

Research

“I desire to have an HIV-free baby”: pregnant and breastfeeding mothers’ perceptions of Viral load testing and suppression in HIV care in southwestern Uganda

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Abstract

Introduction Viral suppression is a critical component for preventing mother-to-child transmission of HIV(MTCT). Mothers’ perceptions of viral load suppression is crucial in the attainment of successful outcomes in preventing mother to child transmission of HIV. We therefore aimed to explore the experiences and perceptions of women on viral suppression.

Methods This was a qualitative sub-study embedded in a cluster-randomized trial (NCT04122144) designed to improve viral load outcomes among pregnant and breastfeeding mothers living with HIV in four level III/IV health facilities in South-western Uganda. Thirty-two in-depth interviews were conducted with pregnant and breastfeeding women with HIV from 1st March 2020 to 30th September 2020 to explore their understanding and interpretation of viral suppression. Interviews were audio-recorded, transcribed, and coded in Dedoose software for analysis.

Results A total of 32 Women living with HIV were enrolled in this qualitative study. WLHIV explained viral suppression in the context of attaining good health and having HIV-free babies. Adherence to ART was presented as a key avenue to viral suppression. The level of engagement with providers was presented as a key attribute of attaining viral suppression. The participants narrated their experiences with viral load testing within the routine services. However, they revealed experiencing some proximate barriers to suppression including anticipated stigma, challenges with non-disclosure of HIV status, pregnancy distress, and distance to the health facility.

Conclusion The understanding and interpretation of viral suppression among pregnant and breastfeeding mothers living with HIV provides a basis for adopting behaviors leading to prevention of vertical transmission of HIV. Health care workers can support women by providing clear and culturally appropriate education about viral suppression, adherence strategies and creating a supportive and non-judgmental environment.

Keywords Viral suppression · Pregnant and breastfeeding women · Perceptions

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1 Introduction

In 2020, there were 1.3 million pregnant women with HIV, of which an estimated 85% received antiretroviral drugs for their own health and to prevent vertical transmission, still notably below the global target of 95% [1, 2]. The World Health Organization (WHO) recommended triple antiretroviral therapy (ART) for the elimination of mother-to-child transmission of HIV (MTCT) among pregnant and postpartum women living with HIV (WLHIV) [3]. Multiple countries have implemented and scaled up universal initiation of lifelong ART to all pregnant and breastfeeding women with HIV aiming to achieve viral suppression. The widespread scale-up of ART has specifically led to an increase in fertility intentions and pregnancy rates among WLHIV in sub-Saharan Africa (SSA) [2, 4–6]. Evidence from Uganda shows that among clients on long-term ART, the incidence of pregnancy increased from 4.6 per 100 person-years in the first year of ART to 7.9 per 100 person-years in the tenth year of ART [7].

Nonetheless, pregnancy presents unique challenges and vulnerabilities for women living with HIV [8]. It is associated with lower CD4 counts and increased risk of opportunistic infections due to immunosuppression. Additionally, evidence shows that viral load is associated with MTCT [9, 10]. However, the steady scale-up and improvement of services to prevent MTCT reduced the annual incidence of infections among children globally by 54% [11, 12]. In Uganda, the Ministry of Health (MoH) has revealed a remarkable reduction in the rates of MTCT from 20% in 2000 to 2.8% in 2022 [13]. Despite these remarkable milestones, vertical transmission rates remain below global targets in most SSA countries including Uganda [14, 15], and the rate of viral suppression remain lower among pregnant and breastfeeding women [3, 16].

Pregnant women living with HIV in SSA also face multiple barriers related to pregnancy and HIV infection including; reliability of ART access, psychosocial factors such as stigma and discrimination as well as ART adherence influencing viral suppression [17]. Studies have shown that maternal viral load is an important predictor of MTCT [9, 10, 18–20]. Retention in HIV care during the perinatal period remains a significant challenge and thus compromises viral suppression yet heightens the risk of vertical transmission [21]. Elsewhere in SSA, retention in programs on MTCT hovered between 50 and 73% which in-part explained the sub-optimal treatment outcomes including viral non suppression [22].

