Pregnancy planning among female sex workers in Uganda: Evaluation of the psychometric properties of the London Measure of Unplanned Pregnancy

Running title: Evaluation of the LMUP among female sex workers in Uganda

Justine Nnakate Bukenya[1*], Christine Nalwadda Kayemba[1], Stella Neema[2], Peter Kyambadde[3] Rhoda K. Wanyenze[4] and Geraldine Barrett[5]

Department of Community Health and Behavioural Sciences, School of Public Health, College of Health Sciences Makerere University, Kampala, Uganda[1]; Department of Sociology , School of Social Sciences, College of Humanities and Social Science, Makerere University, Kampala, Uganda[2]; AIDS Control Programme, Ministry of Health, Kampala, Uganda[3]; Department of Disease Control and Environmental Health, School of Public Health, College of Health Sciences Makerere University, Kampala, Uganda[4]; Institute for Women's Health, University College London, United Kingdom[5]

***For Correspondence:** Email: jbukenya@musph.ac.ug

ABSTRACT

The aim of the study was to evaluate the psychometric properties of the London Measure of Unplanned Pregnancy (LMUP) among female sex workers (FSWs) in Uganda. The LMUP was translated into Luganda and adapted for use with FSWs and underwent cognitive testing and two field tests. From the final Luganda LMUP, three other language versions were created (Acholi, Lugisu and Runyakole), and preliminary field test data were collected. Final data were collected from 819 FSWs attending the 'Most at Risk Population Initiative' clinics. The Luganda field testing showed that there were no missing data, the scale was well targeted, Cronbach's alpha was 0.82, weighted Kappa was 0.78, measurement was unidimensional, and all construct validity hypotheses were met. Likewise, with the Acholi, Lugisu, and Runyankole translations, field testing showed that there were no missing data, the scales were well targeted, Cronbach's alpha were>0.70, and measurement was unidimensional. We concluded that the Luganda LMUP is a valid and reliable tool for assessing pregnancy planning among FSWs in Uganda and that the Acholi, Lugisu, and Runyankole versions of the LMUP also had good initial psychometric properties.

Keywords: Female sex workers, pregnancy planning, psychometric validation, Uganda

INTRODUCTION

Sex work is common in sub- Saharan Africa where it is estimated that 1.4%-8.7% of women admit that they have exchanged sex for money or goods or favours [1] with higher concentrations in urban areas, port cities and on major highways[2] . According to the Crane survey, 3.3% (13,200/400000) of women aged 15 and above were estimated to be FSWs in Kampala, the capital of Uganda[3]. In Uganda, sex work is criminalized[4] and stigmatized. This limits FSWs' access to health services and contributes to disproportionately poor sexual and reproductive health (SRH) consequences [5] including unintended pregnancies among FSWs.

The proportions of FSWs who have experienced unintended pregnancies vary considerably in sub-Saharan Africa ranging from 23.8% in Gambia[6], 24.0% in Kenya[5], 28.6% in Ethiopia[7], 44.0% in Uganda[8] to 61.6% in Zambia[9]. Most of the unintended pregnancies end with abortions, where data are available. In Ethiopia, 59.6% of 99 unintended pregnancies were reported to have been aborted[7]. Abortion in Uganda is restricted and allowed under medical grounds to save a woman's life, cases of rape, incest, and defilement[10]. These restrictions push women with unplanned pregnancies to either continue the pregnancy or procure unsafe abortion which is associated with high mortality.

Uganda is among the countries with fastest growing population. As per estimates from Demographic and Health Surveys (DHS) 2016, Uganda population was 34.6 million in 2014 with annual population growth rate of 3.0%. A woman from Uganda will bear an average of 5.4 children in her lifetime. Further, findings indicate that utilization of family planning is still low at 51% among sexually active unmarried women despite having free family planning services in public health facilities[11]. Among FSWs, a study conducted in Gulu district, in Uganda among 400 FSWs indicated that dual contraception was at 45.0% while only 49.9% had ever used hormonal contraceptives[12]. The same study, showed a high number of unplanned pregnancies reported among FSWs that ended in abortions[12].

Within Uganda there are over 40 ethnic groups and 41 different languages[13] (with Luganda being the most common local language), however, there is a sense of Ugandan identity. Cultural homogeneity is increasing as a result of intermarriage and migration[14]. For example there were no big differences in proportion of women who had more than one sexual partner in the last 12 months and these ranged from 0.8 in Ankole 1.0% in Acholi%, 1.6 in Bugisu and 2.0% Kampala[11].

FSWs of reproductive age may desire to have children but the decisions about when to have children is complicated due to varied interests across multiple sexual partners[15] .The fertility desires of FSWs may differ and depend upon individual partners even in the context of simultaneous relationships. Although FSWs may have different fertility desires across multiple men, they seem not have difficulties in identifying the fathers of the children. A qualitative study which examined the circumstances surrounding pregnancy among women selling sex in Ethiopia in 2017 found that a majority of the FSWs could identify the men who impregnated them[16]. The findings showed that in most cases, the men identified by FSWs as the fathers of their children" were emotional partners including boyfriends or husbands and a few mentioned clients. The study did not clarify whether the pregnancies were planned or not with various categories of men.

The estimates of unintended pregnancies from DHS depend on responses from a single question. Specifically, women are asked "I would like to ask a question about your children born in the last five years, when you got pregnant with (name of last child), did you want to get pregnant at that time? Women are expected to respond, "wanted then, wanted later and wanted no more". Women who respond that pregnancies were wanted then are categorized as an intended birth while the rest are classified as unintended births[17] .

Responses from one question measures in previous studies have demonstrated not to provide accurate estimates of unintended pregnancies[18] . Firstly, measuring unintended or unplanned pregnancy using single question may not adequately capture the complexity of the construct of pregnancy planning[19]. Secondly, the question only demands responses from women whose pregnancies were carried to term. Thus, data on pregnancies that were either terminated or ended in miscarriage are missed. Yet, evidence shows that most pregnancies that are terminated are unplanned[20]. Missing data on pregnancies that are not carried to term therefore leads to underestimation of unplanned pregnancies during surveys. In view of the limitations there is need to use an alternative method that is more robust, reliable and captures the multiple facets of the

complex decisions and actions of pregnancy planning irrespective of outcome. A tool is deemed reliable if it has minimal error, and a set of homogenous items has less error in measuring a complex construct than a single item[21].

The London Measure of Unplanned Pregnancy (LMUP) is a six-item tool that was developed in United Kingdom in the early 2000s[18]. The LMUP has a number of advantages over previous forms of measurement: it was based on lay views; it was developed and tested using psychometric methods to establish reliability and validity; it does not require women to have fully formed childbearing plans, it does not assume a particular form of family building, and it does not presume that women have clearly defined intentions and/or behavior consistent with intentions and thus allowing women to represent a range of positions in relation to pregnancy. The tool captures women`s perspectives on a) contraceptive use, b) timing of motherhood, c) intention to become pregnant, d) desire for / wanting a baby, e) discussion with a partner, and f) pre-conceptual preparations. The tool has been validated in the general population in both high and low income countries[18, 22-30] However, the psychometric properties of the LMUP have not been evaluated among a population of female sex workers (FSWs) who are at high risk of unplanned pregnancies[12]. In this study, we evaluated the psychometric properties of the LMUP in such a population in Uganda. Specifically, we evaluated the acceptability, reliability, and validity of the LMUP in Luganda translation in assessing pregnancy planning for FSWs. We also created three other language versions, based on the Luganda LMUP, and conducted preliminary evaluations of these tools with FSWs. Measuring pregnancy intention/ planning using the LMUP may guide policy makers and programmers in identifying items to focus on during designing interventions.

METHODS

Study design

This was a mixed methods study conducted to evaluate psychometric properties of the LMUP. Our primary focus was on creating and evaluating the LMUP in Luganda translation suitable for use with FSWs. Luganda is the commonly spoken local language of the country[13, 31] but mainly in central region where national referral hospital is located. In other regions, people speak different languages in addition to Luganda. For example Acholi is commonly spoken at one study hospital in the north; Lugisu in the East, and Runyankole in the West.

