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A retrospective cross sectional study assessing factors associated with retention and non-viral suppression among HIV positive FSWs receiving antiretroviral therapy from primary health care clinics in Kampala, Uganda

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Abstract

Background

Patient retention in care and sustained viral suppression are a cornerstone to improved health and quality of life, among people living with HIV. However, challenges of retention on ART remain among female sex workers (FSWs). We report lost to follow up (LTFU), viral load suppression, and the associated factors among FSWs that access HIV treatment at primary health care facilities in Kampala.

Methods

We retrospectively abstracted and analysed patient management data of HIV positive FSWs who enrolled in care between January 2018 to December 2020. LTFU was defined as failure of a FSW to return for treatment at least 90 days from the date of their last clinic appointment. We defined viral suppression as having a last viral load of ≤ 1000 copies/ml preceding data abstraction. Data were analysed using Stata 15.1 software.

Results

A total of 275 FSWs were included in our study sample. We found LTFU of 26% (n = 73) at 24 months, retention was 85% (n = 234) at six months and it decreased with duration of being in care to 74% (n = 202) at 24 months. Viral load testing coverage was 56% (n = 135) and of these, 89.6% (n = 121) were virally suppressed. Factors associated with LTFU in univariable logistic regression; and viral suppression in multivariable logistic regression models were; having a telephone contact (OR: 0.3, 95% CI: 0.1–0.9 p = 0.031), (OR:14.1, 95%CI: 1.10-182.05 P = 0.042); having enrolled in HIV care aged > 35 years (OR: 0.5, 95% CI: 0.2-1.0 p = 0.048), (OR:0.10, 95%CI: 0.00-0.75, p = 0.029); and having good ART adherence (OR: 0.2, 95% CI: 0.1–0.5 p = 0.001), (OR:14.8, 95%CI: 2.64–83.08 p = 0.002) respectively. Having good ART adherence remained statistically significant (OR: 0.22, 95% CI: 0.08–0.53 p = 0.001) in multivariable logistic regression for LTFU.

Conclusion

This study found low retention among HIV diagnosed FSWs in care. Viral load suppression was acceptable and comparable to that of the general population, however viral load coverage was low. Strategies that increase retention in care and access to viral load testing such as individual client centred care models will go a long way to improve retention and viral load coverage among FSWs.

Introduction

At the end of 2019, key populations including female sex workers (FSWs) and their sexual partners accounted for 65% of new HIV infections globally (1). Eastern and Southern Africa regions were mostly affected and in 2020 alone, key populations and their sexual partners accounted for 32% of new infections and the HIV prevalence was 30.6% (1). The new Global AIDS Strategy accentuate commitment to achieving 95, 95, 95 new HIV cascade targets of testing, treatment, and viral suppression with emphasis on high-risk sub populations such as FSWs (2). These targets are only achievable by increasing the reach and strengthening access to HIV services, reinforce prevention interventions, expand treatment, and ensure retention on treatment to achieve viral suppression for all HIV positive populations especially the high risky groups such as FSWs.

The HIV epidemic in Uganda is generalised with an estimated HIV prevalence of 5.4% in 2020 among the population aged 15–49 (1). Key Populations (3) are most affected by the epidemic with FSWs having the highest HIV prevalence among all KP sub groups (1, 4). According to Uganda AIDS Commission 2021 fact sheet, HIV prevalence is estimated at 31.3% among female sex workers (5), a 4.6 times fold when compared to their female counterparts in the general population whose HIV prevalence is 6.8% (1). Although Uganda has made substantial gains in HIV epidemic control and is one of the eight countries that achieved the 90-90-90, global HIV/AIDS 2020 targets (5), there are still population inequities in accessing HIV prevention and treatment services and FSWs are deeply affected. Indeed, the high prevalence among FSW (31.3%), low ART coverage of 65% vs 96% among their female counterparts in the general population, low HIV status awareness of 88% vs 91% in the general population (1, 5) and sub-optimal condom use of 69.4% as well as active syphilis of 6.3% (1) in Uganda suggests that there are significant barriers for FSWs in obtaining access to a comprehensive package of essential health services. In Uganda sex work remains criminalised, leading to increased marginalisation and stigma (6). Factors such as gender inequalities, physical violence, economic vulnerabilities, and discrimination hinder FSWs from accessing HIV prevention, treatment and affect FSWs' retention in care thus suboptimal viral load suppression (7–9).