Viral load suppression in several SSA countries remains below the UNAIDS 95-95-95 targets [14, 15]. Known barriers to viral suppression include: health system barriers such as staff shortages, high turnaround time for viral load results; structural barriers such as transport needs also greatly affect women in the perinatal period [19]. However, pregnant women and breastfeeding mother's perceptions of, and experiences with viral suppression remain understudied despite influencing their decisions about HIV treatment and care in preventing MTCT. Understanding their interpretations of viral suppression is critical to ensuring optimal outcomes for both the mother and child. This study explored women's understanding and interpretation of viral suppression in relation to MTCT in selected public health facilities in Southwestern Uganda.

2 Materials and methods

2.1 Overview of study design

This was a qualitative sub-study conducted between 1st March 2020 and 30th September 2020. It was embedded in an ongoing cluster-randomized trial (ENHANCED-SPS-NCT04122144) designed to improve viral load outcomes among pregnant WLHIV and breastfeeding mothers in four level III/IV health facilities in South-western Uganda. The ENHANCED-SPS study evaluated the effect of the standardized peer mother support and viral load counseling intervention on viral suppression among pregnant women in 14 clinics in Southwestern Uganda.

2.2 Study setting

This study was conducted within public health facilities providing HIV care services to pregnant and postpartum women in Southwestern Uganda. All the clinics provide the standard of care HIV treatment services based on the Ugandan national HIV care and treatment guidelines. The guidelines recommend prompt ART for all identified pregnant and postpartum women and appropriate viral load monitoring (baseline, 6 months and 12 months) as standard of care.

2.3 Selection of study participants

We collected data from pregnant or breastfeeding women aged 18 years and above receiving HIV care from 7 public health facilities. Participants were purposively selected from 490 women enrolled in phase II of the ENHANCED -SPS (NCT0412214) trial to participate in this qualitative sub-study. These were pregnant and postpartum women who were enrolled in the trial and willing to participate in the interviews. Participants were stratified for selection according to their facility, enrollment category and viral suppression status (12-newly diagnosed; 08-virally suppressed; and 12- not virally suppressed at baseline). We obtained data saturation with the sample size of 32 women and we maintained it [23, 24].

2.4 Data collection procedures

We developed interview guides using information from previous studies. We pretested our semi structured interview guides on a sample of six women enrolled in the trial but not part of the qualitative sample and this helped us in adjusting and modifying on the questions developed to explore the women's perceptions of viral suppression. A team of experienced qualitative researchers (CA, JK, A.R.K) were involved in the development and review of these guides.

Data were collected from participants through in-person interviews using a semi-structured in-depth interview guide. The interview guides were developed in English and translated into Runyankole the language spoken and understood by the participants. Questions asked included knowledge and understanding of viral load, support received from providers during antenatal and postpartum periods as well general HIV care. The interviewers were research assistants fluent in both English and Runyankole and were experienced in conducting qualitative interviews. The research assistants were trained in qualitative interviewing. Interviews were conducted in private location within the facility, audio-recorded, transcribed and coded for analysis.

2.5 Interaction with the participants

We worked with health providers and study staff in the study clinics to identify the selected participants for the IDIs. We reached out to these adult HIV participants through phone calls and scheduled appointments for the interviews. Those who responded were given appointments and were consented to participate in the study. We also interviewed other participants who had come to the clinics on their routine clinic visit day. All participants enrolled in the study provided a verbal and written informed consent to participate in the study. Privacy was ensured by using private rooms for the interviews, participation was voluntary and no names or any patient identifiers were used during the interviews, neither are they used anywhere during the publication process.

2.6 Data management and analysis

In-depth Interviews were transcribed verbatim by the interviewers, then translated into English from the local language. Transcripts were checked against the audio files for accuracy. The first author (JK) read all the transcripts and the field notes to identify the meanings and patterns of the data relating the research questions. Thematic analysis was used to analyze the qualitative data. We adopted a hybrid of deductive and inductive analysis to generate themes from the data. Based on the six stages of thematic analysis suggested by Braun and Clarke, the transcripts were read and re-read by the researchers to gain deeper understanding of the meanings of the data. Initial codes were generated by a team of four researchers by studying fragments of data including words, lines and segments to understand their meaning [21]. The codebook was later presented with codes based on the lines of inquiry from the interview guide. Emerging themes were highlighted and the final codebook was completed with all data and the generated codes were imported into Dedoose software for coding and analysis. The results are presented in line with the emergent themes. Verbatim and rich quotes were extracted and presented to support the narratives describing the findings of each of the thematic areas.

