

Research Article

Loss to Follow-Up among HIV Positive Pregnant and Lactating Mothers on Lifelong Antiretroviral Therapy for PMTCT in Rural Uganda

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Background. Mother-to-Child Transmission of HIV accounts for more than 90% of all pediatric HIV infections. However, Prevention of Mother-to-Child Transmission (PMTCT) of HIV through provision of lifelong ART to HIV positive mothers faces various challenges which affect its success. One of such challenges is the loss to follow-up (LTFU) of mothers. **Methodology.** We conducted a cross-sectional study utilizing both quantitative and qualitative data collection methods. We were able to trace 279 HIV positive, pregnant, and lactating mothers among mothers who were initiated on lifelong ART for PMTCT in public health facilities in Ntungamo district, Western Uganda. The proportion of those who were lost to follow-up was determined, and Log binomial regression with stepwise backward elimination method was employed to identify factors associated with LTFU. Focus group discussions (FDGs) of women on lifelong ART and key informant interviews (KIIs) of peer educators were also performed. **Results.** Out of the 279 mothers that were successfully traced and interviewed, 103 (37%) were identified as lost to follow-up. The prevalence of LTFU was higher among those whose transport costs were above \$2.75, **adj (adjusted) PR (Prevalence Ratio) 1.6 (95% CI; 1.02-2.55)**; those who waited beyond one hour before being attended to, **adj PR 1.74 (95% CI; 1.02-2.96)**; and those who assumed that their infant was already infected, **adj PR 1.76 (95% CI; 1.15-2.70)**. On interviews, LTFU in these mothers was attributed to fear of swallowing antiretroviral drugs, HIV related stigma and discrimination, inadequate facilitation of the peer educators, long patient waiting time, and transportation to the health facilities. **Conclusion.** More than one-third of mothers initiated on lifelong ART for PMTCT in Ntungamo district were lost to follow-up over a period of 25 months. **Recommendations.** Provision of regular and adequate pre-ART and ART adherence counseling and provision of routine health education would reduce LTFU.

1. Background

Mother-to-Child Transmission (MTCT) of HIV accounts for more than 90% of all new pediatric HIV infections [1]. It may occur in utero, during labor, during delivery, and/or during breastfeeding [1]. Without any intervention, the MTCT rate of HIV transmission would range from 25% to 45% [1]. The use of combined antiretroviral therapy (ART) and elective caesarean section has reduced MTCT rates to less than 2% in non-breastfeeding populations. Among

breastfeeding populations, studies have demonstrated that timely antiretroviral therapy (ART) can reduce MTCT of HIV to 5% or less [2–4]. In view of these studies and more in 2010, UNAIDS set a target for member states to have virtual elimination of MTCT, defined as reducing MTCT to less than 5% and 90% reduction of new HIV infections among young children by 2015 [5]. However, poor uptake of Prevention of Mother-to-Child Transmission (PMTCT) of HIV services, Loss to Follow-Up (LTFU), and poor adherence to drugs are still a major challenge to achieving virtual elimination of

MTCT of HIV especially in Sub-Saharan Africa [6]. Reducing LTFU among mothers initiated on lifelong ART for PMTCT is therefore a crucial step towards elimination of MTCT of HIV.

In a 2014 Malawian study, 23.5% of the mothers who were initiated on lifelong ART at the antenatal clinic were lost to follow-up after one year [7]. Lifelong ART for PMTCT entails the use of HAART for all HIV positive pregnant and lactating mothers for life. The guidance on PMTCT is provided to countries by World Health Organization (WHO) and Ministry of Health of Uganda adapted these guidelines to eliminate MTCT of HIV in the country [8].