The ability to successfully retain FSWs in HIV care and treatment programs is very important to optimise viral suppression and improve health outcomes (10–12). However, retention on ART and viral suppression among FSWs is a major challenge across different settings. A systematic review conducted among FSWs in Asia, Africa, North America, South America, and Central America and the Caribbean, reported a 38% current ART use among HIV infected FSWs with a 57% viral load suppression. The outcome estimates of ART use were similar between high-, and low- and middle-income countries (13), implying that the challenge of continuity on ART is cross-cutting among FSWs regardless of the setting. Another systematic review conducted in sub-Saharan Africa (SSA), reported suboptimal continuity in care despite expanded ART access among FSWs, with only 26–38% of HIV positive FSWs on ART reported by one of the studies reviewed (14, 15). Similar retention and viral load suppression challenges among FSW have been reported in a recent systematic review conducted in SSA and it found that while retention and ART use may be high at the beginning of implementing retention interventions, the continuity in care is not sustained until the end or beyond the implementation period (16). Indeed, results of a study conducted in Ivory Coast indicate steady loss of retention probability, reported at 75% at 6 months, 68% at

12 months, 55% at 24 months, and 47% at 36 months (17). Similarly, a study conducted in Nigeria, reports an overall retention of 63.5%, 55.4%, 51.2%, and 46.7% at one year, two years, three years, and four years respectively, in a KP program where FSWs had a 54% majority representation (18).

Two studies have reported a combination of retention on ART and viral suppression among FSWs. The first study was conducted in Malawi and reported that, 69% of HIV-infected FSWs with a history of HIV care, only 52% reported current ART use, and of those, 45% were virally suppressed (19). The second study was a cross-sectional respondent driven sampling survey among FSWs in Zimbabwe and found that out of 67.7% of FSWs who reported ART use, 77.8% had HIV viral load < 1000 copies/ml, however among all HIV positive FSWs, 49.5% had a viral load < 1000 copies/ml (20). Studies that have reported high retention and viral load suppression, are those conducted in settings with intensive follow up of participants while in HIV care. For example, an antiretroviral treatment adherence club intervention for FSWs implemented in Western Cape reported viral load suppression of < 1000 copies/ml among 20.5% of FSWs participants at baseline and the outcome increased to viral load suppression levels among 88.2% at 24 months of follow up (21). Notably there are some studies that have reported non-significant differences in viral load suppression among FSWs even when they were conducted in settings that implemented intensive retention and ART use interventions. For example, Cowan (22) reported a viral load suppression of < 1000 copies/ml among 72% of FSWs in an intervention arm vs 67% FSW participants in a control arm at the end of follow up period in a FSW program in Zimbabwe where targeted combination prevention strategies were implemented.

In Uganda, multiple targeted HIV prevention and strategies for treatment continuity have been scaled up, however, challenges of retention and low viral suppression remain among FSWs (23). Challenges of drop-out of care have been reported among women who engage in sex work as their main job (8, 24). While the ART coverage among FSWs stands at 65%, their viral suppression rates are unknown (1) There is a dearth of information in Uganda about retention in care and viral suppression among FSWs, and to the best of our knowledge the only available results are from the a respondent driven sampling whose data was collected as far back as 2012 in Kampala (9). The study reported very low performance, when measured against the 90-90-90 targets where, 45.5% of FSWs knew their HIV status, 37.8% were on ART and 35.2% were virally suppressed (9). In this study, we report retention of HIV positive FSWs in HIV care, their viral load suppression rates, and the associated factors among FSWs that access HIV treatment at primary health care facilities in Kampala.

Methodology

Study design

We performed a retrospective review of medical records of FSWs diagnosed with HIV infection. These were individuals enrolled into the HIV care program from January 2018 to December 2020 at the six-government primary health care facilities in Kampala, Uganda.

Study Setting

The study was conducted at the six-government primary health care centres located in Kampala Uganda. These were Kawaala, Kisugu, Kiswa, Kitebi, Komamboga and Kisenyi, distributed across all the five administrative divisions of Kampala City, including Kampala Central Division, Nakawa Division, Makindye Division, Lubaga Division and Kawempe Division. The health centres serve as the main HIV outpatient for these residential areas in Kampala and provide both curative and preventive health services that include HIV care for the general population including FSWs. The HIV services at the health centres are fully funded and implemented with support from the US Centres for Disease Control and Prevention.

Study Population

We conducted the study in Kampala City in Central Uganda. Kampala is a capital city of Uganda; it is an economically vibrant business centre and attracts potential customers for FSWs due to financial accessibility. The city has many truck drivers that transport commercial goods across Kampala from neighbouring countries of Rwanda, Democratic Republic of the Congo, Tanzania, Kenya, Burundi, and South Sudan. There are over 8800 FSWs workers in Kampala (25) with HIV prevalence estimated at 31.3% among this population (5), 4.6 times higher than their female counterparts whose HIV prevalence is 6.8% (1). The study was a retrospective cohort analysis of routine patient management data. The study population was FSWs living with HIV who started ART between January 2018 and December 2020. We included all medical records of FSWs regardless of age at enrolment and were seeking HIV care at the government primary health care facilities in Kampala. FSWs medical records were excluded if they missed data on key variables for the study including age, date of ART start, WHO staging and CD4 cell count at initiation. A total of 285 medical records within the study period were retrieved from Open MRS data base and screened. However, only 275 records were included in the study and data abstracted, as the remaining ten had scanty information documented at enrolment,

Study outcomes and variable measurement

The primary outcome in this study was lost to follow up (LTFU) from HIV care, and a secondary outcome was virological non-suppression.

