get used to their faces… Clients only give good money to fresh faces... With time they go back to the places they've been before. They just keep on rotating (*moving*)" (Bar owner)*

Some young women work under a manager who has control over their mobility; when, where, how frequently and for how long they work in certain locations. A male partner described how negotiations take place between the manager and the venue owner regarding the young women who are brought from rural areas to work in some locations in Kampala.

It's the boss [the pimp/queen mother] for those [girls]... they go anywhere she tells them to" (Male partner)

In other situations, law enforcement will regulate young women's movements by coercing money out of them or forcing them to move. Some women mentioned how during seasons when police may need money, they will harass YWHR; this will be another reason for their mobility.

Sometimes the police come and search for us and they do not want you there… Like Christmas season…they round you up; we get little money and they want some of it

...You run to some place where they do not know you, . . . (YWHR, early 20s)

IV. How social networks and social support relate to mobility

Participants described home environments where there is no social or financial support. In some cases, YWHR have had to leave school due to the death of parents. These situations can lead to mobility to escape an unstable or unhealthy setting.

They don't have parents. Some have caretakers who aren't their biological parents; they have faced many social issues. They keep on moving from one place to another ...Their needs are not met... they are out of school... (*Health worker)*

YWHR described how they preferred to stay close to their friends, who may be replacing a family network, so that when a friend moves from one place to another they follow along and go together. One participant explained how YWHR count on each other for safety, that they '*have to be there for each other*' and therefore if one feels she has to move, the others will follow.

V. Poverty leads to mobility

The overarching reason for why participants constantly move was financial. One participant mentioned that they travel to different towns to target market days. Other illustrations of this association included descriptions of accommodations that are daily

rate lodges where one has to leave if she cannot pay for the night. Searching for bars where they could have loyal or regular, customers, leaving venues that were already claimed by other sex workers; or going to a place where customers pay higher prices were all situations connecting poverty and mobility.

> *The reason we kept leaving, was money. They may be buying sex workers here for 5,000/= and elsewhere they are buying them at 10,000/= or 15,000/= (YWHR, early 20s)*

> *The biggest reason we left that place was that there were colleagues that had specific customers and they would tell us to look for **our** customers that were dedicated and attached to us... The reason was to get a new place (YWHR, early 20s)*

In addition to the reasons for mobility, we asked about frequency of travel, distances traveled. The farthest distances travelled included Mombasa, Mauritius, Dubai, Juba and Canada.

Reasons for participants' mobility concentrated around five themes including lack of education and employment opportunities, violence, agency, limited family support/social networks as well as poverty. Sub-themes and connections between these themes show a complex web of drivers of mobility and high-risk behavior.

DISCUSSION

Our findings highlight that YWHR in Kampala are highly mobile, with multiple push and pull factors associated with mobility. We found that participants were far more mobile than we anticipated, with both greater distances, greater frequency and destinations of movement.

Previous studies dating back to early 2000s, showed that a number of factors were associated with initiating sex work in Uganda and the region; including low levels of education, broken family systems, limited job market and low access to sexual and reproductive health services and these are similar to the factors we have found that influence mobility.[42,43] Limited access to sexual and reproductive health for AGYW is an important factor related to the high level of unexpected pregnancies among this age group. Maternal mortality is the second largest cause of deaths among adolescent girls aged 15–19 globally. Of all annual births, around 16 million are among girls in this age range; about 2 million are among girls under the age of 15.[44] In addition, 41% of young women 20-24-years old and nearly half of those who experienced sexual violence, were pregnant, the highest rate in sub-Saharan Africa.[45] With limited education, and very high national unemployment, many young women have very few options in making enough money to feed themselves and their children. This of course is exacerbated with the current COVID-19 crisis.

Some sex worker studies conducted in sub-Saharan Africa have highlighted how migration into urban areas to sell sex has resulted in conflicts and violence with local sex workers.[46] Our participants also described how they often moved in order not to

compete with other women or to find a venue where they could cultivate loyal clients.

Violence and fear of violence has been reported as closely intertwined with mobility, poverty, substance abuse and risk for HIV in India.[47,48] Intimate partner violence (IPV) is highly associated with risk for HIV and Ugandan women and female sex workers report extremely high rates of reported IPV (45%-75% globally).[49,50] [18] Among Ugandan women, 20-24 years old, 40% have experienced sexual violence.[51,52] In our study, violence was reported as perpetrated by police, regular and non-regular partners, other sex workers and managers or pimps, and was a reason for mobility. The reasons were to run from a conflictual situation or towards a potentially better situation. Ramesh and colleagues demonstrated that participants who were more mobile were more likely to report violence and that sex workers reporting both mobility and violence were more likely to be infected with HIV.[47] There are many studies globally reporting correlation between violence and increased risk for HIV.[49] Physical, sexual and psychological violence increase susceptibility to HIV among women and girls often through a clustering of factors that include poverty, substance use, social, gender norms that weave into an intractable pattern of higher risk environment.[49]

The proposed pathways showing higher mobility associated with HIV risk in other studies demonstrate that female sex workers who travel more often reported less consistent condom use, have higher STI symptoms, and greater perceived risk for HIV acquisition even after controlling for demographic and socio-economic factors including violence.[53,29,54,55] In our study, over 80% of the participants were mobile, so it is difficult to correlate a statistical relationship between mobility with higher-risk behavior. We do,

however, 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.

To improve our understanding of the dynamic nature of movement, sexual behavior and the relationships between populations and disease transmission, Cassels et al. proposed a network-dyadic conceptual model to interpret previous studies and inform the development of services and research.[56] They propose that the transmission of HIV is dependent on movement and people's behavior which is influenced by the connecting of local sub-epidemics, and the effects on both sending and receiving communities.[56] We propose that the intricate, dynamic and complex nature of relationships between both formal and informal sex work, poverty, substance use, family members, friends, and queenmother relationship networks, violence, and mobility are constantly changing and impacting on each other in different and convoluted ways. How public health intervention development features into the complex interactions of the lives of participants is complex, delicate and the greater understanding we acquire into how mobility impacts on our ability to intervene the more effective these interventions will likely become.

Study retention strategies and health care services should be informed by a more comprehensive and nuanced understanding of the complicated lives of participants and services, and interventions should be tailored to suit mobility patterns. Peers, bar/lodge managers who have influence on YWHR lives and mobility should be involved in research activities if retention of YWHR is to be attained. A mobile clinic, conducted

within active work venues, has been piloted to assess its feasibility for reducing the transport burden on highly mobile participants and increasing retention in care. We have attempted to understand whether and how mobility influences the effectiveness of HIV prevention services specifically with YWHR and the utility of identifying appropriate approaches and methods, inclusive of mobile populations, that are desperately needed at this critical moment in the HIV epidemic.[28]

Footnotes

- Contributors: RK (PhD) conceived of the study. EM and DB conducted the geography data analysis and provided input on study design and study procedures. MM, a female research counsellor, participated in data collection. FK, MM and MN oversaw data collection. RK was primarily responsible for qualitative data analysis, with input from JS. RK composed the first draft of the manuscript. All authors provided input and approved of the final submission.
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COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	18
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	7
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	8
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	5
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	8
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	na
Transcripts returned	23	Were transcripts returned to participants for comment and/or	na

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	7
Description of the coding tree	25	Did authors provide a description of the coding tree?	na
Derivation of themes	26	Were themes identified in advance or derived from the data?	7
Software	27	What software, if applicable, was used to manage the data?	7
Participant checking	28	Did participants provide feedback on the findings?	7
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	8-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	15
Clarity of major themes	31	Were major themes clearly presented in the findings?	15
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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Mobility Study of Young Women who Exchange Sex for Money or Commodities using Google Maps and Qualitative Methods in Kampala, Uganda

Running Head

High Mobility Among Young Sex Workers in Uganda

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ABSTRACT

Objectives:

We aimed to assess mobility patterns and reasons for high mobility amongst young women engaged in sex work within a randomized controlled trial to gauge how mobility may enhance HIV risk in a highly vulnerable population.