In 2002, Uganda adopted and began implementing the first National PMTCT guidelines. This came as recommendations from findings of the PMTCT pilot program of 2000 which had over time expanded to cover 56 districts by the end of 2003 [9]. The main drug that was being used for HIV positive mothers during labor was Nevirapine single dose tablet (SdNvp). In 2006, WHO recommended use of zidovudine (AZT) during pregnancy combined with SdNvp at delivery to the mother at onset of labor and to the newborn, then followed by two weeks of zidovudine and lamivudine (AZT/3TC) to the mother to reduce the risk of emergency resistant virus. Uganda as a country adopted these PMTCT guidelines and this treatment option was called Option A.

In 2010, Uganda adopted a third set of World Health Organization (WHO) guidelines. The recommendations were either use of Option A (maternal AZT during pregnancy plus SdNvp at delivery to the mother and the newborn and two weeks of AZT/3TC to the mother) or the use of highly active antiretroviral therapy (HAART) also known as Option B regimen [8]. In 2012, Uganda transitioned to the new (4th) set of WHO PMTCT guidelines with the implementation of Option B+ (lifelong ART). By 2013-2014, the rapid roll-out had covered all districts in the country.

According to the Ministry of Health of Uganda, these new policy guidelines focus not only on eliminating HIV transmission via mother to child, but also on reducing mortality and morbidity among HIV positive women and their HIV exposed or infected infants [8].

In Ntungamo district, the program was launched in March 2013 with the support of Elizabeth Glaser Pediatric AIDs foundation (EGPAF). EGPAF is a non-governmental organization (NGO) running HIV and TB services in the southwestern part of Uganda. Health facilities in Ntungamo district that were implementing the 2nd PMTCT guidelines (Option A) slowly transitioned to lifelong ART (the 4th PMTCT guidelines). EGPAF built capacity for health workers to provide lifelong ART services in high patient volume sites (health centre (HC) IVs and hospitals) and later scaled up to lower volume sites (HCIIIs). This was followed up with mentorships and provision of necessary logistics to enable a smooth transition.

However, several challenges have been noted in the implementation of the lifelong ART program and such challenges include mothers initiated on HAART either during pregnancy, delivery, or breastfeeding getting lost along the way and not returning to the clinic for monitoring [8]. Monitoring adherence and retention for mothers on Option

B+ are still a big challenge and yet information has already shown that there is substantial LTFU [8].

We aimed at determining the proportion of those on lifelong ART for PMTCT in Ntungamo district who were lost to follow-up and associated factors.

2. Methods

2.1. Study Design. This was a cross-sectional study which employed both qualitative and quantitative methods of data collection.

2.2. Study Setting. The study was carried out in Ntungamo district, located in south western Uganda. The district has 42 health facilities of which one hospital and 16 health centres offer PMTCT. However, eight of these health facilities had adopted and were offering lifelong ART for PMTCT in the district, between September 1st, 2013, and September 30th, 2015. The study involved mothers who were attended to at these health facilities during this period. It also included peer mothers that were once enrolled on lifelong ART and were involved in the follow-up of mothers on PMTCT within the district.

2.3. Selection Criteria

Inclusion Criteria. All mothers who were identified as having been enrolled on lifelong ART for PMTCT from 1st September 2013 to 30th September 2015, as documented in the PMTCT and ART registers, were included.

2.3. Exclusion Criteria

- (i) Mothers who had no telephone contact and/or no clear physical address.
- (ii) Mothers who could not be traced to their physical address. That is, those who had either changed physical address or changed the telephone contact.

2.4. Sample Size Determination

Quantitative Component. All mothers that had a telephone contact or clear physical address were traced. Those successfully traced were included in the study.

Qualitative Study. Two focus group discussions (FGDs) with mothers initiated on lifelong ART and attending family support groups (FSGs) and fifteen key informant interviews (KIIs) with peer educators were conducted.