LTFU from HIV care was defined ‘as failure of a FSW to return to the HIV clinic for ARV drug refill for at least 90 days preceding their last clinic appointment and not classified as transferred out to another clinic for treatment’. The definition of LTFU in this study was adopted from the Uganda Ministry of Health definition (26).

Virological non-suppression was defined as having a last viral load higher than 1,000 copies/ml, chosen based on WHO guidelines (11). Viral load suppression was assessed for only those who had initiated ART at least 6 months before the date of data abstraction.

The exposure variables included Age, Marital status, level of education, year of ART initiation, presence of treatment supporter, having a telephone contact, WHO Stage, baseline CD4 count, if ever ddiagnosed

with TB prior to the study, ART Adherence status at the last visit, ever dropped out of care; returned for treatment continuity and if ART was initiated within ≥7 days following diagnosis of HIV/AIDS.

Data collection

A data extraction form was developed to collect data on variables that are routinely collected during the management of HIV patients. These are often reported to be associated with FSWs LTFU from HIV care. The following procedure were followed in the data collection process i) clinical data were extracted from HIV care/ART cards, a Ministry of Health medical chart for all ART patients used in all health facilities that provide ART services; ii) if CD4 counts and viral load results were not recorded in the HIV care/ART card, the laboratory records were reviewed; iii) data related to sex work were abstracted from key population specific registers that are routinely completed for all sex workers at enrolment or at any time a client identifies herself as a sex worker; iv) finally data were retrieved from the electronic medical record . The patient files were retrieved by a team of patient experts whose role at the facility is to retrieve charts for patients that routinely visit the clinics for drug refills. Assisted by one research assistant, data were collected by a member of the research team, who had taken lead in developing the protocol, study procedures, data collection and study ethics forms. The research assistant was a health worker familiar with HIV service tools and was oriented on the protocol, study procedures and how to extract the data using a structured abstraction tool. Data collection took place between January and February 2021. To ensure quality of the data, all data abstraction forms were reviewed and 10% of the randomly selected FSW files were re-done by the research team. Data were entered into the Research Electronic Data Capture (REDCap) database.

Data management

Data quality check was done daily by crosschecking discrepancies, and completeness of data on all variables. The research team conducted real time form review and corrected missing or erroneous entries on site, where we could refer to the medical records. We checked for all forms of identifiable errors, and data completeness was conducted and exported into Stata version 15.0 for analysis.

Data analysis

Data were analysed using Stata 15.1 software (*Stata* Statistical *Software*: Release 14. College Station, TX: *StataCorp* LP). The normally distributed continuous variables were described using mean and standard deviation, or else median and range where appropriate. The Shapiro Wilk test was used to assess for normality of continuous variables and categorical variables were described as proportions and frequencies. A table was constructed to present data that describes the distribution of retention (dead, loss to follow-up and transferred out)

at given time points (6, 12, 24 and 36 months). Virological outcomes (viral load coverage and viral load suppression) were also presented in a table. Both univariate and multivariable logistic regression models were performed on both outcomes, lost to follow up and virological non-suppression. We used 0.2 level of

significance to select variables to include in the multivariate analysis model. Stepwise logistic regression modelling was undertaken so that predictive variables for lost to follow up and non-virological suppression is carried out by an automatic process, while controlling for confounding effect of other covariates. All factors with $p \leq 0.05$ were then considered statistically significant.

Ethical considerations

This was retrospective study and patients' consent could not be obtained. The study was approved by the Uganda Virus Research Institute ethics committee and the Uganda national Council of science and technology (reference number HS-2665). We also obtained approval from Kampala Capital City Authority health office to allow us have access to patients' data. To ensure confidentiality, no personal identifiers were abstracted, and participant unique identification numbers were used on data collection tools. The abstractors also signed a form stating that no information from the files would be disclosed.

Results

Baseline characteristics

In this study we extracted data for 285 FSWs enrolled in care between January 2018 to December 2020 and 275 FSWs were eligible for inclusion in the study (Table 1). At enrolment in care, half of the participants were aged 25-34 years 51% (n=139) and a slightly higher number was either separated or widowed 38% (100). Approximately 48% (n=131) had education level documented in their clinical records, of those 24% (n=67) had attained primary education while 13% (n=35) had no education and 11% (n=29) had attained secondary education or higher. Majority of the participants were diagnosed with early stage of HIV disease at baseline with 82% (n=223) categorised as having WHO stage 1 disease, 71% (n=195) had baseline CD4 count of ≤500 (cells/µl) and 96% (264) had no signs of tuberculosis. Treatment initiation for the vast majority of participants followed the WHO recommendation of 'test and start' approach (11) with over 95% (n= 261) having initiated on ART within 7 days following HIV positive diagnosis. Details of the baseline participants characteristics are shown in table 1