2.7 Ethical consideration

The study was approved by the higher degrees' committee of Makerere University School of medicine (REC- 2018-0744), and the Ugandan National Council on Science and Technology in Uganda (UNCST-HS-2648) respectively. All participants provided written informed consent before the interviews. All data was de-identified, kept confidential, and analyzed using unique study identification numbers assigned to each participant. This study was conducted in accordance with

the declaration of Helsinki. The research team also sought administrative clearance from the district health officers and in charges of the participating facilities to allow the process of data collection within the study facilities. In addition, the confidentiality of participants was maintained by removing patient identifiers from the questionnaire and keeping the filled data secure.

3 Results

3.1 Demographic characteristics of the participants

Thirty-two pregnant and postpartum women were interviewed. The median age was 29 years; 46.9% aged between 18 and 24 years and 40.6% aged between 25 and 34 years. Majority of the participants were married at 90.6% while single and divorced/separated comprised only 9.4%. Of the participants interviewed, 25% of the participants were known to have HIV, in care and virally suppressed at first antenatal care (ANC) visit, 37.5% were known to have HIV and were in care but non-suppressed at their first ANC visit, while 37.5% were newly diagnosed with HIV at first ANC visit.

3.2 Women's understanding and motivations for attaining and maintaining viral suppression

Women described viral load in lay terms as *the number of viruses in the blood*. For example, *"a high viral load means an increase in the number of viruses in the blood and thus implies a weak body."* Pregnant women expressed their understanding of a "high and low" viral load and its implications for mother to child transmission of HIV. They described viral suppression as a state of having a very low amount of the virus in their blood and an important aspect for good health overall. They explained that if the viral load is high, it increased the chances of HIV transmission to the baby. They also understood that viral suppression serves as an indicator of whether one is taking their ARVs as prescribed or not.

... "If someone doesn't take his or her medication well, the amount of HIV virus increases in the blood, the immunity lowers down and the person gets other opportunistic infections. But if someone adheres well to HIV medication, the amount of HIV virus reduces and the immunity is boosted and other diseases are limited and chances of giving birth to a baby without HIV are high (19-year-old pregnant woman-already in care-not suppressed)."

The desire to have an HIV free baby was a major motivation for WLHIV to work towards attaining viral suppression. Women explained their strategies for attaining suppression. They ensured to take their medication at the stipulated time, others set alarms at specific times, ensuring that they have their meals ready on time. For some, it was just a reflex action because of the strong desire to live and look after their families.

"It (viral load testing) has helped me to keep track of the time that I am supposed to take my medicine and not to exceed that specific time. It has helped me to make sure that before I take my medicine, I should not be stressed and that I should first eat well before I take my medicine and I think this will give me a better life (42-year-old pregnant woman-already in care-not suppressed)."

Other women explained that they were aware that if they stopped their medication the virus would increase in their blood and would infect their unborn babies.

"I know that if I stop taking it (ART) then the HIV in my blood will increase and eventually I can infect my unborn baby..." (25-year-old pregnant woman-already in care-suppressed)."

Women also reported that they were motivated to take their medications as prescribed because they were able to fulfil their fertility desires moreover free of HIV.

"... I wanted a child, so I knew that if I start HIV care and treatment even if I get pregnant, I will give birth to a baby who is not infected and God made it for me and I gave birth to a child without HIV (19-year-old pregnant woman-already in care-not suppressed)."

Additionally, some participants shared experiences of mothers in their surroundings who were infected with HIV and adhered to their medicines as prescribed, that were virally suppressed and had babies without HIV. This gave hope of delivering HIV-free babies to the mothers and acted as a form of reassurance to the participants that if they adhere well to their medication, they would also have HIV free babies.