2.5. Sampling Procedure

Sampling for Quantitative Study. Names and contacts of mothers that were initiated on lifelong ART for PMTCT between 1st September 2013 and 30th September 2015 (period of study) were obtained from the ANC/PMTCT and ART clinic registers of the 8 health facilities that were offering lifelong ART for PMTCT at that time. These formed the sampling frame for the study. All mothers that had been

enrolled on lifelong ART for PMTCT from 1st September 2013 to 30th September 2015 were considered. However, mothers that either did not have a clear contact address or had no telephone contact recorded in the individual ART card were disregarded. The selected respondents were physically identified using their telephone contacts and physical address as recorded in their individual ART cards and ANC/PMTCT/ART clinic registers, with the help of peer educators and or village health teams (VHTs), a method that has also been suggested by Gwadz [10].

Sample Selection for Qualitative Study. The respondents for qualitative data included peer educators and HIV positive pregnant and lactating mothers under care on lifelong ART. This was carried out in the five peer supported health facilities. These are facilities that have high volume with many HIV patients attending the HIV clinic. In each of the five facilities, 3 KIIs with peer educators were conducted.

Two focus group discussions were conducted at two facilities that had the highest patient volumes in the district. The FDGs were conducted among pregnant and lactating mothers on lifelong ART for PMTCT during clinic days.

2.6. Data Collection

Quantitative Data Collection. Records of mothers in the eight health facilities were extracted from the PMTCT and ART registers using abstraction forms that were developed to capture the names, telephone contacts, next of kin, and physical address. Information relating to the mothers' physical address and telephone contact was extracted from the ART card. Information on sociodemographic characteristics of the mothers was collected through a structured questionnaire that was administered to the mothers. Additional information collected through the structured questionnaire included information on individual and interpersonal factors, peer and family support, health provider attitudes, date of last clinic visit, transportation to health facility, stigma and discrimination, patient waiting time, and health beliefs.

Qualitative Data Collection. Qualitative data was collected through FGDs with mothers and KIIs with peer educators. These were conducted with the help of a focus group and key informant interview guides. The FGDs, consisting of 25–30 members each, explored perception towards PMTCT program, challenges in accessibility of PMTCT services, challenges faced because of being HIV positive, support of family members, reasons why mothers get LTFU, and proposed interventions to reduce LTFU of mothers.

Fifteen KIIs were held with peer educators who work with health workers and are assigned the duty of follow-up of mothers once enrolled into PMTCT care. During the FGDs, two research assistants were present: one is to facilitate the discussion while the other was taking notes. Audio recordings for both FGDs and KIIs were also taken by the PI during the interactions, with permission from the respondents.

2.7. Statistical Analysis. We analyzed data using STATA version 12. Percentages were used to determine the proportion

of HIV positive pregnant and lactating mothers enrolled on lifelong ART for PMTCT, who were lost to follow-up defined as HIV positive pregnant and lactating mothers initiated on lifelong antiretroviral therapy (ART) for PMTCT that had not returned to the clinic in > 90 days from their last scheduled appointment.

Log binomial regression was used to determine factors associated with LTFU among pregnant and lactating mothers initiated on lifelong ART. Prevalence ratios were used as the measure of association since the outcome (LTFU) was >10% (37%).

Following bivariable analysis, we selected variables with a significance level of 10% ($P < 0.1$) for inclusion in the multivariable analysis. Multivariable analysis was done using the stepwise approach-backward elimination method. Statistical significance of variables for inclusion in the final model was set at a p value < 0.05 .

2.8. Ethics Considerations. This study was approved by Makerere University School of Public Health Higher Degrees Research and Ethics Committee and permission was obtained from the District Health Officer in Ntungamo. All respondents eligible for the study provided written consent. To ensure confidentiality, all interviews were conducted in privacy and respondent questionnaires were identified using unique identifiers.

3. Results

Overall 480 mothers were identified as having been initiated on lifelong ART for PMTCT between September 1st, 2013, and September 30th, 2015; of these 302 mothers met the inclusion criteria (had a clear physical address or a telephone contact). However, 279 mothers were successfully traced and these were included in the study. Out of these 279 mothers, 103 (37%) were identified as lost to follow-up.