Table 1: Baseline Characteristics of study participants at ART Initiation

Participant Characteristics		Frequencies	Percentage
Health facility level	HC III	209	76.0
	HC IV	66	24.0
ART Initiation	Within 7 days following diagnosis	261	96.0
	After 7 days following diagnosis	11	4.0
Age at enrolment (years)	< 25	92	33.4
	25–34	139	50.6
	≥35	44	16.0
Marital status at enrolment	Never Married	78	29.5
	Married/staying with partner	87	32.8
	Widowed/Separated	100	37.7
Highest Education Level attained	No education	35	12.7
	Primary School	67	24.4
	Secondary or higher	29	10.6
	Unknown	144	52.4
Year of ART start	2018	79	29.0
	2019	108	39.7
	2020	85	31.3
Has treatment supporter	Yes	260	94.6
	No	15	5.4
Has telephone contact	Yes	259	94.2
	No	16	5.8
Baseline WHO Stage	WHO Stage I	223	81.7
	WHO Stage II	40	14.7
	WHO Stage III & IV	10	3.6
Baseline CD4 count (cells/µl)	≤500	195	71.2
1 person had missing baseline value	>500	79	28.8
Diagnosed with TB during study period	Yes	11	4.0

	No	264	96.0
ART Adherence at the last visit	1=Poor	27	11.2
	2=Fair	10	4.2
	3=Good	204	84.6
Loss to follow up/drop out of care	No	160	58.4
	Yes	114	41.6
Reason for drop out of care	Dropped out/LTFU	81	73.0
	Dead	1	0.9
	Transferred out	29	26.1
Client ever dropped and returned to Treatment for Tx Continuity	No	69	89.6
	Yes	8	10.4
Ever missed appointment for more than 3 days post clinical appointment	No	95	34.7
	Yes	179	65.3

Lost to follow up and retention in HIV care

As illustrated in table 1, among 111 participants with reported reasons for drop out of care, 73% (n=81) were lost to follow up, 26% (n=29) had transferred out to seek care from other health facilities while 0.9% (n=1) had died. Among seventy-three participants with documented time-period to drop out of care, 56.2%, 23.3%, 13.7%, and 6.8% were lost to follow up at 6 months, 12, months, 24 months, and beyond 24 months on ART, respectively. These results demonstrate that losses from care happen in within the first 6 months after enrolment in care. The overall retention was 85% at six months and it decreased to 74% at 24 months, implying reduced proportions of losses as participants stayed longer in ART care program. An illustration of the lost to follow up vs retention by time points is presented in table 2 and figure 1 .

Table 2: Retention and lost to follow up at given time points among FSWs enrolled in care between 2018-2020

Time point Factor n=275	Cumulative attrition due LTFU only n (%)	Retention in care n (%)
<6 months	41(14.9)	234 (85.1)
6≤ period ≤12 months	58 (21.1)	217 (78.9)
12< period ≤24 months	68(24.7)	207 (75.3)
>24 months	73(26.5)	202 (73.5)

Virological testing coverage and non-suppression

Among the 274 participants with data on virological status, 49% (n=135) had viral load results, 39% (n=106) had no viral load results while 12% (n=33) were not eligible for viral load testing as they had been in care for less than 6 months prior to the study. Viral load testing coverage among those eligible for viral load testing was 56% (n=135). Of 135 participants with viral load results, 89.6% (n=121) were virally suppressed with ≤ 1000 copies/mL **(Table 3).**

Table 3: Virological outcomes among participants enrolled on ART between Jan 2018–Dec 2020

Factor	N	%
Viral load testing coverage (n=274)		
With viral load result	135	49.3
No viral load result	106	38.7
Not eligible	33	12.0
Viral load suppression (n=135)		
≤ 1000 copies/mL	121	89.6
> 1000 copies/mL	14	10.4

Factors associated with lost to follow up

In univariate logistic regression models for lost to follow up, factors: age, marital status, education level, presence of a treatment supporter, having a telephone contact, WHO stage, TB diagnosis and ART adherence at last visit were significant (at 2% level of significance). Using stepwise multivariable logistic regression, having good ART adherence at the last visit, adjusted for having a telephone contact and being older than 35 years of age at enrolment in HIV care has 0.05 level of significance (OR: 0.22, 95% CI: 0.08-0.53 p=0.001), table 4.