The study comprised two broad phases. The first phase was the creation of the Luganda LMUP which involved five steps: a) translation and back translation; b) pretesting using cognitive interviews and modification where necessary; c) a first field test to collect data for psychometric assessment (with repeat interviews on week after the field test interviews); d) modification of the LMUP; and e) a second field test to collect data for psychometric assessment. The second phase was the creation of three other language versions of the LMUP for FSWs (Acholi, Lugisu and Runyakole) based on the Luganda LMUP, and assessment of their psychometric properties. (The second round of field testing for the Luganda version and the field testing of the three further languages were also designed to identify predictors of pregnancy planning among FSWs, the findings of which will be published separately).

Study setting

The Most at Risk Population Initiative (MARPI) established clinics or spaces within hospitals to serve key populations. The study was conducted at MARPI clinics from April to August 2017. The services offered at the MARPI clinics include family planning, cancers screening, HIV counseling, testing and treatment to high risk or key populations including FSWs. The interviews

with FSWs from MARPI clinics at hospitals in central, north, east and west were conducted in Luganda, Acholi, Lugisu and Runyankole respectively.

Study population and participant recruitment

The study population comprised FSWs of reproductive age (15-49 years). FSWs of reproductive age who reported to have had a pregnancy within the last two years and were attending MARPI clinics were eligible to participate in the study. A two year period was chosen to find a sufficient number of women with pregnancies in that timeframe. A research assistant (RA) administered a screening tool to FSWs before interviews were conducted. FSWs were excluded from the study if they were too sick to participate in the study or intoxicated with drugs and alcohol at the time of interviews.

All FSWs attending MARPI clinics were approached at the clinic reception by the RAs and asked if they were willing to join the study. Written informed consent was obtained from FSWs twice. First, permission was obtained for screening and if eligible, further consent was sought to be recruited into the study. Interviews were conducted in secluded places at the clinics with no interference from the clinic staff and other clients.

Sample size

The sample size for field testing was informed by previous validations of the LMUP , the minimum previous sample size being 125 in Malawi[26]. In support of this, scholars recommend that when externally validating a tool a minimum of 100 events, but preferably 200 or more events should be taken as the sample size[32]. In line with this recommendation, and guidance of sample-size formulae for parameter estimation[33] we aimed to interview at least 200 FSWs in the first Luganda field test, with an assumption that 50% would complete the re-test[34].

Measures and operational definitions

The six items measured in the LMUP are described as in the previous validations[18, 22-26, 28] and are summarized in table 3. Each item 1-6 has a minimum score of 0 and maximum score of 2. Then totals of the LMUP are obtained by summing item scores. This gives a LMUP total score ranging from 0-12 for all the six items. The higher scores correspond to more pregnancy planning effort. In addition, we examined other context relevant study variables. These included:

Emotional partner: These partners were men who may not have given money or gifts all the time after sexual encounter and sex worker felt an emotional attachment with them[35]. FSWs that had emotional partner were assigned "yes" and "no" for those without.

Main work place: The main venue for recruiting clients included streets, entertainment places and residence or home, and on phone.

Pregnancy outcome: The outcomes were categorized as miscarriage (spontaneous abortion), induced abortion, delivered a baby (live or still birth), and currently pregnant.

Marital status: categorized as never married, married and formerly married included separated, divorced and widow.

***Other variables*:** included age, education, number of living children.

Paternity: As with other evaluations of the LMUP (and other studies of pregnancy intention), no biological testing was conducted to confirm that the father of the pregnancy/child was who the woman considered to be.

Creating the Luganda LMUP

Translation and cultural adaptation

The LMUP, initially designed as a self-completion tool, was adapted for interviewer-administration as in previous validations[22, 25, 26, 28], which is more suitable for populations with low literacy such as FSWs in Uganda[36]. Two Luganda-English speaking translators were employed. The tool was translated into Luganda the commonly spoken local language by FSWs attending MARPI clinic at national referral hospital[37] by one translator, and back translated into English by another translator to ensure that no meaning was lost during translation. Two investigators who speak and understand both Luganda and English language compared the translated and back translated versions of the tool. Any differences identified were discussed and agreed on by the investigators. Then revised Luganda version of the tool was pre-tested.

Pre-testing using cognitive interviews

The pre-testing was done using cognitive interviewing techniques to assess if the questionnaire fulfilled its purpose. Specifically, the cognitive interviews assessed a) the acceptability of the questions by identifying words they liked or disliked b) any difficulty experienced by FSWs in understanding the questions, and c) further checked the translation. Three experienced research assistants with university degrees and the principal investigator conducted the interviews. We used verbal probing techniques to elicit responses directly, since the LMUP is short[38] . Cognitive interviews were conducted with 30 FSWs who came for care at the MARPI clinic. A round consisted of five to seven cognitive interviews conducted per day. After each round data were transcribed, then summarized following FSWs` interpretation of items. The analysis was based on guidance of Knaff *et al,* 2007[39], where we used an item by item review approach regarding FSWs` understanding, ability and willingness to respond to the item. This enabled us to identify items for modification. Items found to be comprehensible and consistently interpreted across participants were unchanged. Items showing problems with clarity and wording were revised basing on suggestions from the FSWs and research team. Then further interviews were conducted after revising questions. After the fifth round we stopped the exercise as no new insights were emerging.

First field test

A first field test was conducted to evaluate if the LMUP would work among FSWs speaking Luganda. The tool was administered by the three trained RAs (one female and two males). All women attending MARPI clinic were approached consecutively at the reception as they arrived at the clinic by the RAs and asked if they were willing to join the study. The RAs followed similar screening process as for cognitive interviews. Eligible women were interviewed and scheduled to return on any day of the following week for a repeat interview. An interval of one week was selected to minimize loss to follow up among mobile FSWs[40]. The MARPI identity number for each woman was used to link data of the first visit with second visit. Women who participated in cognitive interviews were excluded since they had already been exposed to the questions. The filled questionnaires were cross checked for completeness on daily basis. The questionnaires were stored in a secure location designated and only accessed by the PI. Double data entry was done using EpiData software. The data were exported to STATA version 14.0 for analysis.

Modification of the Luganda LMUP

Findings from the first field test revealed problems with item 6 (pre-conceptual preparations). Therefore, further analysis of the cognitive interviews was carried out. These findings, plus insights gathered during the first field test data collection, informed the revision of item 6. The LMUP items, including the revised item 6, were taken forward for a second field test [41].

Second field test

A second field test was carried out, collecting data from FSWs attending the MARPI clinic at national referral hospital. The eligibility criterion for recruitment was the same as the first field test. There were no follow up interviews.

Creating the Acholi, Lugisu, and Runyankole versions of the LMUP

Using the final Luganda version of LMUP, translations were made in three more commonly spoken languages by FSWs in the MARPI Clinics of selected hospitals in north, east, and west and these included Acholi[42], Lugisu[43] and Runyankole[44] respectively. The translations into the three new languages were carried out by native speakers of those languages, and there was back translation of each language version, with discussion and agreement on the final translations. No cognitive interviews were carried out. The new translations were taken forward for initial field testing.

Analysis of psychometric properties

Since a Classical Test Theory-based approach was used in the development study of the LMUP and previous evaluations[24, 26, 28], again it was applied to facilitate comparisons. Acceptability was assessed using number of missing responses on the six items as well as, in the creation of the Luganda tool, triangulating findings from cognitive interviews. Targeting was assessed based on the distribution of total scores and this was rated good fitting if all scores from 0-12 were present. We checked maximum item–endorsement to assess item-discrimination[45].

To assess reliability (internal consistency) we examined a) Cronbach's alpha and the standard cut off point of 0.7 was used[46]; b) the item-rest correlations which measure the correlation of item score with the average of the items within a construct and 0.20 considered as acceptable minimum correlation [45]; and c) inter-item correlations where we checked that all inter-item correlations were positive. In the first Luganda field test only, we also assessed reliability in terms of test-retest stability using the weighted kappa, with scores above 0.60 considered substantial[47]. Further analysis was done to test for significant differences between FSWs who returned and those who did not return for repeat interviews using Chi square and t-test in case of variables with expected frequencies of less than 5 in a cell.