3.1. Quantitative Findings

3.1.1. Demographics Characteristics of the Mothers and Their Individual Perceptions. The mean age (SD) was 28.2 (4.6) years and the median age (IQR) was 28 (25–30 years) and 106 (38%) of the mothers were in the age range of 24 to 28 years. 74% were married and 56% were subsistence farmers. Over 99% knew that the drug was safe for them and the baby and that the administered drug works. Majority of the mothers had positive perceptions towards the medication they were receiving; however, approximately one-third (29.3%) feared taking their medication, and a quarter reported having experienced side effects (25.9%) (Table 1).

3.1.2. Proportion of Mothers LTFU. We successfully traced and interviewed 279 HIV positive pregnant and lactating mothers. Of the 279 mothers interviewed, 103 (37%) were lost to follow-up (Figure 1)

3.1.3. Factors Associated with LTFU. From the bivariate analysis, variables that had a p value of < 0.1 , such as fear of

TABLE 1: Social demographic characteristics of the mothers (N=279) and individual perceptions of HIV positive women towards highly active antiretroviral therapy (HAART).

Demographic characteristics	Frequency (n)	Percent (%)
Age		
<i>Mean (sd)</i>	28.2 (4.6)	
<i>Median (IQR)</i>	28 (25-30)	
Age_resp		
19-23	46	16.5
24-28 yrs	106	38
29-33 yrs	92	33
34-38 yrs	30	11
>38 yrs	5	1.8
Religion		
Catholic	79	27.9
Muslim	22	7.9
Evangelical	34	12.2
Anglican/Presbyterian	144	51.6
Tribe		
Acholi	3	1.1
Muganda	15	5.4
Mukiga	40	14.4
Munyankole	202	72.7
Munyarwanda	15	5.4
Other	4	1
Marital status		
Divorced	36	12.9
Married	207	74.2
single	18	6.5
Widowed	18	6.5
Occupation		
Subsistence farmer	156	56.5
House wife	43	15.6
Causal laborer	24	8.7
Professional	28	10.1
Business woman	25	9.1
Individual perceptions		
Perceive administered drug is safe for me and baby		
No	3	1.1
Yes	276	98.9
Perceive that administered drug works		
No	6	2.2
Yes	272	97.8
Fear swallowing ARVs		
No	198	71
Yes	81	29
Ever experienced side effects when swallowing ARVs		
No	206	74.1
Yes	72	25.9
Perceived ease of receiving ARVs		
No	5	1.8
Yes	274	98.2

TABLE 1: Continued.

Are ARVs offered free		
No	3	1.1
Yes	276	98.9
Do you think you can infect your child with HIV		
No	117	42.6
Yes	158	57.5
Do you think you need ARVS		
No	5	1.8
Yes	274	98.2

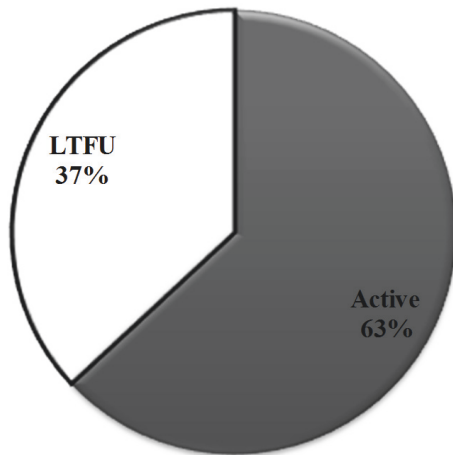


FIGURE 1: Proportion of mothers on lifelong ART for PMTCT who were lost to follow-up between Sept 2013 and Sept 2015, n= 279.

swallowing ARV drugs, perception that the mother can infect the child, disclosure to other relatives other than the spouse, and transport costs, were analyzed further in multivariable analysis.

At multivariable analysis, transport costs above \$2.75 (**adj PR 1.6, CI: 1.02-2.55**), waiting time greater than 1 hour (**adj PR 1.74, CI: 1.02-2.96**), and perception that the child is already infected (**adj PR 1.76, CI: 1.15-2.70**) were the factors significantly associated with loss to follow-up, p value < 0.05. However, the mother knowing that ARV drugs work (**adj PR 0.35, CI: 0.23-0.56**) was protective (Table 2).