Setting:

Participants were recruited from a clinic in Kampala Uganda that was set up for women at high risk of HIV infection.

Participants:

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. High mobility increases exposure to HIV risk. Women participants were eligible if 15-24 years-old, HIV-negative and engaged in sex work.

Interventions:

Participants were randomized to a cognitive-behavioral therapy intervention focusing on health literacy and social media skills, or standard of care at specialized clinic for high-risk women.

Measures: Participants used Google maps to identify work-venues at 12 and 18 month study visits. We also conducted 34 interviews on mobility with: high-risk women, male partners, health workers and sex-worker managers. Topics included: distance, frequency and reasons for mobility. We used Python software to analyze mapping data.

Results:

By mid-March 2020, 236 participants had attended both 12 and 18-month study visits. Participants mapped 1198 work venues. 522 (81%) identified different work sites across time points. For seven (3%) 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.

Conclusions:

Young women at high risk are highly mobile. Retention strategies should be cognizant and tailored to suit mobility patterns. Peers, and managers who have influence on participant's lives and mobility, should be involved in research and healthcare services. A mobile clinic at work venues offering diagnosis, treatment and study activities is being piloted.

Strengths and limitations of this study

- This study investigates behavior of one of the most vulnerable populations to HIV, sexually transmitted infections (STI) and unwanted pregnancy in sub-Saharan Africa; young sex workers aged 15-24 years old.
- This study illuminates detailed factors that motivate young sex worker mobility over time and the potential relationships between mobility and high-risk sexual behavior
- This study employed both qualitative and a mapping methodology to explore participants' own descriptions of distance, frequency and reasons for mobility as well as mapped locations that highlight very high levels of mobility giving insight into options to inform better suited intervenion
- The data gathered here are highly contextual and specific to the study population and environment; the findings may not translate to other regions of sub-Saharan Africa or elsewhere
- In this analysis, we have not combined the STI results with the mobility data

INTRODUCTION

Adolescent girls and young women engaged in sex in exchange for money and/or commodities are at particular risk in countries with high HIV prevalence and high fertility rates.[1-3] Young women may differentiate between commercial and transactional sex work based on stigma or relationship status.[4,5] In some cases, sex work is the only source of family income, and in others, women use transactional sex to supplement income.[6] Transactional sex may thus be situational or temporary, and associated with acute shortfalls in cash, need for school fees or food insecurity.[7,8] Sex work is often socially stigmatizing[9] whereas informal transactional sex may be socially accepted in some, situations, or contexts.[10] Globally, female sex workers (FSW) of all ages are over 10 times more likely to be living with HIV than women in the general population.[11] In sub-Saharan Africa in 2012, the average HIV prevalence among FSW was greater than 35%,[11] with 20-40% of FSW entering sex work as adolescents with a mean age of entry of 16 years or younger.

In Uganda, about 12% of adolescent girls and young women report transactional sex,[12-14] Young people in Uganda have an HIV prevalence of 3.7% nationally, yet younger female sex workers have about a four to seven times higher prevalence of HIV,[15 16] with female sex workers over 15 years old in Kampala reported to have between 33%-37% HIV infection.[17,18] In addition, female sex workers under 16 years old, new to sex work are dramatically more vulnerable than older colleagues to violence, STIs and HIV and poorer access to services.[19-25] Yet, despite rising numbers of young female sex workers and their recognized vulnerability, there have been few interventions to date that have targeted this group.[3,25]

Studies in India have found that sex-work-related mobility is often undertaken to maximize trade opportunity.[26] In East Africa, research around mobility has highlighted that mobility both short and longer -term was associated with higher-risk behaviours, and is strongly associated with gender: the HIV risks associated with mobility are more prominent for women than for men.[27]

High mobility increases young female sex workers exposure to risk.[27,28] Mobility can place people in situations that increase their risk of acquiring STIs, HIV and other infections. [28-31] Studies have reported that mobility is associated with concurrent sexual partners which further increases risk to HIV and other STIs.[32] Studies from Europe have shown that migrants diagnosed with HIV are more likely to present late for treatment and care than nationals.[33] Settling into a new place also presents challenges and instability affecting finding food and medical care[34]; these include irregular housing

status, language and cultural barriers, cost of services, a lack of youth-inclusive health policies and accessible services.[27] In this paper, we report patterns of, and reasons for, young women at higher risk (YWHR) mobility 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 (the ZETRA trial) on reducing the frequency of unprotected sex in Kampala, Uganda.

METHODS

Setting:

This study was based within the Good Health for Women Project clinic in Kampala, Uganda. This clinic was 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 safe location. Since inception, the clinic has been a site for conducting research on the context and underlying factors of HIV risk.[6,18,35-40] The clinic offered routine HIV counselling and testing, syndromic management of sexually transmitted infections, family planning, antenatal care, free condoms, risk reduction counselling, counselling for excessive alcohol use, tuberculosis screening and treatment, ART and co-trimoxazole/dapsone preventive therapy. Enrolled women attended quarterly visits for HIV prevention and treatment services and study visits every six months. This clinic would generally see about 50 sex workers per day during the time of the study. To protect the confidentiality and safety of participants, it was located in an accessible area

of central Kampala not identifiable to the general public as a place frequented specifically by participants at high risk of HIV infection.

Procedures:

Mapping of work venues

The first aim of this sub-study was to explore the dynamics of the social and sexual networks, mobility and context of YWHR in Kampala. Work venues of our randomized controlled trial participants have been mapped in two ways: qualitative and quantitative data collection using key informant interviews of four categories of participants in urban Kampala: YWHR, peer educators, sex worker managers and male partners. In-depth interviews of YWHR study participants explored where, why, how, when, how frequently and for how long they move using interview guides.

Participant enrolment

Randomized parent study. Participants were recruited from a specialized clinic in Kampala called the "Good Health for Women Project" clinic described above. 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 described above.

Inclusion criteria for our parent randomized trial (ZETRA trial) 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 three months, agreeing to participate in

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:

Table 1: Groups, Topics and Number of participants in Qualitative Study on Mobility, 2019-2020

GROUP	TOPICS	NUMBER
• HIV-positive & • HIV-negative YWHR • Peer educators & • Queen mothers (QM)	• Mobility (reasons, frequency, distance, length of time away, agency) • Agency (level of independence and control over their lives) • Other barriers (employment, health seeking, phone issues)	6 HIV positive 8 HIV negative 8 (3 PE; 4 QM)
Male partners of YWHR	Customers perspectives on mobility	6
Health workers	Provider perspectives on barriers to retention; possible solutions	6
TOTAL		34

In addition to describing work venues using text, together with a staff member, the participant used Google Maps to point out the location and improve the accuracy of the work venues' latitude and longitude coordinates at two time points to assess change over time. An exploratory analysis using Python and Pandas library was conducted to gain a better understanding of the data aspects such as the main features of the data. Python is a programming language. Pandas stands for "Python Data Analysis Library". This is a useful Python Library that takes data and creates a python object with rows and columns forming data frame that acts very similar to tables in statistical software packages like Excel and SPSS. This was then used to store the data after pre-processing. Finally, descriptive statistics were tabulated.