To assess construct validity, Principal Components Analysis (PCA) was used to evaluate the internal structure of the LMUP through identification of underlying components in the LMUP. Therefore the scale was considered valid if all items loaded onto one component with an Eigen value larger than one; this confirmed that measurement was unidimensional[18].

In the first Luganda field test only, construct validity was further examined by means of hypothesis testing. We generated hypotheses based on the literature showing the factors associated with unplanned pregnancies among FSWs in the sub-Saharan region[5, 7, 9, 48] . Given the non-parametric distribution of pregnancy intention scores, the Wilcoxon Rank-Sum (Mann Whitney U) test was used to test hypotheses where variables had two categories and Kruskal-Wallis equality-of-populations rank test for variables with more than two categories. We had

hypothesed that pregnancies would have lower LMUP scores (i.e. be more unplanned) among a) women with number of living children equal to 4 or more , b) women with no emotional partner, c) among women who had abortion, and d) unmarried women.

ETHICAL CONSIDERATIONS

This study was approved by Makerere University School of Public Health Higher Degrees, Research and Ethics Committee and the Uganda National Council for Science and Technology (*Reference: SS 4262*). We obtained permission from facility authorities. Participants also provided written informed consent by signing or thumb printing the consent form. The research assistants (RAs) emphasized to FSWs that participation was voluntary, and they were free not to answer some questions deemed embarrassing or that caused discomfort. The FSWs below the age of 18 years were enrolled as emancipated minors based on the national research guidelines[49]. Consequently, we did not obtain consent from the legal guardians of the participants aged less than 18 years. The consent procedure was approved by the ethics committees. Participants received 5,000 Uganda shillings (approx. US$ 1.4) as compensation for their time and those who came back for repeat interviews received an additional 5,000 Uganda shillings as transport reimbursement.

RESULTS

Characteristics of respondents

The cognitive interviews were conducted among 30 FSWs with median age of 26 years (interquartile range (IQR) 19 – 39). About a quarter of women 23% (7) were married with 57% (17) reporting primary as the highest level of education ever achieved. Half of the women 50% (15) were street–based FSWs, while 33% (10) reported having no emotional partner. Slightly more than half 53% (16) had no other source of income besides sex work.

In the first Luganda field test, a total of 211 FSWs were enrolled, with median age of 29 years (IQR- 18-43). About quarter 24% (50) were married with 57% (121) reporting primary as the highest level of education ever achieved. More than half 54% (113) were street–based FSWs, while 61% (128) reported having an emotional partner. The majority 72% (153) reported taking alcohol and other characteristics are as described in table 1. There was no significant difference between the characteristics of FWSs who came back for repeat interviews and those who did not except for marital status. Fewer married FSWs came back for repeat interviews ($p<0.001$).

The 517 participants for second Luganda field test had similar characteristics as for the first field test. The median age was 29 years (IQR-18-45). Fifty-six per cent (290) had only attained primary education. Less than a quarter 18% (97) were married, though more than half 59% (304) had at least one emotional partner. About three quarters 76% (395) reported taking alcohol.

The data for field testing for Acholi Lugisu and Runyankole langauges were drawn from another study for determining the predictors of pregnancy planning among FSWs. The samples from Acholi, Lugisu and Runyankole speaking FSWs were 100, 112 and 90 respectively. The characteristics of these FSWs are detailed in Table 2. Briefly the average age for FSWs ranged from 24 among Runyankole to 28 among Lugisu speakers. About 10% and less were reported to be married and half or more had only attained primary education from each site.

Pre-testing results of the Luganda version

The majority of the FSWs found the six items of the tool easy to understand. However, some FSWs disliked or were uncomfortable with the word "partner". To them partner meant a man with whom they had emotional attachment (and those who were not married especially, perceived the question as being ridiculous). During adaptation for item 5 that captured data on discussion of pregnancy planning with partner, we expounded the meaning of partner to include a phase "man who made you pregnant".

First Luganda field test

There were no missing data on the responses of the six items. The distribution of total scores is illustrated in a histogram (Fig 1) and shows a full range of scores from 0-12. There was no question with a response of more than 76% endorsement as shown in table 3. Cronbach's α was 0.73. Table 4 shows item-rest correlations >0.2 for four items (items 2-5). The item-rest correlation for item 1 (contraception use) was 0.13 and item 6 (pre-conceptual activities) was 0.03. The inter-item correlations were all positive ranging from 0.28 to 0.86. For the test-retest, weighted kappa was 0.78. The PCA showed that there were two components with an Eigenvalue >1 (table 4). Items 1-5 loaded onto the first component, and item 6 loaded onto the second component. All construct validity hypotheses were met (Fig 2). In short, lower LMUP scores were observed among: a) women with four or more living children (p= 0.041), b) women with non-emotional partner as a man who fathered last pregnancy (p=0.002), c) among women who had abortion (p=0.002), and d) unmarried women (p=0.002).

Modification of the Luganda LMUP

Observations from the first field test (in particular, the unusually high endorsements for item 6's pre-conceptual preparations in the context of low scores on other items) and a re-examination of the cognitive interview data revealed some respondents did not clearly distinguish between preparing for pregnancy and during pregnancy. Therefore, modifications were made to item 6. We added a probe to emphasize the time before conception of the most recent pregnancy. For example, if a FSW mentioned that she took iron, this was followed with probe "Did you do it in preparation for this most recent pregnancy?" Further, we formatted the individual responses or options to have "yes" and "no" responses to improve clarity in responding to each option as it was done in Malawi validation[26]. In addition, considering the high risk of HIV acquisition associated with unsafe sex with many sexual partners, we added an option of "stop sex working" as one of the preconception activities.

Second Luganda field test

No missing data were observed among the responses of the six items. The distribution of total scores shows a full range of scores from 0-12 (Fig 3). Item endorsements are shown in Table 3. The Cronbach's α was 0.82. Table 4 shows that item-rest correlations >0.2 for all items except item 1. The inter-item correlations were all positive ranging from 0.28 to 0.86.

Table 1: Socio demographics of Female Sex workers from the first Luganda London Measure of Unintended Pregnancy field test, March-April,2017 (N=211)