Table 4: Logistic univariable and multivariable analysis of factors associated with Lost to follow-up

	Lost to follow up			
	Univariable Analysis		Multivariable Analysis	
Factors	**OR (95% CIs)**	**p**	**OR (95% CIs)**	**p**
Health facility level				
HC III	Ref			
HC IV	1.0(0.6-1.8)	0.990		
Days on ART after enrolment				
Within 7 days	Ref			
After 7 days	1.2(0.3-3.9)	0.797		
Age at enrolment in care				
< 25	Ref		Ref	
25–34	0.6(0.4-1.1)	0.104	0.7(0.4-1.2)	0.192
≥35	0.5(0.2-1.0)	0.048	0.4(0.2-1.1)	0.075
Marital status				
Never Married	Ref			
Married	0.5(0.2-0.9)	0.017		
Widowed/Separated	0.7(0.4-1.3)	0.253		
Highest Education Level attained				
No education	Ref			
Primary School	0.9(0.4-2.1)	0.778		
Secondary or higher	0.4(0.1-1.2)	0.098		
Has treatment supporter				
No	Ref			

Yes	0.5(0.2-1.3)	0.146		
Has telephone contact				
No	Ref		Ref	
Yes	0.3(0.1-0.9)	0.031	0.3(0.1-1.2)	0.086
Baseline WHO Stage				
WHO Stage I	Ref			
WHO Stage II	0.7(0.3-1.3)	0.261		
WHO Stage III & IV	0.1(0.0-1.1)	0.062		
Baseline CD4 count (cells/µl)				
≤500	Ref			
>500	0.9(0.5-1.6)	0.789		
Diagnosed with TB during study period				
No	Ref			
Yes	0.3(0.6-1.4)	0.128		
ART Adherence at the last visit				
1=Poor	Ref		Ref	
2=Fair	0.7(0.1-3.0)	0.600	0.7(0.2-3.5)	0.698
3=Good	0.2(0.1-0.5)	<0.001	0.2(0.1-0.5)	0.001
Ever missed appointment for more than 3 days post clinical appointment.				
No	Ref			
Yes	1.2(0.8-2.1)	0.392		

Factors associated with virological suppression.

In table 5, the univariate logistic regression models for virological suppression, age, health centre level, having a telephone contact, ART adherence at last visit and having been transferred out of care were significant, at 2% level of significance. A multivariable logistic regression model showed that virological suppression was associated with having good ART adherence at last visit (OR:14.8, 95%CI: 2.64-83.08 p=0.002) having a telephone contact (OR:14.1, 95%CI: 1.10-182.05 P=0.042) and having enrolled in HIV care aged >35 years (OR:0.10, 95%CI: 0.00-0.75, P=0.029). There was significant (p-value = 0.002) 1381% increase in odds to viral suppression in the group which adhered to ART at last visit from those who did not adhere to ART. Adhering to ART is a beneficial intervention after adjusting for age and having a telephone contact. The odds to viral suppression in the group with having telephone contact were 14.1 times the odds to viral suppression in the group without telephone contact after adjusting for age and ART adherence at last visit. There was a 94% decrease in odds to viral suppression in > 35 years age group as compared to < 25 years age group after adjusting for both ART adherence at last visit and having a telephone contact.

Table 5: Logistic univariable and multivariable analysis of factors associated with virological suppression

	Virologically suppressed			
	Univariable Analysis		Multivariable Analysis	
Factors	**OR (95% CIs)**	**p**	**OR (95% CIs)**	**p**
Health facility level				
HC III	Ref		Ref	
HC IV	3.9(0.5-31.2)	0.198	6.1(0.4-90.2)	0.185
Days on ART after enrolment				
Within 7 days	Ref			
After 7 days	0.4(0.0-4.3)	0.488		
Age at enrolment in care				
< 25	Ref		Ref	
25–34	0.2(0.0-1.2)	0.077	0.1(0.0-1.2)	0.073
≥35	0.1(0.0-0.8)	0.032	0.1(0.0-0.7)	0.029
Marital status				
Never Married	Ref			
Married	1.5(0.2-5.7)	0.590		
Widowed/Separated	2.1(0.5-9.3)	0.313		
Has treatment supporter				
No	Ref			
Yes	1.8(0.2-16.5)	0.609		
Has telephone contact				
No	Ref		Ref	
Yes	6.6(1.0-43.2)	0.051	14.2(1.1-182.0)	0.042

Baseline WHO Stage				
WHO Stage I	Ref			
WHO Stage II	2.6(0.3-21.3)	0.366		
WHO Stage III & IV				
Baseline CD4 count (cells/µl)				
≤500	Ref			
>500	0.9(0.3-2.9)	0.891		
ART Adherence at the last visit				
1=Poor			Ref	
2=Fair	0.6(0.0-11.8)	0.718	0.7(0.0-37.6)	0.863
3=Good	6.9(1.7-28.2)	0.007	14.8(2.6-83.1)	0.002
Ever missed appointment for more than 3 days post clinical appointment.				
No	Ref			
Yes	0.5(0.1-2.5)	0.422		
Loss to follow up/drop out of care.				
No	Ref			
Yes	0.5(0.2-1.7)	0.289		
Reason for drop out				
Dropped out/LTFU	Ref			
Transferred out	0.1(0.0-0,8)	0.031		
Drop out of care at given time points				
<6 months	Ref			
6≤ period ≤12 months	0.5(0.1-3.4)	0.477		