Community mapping of work venues identified areas sometimes termed 'hot spots' where HIV high-risk youth congregate. Mapping has been dynamic as new `hotspots'

were discovered over time and new information built onto data obtained from community members and the study field team who have strong relationships with participant community members over more than 10 years. The interviews, lasting about one hour, took place in secure and private spaces at the study clinic offices with only researcher and participant present.

All interviewed participants received UgSh 20,000 (USD $8.00) as compensation for their transport expenses as is current practice for all other studies at the study clinic.

Data collection and analysis

Interviewers were university-trained social scientists and research counsellors, who conducted in-depth interviews in the local language (Luganda) and had interest in the research topic. Interviews were recorded and field notes taken. Discussions were held before and during the study regarding the sensitive (illegal) nature of sex work in Uganda and how that may affect the research as well as the safety of staff and participants. The interviewers (three women; one man) had over five years of experience working with high-risk women and are known and trusted in the participant community.

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 using NVIVO12 for Mac by two coders based in Uganda with complete knowledge of the context

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. The main codes included in the interview guides included: frequency, distance and reasons for travel. The codes that emerged during analysis under reasons for mobility included: lack of education and employment, violence, lack of agency, influence of social networks and poverty.

Patient and Public Involvement

Interaction with patients' in the study was done deliberately from the formative phase where participants shared their priorities, experiences and preferences which informed and guided the development of the research questions, measures and intervention. Patients were not directly involved in the original study design (at proposal writing phase) but they were directly engaged in recruitment of study participants and gave significant input into intervention development with regards to content and form. The current study has benefitted from two community advisory boards, one that was set up for the clinic at initiation in 2008 and one that was a youth-specific community advisory board developed for this study. The groups both met every quarter during the study implementation and provided guidance on both implementation and interpretation of study results. Two specific additional member-checking exercises were conducted in January 2021 with data collection staff and study participants. The study has been approved under the Uganda Virus Research Institute and the Uganda National Council

fo Science and Technology. We have written informed consent for all participants and have, as confirmed by the Uganda National Council of Science and Technology, confirmed all those who are under 18 as "emancipated minors". The UNCST has approved this study under the regulations as such.

FINDINGS

We recruited 644 YWHR participants for the RCT. All participants were HIV-negative at enrolment. For this sub-study, we conducted 34 qualitative interviews; in addition to the 14 sex workers (six HIV positive, eight HIV negative), six health worker/policy makers, three peer educators, five '*queen mothers'* and six male partners were recruited for qualitative interviews. A "Queen mother" is the term used by participants and can roughly translate as a sex work manager. The inclusion criteria for peer educators were: must be a sex worker who was influential in the sex worker community, knew the sex workers 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. The median age of YWHR sample at baseline was 20.5 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.

Table 2: Average Age and Age Range of Qualitative Participants 2019-2020.

Category	Average age	Range
Queen mothers	39.8	32-53
YWHR HIV negative	20.5	18-24
YWHR HIV positive	22.5	20-24
Male partners	36.4	34-40
HCWs	34.2	23-45

Nobody refused to be interviewed.

By 15 March 2020, of the 236 participants who attended both 12- and18- month follow-up visits, 193 (82)% identified different work venues across these time points.

Work venues span distances from Sudan, Kenya and Rwanda, rural Uganda and Kampala. The median distance travelled was five kilometers (km) with an interquartile range of 4-10 in active Kampala work venues like Makindye and Bwaise, with the clinic coordinates as reference point. Most (85%) of the movement was within a radius of 15 km from Kampala. 15% of the movements were beyond 15km from Kampala (Figure 1).

More older women (20-24 year-olds) travelled farther (greater than 15km) compared to YWHR aged 15-19 years. Some participants described frequenting up to twelve workplaces in the previous month. Seven YWHR participants had seroconverted at their 6-month visit, three at 12 months and three at 18 months.

In interviews we asked YWHR (HIV positive and negative), male partners, bar managers and owners, and “queen mothers” reasons for high mobility. Five basic themes emerged: lack of education and employment opportunities, violence, lack of agency, social/sexual/familial networks and poverty (Figure 2).

I. Lack of education and employment options leading to mobility

With little or no education or job training, participants narrated life stories that they described as ‘failed dreams’. One participant, the tenth child in her family, described her dream as a young girl of wishing to become a doctor. With insufficient money to

continue her education, she had a second dream of hotel management. As this dream did not materialize, she described survival strategies that included moving from place to place doing sex work. Changing dreams led to changing locations. Another participant, the ninth child in her family, recounted her story of deciding to stop school to help her parents stop worrying about her school fees. 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. Some YWHR mentioned stealing money as a way to survive without a job and running from one place to another not to be caught by police or by the people they stole from.

> *""You go to a club in Wandegeya [a Kampala quarter] and meet a man who gives you 20,000/= [~6 USD] to go and buy beer... It is at that point that you get out of the club and move to another bar...You disappear ... When you go to [another bar] and meet someone who gives you 10,000/= to buy beer, you also leave ... By the end of the day, all you have done is cheat them of their money without much effort" (YWHR, early 20s).*

Some young women noted that there are educated sex workers however but they often work under different circumstances described as escort services that earn more money and are in less dangerous conditions.

II. Violence between YWHR and customers and between themselves

YWHR described situations where violence was a 'normal' part of their lives inflicted by customers neglecting to wear condoms. One YWHR narrating her experiences working on the Ssese Islands: "*You may ask a man to wear a condom and those are automatic*

punches." 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)*

Physical violence, or the threat of violence, perpetrated by boyfriends, colleagues or pimps was reported as a reason for frequent mobility; sometimes as a response to what may have been thought of as wrongdoing:

> *. … when we steal from customers… should he find you, he can box you [Laughs heartedly]... Should he get you, he can beat you up. So, you have to be really witty. Some men have families and they budget how much they are to spend on a prostitute .. say about 5,000/= [~1.30 USD]... you come and take it all, you also take his phone. Should he find you, he can surely beat you up (YWHR, early 20s)*

A YWHR, whose parents had both died when she was under 10 years old and who was raised by her uncle, narrated her experience of leaving that home soon after her parents died and starting sex work under 15 years old. She described how customers in bars would often give young women too much alcohol so that they would get very drunk and then force them to have sex without payment; if the woman refused she would either have to run or be beaten up. A second YWHR recounted the story of a friend who was

sold to an overseas sex worker-dealer and broke her legs when she was thrown off a balcony.

> *Sometimes you might even be put in a room with twenty men and you're to sleep with all of them in one night ... (young sex worker, HIV positive, early 20s)*

One male partner described that some relationships between YWHR may become violent. Sex workers themselves discussed how the competition for customers and jealousy regarding success between them can lead to violence and movement.

> *They are so violent. They fight too much ...one gets to a point where they cannot live with anyone ... Alcohol and the things they use [other drugs]... fighting also causes them to move ... they are drunk full-time (*Male partner)

Drug use, tension and infighting among YWHR and between them and customers were all reasons for mobility.

III. Lack of agency in relation to mobility

Some participants noted that YWHR do not often have full control over their lives and the movement in their lives. They could be at the mercy of clients, queen mothers, whomever is providing housing, the police, bar owners or managers. One male partner noted that some bars bring a group of young women, about ten, on the weekends, take them back to rural areas on Monday, and bring a new group the following weekend.

*"They have to keep on moving because it's not good when the clients get used to their faces… Clients only give good money to fresh faces... With time they go back to the places they've been before. They just keep on rotating (*moving*)" (Bar owner)*

Some young women work under a manager who has control over their mobility; when, where, how frequently and for how long they work in certain locations. A male partner described how negotiations take place between the manager and the venue owner regarding the young women who are brought from rural areas to work in some locations in Kampala.