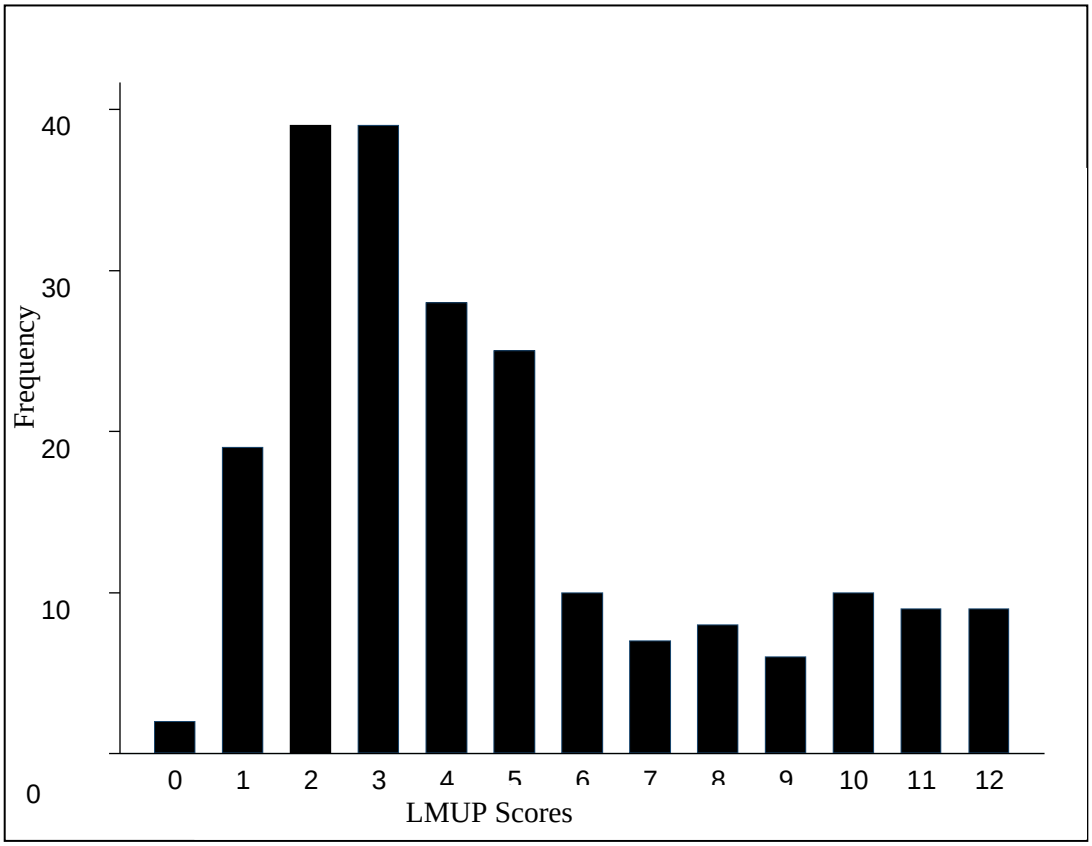
Socio demographics characteristics	Enrollment N=211 (%)	Returned n=121(%)	Not Returned n=90 (%)	Comparison of returned and not returned (Chi2)
Age				p=0.819
Mean (sd)	28.7(5.7)	29.4 (6.0)	28.2 (5.2)	
Median (IQR)	29 (18-43)	29 (19-43)	28 (19-37)	
Range	17-46	18-46	17-45	
Age group*				p =0.277
15-19	8 (3.8)	4 (3.3)	4 (4.5)	
20-24	41 (19.4)	22 (18.2)	18 (20.0)	
25-29	66 (31.3)	36 (29.8)	31 (34.5)	
30-34	69 (32.7)	35 (28.9)	30 (33.3)	
35-39	16 (7.6)	16 (13.2)	4 (4.4)	
≥40	11 (5.2)	8 (6.6)	3 (3.3)	
Biological living				p =0.085
0	8 (3.8)	6 (5.00)	3 (3.3)	
1	42 (19.9)	18 (15.0)	24 (26.7)	
2	68 (32.2)	38 (31.7)	29 (32.2)	
3	47 (22.3)	35 (29.1)	14 (15.6)	
4/max	46 (21.8)	23 (19.2)	20 (22.2)	
Marital status				**p <0.001**
Never married	36 (17.1)	22 (18.2)	14 (15.6)	
Married	41 (19.4)	13 (10.7)	28 (31.1)	
Formerly married	134 (63.5)	86 (71.1)	48 (53.3)	
Education*				p =0.762
None	8 (3.7)	3 (2.5)	3 (3.3)	
Primary	121 (57.4)	72 (60.5)	48 (53.3)	
Secondary	73 (34.6)	39 (32.8)	35 (38.9)	
Post Primary	9 (4.3)	5 (4.2)	4 (4.5)	
Main place of work				p =0.565
Street-based	113 (53.6)	63 (52.5)	48 (53.3)	
Entertainment place	74 (35.1)	44 (36.7)	36 (38.1)	
Residence/Home-based	24 (11.3)	13 (10.8)	6 (6.7)	
Emotional partner				p =0.058
Yes	128 (60.7)	65 (53.7)	60 (59.2)	
Alcohol use				p=0.184
Yes	153 (72.5)	92 (76.0)	61 (67.8)	
Substance use				p =0.328
Yes	90 (42.6)	44 (36.7)	39 (43.3)	
Pregnancy outcome				p =0.112
Still pregnant	14 (6.7)	6 (4.5)	6 (6.7)	
Delivered a baby	75 (35.7)	35 (28.9)	37 (41.1)	
Abortion	84 (40.0)	50 (41.3)	35 (38.9)	
Miscarriage	37 (17.6)	30 (24.8)	12 (13.3)	

**used t-test, Sd: Standard deviation; IQR : Interquintile range*

Table 2: Socio demographics of female sex workers recruited during Second Luganda field test and other London Measure of Unintended Pregnancy language-version field tests: May –August 2017 (N=517)

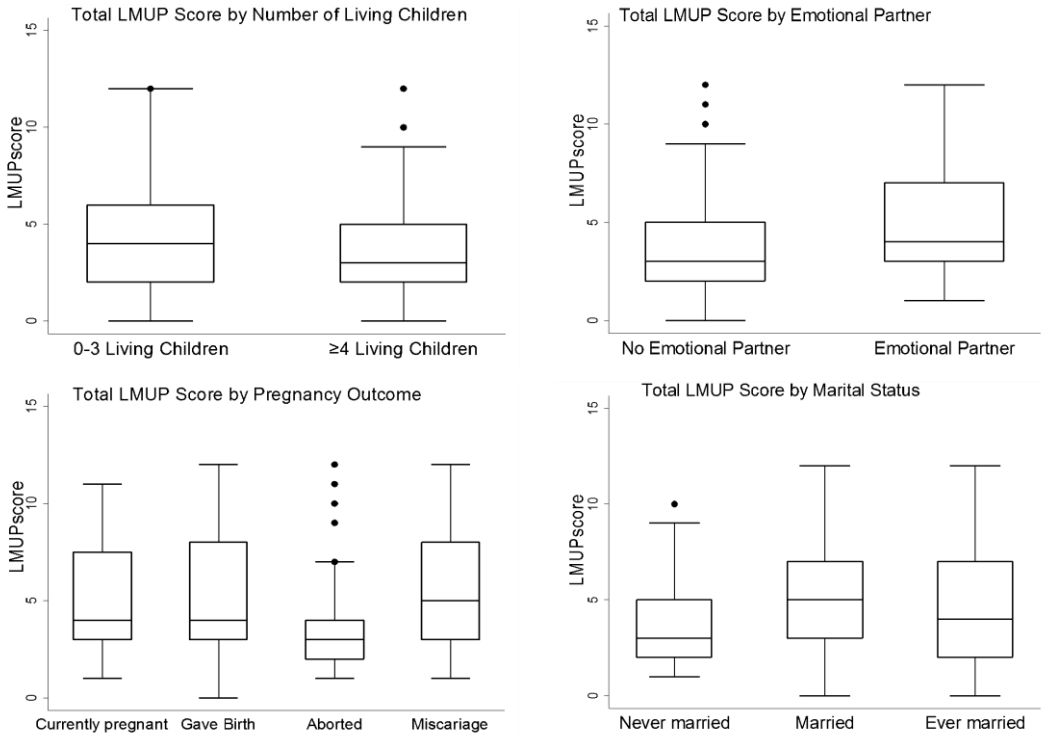
Socio demographics characteristics	Spoken Language			
	Luganda N=517 (%)	**Acholi N=100 (%)**	**Lugisu N=112(%**	**Runyankole N=90(%)**
Age				
Mean (sd)	29 (6.1)	25 (4.3)	28 (7.9)	24 (5.0)
Median (IQR)	29 (25-44)	25(22-28)	28 (22-	23 (21-28)
Range	18-46	16-38	15-47	15-39
Age group*				
15-19	7 (1.4)	8 (8)	17 (15.2)	10 (11.1)
20-24	121(23.4)	42 (42.0)	27 (24.1)	44 (48.9)
25-29	150 (29.0)	36 (36.0)	19 (17.0)	26 (28.9)
30-34	119 (23.0)	12 (12.0)	21 (18.7)	4 (4.4)
35-39	91 (17.6)	2 (2.0)	19 (17.0)	6 (6.7)
≥40	29 (5.6)	0	9 (8.0)	0
Biological living				
0	285 (55.1)	12 (12.0)	25 (22.3)	58 (64.4)
1	60 (11.6)	31 (31.0)	18 (16.1)	22(22.4)
2	65 (12.6)	31 (31.0)	27 (24.1)	7 (7.8)
3	55 (10.6)	16 (16.0)	22 (19.6)	3 (3.3)
4/max	52 (10.1)	10 (10.0)	10 (17.9)	0
Marital status				
Never married	104 (20.1)	55 (55.0)	35 (31.3)	27 (30.0)
Married	97 (18.8)	1 (1.0)	12 (10.7)	6 (6.7)
Formerly married	316 (61.1)	44 (44.0)	65 (58.0)	57 (63.3)
Education*				
None	36 (7.0)	1 (1.0)	4 (3.5)	8(8.9)
Primary	285 (55.1)	42 (42.0)	54 (48.2)	60 (66.7)
Secondary	161(31.1)	51 (51.0)	48 (42.9)	19 (21.1)
Post Primary	35(6.8)	6 (6.0)	6 (5.4)	3 (3.3)
Main place of work				
Street-based	197 (38.1)	5 (5.0)	45(40.2)	23 (25.6)
Entertainment place	114 (22.1)	42 (42.0)	36 (32.1)	34 (37.8)
Residence/Home-	30 (5.80)	3 (3.0)	1(1.0)	7 (7.8)
Phone*	176 (34.0)	50 (50.0)	30 (26.7)	26 (28.9)
Emotional partner				
Yes	304 (58.8)	44 (44.0)	94 (83.9)	56 (62.2)
Alcohol use				
Yes	395 (76.4)	49 (49.0)	94 (83.9)	56 (62.2)
Substance use				
Yes	216 (41.8)	31 (31.1)	73 (65.1)	79 (87.8)
Pregnancy outcome				
Still pregnant	31 (6.0)	6 (3.0)	7 (6.2)	7 (7.8)
Delivered a baby	162 (31.3)	82 (82.0)	33 (29.5)	44 (48.9)
Abortion	242 (46.8)	9 (9.0)	48 (42.9)	15 (16.7)
Miscarriage	82(15.9)	3 (6.0)	24 (21.4)	24 (26.7)

