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Factors Associated with HIV Viral Load Testing Uptake among Pregnant and Lactating Women in Iringa Municipal, Tanzania

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Abstract:

- ***Background:***

Vertical transmission of HIV in Tanzania and Iringa Municipal is still high with 11% HIV exposed infant born with HIV despite great effort done to reach elimination vertical transmission. This could be contributed by multiple factors; poor monitoring of HIV positive women is among the major contributing factor. There is currently a poor uptake of HIV viral load testing among pregnant and lactating women living with HIV compared to the general population getting HIV care and treatment despite efforts made by the World Health Organization (WHO).

- ***Objectives:***

This study was aiming at determining the proportional and factors associated with HIV viral load testing among pregnant and lactating women living with HIV in Iringa Municipal.

- ***Method and Materials:***

The Study design was facility based cross sectional in Iringa Municipal council. A total of 320 pregnant and lactating women who attended PMTCT services between 1st July and 31st July 2022 were interviewed. More information about client's HIV viral load testing was extracted from clients' cards and database. Descriptive statistic was done using frequency distributions, means/median, interquartile range while bivariable analysis was done by using logistic regression model to measure association of different variables with HIV viral load testing. All variables which had a p-value of less than 0.25 were subjected into multivariable analysis by using modified Poisson regression with robust standard error while adjusting for confounders.

- ***Results:***

Out of 320 participants 163(50.9%) had HIV viral load tested within the past six months prior to the interview date. Pregnant and lactating women living with HIV who had understanding of when they are supposed to be tested for HIV viral load had 36% prevalence more to be tested for HIV viral load compared to those who do not understand. (aPR=1.358; p=0.015; 95%CI 1.065-1.737). Pregnant and lactating women living with HIV who receive PMTCT services from hospital and health center have 38% and 30% higher prevalence respectively for testing HIV viral load compared to those who receive at dispensary level. Hospital HVL testing (aPR=1.383; p=0.014; 95%CI=1.068 -1.79) and HVL testing at Health Center (aPR=1.299; p=0.047; 95%CI =1.004 -1.681).

- ***Conclusion and Recommendation***

The proportional of HIV viral load testing among pregnant and lactating women (50.9%) found in this study is far below WHO recommendation. Predictive factor associated with low HIV viral load testing were clients understanding of when they are supposed to be testing for HIV viral load as well as level facilities. Tanzania Ministry of Health and Iringa Municipal council should consider identified factors to address low HIV viral load testing among HIV positive pregnant and breastfeeding women.

Keywords: *HIV Viral Load Testing, Pregnant and Lactating Women Living with HIV, Uptake.*

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I. INTRODUCTION

Around 18.2 million women worldwide have HIV infection, with the majority of these (1.3 million) being pregnant women who reside in Sub-Saharan Africa (SSA). Vertical transmission of HIV is responsible for more than 90% of cases in children.(2,3). Since 2020, the number of new HIV infections in children has decreased by more than half because to efficient HIV care and treatment programs. (4).

There are 1.7 million HIV-positive persons living in Tanzania (PLHIV). 54% of them are women, and 6% of them are expectant mothers (1). In Tanzania, 11% of children born to HIV-positive pregnant mothers are infected by the HIV virus through mother-to-child transmission (MCTC). (4)

To prevent mother-to-child transmission of HIV, pregnant and lactating women must get effective care and treatment (5). Services for preventing mother-to-child transmission are provided before to conception, during pregnancy, childbirth, and lactation as a continuum of care (6).

Under the Universal Test and Treat Policy, all newly diagnosed HIV positive pregnant and nursing women must begin lifetime (7,8) ART medication regardless of their CD4 numbers in order to decrease viral load and hence lengthen life.

Less than 200 copies of HIV are considered to be suppressive viral loads in milliliters of blood (WHO, 2020). However, Tanzania defines viral load suppression as having fewer than 1000 HIV copies per milliliter (10).