Discussion

This cross-sectional study assessed factors associated with retention and non-viral suppression among HIV positive FSWs who were enrolled in care between January 2018 and December 2020 in primary health care clinics in Kampala, Uganda. The study found a high percentage of lost to follow up of 26% at 24 months of being in care. Retention in care was 85.5% at six months and it decreased to 73.5% at 24 months. Viral load coverage among those eligible for viral load testing was 56% (n = 135). The high LTFU during the study period suggests the presence of low viral load testing coverage in this participant population, however, among the 135 participants with recent viral load testing results, 89.6% (n = 121) had viral load of ≤ 1000 copies/mL. This viral suppression of ~ 90% is comparable to that of the general population of PLWHIV in Uganda (1, 5). However, this observed viral suppression is lower than the UNAIDS 95:95:95 target, although the trajectory is on the positive directions towards achieving the UNAIDS 95% viral suppression target by the year 2025 as projected (1).

The retention on ART of 85% at 6 months and 74% at 24 months, is an indication that a bigger proportion of FSWs drop out of care at 6 months. Previous studies have shown high drop out of FSWs from care in the early months of being enrolled in care as well as reduced retention in care as duration passes while in the HIV care system (17, 18). A retrospective cohort study in the Republic of Côte d'Ivoire among FSW found low levels of retention on ART of 75% after 6 months of initiation on ART. This dropped to 68% at 12 months, 55% at 24 months, and 47% at 36 months (17). This showed a linear trajectory of decline in retention in care among FSWs on ART consistent with what we observed in our study. Another retrospective cohort study on retention in care among key populations in Nigeria showed a similar pattern of decline in care from 63.5% at initiation to 55.4%, 51.2%, and 46.7% after 1 year, 2 years, 3 years, and 4 years of follow up on ART (18). These findings are consistent with multiple studies done across the continent of Africa and reflect our observation in Uganda. The retention of FSWs on ART in Uganda is 98% in the general population (5). Our study found that the retention among FSWs averages 80% showing that there is an 18% difference in retention observed among the FSWs compared to the general population. This is a cause for concern as this is a high-risk group which has the propensity to facilitate transmission of HIV in the population. Good retention is a precursor for good viral suppression, which is a positive step towards sustaining reduced transmission of HIV catalyzed by this high-risk population (12). Patients on chronic medications always suffer from the treatment fatigue, as such there is need to find modalities of reinforcement treatment retention efforts that would stimulate continued adherence to ART as well as continued retention in care. Studies have shown that interventions for improving retention on ART among FSWs have included; implementation of all forms of client centred differentiated service delivery models at both facility and community level with fully functional ART FSW support groups (27, 28), options for fast track drug refills; comprehensive treatment education programs designed and implemented by KP-led civil society organizations with competence to provide quality KP-centered services and well trained and managed community and professional health workers (16, 29).

Our study found 89.6% viral suppression among FSWs. This is comparable to the viral suppression of 90% among PLWHIV general population in Uganda (5). These findings are contrary to what has been reported in other studies such as the one conducted in Burkina Faso where the viral load was undetectable in 81.8% of FSWs (30); in Tanzania study the viral suppression was 50.6% after an 18

months of follow up of FSWs (31) and in Zimbabwe where the viral load was 72% (22). The observed differences could be due to an exceptionally low viral load testing coverage, in that only 56% of FSWs that were eligible for viral load testing had a documented viral load test result. It is likely that patients who adhere to their clinical care and ART schedule mostly follow viral load testing schedule and understand the benefits of adherence to ART treatment and as such, are self-motivated to seek a viral load test when they are due for testing. Nevertheless, robust strategies must be instituted to improve access to viral load testing among FSWs. For example, community viral load sample collection is a viable alternative that should be integrated into other community-based HIV services for FSWs who otherwise would be missing their viral load testing when conducted at facility level. The approach to community-based viral load sample collection has been successful in Zambia (32), however to ensure quality and accuracy of tests, HIV programs need to develop standard service guidelines for referencing during implementation of community based viral load sample collection. In addition, challenges with low viral load coverage could be addressed by enhancing efforts towards focused viral load uptake education aimed at disseminating information on benefits of routine viral load testing, relevance of the results, and clinical management.

Our study also found high LTFU among younger FSWs aged below 25 years compared to the older FSWs. As shown in other previous studies focusing on the general female population, data from such studies showed better retention rates among older women compared to adolescents and young women aged 18–24 (33, 34). This could be due to differences in understanding the value of continued follow up in care among FSWs or due to difference in experience with ART as the older FSWs might have been exposed to ART or HIV/AIDS related education for much longer than the younger inexperienced FSWs who might not have been exposed to HIV/AIDS education.