"... I have been seeing my colleagues who also have HIV and also get pregnant but because they take their medicines well and take advice from the nurses, they are able to produce babies without HIV. When they told me that I have HIV, I said to myself, "I am going to listen to the nurses and I will do whatever they ask me to do so that I live a good life and also have a healthy partner (42-year-old pregnant woman-already in care -not suppressed)"."

3.3 Viral load testing experiences and provider support

Women perceived VL testing as part of routine care for WLHIV attending the health facility and there was less anxiety when testing for viral load compared to the HIV test.

"Everything went well because they got the blood sample the same way they had when testing for HIV except this time the anxiety was less ... because this time, I was aware of my HIV status and I just wanted to know whether the amount of HIV has increased or reduced (23-year-old pregnant woman already in care-suppressed)".

Mothers described the processes of viral load testing at the health facility. They explained that their blood samples were taken and they received the results on a given return date. On that day, they received information on whether their viral load was high or low. They had concerns about the amount of blood taken for viral load testing, turn-around time of the results and questions about why viral load tests should be done routinely even when one is suppressed.

"... they teach us about viral load testing as a group after which each person goes to the doctor alone, they take blood sample for viral load testing and they tell us when to come back for viral load results...and they counsel us basing on whether the viral is high or low (27-year-old pregnant woman, already in care- suppressed)".

The providers availed WLHIV with information about their viral loads and viral suppression; in group sessions at the triage using illustrations such as the emoji, and individually counselled them after they received their results.

"...the provider pulled out two files with; one picture of a smiling face while another one had a picture of an annoyed face...who...didn't take their medication on schedule while one with smiling face took their medication on schedule and without missing. That demonstration made me happy (27-year-old pregnant woman, already in care-suppressed)".

Interactions with providers after receiving viral load test results included encouraging clients to adhere to their medication as prescribed or else their viral loads would surge. They explained to mothers with suppressed viral loads about the consequences of having an increased viral load.

"If viral load is low, they encourage us to continue adhering because when it is low, it means that the virus is just dormant /suppressed and if someone doesn't adhere, it multiplies again. And if viral load is high, it means that someone has been taking drugs poorly, they encourage him or her to start taking drugs on schedule without missing (27-year-old pregnant woman-already in care-suppressed)".

Not all women fully benefited from the same support from the providers. Some reported lack of clear information on viral loads from the providers. One participant revealed that she was not informed why her blood sample was taken and does not recall receiving her test results.

"Yes, the providers said they wanted to know the amount of the virus in my blood, but they did not tell me the results (19-year-old pregnant woman already in care-not suppressed)".

Awareness of the viral load test results determined refill time for the pregnant woman to return to the clinic. The turn-around time for receiving viral load results varied depending on the time each woman had until the next refill, and on whether they were suppressed or not.

"...I did not get my results right away, I waited for about 2 months to get them...on my return date, that's when the providers find the viral load results in your file. When you are suppressed...you are given 3 months' refill because you will have impressed the provider with your good adherence...those not suppressed and not adhering well are given 1-month refill, and they are also sent to a counsellor..." (32-year-old pregnant woman already in care-suppressed)".

Mothers reported their experiences with providers in addressing issues surrounding unsuppressed viral load and strategies for attaining suppression. They acknowledged that counselling was important during this time to support the mothers to achieve viral suppression as a primary goal of ART.

"You know I had tested for viral load, and I was not suppressing, when I went back after the counselling that I got, I was told that my viral load had lowered, and so that's why I was appraised and urged to continue adhering well (28-year-old pregnant woman-already in care-not suppressed).

One mother explained being advised by the provider that an unsuppressed viral load could accelerate illness which would result in stigma. This information was very helpful and encouraged mothers to strive to adhere in order to achieve good health.

"they say that when you do not adhere well on your medication, your viral load will go up and HIV symptoms will spring up too. Eventually will you develop stigma and start hiding from people (35-year-old pregnant woman-already in care-not suppressed)."