When compared to values below 50 copies/mL, the perinatal HIV transmission rate is considerably greater in pregnant women with viral load concentrations between 50 and 400 copies/mL near delivery. Furthermore, the risk of perinatal HIV transmission is inversely correlated with maternal VL concentration among pregnant women living with HIV who are also receiving ART. Consequently, even though the WHO considers a maternal VL of less than 1000 copies/mL to be at low risk of perinatal HIV transmission, HIV transmission can still happen below this viral load concentration.(5) Viral load monitoring has been shown to promote treatment adherence, fast regimen adjustments, early detection of treatment failure, and higher survival rates (12,13). In order to give pregnant and lactating women living with HIV priority when it comes to HIV viral load testing, the World Health Organization (WHO) recommended accelerating the turnaround time for results and conducting more frequent testing. (14)

Tanzania started implementing HIV viral load as a routine monitoring since 2016 soon after WHO recommendation. Tanzania care and treatment guidelines, all pregnant and breastfeeding women newly identified as HIV positive naïve are required to be tested for HIV viral load three months after ART initiation. For those already on ART, HIV viral load should be conducted on the first antenatal visit. For those with a suppressed HIV viral load of less than 1000 copies/ml, repeated HIV viral load testing should be done every six months until they stop breastfeeding after which HIV viral load testing will be conducted as per general HIV viral load testing protocol.(6)

For those who have an unsuppressed HIV viral load, Enhanced Adherence Counseling (EAC) will need to be started. The initial EAC will take place over three days, followed by a one-day session every two weeks. Enhanced adherence and counseling that has been effective and better adherence are shown by a repeat HIV viral load three months after the initial EAC.

If someone is on second line and still has high viral loads after repeated HIV viral load tests, they will need to be transferred to third or fourth line. A collaborative decision will be made based on information gathered from both physicians and counselors. (10)

Despite the efforts, Tanzania still has 10 to 15% of new HIV postnatal infections among breastfeeding mothers. It is essential to comprehend the scope and associated variables for HIV viral load testing uptake among nursing mothers in order to completely eliminate vertical HIV transmission. If inconsistencies in the use of HIV viral load monitoring among PMTCT are overlooked, the 2030 aim for eliminating MTCT won't be reached.

The magnitude, determinant factors, and implementation gap for HIV viral load among pregnant and lactating women living with HIV in Iringa municipal council are unknown. The hypothetical understanding was that there was low HIV viral load testing uptake contributed by different contextual factors in Iringa Municipal Council during PMTCT services implementation from both clients and institutional. This contributes to the existence of a high level of vertical transmission of HIV. Therefore, this study was determining the magnitude of HIV viral load uptake and determinant factors for HIV viral load testing among pregnant and lactating women living with HIV in Iringa Municipal Council.

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II. METHODOLOGY

A. Study Design

We conducted a cross sectional facility-based study design in Iringa municipal council between 1st July and 30th July 2022.

B. Study Area

Iringa Municipal council is located in Iringa region in the southern highlands of Tanzania. Iringa region has five councils namely Iringa District Council, Iringa Municipal council, Kilolo District council, Mafinga Town Council and Mufindi District Council. Iringa region borders Dodoma region in the north, Morogoro region to the east, Njombe region to the south and Mbeya region to the west. The region covers an area of 35503Km2. The region has a population of approximately 941,238 as projected from the 2012 population census.

Iringa region has prevalence of 11.3% of people living with HIV compared to 4.6% national prevalence making it the second top region with high prevalence in Tanzania after Njombe.

According to Tanzania ANC HIV Sentinel Surveillance Report of 2021, HIV prevalence among antenatal clinic attendees for Iringa region stand at 14.4% while that for Iringa Municipal is at 14.0%.(30).

HIV viral load testing services in Iringa Municipal started in 2016 after WHO recommendation on the use of HIV viral load results as routine monitoring method over immunological monitoring which was previous used as monitoring modality.

A total of 17 facilities participated, among them 14 were government owned facilities while 3 facilities were private health facilities. Among selected facilities 10 were dispensaries, 5 health center and 2 hospitals.

C. Study Population

Women attending PMTCT services in health facilities in Iringa MC from 1st to 31st July 2022 with 18years old and above.

D. Eligibility Criteria

- *Inclusion Criteria:*

HIV positive pregnant or breastfeeding women who were registered in PMTCT services with more than 3month aged 18 years and above.

- *Exclusion Criteria:*

Those who are very sick, transferred in women from other facilities and women with missing CTC2 cards

E. Sample Size

A single population proportion formula was used to calculate the sample size, with a precision of 5% and a 95% confidence level assumed. The original sample size was determined using the percentage of pregnant and lactating women living with HIV who underwent an HVL test from prior research carried out in Kenya, which was 72%, with a 5% marginal error(d), a 95% confidence level, and an alpha of 0.05. (33)

The following formula was used to estimate the calculated total sample size:

$$N = \frac{Z^2 \, x \, P(100 - p)}{\mathrm{d}^2}$$

Whereby

$$N = \frac{1.96^2 \, x \, 72(100 - 72)}{5^2}$$

N=310

The adjustment of calculated sample size was made for non-response rate of 10%, (310x100/(100-10)) therefore total sample size was 344.