Our observed association of age with LTFU, was the same with viral suppression, FSWs who were younger (< 25) were likely to have non-suppressed viral load. Existing data indicates that adolescents and young women living with HIV have lower uptake, delayed treatment initiation, and lower retention in care (35). Furthermore, population-based surveys in SSA countries indicate that adolescent girls and young women living with HIV have lower rates of suppression of viral loads than women 25 years and older (36). Low rates of viral ssuppression also suggest that receiving ART might not be sufficient on its own to sustain viral suppression, young women living with HIV require additional targeted care such as intensive adherence counselling support to ensure adherence to treatment and retention in care. Moreover, being an HIV positive young FSW adds up multi-layered issues related to negative social and economic challenges, stigma, rejection, violence, inadequate social support and reduced educational opportunities (29, 37) which are all complex to manage. Young FSWs require special consideration when developing targeted services and support to prevent HIV, support early initiation on ART and retention in care of this group to achieve improved retention in care translating into improved quality of life and reduced risk of HIV transmission.

As seen in a study conducted in a rural district of Uganda (34) and in Kenya (33), we observed that FSWs with telephone contacts were less likely to be lost to follow up and were 14 times likely to be virally suppressed than those without telephone contacts. In the recent past HIV programs are increasingly

utilizing technology platforms to reach a broader range of key populations including FSWs who may be reluctant to access health services including continued access to ART (12). The primary health clinics where the study was conducted, patients were sent short reminder text messages before their clinic appointment day for ART refills and reminder for viral load testing are sent when they are due. It is worth noting however, that appointment reminders through telephone follow up may not independently reduce LTFU and improved ART adherence. Besides our findings show extremely low proportions (10%) of FSWs whose treatment was interrupted and later returned to care. This is despite the recommendations of enhancing 'Return to Treatment' processes as a high priority intervention suggested by WHO and Presidential Emergency Plan for AIDS Relief for all treatment sites (12, 38). As such, comprehensive strategies such as community/facility coordination and integrated adherence support mechanisms through peer follow up, and intensive adherence counselling support as well as linkage to additional individual need services are proven to reduce interruption in treatment, reduced LTFU and improved retention in care (16).

In this study, FSWs whose ART adherence was categorised as 'good' at their last clinic visit had extremely high odds of a viral load suppression (1381%) compared to those whose adherence levels in their clinic records was documented as either 'fair or poor'. Similarly, FSWs with good ART adherence were less likely to have dropped out of care. Adherence to ART has widely been documented to be associated with viral load suppression (18, 22, 35). Besides, in this study non-suppressed viral load was observed among the FSWs who were lost to follow up. A detectable viral load is a leading signal of lower adherence among PLWHIV, as has been reported in other studies (30, 39). FSWs are a known vulnerable group that continue to face barriers that make it harder to maintain regular clinical care and ART adherence (13, 40), continuation of intensive follow-up is required to support ART adherence for those in care and to bring back to care those who have fallen out of treatment. To improve ART adherence, reduce treatment interruption and improve viral suppression among FSWs, differentiated service delivery models that promote person-centered approaches to HIV care and treatment have been documented as optimal and effective models of care (28, 41, 42). A fundamental need therefore exists, for HIV programs to work with KP focused organisations to ensure awareness of the available service options for FSWs and to support them select the services best fitting their needs for treatment continuity.

This study had strengths and limitations; Recruitment was done from all government primary health centres in Kampala city. This led to an increased representativeness of the sample for the study. The limitations in this study that should be considered while interpreting study findings include i) We utilized secondary data, routinely collected for patient management. Such data sometimes have gaps and may not warrant rigor for scientific research. Never the less, the limitation may be minimal since there is standard data validation rules and routine data cleaning which can guarantee a certain degree of data accuracy; i) Data on key variable such as disclosure, education, religion, and income status known to affect LTFU were missed; ii) Uganda HIV programs do not have national patient unique identifiers, making it impossible to track patients who shift to get HIV care services from other facilities, this may have resulted in overestimation of FSWs counted as LTFU. However, there is a dedicated team of FSWs peers

who follow up and document clients who don't return for their drug refill and this might have possibly minimised wrong categorisation.

Conclusion

This study has shown that the risk of lost to follow up among HIV diagnosed FSWs who enrolled in care is high and the occurrence mostly happen in the first six months after initiating ART. Interventions to improve retention such as intensive adherence support, immediate attachment to FSW peer supporters and provision of individual need-based ART care should target newly enrolled FSWs during the early months of enrolment. Although viral load suppression was acceptable and comparable to that of the general population, viral load coverage was grossly incredibly low. To address challenges of low viral load coverage, strategies that increase access to viral load testing such as disseminating information on benefits of routine viral load testing, extending testing services nearer to the FSWs by conducting viral load sample collection from the communities will go a long way to improve viral load coverage among FSWs. Lastly, the observation of having telephone contacts and their association to reduce LTFU calls for embracing technological media advancements in HIV care and leveraging on mHealth for patient follow up to improve patients' retention into care throughout the entire treatment cascade.