**Data not captured on phone as means of recruiting clients during first field test*



March-April,2017 (N=211)
LMUP score 0 unplanned pregnancy, 12 planned pregnancy

Figure 1: Distribution of London Measure of Unplanned Pregnancy (LMUP) score in the first Luganda field test



406
407
408 **Fig 2. London Measure of Unplanned Pregnancy (LMUP) scores by the four**
409 **construct validity hypotheses, March-April, 2017 (N=211)**
410

Table 3: Endorsement of the London Measure of Unplanned Pregnancy response options, March-April, 2017 (N=211)

Item	Response options	Luganda 1st Field	Luganda 2nd Field	Acholi (N=100)	Lugisu (N=112)	Runyankole (N=90)
		n (%)	n (%)	n (%)	n (%)	n (%)
1: At the time of conception, you were	2. Not using	96 (45.5)	213 (41.2)	7 (7.0)	43 (38.4)	48 (53.3)
	1.Inconsistently	111 (52.6)	299 (57.8)	42 (42.0)	61 (54.5)	41 (45.6)
	0.Always using contraception	4 (1.9)	5 (1.0)	51 (51.0)	8 (7.1)	1 (1.1)
2: In terms of becoming a mother, you felt that your pregnancy happened at	2.Right time	40(19.0)	86(16.6)	9(9.0)	32(28.6)	40(44.4)
	1. An OK time but not quite right	11(5.2)	14(2.7)	12(12.0)	25(22.3)	18(20.0)
	0.Wrong time	160(75.8)	417(80.7)	79(79.0)	55(49.1)	32(35.6)
3: Just before falling pregnant	2.You intended to	47(22.3)	103(19.9)	9(9.0)	30(26.8)	42(46.7)
	1.Your intention kept on changing	8(3.8)	8(1.6)	14(14.0)	9(8.0)	10(11.1)
	0.You did not intend to become pregnant	156(73.9)	406(78.5)	77(77.0)	73(65.2)	38(42.2)
4: Just before falling pregnant, you	2.Wanted a baby	75(35.5)	145(28.0)	10(10.0)	35(31.2)	64(71.1)
	1.Had mixed feelings about	9 (4.3)	3(0.6)	20(20.0)	19(17.0)	2(2.2)
	0.Did not want a baby	127(60.2)	369(71.4)	70(70.0)	58(51.8)	24(26.7)
5: Before falling pregnant had you and the man who made you pregnant	2.Agreed to	32(15.2)	62(12.0)	16(16.0)	41(36.6)	42(46.7)
	1.Discussed having children together but no firm agreement	24(11.4)	31(6.0)	15(15.0)	38(33.9)	12(13.3)
	0.Never discussed having children together	155(73.4)	424(82.0)	69(69.0)	33(29.5)	36(40.0)
6: Health actions before falling	2.Two or more Actions	107(50.7)	17(3.3)	21(21.0)	5(4.5)	4(4.4)
	1. Action	28(13.3)	22(5.0)	52(52.0)	8(7.1)	7(7.8)
	0.No Action	76(36.0)	478(92.4)	27(27.0)	99(88.4)	79(87.8)

**health actions included "taking iron", "saving money", "eating health food", "going to health facility", "stopping sex work", "stopped or cut down drinking alcohol", & "stopped or cut down taking drugs"*

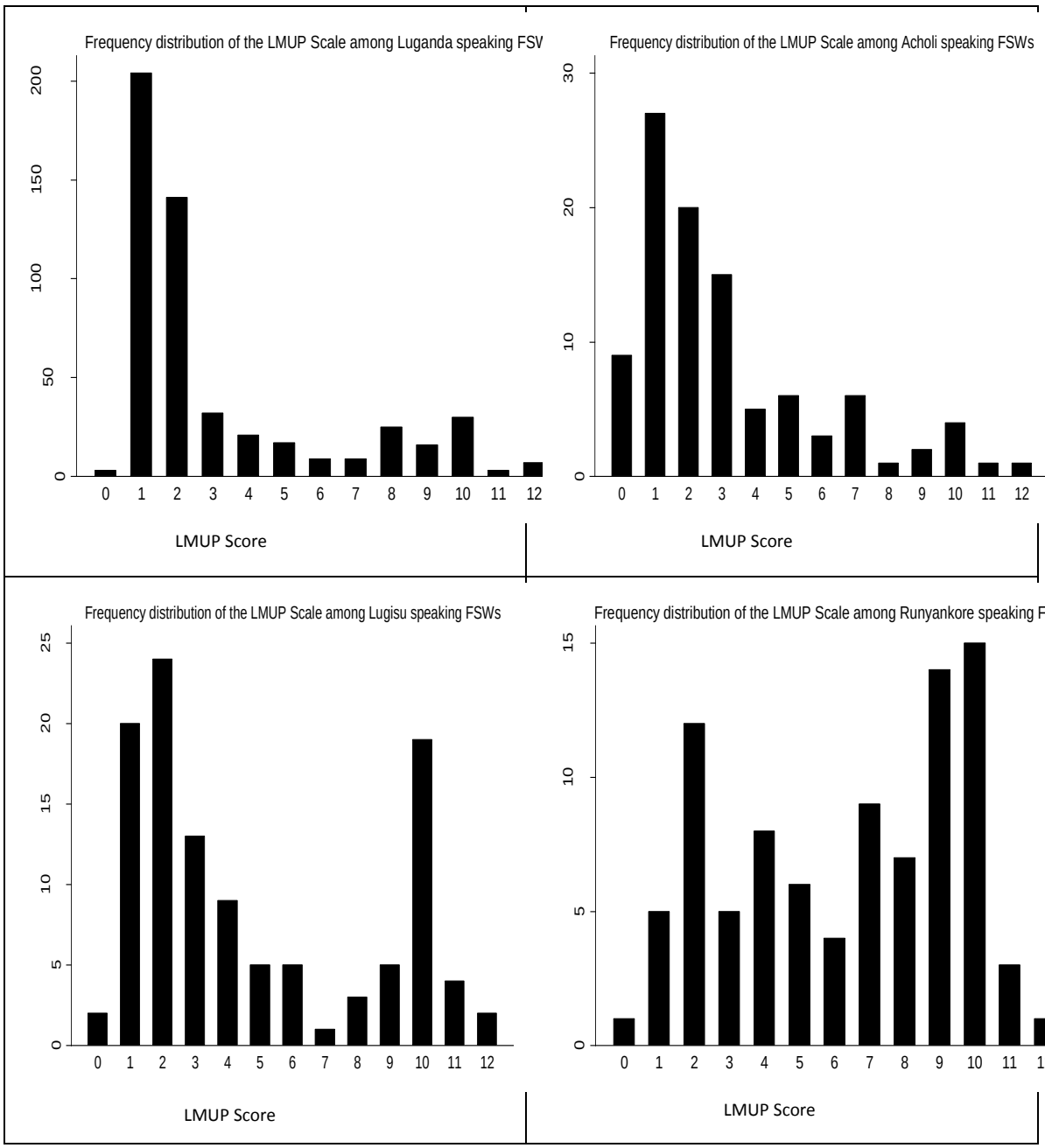
Table 4: Principal Component Analysis of all four language versions of the London Measure of Unplanned Pregnancy, March-April, 2017 (N=211) & (May-August,2017), N=819