F. Sampling Procedure

All facilities with PMTCT services were included in the study. The number of pregnant and lactating women living with HIV from each facility was determined as proportionally to the total number of HIV-exposed infants registered between January 2021 to December 2021. This was obtained based on reported data in national health management informatics system (HMIS). Finally, Sampling frame of 777 pregnant and lactating women living with HIV was obtained from respective Health Facility by extracting unique ID numbers from national CTC2 electronic database. This was based on the participants expected to visit these facilities within 1st July to 31st July 2022. Simple random selection using lottery method was used to select study participants from each selected health facilities until when required number per facility is reached. The sampling procedure are summarized in table below

G. Study Variables

- *Dependent Variable*

Uptake of HIV viral load testing was evaluated in this study by reviewing documents from participants' CTC2 cards. A dichotomous answer (tested or not tested) was utilized for the outcome variable (HIV viral load testing uptake), which is a categorical variable. A participant was deemed to have taken an HIV viral load test if their results were documented and obtained no more than six months prior to the study's start date.

- *Independent Variables*

Participant Social demographic: Age, area of residence, marital status, level of education, employment, parity and knowledge. Participants were accessed for knowledge on HIV viral load testing using a set of ten questions. Each question was given a weight of one point. The total summative score for the knowledge was computed (Range 0 – 10). By using 2/3 rule those who scored 67% or

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more were categorized as having "adequate knowledge" while those who scored below 67% were categorized as having "inadequate knowledge".

Participant clinical characteristic factors: HIV status disclosure, prior exposure, duration on treatment, psychosocial support, adhere to appointment visit, number of repeated HVL testing.

Health facility factors: availability of commodities for HIV viral load testing, accessibility of HIV viral load services, time of availability of HIV viral load testing services, distance from home to HIV Viral load testing point, availability of HIV viral load resources, level of facility in HIV viral load collection (use point of care, spoke, hub or central laboratory), turnaround time, and travel cost to access HIV viral load services.

H. Data Collection Methods

- *An Interviewer-Administered Questionnaire:*

It was used to gather information regarding uptake of HVL testing and associated factors to HIV viral load testing uptake among pregnant and lactating women living with HIV. In additional to that, unstructured questionnaire was used to gather information from health care providers at RCH and laboratory services. One RCH in charge and one laboratory technician were interviewed from each 17 facilities based on their convenient time of availability.

- *Document Review*

The proportion of pregnant and lactating women living with HIV who obtained an HVL testing service was calculated using CTC2 card records. Visit dates, HIV viral load test dates, and HIV viral load values were among the variables that were gathered from CTC2 cards.

- *Data Analysis*

STATA statistic data analysis Copyright 1985-2017 StataCorp LLC version 15 was used to analysis data in this study.

- *Univariable Analysis*

The univariable analysis was conducted, whereby categorical variable was presented by using frequencies and percentages. A continuous variable were observed for their frequency and patterns using a histogram chart, if normally distributed was presented by mean and standard deviation. If continues variables are not normally distributed its information was presented via median and range.

- *Bivariate Analysis:*

Bivariate logistic regression was used to assess association between the dependent variable (HVL testing uptake) and each independent variable where by chi-square test was used.

- *Multivariable Analysis:*

A multivariable analysis was conducted to identify parameters impacting HVL testing uptake while controlling potential confounders. All variables chosen for multivariable modified Poisson regression model analysis in this study had a p-value in the bivariable analysis of less than 0.25. Statistically significant data were taken into account when p 0.05 and were expressed as an adjusted prevalence ratio with 95% confidence intervals (CI).

I. Ethical Consideration

The Institutional Review Board of Muhimbili University of Health and Allied Sciences granted ethical approval (Ref; MUHAS-REC-06-2022-1217). The Iringa Regional Administrative Secretary (RAS), who informs the Iringa Municipal Executive Secretary, granted permission (Ref No; FA. 255/265/01/H/84)

III. RESULTS

A. Social Demographic Characteristics of Participants:

The mean age of the 320 participants was 31years which was under normal distributed with standard deviation of 6.4years. Majority of participants, 80(25.0%), had age range between 25 to 29years.

Majority of participants, 281(87.8%), resided within Iringa Municipality and majority, 235(73.4%), staying in less than 5kms from a health facility to where they receive their PMTCT services. The furthest participant stays 38km and majority, 216(67.5%), use public transport as a model of transport to reach health facility for PMTCT services.