Declarations

Ethics approval

The study was approved by the Institutional Review Boards of the Uganda Virus Research Institute reference number GC/12719/08/723, and Ethics Committee of Faculty of Medicine and Health Sciences of Stellenbosch University reference number S19/05/088 and Uganda National Council of Science and Technology reference number HS-2665. All methods were carried out in accordance with relevant guidelines and regulations

Consent to participate

This is retrospective cohort study using secondary data. The consent to participate is not applicable

Consent for publication

Not Applicable

Availability of data and material

Due to conditions of ethical approvals of research among key populations, we are unable to provide access to the full dataset on a public repository. However, we are willing to de-identify data and make it available upon reasonable request. Interested persons should contact the corresponding author

Competing interests

The authors declare that they do not have any competing interests

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Author contributions

Lydia Atuhaire; Conceptualization, methodology, development of interview tools, writing – original draft manuscript, writing – review & editing. **Constance S Shumba;** Review of interview tools, methodology, writing review and editing. **Lovemore Mapahla**; analysis, methodology, writing – review & editing; **Peter S Nyasulu;** Review of interview tools, methodology, writing-review, and editing. **All authors;** Read and approved the final manuscript

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Figures

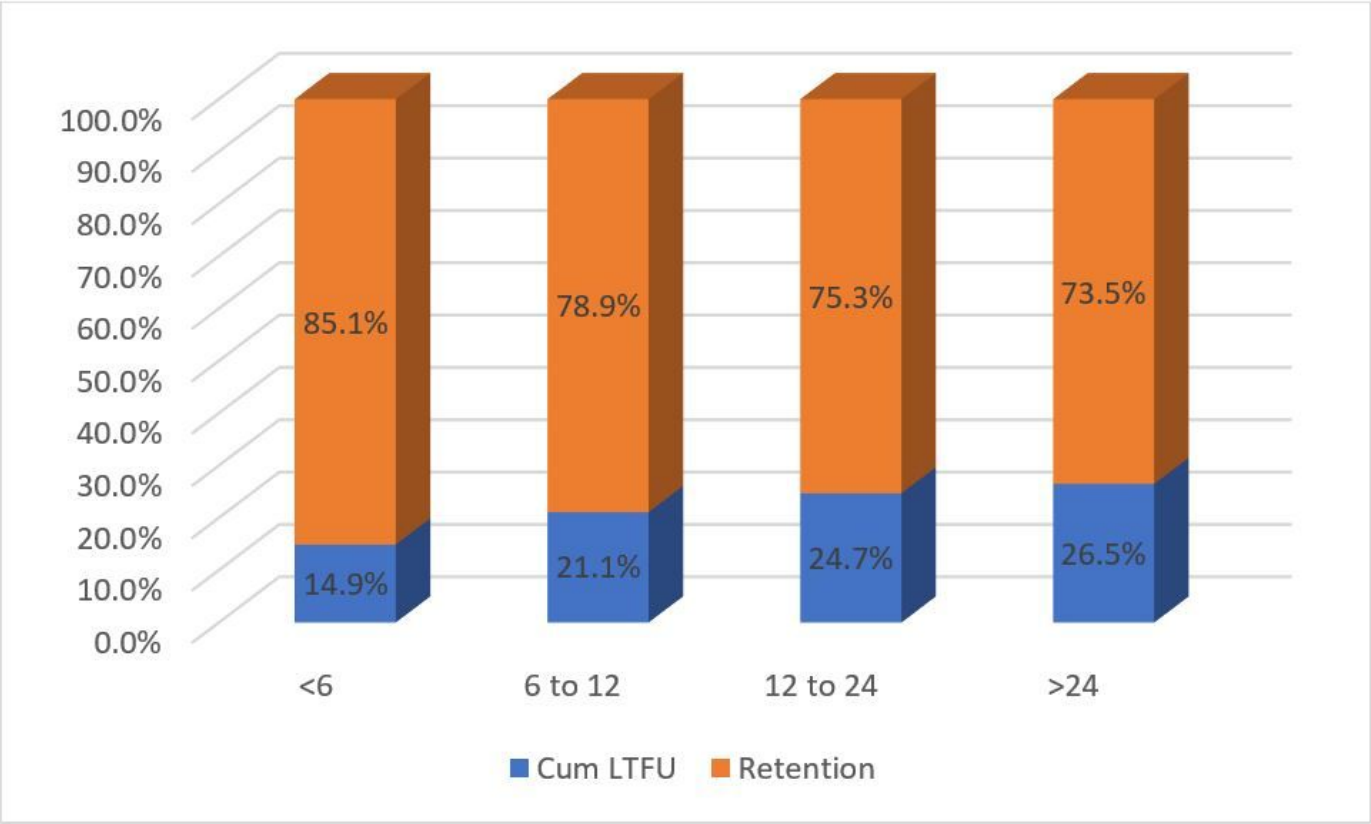

Figure 1

Cumulative lost to follow up vs retention (Months) in care at given time points among FSWs enrolled in care between Jan 2018–Dec 2020