Item/s	1st Luganda Field test			2nd Luganda Field test		Acholi		Lugisu		Runyankole	
	Item rest cor.	PCA Com1 Ev=2. I.L	PCA Com2 Ev=1. I.L	Item rest cor.	PCA Com1 Ev=3. I.L	Item rest cor.	PCA Com1 Ev=3.3 I.L	Item rest cor.	PCA Com1 Ev=3.7 I.L	Item rest cor.	PCA Com1 Ev=2.9 I.L
Item 1	0.13	0.32	-0.73	0.15	0.21	0.20	0.29	0.36	0.47	0.11	0.18
Item 2	0.76	0.89	-0.01	0.85	0.92	0.78	0.90	0.90	0.95	0.75	0.88
Item 3	0.69	0.88	-0.04	0.83	0.93	0.85	0.95	0.89	0.94	0.71	0.87
Item 4	0.61	0.76	0.27	0.72	0.84	0.74	0.90	0.85	0.92	0.61	0.78
Item 5	0.67	0.83	-0.02	0.67	0.80	0.62	0.78	0.79	0.87	0.66	0.82
Item 6	0.03	0.12	0.85	0.28	0.40	0.25	0.35	0.25	0.34	0.06	0.10

PCA*=Principal component analysis;* ***Comp****=Component;* ***Ev****=Eigen value;* ***Itemrestcor****= Item–rest correlation.* ***I.L****= Item Loading*

Field test findings of Acholi, Lugisu and Runyankole LMUP

All the three language versions had no missing data in the responses of the six items. Table 3 shows endorsements of item response options. The full range of scores, from 0 to 12, was present in all three language versions as illustrated in Fig 3. The Cronbach's α were 0.80, 0.87 0.76 for Acholi, Lugisu and Runyankole respectively. The item-rest correlations were above 0.2 for all items in the three languages except for item 1 and 6 in Runyankole (Table 4). The inter-item correlations were all positive for all languages. In the PCA, items loaded onto one component with an Eigen value of 3.3, 3.7 and 2.9 for Acholi, Lugisu and Runyankole respectively.



LMUP score: 0 unplanned pregnancy, 12 planned pregnancy

Figure 3: Graphs showing Frequency distribution of the London Measure of Unplanned Pregnancy Scores in the four languages, May-August 2017 N=819

DISCUSSION

We evaluated the Luganda version of the LMUP to assess pregnancy planning among sex workers in Uganda. The evaluation of the Luganda version of the LMUP among FSWs in Uganda using classical test theory confirms that the tool meets predetermined criteria for validation. The pre-set criteria included domains for acceptability, targeting, reliability (internal consistency,

stability) and construct validity based on PCA and hypotheses testing[18]. A lack of missing data on the items completed during field testing confirmed willingness to respond to the items expressed by the FSWs during the cognitive interviews and the acceptability of the tool. Although the full ranges of LMUP scores were present, the results showed, overall, a tendency towards low scores implying high levels of unplanned pregnancies in this population.

In the second Luganda field test some item response options had high endorsements but this is likely due to the skewed distribution of LMUP scores for FSWs. Most FSWs had low levels of pregnancy planning so it is not surprising that many FSWs had higher endorsement for wrong timing, never discussing with man who impregnated them and having taken no preconception preparation activity. The literature shows that FSWs often become pregnant by clients[50]. Such partners who are clients are unlikely to discuss and agree on when to have babies. High endorsement of having done no pre-conception preparation activity is not surprising. The literature shows that FSWs face difficulties while accessing care[12] so visiting facilities before conception would be challenging. Many FSWs continue consuming alcohol during pregnancy[51] and majority continue with sex work as it is main source of income[16, 52].

From the Luganda LMUP we created, and conducted preliminary evaluations of, three new language versions of the LMUP, in Acholi, Lugisu, and Runyankole, for use with Ugandan FSWs. There were, however, limitations to our evaluations, for instance, we did not conduct cognitive interviews to check women's understanding and our field test samples were opportunistic (as part of a wider study of factors associated with pregnancy planning) and therefore sample sizes were smaller than ideal. Reassuringly, the psychometric properties of the new language versions largely met standard criteria for performance. It is notable, however, that the endorsement frequencies for item 6 (preconception preparations) in Acholi were higher than those of the other Ugandan language versions; this might be an accurate reflection of behaviour or, more likely, it might be a misinterpretation of the item and this warrant further investigation in future. Also, we did not check the stability (test-retest reliability) of the three new language versions.

To our knowledge, this is the first study anywhere to evaluate the LMUP score among FWSs. The findings in this study are comparable with the previous studies that have evaluated the LMUP scale in the general population. For example previous evaluations have estimated Cronbach`s alpha of 0.71-0.92[22-28, 53]; test-retest weighted kappa of 0.72-0.97[18, 24, 26, 27]; and established the unidimensionality of the LMUP[22-29]. Also, the patterns of response to the six LMUP items (i.e. item endorsements, item-rest scores, component loadings in the PCA) are like elsewhere. The final LMUP version in English is available[54].

Responses to item 1 (contraception) showed few women used contraception consistently (in the context of low levels of pregnancy intention as shown by the overall LMUP scores). This likely explains the lower item-rest scores and the relatively low component loadings in the PCA of item 1 (within the context of overall good internal consistency and unidimensionality).The performance of item 1 could be due to poor uptake of family planning services among FSWs[12]. However, in the previous evaluations of the LMUP, for example in Malawi[26] and India[28], the same item of contraceptive use was retained despite similar issues. However, with the Chichewa LMUP in Malawi, subsequent analysis its measurement properties in a new study have shown good performance of all the items, including the contraceptive item[53]. Similarly, we have left this item in for comparability with LMUP elsewhere in the world.

In the second Luganda field test and the Lugisu and Runyankole field tests, we observed a high endorsement of no activities for item 6, preconception preparations. The high endorsement of no pre- conception activities is not uncommon even in the general population. This implies that there is less attention paid to the area of pre-conception care along continuum of reproductive health. Even in the general population, few women are knowledgeable about preconception care[55] and fewer women receive services in preparations for pregnancies[56]. This demands that as health

providers promote the notion of a continuum of reproductive care, this area needs to be strengthened to improve the health status of women before conception.

The strength of our paper is that we were able to include women who had experienced induced abortion unlike some validations[22, 23, 26, 28]. This provided an opportunity to assess the level of pregnancy planning among FSWs whose pregnancy never reached term. Our construct validity hypothesis test in the Luganda field test showed, as expected, that women who had abortions had lower LMUP scores reflecting the lack of intention. This is congruent with previous studies[18, 24, 25, 57, 58]. Women whose pregnancies never reached term are missed in the DHS and yet they contribute substantially to proportions of unplanned pregnancies.