It's the boss [the pimp/queen mother] for those [girls]... they go anywhere she tells them to" (Male partner)

In other situations, as sex work is illegal, law enforcement will regulate young women's movements by coercing money out of them or forcing them to move. Some women mentioned how during seasons when police may need money, they will harass YWHR; this will be another reason for their mobility.

IV. *Sometimes the police come and search for us and they do not want you there… Like Christmas season…they round you up; we get little money and they want some of it ...You run to some place where they do not know you, . . . (YWHR, early 20s)*.How social networks and social support relate to mobility

Participants described home environments where there is no emotional, social or financial support. In some cases, YWHR have had to move from home to home or to leave school due to the death of parents. These situations can lead to mobility to escape an unstable or unhealthy setting.

> *They don't have parents. Some have caretakers who aren't their biological parents; they have faced many social issues. They keep on moving from one place to another ...Their needs are not met... they are out of school...* (*Health worker, 45 years old)*

YWHR described how they preferred to stay close to their friends, who may be emotionally replacing a family network, so that when a friend moves from one place to another they follow along and go together. One participant also explained how YWHR count on each other for safety, that they '*have to be there for each other'*. Participants have also noted that their connections to one another are similar to a business partner where if a customer requests a quality such as size or beauty, a participant may connect her associate to that customer. One health worker also mentioned peer pressure as a factor leading to mobility; ' she might have a colleague in Bwaise who will convince her to move [there] when they talk to each other'; citing higher payment in another location.

V. Poverty leads to mobility

The overarching reason for why participants constantly move was financial. One participant mentioned that they travel to different towns to target market days. Other illustrations of this association included descriptions of accommodations that are daily rate lodges where one has to leave if she cannot pay for the night. Searching for bars where they could have loyal or regular, customers, leaving venues that were already claimed by other sex workers; or going to a place where customers pay higher prices were all situations connecting poverty and mobility.

> *The reason we kept leaving, was money. They may be buying sex workers here for 5,000/= and elsewhere they are buying them at 10,000/= or 15,000/= (YWHR, early 20s)*

> *The biggest reason we left that place was that there were colleagues that had specific customers and they would tell us to look for **our** customers that were dedicated and attached to us... The reason (for mobility) was to get a new place (YWHR, early 20s)*

In addition to the reasons for mobility, we asked about frequency of travel, distances traveled. The farthest distances travelled included Mombasa, Mauritius, Dubai, Juba and Canada.

Reasons for participants' mobility concentrated around the themes of lack of education and employment opportunities sometimes related to seasons including the festive

season, violence, lack of agency, limited family support/social networks as well as poverty. Sub-themes and connections between these themes show a complex web of drivers of mobility potentially leading to high-risk sexual behavior.

DISCUSSION

Our findings highlight that YWHR in Kampala are highly mobile, with multiple push and pull factors associated with mobility. We found that participants were far more mobile than we anticipated, with both greater distances, greater frequency and destinations of movement.

Access to sexual and reproductive health services: Previous studies dating back to early 2000s, showed that a number of factors were associated with initiating sex work in Uganda and the region; including low levels of education, broken family systems, limited job market and low access to sexual and reproductive health services and these factors are similar to the factors we have found that influence mobility.[42,43] Limited access to sexual and reproductive health for AGYW is an important factor related to the high level of unexpected pregnancies among this age group. Maternal mortality is the second largest cause of death among adolescent girls aged 15–19 globally. Of all annual births, around 16 million are among girls in this age range; about two million are among girls under the age of 15.[44] In addition, 41% of young women 20-24-years old and nearly half of those who experienced sexual violence, were pregnant, the highest rate in sub-Saharan Africa.[45] With limited education, and very high national unemployment, many young women have very few options in making enough money to feed themselves and their children. This of course is exacerbated with the current

COVID-19 crisis. Often the constellation of factors leading young women into sex work are the factors that push them into steady mobility.

Violence motivates mobility: Some sex worker studies conducted in sub-Saharan Africa have highlighted how migration into urban areas to sell sex has resulted in conflicts and violence with local sex workers.[46] Our participants also described how they often moved in order not to compete with other women or to find a venue where they could cultivate loyal clients. Violence and fear of violence has been reported as closely intertwined with mobility, poverty, substance abuse and risk for HIV in India.[47,48] Intimate partner violence (IPV) is highly associated with risk for HIV and Ugandan women and female sex workers report extremely high rates of reported IPV (45%-75% globally).[49,50] [17] Among Ugandan women, 20-24 years old, 40% have experienced sexual violence.[51,52] In our study, violence was reported as perpetrated by police, regular and non-regular partners, other sex workers and managers or pimps, and was a reason for mobility. The reasons were to run from a conflictual or violent situation or towards a potentially more peaceful situation. Ramesh and colleagues demonstrated that participants who were more mobile were more likely to report violence and that sex workers reporting both mobility and violence were more likely to be infected with HIV.[47] There are many studies globally reporting correlation between violence and increased risk for HIV.[49] Physical, sexual and psychological violence increase susceptibility to HIV among women and girls often through a clustering of factors that include poverty, substance use, social, gender norms that weave into an intractable pattern of higher risk environment.[49]

Relationship between mobility and HIV prevention: The proposed pathways showing higher mobility associated with HIV risk in other studies demonstrate that female sex workers who travel more often reported less consistent condom use, have higher STI symptoms, and greater perceived risk for HIV acquisition even after controlling for demographic and socio-economic factors including violence.[53,29,54,55] In our study, over 80% of the participants were mobile, and we do note that reasons for mobility are qualitatively related to high-risk sexual behavior and are strong obstacles for HIV prevention behavior including consistent adherent condom use and use of PrEP medication.

Limitations and strengths: Our study was not originally powered to statistically measure the relationship between mobility and STI, HIV or unplanned pregnancy. We noted the high mobility on assessing the reasons for difficulty in retaining our study participants. This became a sub-study and we were then able to discuss in-depth the frequency, distances, reasons and context surrounding our participants' mobility.

To improve our understanding of the dynamic and complex nature of movement, sexual behavior and the relationships between populations and disease transmission, Cassels et al. proposed a network-dyadic conceptual model to interpret previous studies and inform the development of services and research.[56] They propose that the transmission of HIV is dependent on movement and people's behavior which is influenced by the connecting of local sub-epidemics, and the effects on both sending and receiving communities.[56] We propose that the intricate, dynamic and complex nature of

relationships between both formal and informal sex work, poverty, substance use, family members, friends/colleagues, and queen mother relationship networks, violence, and mobility are constantly changing and impacting on each other in different and convoluted ways. How public health intervention development and implementation features into the complex interactions of the lives of participants is complex, delicate and the greater understanding we acquire into how mobility impacts on our ability to intervene the more effective these interventions will likely become. Study retention strategies and health care services should be informed by a more comprehensive and nuanced understanding of the complicated and tenuous lives of participants and services, and interventions should be tailored to suit mobility patterns. Peers, bar/lodge managers who have influence on YWHR lives and mobility should be involved in research activities if retention of YWHR is to be attained. We must build a mindful PrEP intervention appreciating that our beneficiaries are constantly on the move. This may look very different from a traditional clinic-based service that expects all clients to come on a regular basis for follow-up visits. A mobile clinic, conducted within active work venues, has been piloted to assess its feasibility for reducing the transport burden on highly mobile participants and increasing retention in care. We have attempted to understand whether and how mobility influences the effectiveness of HIV prevention services specifically with YWHR and the utility of identifying appropriate approaches and methods, inclusive of mobile populations, that are desperately needed at this critical moment in the HIV epidemic.[27]