3.2. Qualitative Findings. Qualitative evaluation was done to explore further mothers views as to why women on lifelong ART get lost to follow-up. A total of two focus group discussions (FGDs) with mothers and 15 key informant interviews (KIIs) with peer mothers were conducted. The factors that were repeatedly common throughout these interviews were fear of swallowing ARV drugs, domestic violence following disclosure, HIV related stigma and discrimination, inadequate facilitation of peer educators and mothers, long patient waiting time, and cost of transportation to the health facilities.

4. Discussion

This study found that the proportion of mothers who get lost to follow-up from the PMTCT program was 37%. A study done in Malawi revealed the LTFU as 30% after 3 years of initiation on lifelong ART [11]. This is an indication that there is significant LTFU of mothers initiated on lifelong ART for PMTCT. Therefore, addressing the associated factors will go a long way to reduce this loss, hence leading to the sustainable achievement of elimination of MTCT.

Mothers who had to incur transport costs above \$2.75 (**adj PR 1.6, CI: 1.02-2.55**) were more likely to be lost to follow-up. In a rural setting transport is costly because most mothers are subsistence farmers with a poor socioeconomic status. This forces mothers to resort to walking long distances. This finding is in agreement with other studies, where distance to the clinic and transport cost were found to be major barriers to retention in care in a wide variety of settings in Africa including Uganda [12].

Waiting at the health facility for more than an hour before being attended to by a health worker was a predictor of LTFU (**adj PR 1.74, CI: 1.02-2.96**). This may be a result of low staffing levels compared to the large volumes of patients, hence leading to the long waiting time. A study done in Northern Uganda also noted that high patient loads at the facilities caused long patient waiting times [13]. Preventing batching up, that is, having all patients flooding the clinic at the same time very early in the morning, synchronizing staff shifts so as to have more staff on duty during clinic days, triaging of the mothers in order to separate critically ill from those walking or for refill, and provision of health education may go far in reducing the waiting times or make them endurable [14].

Knowing that the mother could infect their baby was a predictor for LTFU (**adj PR 1.76, CI: 1.15-2.70**). This indicates that mothers are knowledgeable about the transmission of HIV to their babies. But, upon defaulting from the PMTCT, they perceive that their breastfed child is HIV positive and hence fear returning to the clinic to avoid being blamed by the health workers if the child turns out to be HIV positive on testing. Improving health provider attitudes and providing customer care training to health providers could help change the way patients perceive care and their choice on whether to continue receiving care or not.

Interviews from the qualitative evaluation also noted high transport costs and long patient waiting time as some of the predictors of loss to follow-up. Other factors that were

TABLE 2: Factors associated with LTFU among HIV positive pregnant and lactating mothers on lifelong ART for PMTCT.