The providers helped the women to understand and address issues such as the scheduling of time for taking pills that may lead to a decrease in the viral load. A mother also explained that the health worker advised her to avoid stress and to maintain proper nutrition in order to keep her viral load down and remain unsuppressed. The providers also helped clients to get rid of the fear related to having a high viral load.

"I asked the nurse if it was possible to regain my immunity and lower my viral load when I adhere to HIV medication? "as long as you take your medicine on time and try to avoid stress, you will regain your health" she answered me...if I get angry and stressed, I will fail to eat and the medicine may not work for me." (42-year-old pregnant woman already in care- not suppressed)."

3.4 Challenges to achieving viral suppression

Despite the described benefits of viral suppression, women reported challenges to achieving viral suppression which included non-disclosure of HIV status, anticipated stigma and distance to clinics resulting in missed appointments. In addition, some women reported distress arising from being both pregnant and having HIV which created anxiety about the possibility of having an HIV infected baby. Other Challenges were related to the health care system such as variations in the relay of viral load test results. For instance, women expressed concerns about delays in the return of viral load test results, and the lack of general HIV counseling and education within the maternal and child health section of the health facility. All these challenges were reported to affect women negatively and hinder them from achieving viral suppression.

Fear of HIV- related stigma at the clinic visits was reported to hinder achieving viral suppression especially for women who had not yet disclosed to anyone. This was very common when the initial diagnosis of HIV was made at antenatal clinics. Stigma was reported as one of the key reasons for missed appointments and non-disclosure resulting in viral non-suppression. The fear to be seen by friends or other acquaintances resulted in several adjustments to clinic visits and resulted in delays or eventually missing of clinic visits.

"...some people fear to meet each other at the health center and they try their best to make sure that they do not reach there at the same time (unknown age, pregnant woman-newly diagnosed with HIV-not suppressed)."

In other instances, some pregnant women were skeptical about disclosing their HIV status for fear of being denied financial support from their partners during the pregnancy. Much as the women appreciated the importance of viral suppression, the fear of unknown consequences resulting from disclosure to their partners limited the ability to achieve viral suppression,

"I think that since I am already pregnant for him, once I disclose that I have HIV he may not give me any assistance like paying for my rent. Secondly, I fear that once he knows about it, he will tell all his sisters and the mother. Something that may not make them happy (27-year-old pregnant woman-already in care- suppressed)."

Distance to the health facility coupled with transport challenges hindered timely refills and adherence to clinic appointments. Participants reported transport challenges which were further complicated by pregnancy since they could not walk for long distances. Most times this resulted in missing their clinic appointments which eventually contributed to poor adherence and subsequent viral non suppression.

"Yes, I sometimes miss coming to collect my medicine because the transport is too high around shillings 20,000 and do not have energy to travel by foot (27-year-old pregnant woman-already in care—not suppressed)."

Participants expressed concerns about the possibility of vertical transmission during breastfeeding. A client explained that after learning that she had a high viral load, her main concern was about the possibility of infecting her breastfeeding baby.

"I feared because I had given birth and I was breastfeeding my child, so I feared that my child might contract HIV from me (23-year-old pregnant woman-already in care- suppressed)."

Some clients expressed preference for receiving same day results after viral load testing with near point of care viral load testing.

"Of course, I would prefer to know the results on that same day of testing because I am always anxious to know whether the HIV in my body has increased or reduced and whether I am taking my medicine well or not (20-year-old pregnant woman-already in care-unknown viral load status)."

However, there were variations in how clients received their viral load test results. A participant revealed that her blood sample was taken two months ago but has not received her test results. Some clients expressed concern about not being informed about the reason for taking their blood samples and not being able to receive test results in a timely manner. Participants also express anxiety as far as delay to convey viral load test results is concerned as well as the lack of general HIV counselling and education within the maternal and child health section.

"The last time I was pregnant they did not tell me the results, may be some time back, they had tested me, and I was told that I had suppressed (32-year-old pregnant woman-already in care- suppressed)."

"...what I remember, I did not get my results right away, I waited for about 2 months to get them. So, on your return date, that's when the providers find your viral load results in your file (32-year-old pregnant woman-already in care- suppressed)."