Figure Legends

Figure 1: Mapping data on reported work venues for young sex workers in Kampala

Figure 2: The Factors influencing mobility among young sex workers in Kampala

Footnotes

- Contributors: RK (PhD) conceived of the study. EM and DB conducted the geography data analysis and provided input on study design and study procedures. MM, a female research counsellor, participated in data collection. FK, MM and MN oversaw data collection. RK was primarily responsible for qualitative data analysis, with input from JS. RK composed the first draft of the manuscript. All authors provided input and approved of the final submission.
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Figure 1: Mapping data on reported work venues for young sex workers in Kampala

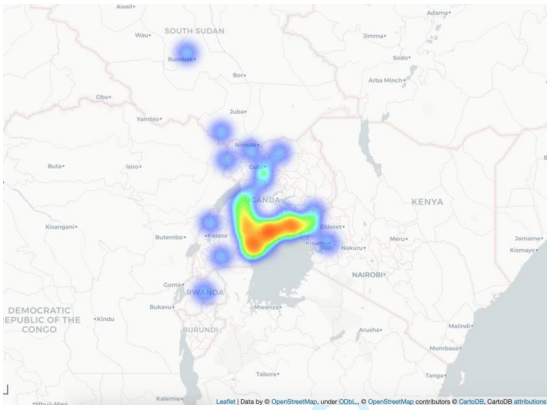
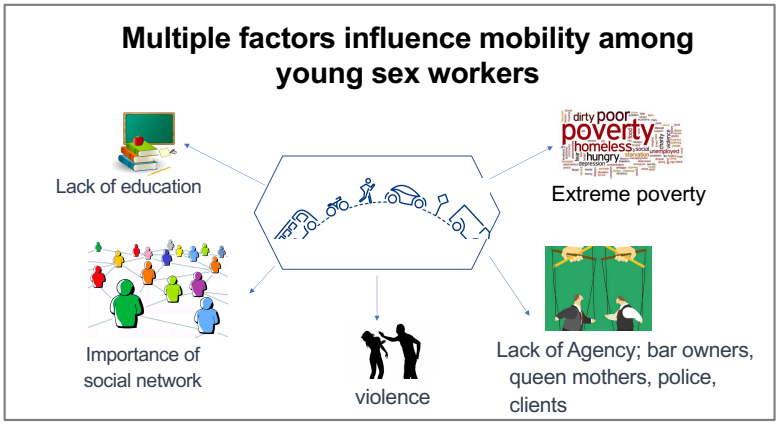


Figure 2: The Factors influencing mobility among young sex workers in Kampala



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A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	18
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	7
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	8
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	5
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	8
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	na
Transcripts returned	23	Were transcripts returned to participants for comment and/or	na

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	7
Description of the coding tree	25	Did authors provide a description of the coding tree?	na
Derivation of themes	26	Were themes identified in advance or derived from the data?	7
Software	27	What software, if applicable, was used to manage the data?	7
Participant checking	28	Did participants provide feedback on the findings?	7
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	8-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	15
Clarity of major themes	31	Were major themes clearly presented in the findings?	15
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

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Mobility Study of Young Women who Exchange Sex for Money or Commodities using Google Maps and Qualitative Methods in Kampala, Uganda

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Mobility Study of Young Women who Exchange Sex for Money or Commodities using Google Maps and Qualitative Methods in Kampala, Uganda

Running Head

High Mobility Among Young Sex Workers in Uganda

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ABSTRACT

Objectives:

We aimed to assess mobility patterns and reasons for high mobility amongst young women engaged in sex work within a randomized controlled trial to gauge how mobility may hinder access to health services and enhance HIV risk in a highly vulnerable population.

Setting:

Participants were recruited from a clinic in Kampala, Uganda set up for women at high risk of HIV infection.

Participants:

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. High mobility increases exposure to HIV risk. Women participants were eligible for the parent study if 15-24 years-old, HIV-negative and engaged in sex work. For this sub-study, 34 qualitative interviews were held with 14 sex workers (six HIV positive, eight HIV negative), six health worker/policy makers, three peer educators, five 'queen mothers' and six male partners were recruited for qualitative interviews.

Measures: Participants used Google maps to identify work-venues at 12 and 18 month study visits. We also conducted 34 interviews on mobility with: high-risk women, male partners, health workers and sex-worker managers. Topics included: distance, frequency and reasons for mobility. We used Python software to analyze mapping data.

Results:

Interviews found in depth narratives describing lack of education and employment opportunities, violence, lack of agency, social, sexual and familial support networks and poverty as a complex web of reasons for high mobility among young sex workers.

Conclusions:

Young women at high risk are highly mobile. Reasons for mobility impact access and retention to health services and research activities. Strategies to improve retention to care should be cognizant and tailored to suit mobility patterns.

Strengths and limitations of this study

- This study investigates behavior of one of the most vulnerable populations to HIV, sexually transmitted infections (STI) and unwanted pregnancy in sub-Saharan Africa; young sex workers aged 15-24 years old.
- This study illuminates detailed factors that motivate young sex worker mobility over time and the potential relationships between mobility and high-risk sexual behavior
- This study employed both qualitative and a mapping methodology using Google maps to explore participants' own descriptions of distance, frequency and reasons for mobility as well as mapped locations that highlight very high levels of mobility giving insight into options to inform better suited intervention
- The data gathered here are highly contextual and specific to the study population and environment; the findings may not translate to other regions of sub-Saharan Africa or elsewhere
- In this analysis, we have not combined the STI results with the mobility data

INTRODUCTION

Adolescent girls and young women engaged in sex in exchange for money and/or commodities are at particular risk in countries with high HIV prevalence and high fertility rates.[1-3] Young women may differentiate between commercial and transactional sex work based on stigma or relationship status.[4,5] In some cases, sex work is the only source of family income, and in others, women use transactional sex to supplement income.[6] Transactional sex may thus be situational or temporary, and associated with acute shortfalls in cash, need for school fees or food insecurity.[7,8] Sex work is often socially stigmatizing[9] whereas informal transactional sex may be socially accepted in some, situations, or contexts.[10] Globally, female sex workers (FSW) of all ages are over 10 times more likely to be living with HIV than women in the general population.[11] In sub-Saharan Africa in 2012, the average HIV prevalence among FSW was greater than 35%,[11] with 20-40% of FSW entering sex work as adolescents with a mean age of entry of 16 years or younger.

In Uganda, about 12% of adolescent girls and young women report transactional sex,[12-14] Young people in Uganda have an HIV prevalence of 3.7% nationally, yet younger female sex workers have about a four to seven times higher prevalence of HIV,[15 16] with female sex workers over 15 years old in Kampala reported to have between 33%-37% HIV infection.[17,18] In addition, female sex workers under 16 years old, new to sex work are dramatically more vulnerable than older colleagues to violence, STIs and HIV and poorer access to services.[19-25] Yet, despite rising numbers of young female sex workers and their recognized vulnerability, there have been few interventions to date that have targeted this group.[3,25]

Studies in India have found that sex-work-related mobility is often undertaken to maximize trade opportunity.[26] In East Africa, research around mobility has highlighted that mobility both short and longer -term was associated with higher-risk sexual behavior, and is strongly associated with gender: the HIV risks associated with mobility are more prominent for women than for men.[27]

High mobility increases young female sex workers exposure to risk.[27,28] Mobility can place people in situations that increase their risk of acquiring STIs, HIV and other infections. [28-31] Studies have reported that mobility is associated with concurrent sexual partners which further increases risk to HIV and other STIs.[32] Studies from Europe have shown that migrants diagnosed with HIV are more likely to present late for treatment and care than nationals.[33] Settling into a new place also presents challenges and instability affecting finding food and medical care[34]; these include irregular housing

status, language and cultural barriers, cost of services, a lack of youth-inclusive health policies and accessible services.[27] In this paper, we report patterns of, and reasons for, young women at higher risk (YWHR) mobility 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 (the ZETRA trial) on reducing the frequency of unprotected sex in Kampala, Uganda.