	<i>Proportion lost to follow-up</i>	<i>Crude PR (95% CI)</i>	<i>Adjusted PR (95% CI)</i>	<i>P value</i>
Age (years)				
19-23	16/46	Ref		
24-28 yrs	39/106	1.05(0.66-1.7)		
29-33 yrs	31/92	0.96(0.59-1.58)		
34-38 yrs	16/30	1.53(0.91-2.57)		
>39 yrs	1/5	0.46(0.48-4.55)		
Religion				
Catholic	32/79	Ref		
Muslim	7/22	1.4(0.92-2.06)		
Evangelical	19/34	0.78(0.4-1.53)		
Anglican/Presbyterian	45/144	0.77(0.53-1.1)		
Marital status				
single	8/18	Ref		
Married	76/207	0.83(0.47-1.43)		
Divorced	15/36	0.94(0.49-1.79)		
Widowed	4/18	0.5(0.08-1.52)		
Occupation				
Subsistence farmer	62/156	Ref		
Home maker	17/43	0.99(0.65-1.5)		
Causal laborer	9/24	0.94(0.54-1.6)		
Professional	7/28	0.63(0.32-1.23)		
Self employed	6/25	0.6(0.29-1.24)		
Tribe				
Muganda	7/15	Ref		
Munyankole	75/202	0.79(0.45-1.41)		
Mukiga	16/40	0.86(0.44-1.66)		
Acholi	0/3	Omitted		
Munyarwanda	3/15	0.43(0.14-1.35)		
Other	1/3	0.7(0.31-3.8)		
Perceptions towards HAART				
Perceive admin drug is safe for me and baby				
No	1/3	Ref		
Yes	102/276	1.17(0.2-5.5)		
Perception that administered drug works				
No	6/6	Ref		
Yes	97/272	0.35(0.30-0.42)	0.35(0.23-0.56)	0.00
Fear to swallow ARVs				
No	62/198	Ref		
Yes	41/81	1.62(1.19-2.18)	0.77(0.51-1.2)	0.23
Ever experienced side effects after swallowing ARVs				
No	76/206	Ref		
Yes	27/72	1.02(0.72-1.44)	0.84(0.45-1.57)	0.59
Perceived ease of receiving ARVs				
No	3/5	Ref		
Yes	100/274	0.6(0.29-1.26)		

TABLE 2: Continued.

	<i>Proportion lost to follow-up</i>	<i>Crude PR (95% CI)</i>	<i>Adjusted PR (95% CI)</i>	<i>P value</i>
<i>Is the drug easy to swallow</i>				
No	7/18	Ref		
Yes	96/261	0.91(0.34-2.43)		
<i>Are ARVs offered free</i>				
No	1/3	Ref		
Yes	102/276	1.1(0.2-5.5)		
<i>Do you think you can infect your child with HIV**</i>				
No	33/117	Ref		
Yes	66/158	1.5(1.05-2.1)	1.72(1.13-0.62)	0.01
<i>Do you think you need ARVS</i>				
No	2/5	Ref		
Yes	101/274	0.92(0.31-2.7)		
<i>Mode of transport to facility</i>				
Walking	29/71(40.8)	Ref		
Taxi	40/99(40.4)	0.98(0.68-1.43)		
Boda boda (motor cycle)	72/106(32.0)	0.78(0.53-1.16)		
<i>Total Transport Cost**</i>				
<5000 shs	30/99(30.3%)	Ref		
5001-10000 shs	25/73(34.2%)	1.13(0.7-1.74)	1.09(0.70-1.7)	0.7
>10001	18/34(52.1%)	1.75(1.12-2.74)**	1.57(1.002-2.4)	0.049
<i>Waiting time between arriving and receiving service</i>				
<30 min	19/67(28.3%)	Ref		
30 min-1 hr	28/79(35.4%)	1.2(0.77-2.03)	1.5(0.83-2.7)	0.2
>1 hr	56/133(42.1%)	1.5(0.96-2.28)	1.74(1.02-2.96)	0.04
STIGMA				
<i>Disclosed to spouse</i>				
No	19/69	Ref		
Yes	81/199	1.48(0.97-2.28)		
<i>Does he support you?*</i>				
No	32/68	Ref		
Yes	50/135	0.79(0.56-1.10)		
<i>Disclosed to relatives other than spouse</i>				
No	153	Ref		
Yes	126	1.5(1.10-2.04)	1.38(0.86-1.7)	0.4
<i>Any one refused to offer any service to you because of your HIV status</i>				
No	82/243	Ref		
Yes	20/35	1.69(1.21-2.38)	1.3(0.84-2.1)	0.2

PR: prevalence ratio.

mentioned as predictors of LTFU included fear of swallowing ARV drugs, domestic violence following disclosure of HIV status, stigma and discrimination, and inadequate facilitation of the peer educators.