There are some limitations in our study. First, the women were recruited from MARPI clinic, this might create selection bias towards users of health services. This would imply that the LMUP score obtained from this study could be different if compared with FSWs drawn from the community. Nevertheless, the information collected on pregnancy planning would benefit both users and non–users of the services from the health facility. Secondly, we used face to face interviews instead of a self-administered method. The interviewer-participant interaction could have influenced FSWs' responses, especially on sensitive questions. However, conducting interviews in secluded rooms by experienced research assistants gave confidence and reassurance to the respondents so they were able to express and answer the questions freely. Besides, this tool has been tested in other settings using face-face interviewers among respondents of lower education status like our study population. Thirdly, we carried out the test-retest (to assess stability/reliability) on the first Luganda field test, on the near-final Luganda LMUP, rather than the final version in the second field test. However, as five of the LMUP items were unchanged, and the sixth item only partially changed (thus with a minimal effect on the total LMUP scores), plus internal consistency >0.7 in both field tests, we would expect a similar test-retest result if it had been repeated. Finally, the version of LMUP evaluated among FSWs may need minor modification and further assessment before using it in the general population. In this version for item 6 we added three options for FSWS including stopping sex work, taking alcohol, and substance abuse which may not be relevant to women in Uganda who are not sex workers.

CONCLUSION AND RECOMMENDATION

The Luganda LMUP version is a validated tool to assess pregnancy planning among sex workers in Uganda as it meets the pre-set criteria. Specifically, the tool can be used to measure the intendedness of pregnancies among FSWs. The Acholi, Lugisu, and Runyankole versions of the LMUP, based on the Luganda translation, also show good psychometric properties. However, as only partial evaluations were carried out in Acholi, Lugisu, and Runyankole versions, further confirmation of these findings in these languages are required. Using the LMUP with FSWs can be an alternative method to the other ways of assessing unplanned pregnancies such as in the DHS. The LMUP can be used to evaluate and refocus interventions to reduce unplanned pregnancies among FSWs in Uganda.

ACKNOWLEDGMENT

We are grateful to the Makerere University, School of Public Health IRB for candid feedback that assisted us improve the study protocol. The staff and management of MARPI clinic, for allowing the research team access to the respondents and providing the venue to conduct our interviews. To the research assistants we are thankful to your diligence during data collection. Finally, we thank our respondents, the FSWs who accepted to be study participants.

549 REFERENCES
550

551 1. Vandepitte J, Lyerla R, Dallabetta G, Crabbé F, Alary M and Buvé A. Estimates of the
552 number of female sex workers in different regions of the world. Sexually Transmitted
553 Infections, 2006. **82**(Suppl 3): p. iii18-iii25.
554 2. WHO. Preventing HIV among sex workers in sub-Saharan Africa: A literature review
555 Geneva, Switzerland. 2011, World Health Organization Geneva, Switzerland.
556 3. Crane Survery Report. High Risk Group Surveys Conducted in 2008/9" Kampala, Uganda.
557 Makerere University, PEPFAR, United States Centers for Disease Control and Prevention,
558 and Republic of Uganda Ministry of Health. 2010.
559 4. The Republic of Uganda. Panel code act cap. 120. 1950, Kampala Uganda.
560 5. Luchters S, Bosire W, Feng A, Richter M L, King'ola N, Ampt F, Temmerman M and
561 Chersich M F. "A Baby Was an Added Burden": Predictors and Consequences of
562 Unintended Pregnancies for Female Sex Workers in Mombasa, Kenya: A Mixed-Methods
563 Study. PLoS One, 2016. **11**(9): p. e0162871.
564 6. Sherwood J A, Grosso A, Decker M R, Peitzmeier S, Papworth E, Diouf D, Drame F M,
565 Ceesay N and Baral S. Sexual violence against female sex workers in The Gambia: a
566 cross-sectional examination of the associations between victimization and reproductive,
567 sexual and mental health. BMC Public Health, 2015. **15**(1): p. 270.
568 7. Weldegebreal R, Melaku Y A, Alemayehu M and Gebrehiwot T G. Unintended pregnancy
569 among female sex workers in Mekelle city, northern Ethiopia: a cross-sectional study.
570 BMC Public Health, 2015. **15**: p. 40.
571 8. Duff P, Muzaaya G, Muldoon K, Dobrer S, Akello M. Birungi J and Shannon K, High rates
572 of unintended pregnancies among young women sex workers in conflict-affected
573 Northern Uganda : the social contexts of brothels/lodges and substance use. African
574 Journal of Reproductive Health, 2017. **21**(2): p. 64-72.
575 9. Chanda M M, Ortblad K F, Mwale M, Chongo S, Kanchele C, Kamungoma N, Barresi L G,
576 Harling G, Barnighausen T and Oldenburg C E. Contraceptive use and unplanned
577 pregnancy among female sex workers in Zambia. Contraception, 2017.
578 10. Ministry of Health. Reducing Morbidity and Mortality from Unsafe Abortion in Uganda:
579 Standards and Guidelines. 2015, Ministry of Health,Uganda.
580 11. Uganda Bureau of Statistcs (UBOS) and ICF. Uganda Demographic and Health Survey
581 2016. 2018, UBOS and ICF: Uganda and Rockville, Maryland, USA.
582 12. Erickson M, Goldenberg S M, Ajok M, Muldoon K A, Muzaaya G and Shannon K.
583 Structural determinants of dual contraceptive use among female sex workers in Gulu,
584 northern Uganda. Int J Gynaecol Obstet, 2015. **131**(1): p. 91-5.
585 13. Namyalo S and Nakayiza J. Dilemmas in implementing language rights in multilingual
586 Uganda. Current Issues in Language Planning, 2015. **16**(4): p. 409-424.
587 14. Uganda Bureau of Statistics. The National Population and Housing Census 2014 – Main
588 Report. 2016: Kampala, Uganda.
589 15. Schwartz S R and Baral S. Fertility-related research needs among women at the margins.
590 Reproductive Health Matters. **23**(45): p. 30-46.
591 16. Yam E A, Kidanu A, Burnett-Zieman B, Pilgrim N, Okal J, Bekele A, Gudeta D and Caswell
592 G. Pregnancy Experiences of Female Sex Workers in Adama City, Ethiopia: Complexity of
593 Partner Relationships and Pregnancy Intentions. Studies in Family Planning, 2017. **48**(2):
594 p. 107-119.