"They didn't tell me what it (the viral load test) was for and up to now I have not yet known the results. They told me that I will know what came out of the test when I come back (25-year-old pregnant woman-already in care-suppressed)."

Long waiting hours with no provision of lunch for clients in the public health facilities was another barrier to accessing HIV care. Women reported that the average waiting time of 5–7 h when they visited to the clinic at times hindered their return for subsequent clinic visits.

"There's when we reach at the clinic at 8 am and leave at 6 pm, those are 10 h of waiting, we even fear to be looted along the way while going back home. The clients are always very many, and also the providers delay to start working (29-year-old pregnant woman-already in care- unknown viral load status)."

4 Discussion

This qualitative study sought to explore WLHIV perceptions of viral suppression and its implications during the perinatal period. The study found that women's interpretation and understanding of viral suppression influenced their HIV care decisions including adherence and retention in care.

These findings are presented within a context where attainment of fertility goals is deeply entrenched in traditional gender and socio-cultural norms that dictate women's fertility choices irrespective of the circumstances including HIV infection [15, 25]. Evidence indicates an increase in fertility intention rates among women living with HIV, hence the need for interventions to optimize viral suppression as the single most predictor to MTCT [4, 26, 27]. The advent of multidisciplinary strategies within PMTCT programs, including ART for all pregnant and breastfeeding mothers averted concerns around the possibility of MTCT [28]. This motivated mothers with HIV that with a suppressed viral load, they could have HIV free babies and attain positive health outcomes. However, our findings indicate the fear and anxiety among mothers to continue breastfeeding despite attaining viral suppression. This anxiety is exacerbated by the knowledge of HIV's transmission routes and the historical context of high MTCT rates before the widespread availability of antiretroviral therapy (ART) [29]. It is crucial to address these fears through continued counseling and reassurance from healthcare providers, emphasizing the effectiveness of ART and viral suppression in preventing MTCT especially during breastfeeding.

Nonetheless, barriers to retention within PMTCT programs in low resources settings persist [14, 15]. In this study, access to the health facility, non-disclosure and anticipated stigma were key hindrances to attaining viral suppression among pregnant and breastfeeding women. Non-disclosure of HIV status is proven to affect adherence to ART. Particularly

disclosure to sexual partners was revealed to be an important facilitator to viral load suppression [30]. The study was conducted in a setting where men overrule decision making in the household as well as resources. This may highlight that indirect male partner support influences retention in care among women living with HIV more specifically in the perinatal period [31, 32]. There is also need to test interventions aimed at leveraging male partner support for HIV care specifically in the perinatal period remains [32].

The turn-around time for receiving test results was another concern. Delays in obtaining results can cause anxiety and uncertainty, potentially affecting adherence to treatment and follow-up appointments [33]. Health facilities should strive to streamline the testing process to reduce waiting times. This could involve improving laboratory efficiency, leveraging faster diagnostic technologies, and optimizing logistical aspects of sample transportation and processing [33]. Mothers questioned the necessity of routine viral load tests, particularly when their viral loads are suppressed. This points to a potential gap in understanding the rationale behind regular monitoring. Healthcare providers should emphasize the importance of consistent monitoring, even when viral loads are low, to maintain optimal health outcomes. Enhanced communication strategies, including educational sessions and informational materials and peer support could help address these misconceptions [33].

The physical distance to health facilities was another significant barrier reported by women. For women in remote or underserved areas, the travel burden can be particularly challenging, exacerbating the difficulties in maintaining regular healthcare visits especially newly diagnosed and not suppressed. Addressing this barrier requires a multifaceted approach, the implementation of targeted outreaches and leveraging on peer support mechanisms to improve access to services at the community level. There is also need to advocate and modify the current DSD models to accommodate the needs of clients who are newly diagnosed and not virally suppressed.