Fear of swallowing ARVs as a reason for getting lost to follow-up needs to be recognized. The size and smell of the tablets, taking the medication without an assurance of a meal, and the anticipated side effects are some of

the reasons mothers stopped taking the ARVs, hence self-censoring themselves from coming to the clinic. Studies have also shown that poor adherence to drugs is attributed to the feared side effects [15] and food insecurity [16, 17]. Health Education coupled with initial and ongoing HIV and adherence counseling especially with the help of peers will help dispel the myths that are associated with the taking of medication.

Mothers interviewed in this study expressed the fear of stigma and discrimination from the community and family members. This was attributed to the fear of domestic violence after disclosing their status to their spouses. Some quantitative studies have shown this to be true [18].

4.1. Limitation of the Study. The strength of this study is that women were traced to their physical addresses and therefore, we were able to know if a mother was lost to follow-up or active in care. However, this study had some important limitations that should be considered when interpreting the results. First the cross-sectional nature of the study design does not confirm definitive cause and effect relationship between dependent and independent variables. In addition, the study did not account for the mothers that could not be traced and hence could lead to underestimation of the LTFU. In order to get more insight of the study's third objective, we should have conducted in-depth interviews with mothers that we had found to be lost to follow-up as this would give a clear view of why mothers get lost to follow-up. The use of the definition of LTFU in this study as patients who were started on lifelong ART and not seen for more than 90 days after their scheduled appointment has a weakness as some mothers were found to have transferred to other facilities than the original facility where they were initiated on treatment. However, since mothers were being interviewed and had to recall some instances which were used to ascertain LTFU, this could have some recall bias.

4.2. Conclusions. There was substantial LTFU of mothers initiated on lifelong ART for PMTCT in Ntungamo district. Personal fears, wrong perceptions among patients, stigma, discrimination in the community, high transport costs, long patient waiting time, and inadequate facilitation of peer educators are some of the bottlenecks to achieving success desired from the provision of lifelong ART for PMTCT.

4.3. Recommendations. Focus should be directed to provision of regular quality pre-ART and ART adherence counseling, provision of routine health education, strengthening HIV awareness campaigns through local village authorities, increasing HIV outreach services, community engagement, and building community networks through peer support. Large scale research to look at the rates of LTFU at the different points of PMTCT cascade would inform targeted PMTCT interventions.

Abbreviations and Operation Definitions

Lifelong ART: This is an approach recommended by World Health Organization to prevent mother-to-child HIV transmission with which all HIV positive pregnant and lactating women are initiated on antiretroviral therapy (ART) for life regardless of CD4 count or WHO staging

Loss to follow-up: Patients who were started on lifelong ART and not seen within 90 days of their scheduled appointment

Peer educator: HIV positive patients who are trained to provide peer support and counseling to their fellow HIV positive patients and also follow up mothers by virtue of their good adherence and to some extent their level of education

ANC: Antenatal care

EGPAF: Elizabeth Glaser Pediatric AIDs Foundation

e-MTCT: Virtual Elimination of Mother-to-Child Transmission

HAART: Highly active antiretroviral therapy

HC: Health centre

HIV: Human immunodeficiency virus

LTFU: Loss to follow-up

MCH: Maternal and child health

MOH: Ministry of Health

PMTCT: Prevention of Mother-to-Child Transmission

UNAIDS: United Nations Joint Program on AIDS

VCT: Voluntary Counseling and Testing

WHO: World Health Organization.

Disclosure

The corresponding author had full access to all the data in the study and had final responsibility for the decision to prepare the manuscript and submit for publication.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Authors' Contributions

Matilda Kweyamba was responsible for the manuscript from its conception, analysis, and interpretation of data; she drafted the manuscript. **Joy Kusiima** participated in data analysis and review of the manuscript. **Esther Buregyeya** participated in the interpretation and review of the manuscript. **Aggrey Mukose** participated in the interpretation and review of the manuscript. **Vianney Kweyamba** participated in the drafting, interpretation, and review of the manuscript. All authors approved the final manuscript.

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