METHODS

Setting:

This study was based within the Good Health for Women Project clinic in Kampala, Uganda. This clinic was 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 safe location. Since inception, the clinic has been a site for conducting research on the context and underlying factors of HIV risk.[6,18,35-40] The clinic offered routine HIV counselling and testing, syndromic management of sexually transmitted infections, family planning, antenatal care, free condoms, risk reduction counselling, counselling for excessive alcohol use, tuberculosis screening and treatment, ART and co-trimoxazole/dapsone preventive therapy. Enrolled women attended quarterly visits for HIV prevention and treatment services and study visits every six months. This clinic generally saw about 50 sex workers per day during the time of the study. To protect the confidentiality and safety of participants, it was located in an accessible area of central

Kampala not identifiable to the general public as a place frequented specifically by participants at high risk of HIV infection.

Procedures:

Mapping of work venues

The first aim of this sub-study was to explore the dynamics of the social and sexual networks, mobility and context of YWHR in Kampala. Work venues of our randomized controlled trial participants have been mapped in two ways: qualitative and quantitative data collection using key informant interviews of four categories of participants in urban Kampala: YWHR, peer educators, sex worker managers and male partners. In-depth interviews of YWHR study participants explored where, why, how, when, how frequently and for how long they move using interview guides.

Participant enrolment

Randomized parent study. Participants were recruited from a specialized clinic in Kampala called the "Good Health for Women Project" clinic described above. 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 described above.

Inclusion criteria for our parent randomized trial (ZETRA trial) 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 three months, agreeing to participate in

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 in order to access opinions, experiences, perceptions on the research questions around mobility from a wide range of possible angles (see Table 1).

Table 1: Groups, Topics and Number of participants in Qualitative Study on Mobility, 2019-2020

GROUP	TOPICS	NUMBER
• HIV-positive & • HIV-negative YWHR • Peer educators & • Queen mothers (QM)	• Mobility (reasons, frequency, distance, length of time away, agency) • Agency (level of independence and control over their lives) • Other barriers (employment, health seeking, phone issues)	6 HIV positive 8 HIV negative 8 (3 PE; 4 QM)
Male partners of YWHR	Customers perspectives on mobility	6
Health workers	Provider perspectives on barriers to retention; possible solutions	6
TOTAL		34

In addition to describing work venues using text, together with a staff member, the participants used Google Maps to point out the location and improve the accuracy of the work venues' latitude and longitude coordinates at two time points to assess change over time. An exploratory analysis using Python and Pandas library was conducted to gain a better understanding of the data aspects such as the main features of the data. Python is a programming language. Pandas stands for "Python Data Analysis Library". It takes data and creates a python object with rows and columns forming a data frame that acts very similar to tables in statistical software packages like Excel and SPSS. This was then used to store the data after pre-processing. Finally, descriptive statistics were tabulated.

Community mapping of work venues identified areas sometimes termed 'hot spots' where HIV high-risk youth congregate. Mapping was dynamic as new `hotspots' were

discovered over time and new information built onto data obtained from community members and the study field team who had strong relationships with participant community members over more than 10 years. The interviews, lasting about one hour, took place in secure and private spaces at the study clinic offices with only researcher and participant present.

All interviewed participants received UgSh 20,000 (USD $8.00) as compensation for their transport expenses as is current practice for all other studies at the study clinic.

Data collection and analysis

Interviewers were university-trained social scientists and research counsellors, who conducted in-depth interviews in the local language (Luganda) and had interest in the research topic. Interviews were recorded and field notes taken. Discussions were held before and during the study regarding the sensitive (illegal) nature of sex work in Uganda and how that may affect the research as well as the safety of staff and participants. The interviewers (three women; one man) had over five years of experience working with high-risk women and are known and trusted in the participant community.

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 using NVIVO12 for Mac by two coders based in Uganda with complete knowledge of the context

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. The main codes included in the interview guides included: frequency, distance and reasons for travel. The codes that emerged during analysis under reasons for mobility included: lack of education and employment, violence, lack of agency, influence of social networks and poverty.

Patient and Public Involvement

Interaction with patients' in the study was done deliberately from the formative phase where participants shared their priorities, experiences and preferences which informed and guided the development of the research questions, measures and intervention. Patients were not directly involved in the original study design (at proposal writing phase) but they were directly engaged in recruitment of study participants and gave significant input into intervention development with regards to content and form. The current study has benefitted from two community advisory boards, one that was set up for the clinic at initiation in 2008 and one that was a youth-specific community advisory board developed for this study. The groups both met every quarter during the study implementation and provided guidance on both implementation and interpretation of study results. Two specific additional member-checking exercises were conducted in January 2021 with data collection staff and study participants. The study was approved under the Uganda Virus Research Institute and the Uganda National Council for

Science and Technology. We have written informed consent for all participants and have, as confirmed by the Uganda National Council of Science and Technology, confirmed all those who are under 18 as "emancipated minors". The UNCST has approved this study under the regulations as such.

FINDINGS

We recruited 644 YWHR participants for the parent RCT. All participants were HIV-negative at enrolment. For this sub-study, we conducted 34 qualitative interviews; in addition to the 14 sex workers (six HIV positive, eight HIV negative), six health worker/policy makers, three peer educators, five '*queen mothers'* and six male partners were recruited for qualitative interviews. A "Queen mother" is the term used by participants and can roughly translate as a sex work manager. The inclusion criteria for peer educators were: must be a sex worker who was influential in the sex worker community, knew the sex workers 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. The median age of YWHR sample at baseline was 20.5 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 (see Table 2).

Table 2: Average Age and Age Range of Qualitative Participants 2019-2020.

Category	Average age	Range
Queen mothers	39.8	32-53
YWHR HIV negative	20.5	18-24
YWHR HIV positive	22.5	20-24
Male partners	36.4	34-40
HCWs	34.2	23-45

Nobody refused to be interviewed.

By 15 March 2020, of the 236 participants who attended both 12- and18- month follow-up visits, 193 (82)% identified different work venues across these time points.

Work venues span distances from Sudan, Kenya and Rwanda, rural Uganda and Kampala. The median distance travelled was five kilometers (km) with an interquartile range of 4-10 in active Kampala work venues like Makindye and Bwaise, with the clinic coordinates as reference point. Most (85%) of the movement was within a radius of 15 km from Kampala. 15% of the movements were beyond 15km from Kampala (Figure 1).

More older women (20-24 year-olds) travelled farther (greater than 15km) compared to YWHR aged 15-19 years. Some participants described frequenting up to twelve workplaces in the previous month. Seven YWHR participants had seroconverted at their 6-month visit, three at 12 months and three at 18 months.

In interviews we asked YWHR (HIV positive and negative), male partners, bar managers and owners, and “queen mothers” reasons for high mobility. Five basic themes emerged: lack of education and employment opportunities, violence, lack of agency, social/sexual/familial networks and poverty (Figure 2).