The finding that participants acknowledged the role of viral suppression in preventing mother-to-child transmission (MTCT) of HIV highlights a significant understanding within the study population. This recognition indicates that participants are aware of the importance of maintaining low viral loads to minimize the risk of transmitting the virus to their children. Previous evidence from evaluation of PMTCT programs in Namibia highlighted knowledge as a key determinant to adherence [34]. This awareness among participants suggests that public health interventions and educational programs have successfully conveyed the critical link between viral suppression and MTCT prevention. It reflects the effectiveness of ongoing efforts to educate people living with HIV, particularly expectant mothers, about the importance of adhering to antiretroviral therapy (ART) to achieve and maintain viral suppression. Healthcare providers play a crucial role in ensuring that patients understand their treatment regimens and the significance of viral suppression in protecting their unborn or breastfeeding children. Continued support, counseling, and access to ART are essential to sustain viral suppression and, by extension, prevent MTCT. However due to over stretching of the healthcare work force, peer mothers can be supported.

Health education and routine counselling from the providers encouraged women to continue taking ART as prescribed. Previous studies have shown that poor interpersonal interaction between HIV clients and care providers can lead to poor engagement in care [31]. This arises from poor attitudes of providers coupled with clinic level challenges that interfere with the quality of care [35, 36]. On the contrary, women in this study attest to a positive attitude of the providers revealing support with counselling and information on adherence and its importance to achieving viral suppression. They further revealed how they eventually achieved suppression from previous non suppression due to the positive engagement of the providers in identifying and addressing of the barriers to viral suppression. The advent of client-centered care has also enabled HIV clients to efficiently navigate the structural barriers to viral suppression [37]. Training for the physicians and clinic workers in this area could further improve women's achievement of viral suppression.

With the scaling up of the 'treat all policy', women with HIV who are stable in care are most likely to attain or maintain viral suppression easily compared to those newly diagnosed with HIV [38]. Anti-retroviral therapy and other support services to enhance engagement in care through best practices such as streamlined HIV care [39, 40], option B+ [15] and other differentiated care models, have led to subsequent improvement in viral load outcomes of HIV clients [41]. This also justifies the confidence displayed by mothers in this study that having a suppressed viral load could enable them to have HIV free babies and attain positive health outcomes. However, women diagnosed during the perinatal period are likely to face challenges while negotiating the HIV care system and may arise challenges of attaining suppression during pregnancy [38]. There is still need for multidimensional interventions to optimize viral suppression for this sub-population.

Our findings further reveal that viral load suppression is attainable within the context of the general HIV care setting. Strategies such as general counselling and group education, sharing of positive previous experiences about successful pregnancies and subsequent HIV free babies, ensuring sufficient drug stocks and deliveries which form part of the routine HIV care setting among others contribute to viral load suppression [31]. However, there is no

deliberate effort targeted to mothers in the perinatal period which leads to missed opportunities for attaining viral suppression [18], so as a result HIV infections are persistent among children.

5 Conclusion

The understanding and interpretation of viral suppression among pregnant and breastfeeding mothers living with HIV provides a basis for adopting behaviors leading to prevention of MTCT. Health care workers can support women by providing clear and culturally appropriate education about viral suppression, adherence strategies and creating a supportive and non-judgmental environment.

There is need to augment counseling sessions with messages on the importance of- viral load testing and suppression, stigma reduction information, and HIV status disclosure. Peer support is reported in previous evidence to play a significant role [42–44]. Counselling sessions also needs to be focused on enabling positive living during the pregnancy phase. The perceptions, understanding and interpretation of viral suppression among pregnant and breastfeeding women living with HIV provides a basis for adopting behaviors leading to prevention of MTCT. Health providers can support women by providing clear and culturally appropriate education about viral suppression, adherence strategies and creating a supportive and non-judgmental environment.

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Data availability All the data needed for this manuscript have been included. In case there is a need for clarification, the corresponding author can be contacted. Codebooks used to analyze the data are available on request.

Declarations

Ethics approval and consent to participate The study was approved by the higher degrees' committee of Makerere University School of medicine (REC-2018-0744), and the Ugandan National Council on Science and Technology in Uganda (UNCST-HS-2648) respectively. All participants involved in this study signed a written informed consent form that allowed them to participate in the study and also authorized to publish the data after meaningful analysis. Consent forms were translated to the local language understood by participants. All participation was voluntary. All participant data was de-identified for confidentiality issues and avoiding unintentional disclosures.

Competing interests The authors declare no competing interests.

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