17. Uganda Bureau of Statistics and ICF International Inc. Uganda Demographic and Health Survey 2011. 2012, UBOS and Calverton, Maryland: ICF International Inc.: Kampala, Uganda.
18. Barrett G, Smith S and Wellings K. Conceptualisation, development and evaluation of a measure of unplanned pregnancy. J Epidemiol Community Health, 2004. **58**(5): p. 426-33.
19. Population Council. Conceptualizing and Measuring Unintended Pregnancy and Birth: Moving the Field Forward. 2015, Population Council: Accra, Ghana p. 20.
20. Singh S, Sedgh G and Hussain R. Unintended pregnancy: worldwide levels, trends, and outcomes. Stud Fam Plann, 2010. **41**(4): p. 241-50.
21. Blackwell M, Honaker J and King G. A Unified Approach to Measurement Error and Missing Data: Overview and Applications. Sociological Methods and Research, 2017. **46**(3): p. 303-341.
22. Roshanaei S, Shaghaghi A, Jafarabadi M A and Kousha A. Measuring unintended pregnancies in postpartum Iranian women: validation of the London Measure of Unplanned Pregnancy. East Mediterr Health J, 2015. **21**(8): p. 572-8.
23. Habib M A, Raynes-Greenow C, Nausheen S, Soofi S B, Sajid M, Bhutta Z A and Black K I. Prevalence and determinants of unintended pregnancies amongst women attending antenatal clinics in Pakistan. BMC Pregnancy and Childbirth, 2017. **17**(1): p. 156.
24. Morof D, Steinauer J, Haider S, Liu S, Darney P and Barrett G. Evaluation of the London Measure of Unplanned Pregnancy in the a United States population of women. PloS One, 2012. **7**.
25. Borges A L V, Barrett G, Santos O A D, Nascimento N D C, Cavalhieri F B and Fujimori E. Evaluation of the psychometric properties of the London Measure of Unplanned Pregnancy in Brazilian Portuguese. BMC Pregnancy and Childbirth, 2016. **16**(1): p. 244.
26. Hall J, Barrett G, Mbwana N, Copas A, Malata A and Stephenson J. Understanding pregnancy planning in a low-income country setting: validation of the London measure of unplanned pregnancy in Malawi. BMC Pregnancy and Childbirth, 2013. **13**(1): p. 200.
27. Almaghaslah E, Rochat R and Farhat G. Validation of a pregnancy planning measure for Arabic-speaking women. PLoS One, 2017. **12**(10): p. e0185433.
28. Rocca C H, Krishnan S, Barrett G and Wilson M. Measuring pregnancy planning: An assessment of the London Measure of Unplanned Pregnancy among urban, south Indian women. Demogr Res, 2010. **23**.
29. Goossens J, Verhaeghe S, Van Hecke A, Barrett G, Delbaere I and Beeckman D. Psychometric properties of the Dutch version of the London Measure of Unplanned Pregnancy in women with pregnancies ending in birth. PloS one, 2018. **13**(4): p. e0194033.
30. Hall J A, Barrett G, Phiri T, Copas A, Malata A and Stephenson J. Prevalence and Determinants of Unintended Pregnancy in Mchinji District, Malawi; Using a Conceptual Hierarchy to Inform Analysis. PLoS One, 2016. **11**(10): p. e0165621.
31. Namyalo S. Terminological modernization of Luganda in the field of linguistics. 2010, Ph. D. thesis, Makerere University.
32. Collins G S, Ogundimu E O and Altman D G. Sample size considerations for the external validation of a multivariable prognostic model: a resampling study. Statistics in Medicine, 2016. **35**(2): p. 214-226.
33. David l Streiner. Sample-size formulae for parameter estimation 1994. p. 75-284.

34. Roscoe J T. Fundamental Research Statistics for the Behavioral Science, International Series in Decision Process, 2nd Edition, Holt, Rinehart and Winston, Inc., New York 1975.
35. Luchters S, Richter M L, Bosire W, Nelson G, Kingola N, Zhang X D, Temmerman M and Chersich M F. The contribution of emotional partners to sexual risk taking and violence among female sex workers in Mombasa, Kenya: a cohort study. PLoS One, 2013. **8**(8): p. e68855.
36. Vandepitte J, Bukenya J, Weiss H A, Nakubulwa S, Francis S C, Hughes P, Hayes R and Grosskurth H. HIV and Other Sexually Transmitted Infections in a Cohort of Women Involved in High-Risk Sexual Behavior in Kampala, Uganda. Sexually Transmitted Diseases, 2011. **38**(4): p. 316-323 10.1097/OLQ.0b013e3182099545.
37. Bishai D, Patil P, Pariyo G and Hill K. The Babel Effect: Community Linguistic Diversity and Extramarital Sex in Uganda. AIDS and Behavior, 2006. **10**(4): p. 369-376.
38. Willis G B and Artino J A R. What Do Our Respondents Think We're Asking? Using Cognitive Interviewing to Improve Medical Education Surveys. Journal of Graduate Medical Education, 2013. **5**(3): p. 353-356.
39. Knafl K, Deatrick J, Gallo A, Holcombe G, Bakitas M, Dixon J and Grey M. The analysis and interpretation of cognitive interviews for instrument development. Research in Nursing & Health, 2007. **30**(2): p. 224-234.
40. Wilson D. HIV Programs for Sex Workers: Lessons and Challenges for Developing and Delivering Programs. PLoS Medicine, 2015. **12**(6): p. e1001808.
41. The London Measure of Unplanned Pregnancy (LMUP). Luganda version. 2019 28th March 2019]; Available from: www.lmup.org.uk/docs/LugandaLMUP.pdf.
42. The London Measure of Unplanned Pregnancy L. Acholi version. 2019 28th March 2019]; Available from: www.lmup.org.uk/docs/AcholiLMUP.pdf.
43. The London Measure of Unplanned Pregnancy (LMUP). Lugisu version. 2019 28th March 2019]; Available from: www.lmup.org.uk/docs/LugisuLMUP.pdf.
44. The London Measure of Unplanned Pregnancy (LMUP). Runyankole version. 2019 28th March 2019]; Available from: www.lmup.org.uk/docs/RunyankoleLMUP.pdf.
45. Streiner D and Norman G. Health Measurement Scales: a practical guide to their development and use. 4th edition. 2008, Oxford: Oxford University Press.
46. Cronbach LJ. Essentials of psychologic testing. 1990, New York: Harper & Row; 1.
47. Landis J R and Koch G G, The measurement of observer agreement for categorical data. Biometrics, 1977. **33**(1): p. 159-74.
48. Schwartz S, Papworth E, Thiam-Niangoin M, Abo K, Drame F, Diouf D, Bamba A, Ezouatchi R, Tety J, Grover E and Baral S. An urgent need for integration of family planning services into HIV care: the high burden of unplanned pregnancy, termination of pregnancy, and limited contraception use among female sex workers in Cote d'Ivoire. J Acquir Immune Defic Syndr, 2015. **68 Suppl 2**: p. S91-8.
49. Uganda National Council for Science and Technology (UNCST). National Guidelines for Research involving Humans as Research Participants., in Informed Consent Process: Informed Consent by Mature and Emancipated Minors. 2014, UNCST: Kampala, Uganda.
50. Beard J, Biemba G, Brooks M I, Costello J, Ommerborn M, Bresnahan M, Flynn D and Simon J L. Children of female sex workers and drug users: a review of vulnerability, resilience and family-centred models of care. Journal of the International AIDS Society, 2010. **13**(Suppl 2): p. S6-S6.
51. Willis B, KatherineWelch and Saki Onda. Health of female sex workers and their children: A call for action. Lancet Global Health 2016. **4**(7): p. e438–e439.

52. Becker M, Ramanaik S, Halli S, Blanchard J F, Raghavendra T, Bhattacharjee P, Moses S, Avery L and Mishra S. The Intersection between Sex Work and Reproductive Health in Northern Karnataka, India: Identifying Gaps and Opportunities in the Context of HIV Prevention. AIDS Research and Treatment, 2012. **2012**: p. 9.
53. Yeatman S and Smith-Greenaway E. Birth Planning and Women's and Men's Health in Malawi. Studies in family planning, 2018. **49**(3): p. 213-235.
54. The London Measure of Unplanned Pregnancy (LMUP). English version. 2019 Accesed 28th March 2019]; Available from: www.lmup.org.uk/docs/RunyankoleLMUP.pdf. 2019.
55. Ayalew Y, Mulat A, Dile M and Simegn A, Women's knowledge and associated factors in preconception care in adet, west gojjam, northwest Ethiopia: a community based cross sectional study. Reproductive Health, 2017. **14**(1): p. 15.
56. Olowokere A, Komolafe A and Owofadeju C. Awareness, knowledge and uptake of preconception care among women in Ife Central Local Government Area of Osun State, Nigeria. Journal of Community Medicine and Primary Health Care, 2015. **27**(2): p. 83-92.
57. Lakha F and Glasier A. Unintended pregnancy and use of emergency contraception among a large cohort of women attending for antenatal care or abortion in Scotland. Lancet, 2006. **368**.
58. Wellings K, Jones K G, Mercer C H, Tanton C, Clifton S, Datta J, Copas A J, Erens B, Gibson L J, Macdowall W, Sonnenberg P, Phelps A and Johnson A M. The prevalence of unplanned pregnancy and associated factors in Britain: findings from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). Lancet, 2013. **382**(9907): p. 1807-1816.