I. Lack of education and employment options leading to mobility

With little or no education or job training, participants narrated life stories that they described as ‘failed dreams’. One participant, the tenth child in her family, described her dream as a young girl of wishing to become a doctor. With insufficient money to

continue her education, she had a second dream of hotel management. As this dream did not materialize, she described survival strategies that included moving from place to place performing sex work. Changing dreams led to changing locations. Another participant, the ninth child in her family, recounted her story of deciding to quit school to help her parents stop worrying about her school fees. 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. Some YWHR mentioned stealing money as a way to survive without a job and running from one place to another not to be caught by police or by the people they stole from.

> *""You go to a club in Wandegeya [a Kampala quarter] and meet a man who gives you 20,000/= [~6 USD] to go and buy beer... It is at that point that you get out of the club and move to another bar...You disappear ... When you go to [another bar] and meet someone who gives you 10,000/= to buy beer, you also leave ... By the end of the day, all you have done is cheat them of their money without much effort" (YWHR, early 20s).*

Some young women noted that there are educated sex workers, however but they often work under different circumstances described as escort services that earn more money and are in less dangerous conditions.

II. Violence between YWHR and customers and between themselves

YWHR described situations where violence was a 'normal' part of their lives inflicted by customers neglecting to wear condoms. One YWHR narrating her experiences working on the Ssese Islands: "*You may ask a man to wear a condom and those are automatic*

punches." 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)*

Physical violence, or the threat of violence, perpetrated by boyfriends, colleagues or pimps was reported as a reason for frequent mobility; sometimes as a response to what may have been thought of as wrongdoing:

> *. … when we steal from customers… should he find you, he can box you [Laughs heartedly]... Should he get you, he can beat you up. So, you have to be really witty. Some men have families and they budget how much they are to spend on a prostitute .. say about 5,000/= [~1.30 USD]... you come and take it all, you also take his phone. Should he find you, he can surely beat you up (YWHR, early 20s)*

A YWHR, whose parents had both died when she was under 10 years old and who was raised by her uncle, narrated her experience of leaving that home soon after her parents died and starting sex work under 15 years old. She described how customers in bars would often give young women too much alcohol so that they would get very drunk and then force them to have sex without payment; if the woman refused, she would either have to run or be beaten up. A second YWHR recounted the story of a friend who was

sold to an overseas sex worker-dealer and broke her legs when she was thrown off a balcony.

> *Sometimes you might even be put in a room with twenty men and you're to sleep with all of them in one night ... (young sex worker, HIV positive, early 20s)*

One male partner described that some relationships between YWHR may become violent. Sex workers themselves discussed how the competition for customers and jealousy regarding success between them can lead to violence and movement.

> *They are so violent. They fight too much ...one gets to a point where they cannot live with anyone ... Alcohol and the things they use [other drugs]... fighting also causes them to move ... they are drunk full-time (*Male partner)

Drug use, tension and infighting among YWHR and between them and customers were all reasons for mobility.

III. Lack of agency in relation to mobility

Some participants noted that YWHR do not often have full control over their lives and the movement in their lives. They could be at the mercy of clients, queen mothers, whomever is providing housing, the police, bar owners or managers. One male partner noted that some bars bring a group of young women, about ten, on the weekends, take them back to rural areas on Monday, and bring a new group the following weekend.

*"They have to keep on moving because it's not good when the clients get used to their faces… Clients only give good money to fresh faces... With time they go back to the places they've been before. They just keep on rotating (*moving*)" (Bar owner)*

Some young women work under a manager who has control over their mobility; when, where, how frequently and for how long they work in certain locations. A male partner described how negotiations take place between the manager and the venue owner regarding the young women who are brought from rural areas to work in some locations in Kampala.

It's the boss [the pimp/queen mother] for those [girls]... they go anywhere she tells them to" (Male partner)

In other situations, as sex work is illegal, law enforcement will regulate young women's movements by coercing money out of them or forcing them to move. Some women mentioned how during seasons when police may need money, they will harass YWHR; this will be another reason for their mobility.

Sometimes the police come and search for us and they do not want you there… Like Christmas season…they round you up; we get little money and they want some of it ...You run to some place where they do not know you, . . . (YWHR, early 20s).How social networks and social support relate to mobility

Participants described home environments where there is no emotional, social or financial support. In some cases, YWHR have had to move from home to home or to leave school due to the death of parents. These situations can lead to mobility to escape an unstable or unhealthy setting.

> *They don't have parents. Some have caretakers who aren't their biological parents; they have faced many social issues. They keep on moving from one place to another ...Their needs are not met... they are out of school...* (*Health worker, 45 years old)*

YWHR described how they preferred to stay close to their friends, who may be emotionally replacing a family network, so that when a friend moves from one place to another they follow along and go together. One participant also explained how YWHR count on each other for safety, that they '*have to be there for each other'*. Participants have also noted that their connections to one another are similar to a business partner where if a customer requests a quality such as size or beauty, a participant may connect her associate to that customer. One health worker also mentioned peer pressure as a factor leading to mobility; ' she might have a colleague in Bwaise who will convince her to move [there] when they talk to each other'; citing higher payment in another location.

IV. Poverty leads to mobility

The overarching reason for why participants constantly move was financial. One participant mentioned that they travel to different towns to target market days. Other illustrations of this association included descriptions of accommodations that are daily rate lodges where one has to leave if she cannot pay for the night. Searching for bars where they could have loyal or regular, customers, leaving venues that were already claimed by other sex workers; or going to a place where customers pay higher prices were all situations connecting poverty and mobility.

> *The reason we kept leaving, was money. They may be buying sex workers here for 5,000/= and elsewhere they are buying them at 10,000/= or 15,000/= (YWHR, early 20s)*

> *The biggest reason we left that place was that there were colleagues that had specific customers and they would tell us to look for **our** customers that were dedicated and attached to us... The reason (for mobility) was to get a new place (YWHR, early 20s)*

In addition to the reasons for mobility, we asked about frequency of travel, distances traveled. The farthest distances travelled included Mombasa, Mauritius, Dubai, Juba and Canada.

Reasons for participants' mobility concentrated around the themes of lack of education and employment opportunities sometimes related to seasons including the festive

season, violence, lack of agency, limited family support/social networks as well as poverty. Sub-themes and connections between these themes show a complex web of drivers of mobility potentially leading to high-risk sexual behavior.

DISCUSSION

Our findings highlight that YWHR in Kampala are highly mobile, with multiple push and pull factors associated with mobility. We found that participants were far more mobile than we anticipated, with both greater distances, greater frequency and destinations of movement.

Access to sexual and reproductive health services: Previous studies dating back to early 2000s, showed that a number of factors were associated with initiating sex work in Uganda and the region; including low levels of education, broken family systems, limited job market and low access to sexual and reproductive health services and these factors are similar to the factors we have found that influence mobility.[42,43] Limited access to sexual and reproductive health for AGYW is an important factor related to the high level of unexpected pregnancies among this age group. Maternal mortality is the second largest cause of death among adolescent girls aged 15–19 globally. Of all annual births, around 16 million are among girls in this age range; about two million are among girls under the age of 15.[44] In addition, 41% of young women 20-24-years old and nearly half of those who experienced sexual violence, were pregnant, the highest rate in sub-Saharan Africa.[45] With limited education, and very high national unemployment, many young women have very few options in making enough money to feed themselves and their children. This of course is exacerbated with the current

COVID-19 crisis. Often the constellation of factors leading young women into sex work are the factors that push them into steady mobility.

Violence motivates mobility: Some sex worker studies conducted in sub-Saharan Africa have highlighted how migration into urban areas to sell sex has resulted in conflicts and violence with local sex workers.[46] Our participants also described how they often moved in order not to compete with other women or to find a venue where they could cultivate loyal clients. Violence and fear of violence has been reported as closely intertwined with mobility, poverty, substance abuse and risk for HIV in India.[47,48] Intimate partner violence (IPV) is highly associated with risk for HIV and Ugandan women and female sex workers report extremely high rates of reported IPV (45%-75% globally).[49,50] [17] Among Ugandan women, 20-24 years old, 40% have experienced sexual violence.[51,52] In our study, violence was reported as perpetrated by police, regular and non-regular partners, other sex workers and managers or pimps, and was a reason for mobility. The reasons were to run from a conflictual or violent situation or towards a potentially more peaceful situation. Ramesh and colleagues demonstrated that participants who were more mobile were more likely to report violence and that sex workers reporting both mobility and violence were more likely to be infected with HIV.[47] There are many studies globally reporting correlation between violence and increased risk for HIV.[49] Physical, sexual and psychological violence increase susceptibility to HIV among women and girls often through a clustering of factors that include poverty, substance use, social, gender norms that weave into an intractable pattern of higher risk environment.[49]

Relationship between mobility and HIV prevention: The proposed pathways showing higher mobility associated with HIV risk in other studies demonstrate that female sex workers who travel more often reported less consistent condom use, have higher STI symptoms, and greater perceived risk for HIV acquisition even after controlling for demographic and socio-economic factors including violence.[53,29,54,55] In our study, over 80% of the participants were mobile, and we do note that reasons for mobility are qualitatively related to high-risk sexual behavior and are strong obstacles for HIV prevention behavior including consistent adherent condom use and use of PrEP medication.

Limitations and strengths: Our study was not originally powered to statistically measure the relationship between mobility and STI, HIV or unplanned pregnancy. We noted the high mobility on assessing the reasons for difficulty in retaining our study participants. This became a sub-study and we were then able to discuss, in-depth, the frequency, distances, reasons and context surrounding our participants' mobility.

To improve our understanding of the dynamic and complex nature of movement, sexual behavior and the relationships between populations and disease transmission, Cassels et al. proposed a network-dyadic conceptual model to interpret previous studies and inform the development of services and research.[56] They propose that the transmission of HIV is dependent on movement and people's behavior which is influenced by the connecting of local sub-epidemics, and the effects on both sending and receiving communities.[56] We propose that the intricate, dynamic and complex nature of

relationships between both formal and informal sex work, poverty, substance use, family members, friends/colleagues, and queen mother relationship networks, violence, and mobility are constantly changing and impacting on each other in different and convoluted ways. How public health intervention development and implementation features into the complex interactions of the lives of participants is complex, delicate and the greater understanding we acquire into how mobility impacts on our ability to intervene the more effective these interventions will likely become. Study retention strategies and health care services should be informed by a more comprehensive and nuanced understanding of the complicated and tenuous lives of participants and services, and interventions should be tailored to suit mobility patterns. Peers, bar/lodge managers who have influence on YWHR lives and mobility should be involved in research activities if retention of YWHR is to be attained. We must build a mindful PrEP intervention appreciating that our beneficiaries are constantly on the move. This may look very different from a traditional clinic-based service that expects all clients to come on a regular basis for follow-up visits. A mobile clinic, conducted within active work venues, has been piloted to assess its feasibility for reducing the transport burden on highly mobile participants and increasing retention in care. We have attempted to understand whether and how mobility influences the effectiveness of HIV prevention services specifically with YWHR and the utility of identifying appropriate approaches and methods, inclusive of mobile populations, that are desperately needed at this critical moment in the HIV epidemic.[27]

Figure Legends

Figure 1: Mapping data on reported work venues for young sex workers in Kampala

Figure 2: The Factors influencing mobility among young sex workers in Kampala

Footnotes

- Contributors: RK (PhD) conceived of the study. EM and DB conducted the geography data analysis and provided input on study design and study procedures. MM, a female research counsellor, participated in data collection. FK, MM and MN oversaw data collection. RK was primarily responsible for qualitative data analysis, with input from JS. All authors were involved in member-check. RK composed the first draft of the manuscript. All authors provided input and approved of the final submission.
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- Patient consent for publication: All participants gave written informed consent to participate.
- Ethics approval: This research was approved by the Uganda Virus Research Institute (#GC/127/16/08/527) and the Ugandan National Council for Science and Technology (#HS1886).
- Provenance and peer review: Not commissioned; externally peer reviewed.
- Data availability statement:
    - All data relevant to the study are included in the article

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Figure 1: Mapping data on reported work venues for young sex workers in Kampala

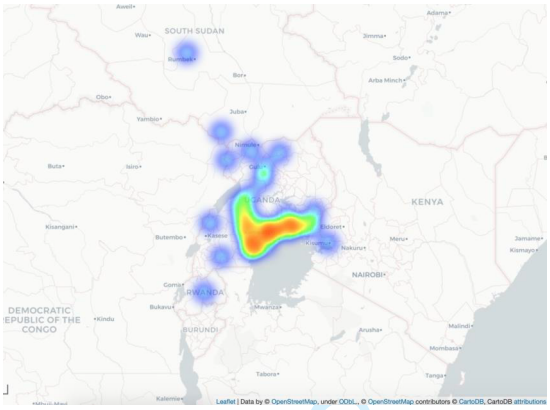
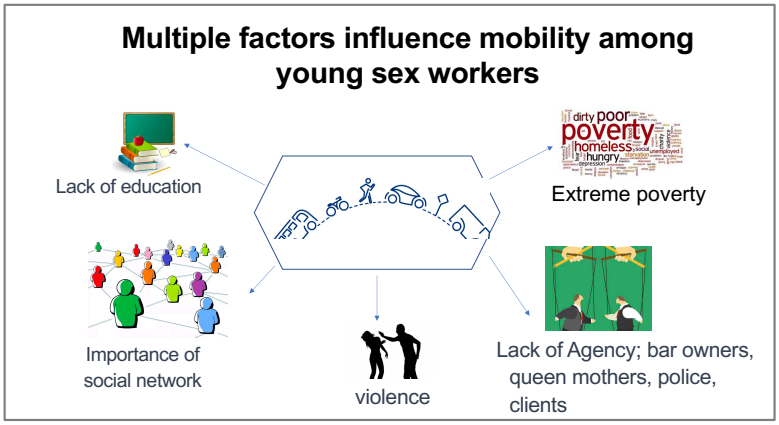


Figure 2: The Factors influencing mobility among young sex workers in Kampala



COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	18
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	6
Occupation	3	What was their occupation at the time of the study?	6
Gender	4	Was the researcher male or female?	6
Experience and training	5	What experience or training did the researcher have?	6
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	6
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	6
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	6
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	7
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	6
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	6
Sample size	12	How many participants were in the study?	7
Non-participation	13	How many people refused to participate or dropped out? Reasons?	8
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	6
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	6
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	8
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	5
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	8
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	6
Field notes	20	Were field notes made during and/or after the inter view or focus group?	6
Duration	21	What was the duration of the inter views or focus group?	6
Data saturation	22	Was data saturation discussed?	na
Transcripts returned	23	Were transcripts returned to participants for comment and/or	na

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	7
Description of the coding tree	25	Did authors provide a description of the coding tree?	na
Derivation of themes	26	Were themes identified in advance or derived from the data?	7
Software	27	What software, if applicable, was used to manage the data?	7
Participant checking	28	Did participants provide feedback on the findings?	7
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	8-14
Data and findings consistent	30	Was there consistency between the data presented and the findings?	15
Clarity of major themes	31	Were major themes clearly presented in the findings?	15
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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