Table 1. Social - Demographic Characteristics of Participants, Iringa Municipal Council, Tanzania, July 2022 (N=320).

Characteristic	Frequency (n)	Percent (%)
Age of Participants		
15 - 24 years	54	16.8
25 - 29 years	80	25.0
30 - 34 years	78	24.4
35 - 39 years	76	23.8
40 - 49 years	32	10.0
Residence of participants		
Rural	39	12.2
Urban	281	87.8
Marital status		
Married/Cohabit	225	70.3
Single/Widow/Divorced	95	29.7

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Level of Education		
Primary Education and below	220	68.7
Secondary Education and above	100	31.3
Employment		
Employed/Self- employed	203	63.4
Unemployed/Housewife/Small farmer	117	36.6
Estimate Distance home to facility		
Less than 5kms	235	73.4
5 to 10kms	61	19.1
More than 10kms	24	07.5
Model of Transport to the facility		
Walking	94	29.4
Use transport (Public/Private)	226	70.6

B. Clinical Characteristic of Participants:

Among participant's majority, 269 (84.1%), were breastfeeding and 51 (15.9%) were pregnant the time this study was conducted.

Majority, 301(94.1%), had disclosed their status to their partners, relative and close friends. Majority, 273(85.3%), reported to have good adherence to appointment and majority 243(75.9%), had previous experience on PMTCT services.

Majority of participants, 281(87.8%), had more than a year on treatment, minimum year on ART was 4months while maximum year on ART was 26years with median year of stay on ART of 4.8years.

Majority, 298(93.1%), of participants reported not being joined psychosocial support groups for HIV treatment support.

Table 2: Clinical characteristics of participants, Iringa Municipal, Tanzania.

Characteristic	Frequency (n)	Percent (%)
Current reproductive status		
Breastfeeding	269	84.1
Pregnant	51	15.9
HIV status disclosure		
No	19	5.9
Yes	301	94.1
Adherence to appointment		
Non adherence to appoint	47	14.7
Adherence to appointment	273	85.3
Previous experience to PMTCT services		
Has previous experience	243	75.9
Has no previous experience	77	24.1
Number of years on ART		
On ART for 1 year and below	39	12.2
On ART for more than 1 year	281	87.8
HVL testing turn-around-time *		
0 to 14 days	150	70.42
15 to 30 days	22	10.33
Above 30 days	41	19.25

**N not equal to 320 due to some of participants were missing recent HIV viral load results of recent in the past 6months.*

C. Proportional of HIV Viral Load Testing Among Pregnant and Lactating Women Living with HIV;

Out of 320 participants 163(50.9%), 95% Confidence Interval (45.3% to 56.5%), had HIV viral load tested within the past six months prior to the interview date.

D. Bivariable Analysis

A chi-square test for independent variables was performed to determine whether client's factors and facilities factors are associated with uptake of HVL testing

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among HIV positive pregnant and lactating women against dependent.

E. Clients' Social Demographic Factors Associate with HIV Viral Load Testing

An analysis of clients' social demographic factors on HIV viral load testing showed that, understanding of expected date for HIV viral load testing is significantly associated with HIV viral load testing ($\chi 2$=4.38; p = 0.036).

Table 3: Association between client social demographic and clinical characteristics with uptake of timely HVL test.

Characteristics	Uptake of HVL testing n (%)				
	N	Tested for HIV viral load	$\chi 2$	P -Value <0.005	
Age group (Years)					
15 - 19 years	6	03(50.0)			
20 - 24 years	48	25(52.1)			
25 - 29 years	80	42(52.5)			
30 - 34 years	78	39(50.0)	2.2192	0.898	
35 - 39 years	76	36(47.4)			
40 - 44 years	27	14(51.9)			
45 - 49 years	5	04(80.0)			
Area of residence					
Rural	39	18(46.2)	0.4067	0.526	
Urban	281	145(51.6)			
Tribe of participants					
Bena	57	29(50.9)			
Hehe	190	99(52.1)	0.3653	0.833	
Others	73	35(47.9)			
Religion of Participants					
Christian	280	142(50.7)	0.0447	0.833	
Muslim	40	21(52.5)			
Marital status					
Married/Cohabit	225	113 (50.2)	0.1552	0.694	
Single/Divorced /Widow	95	50 (52.6)			
Level of education					
Primary education and below	208	101(48.6)	0.0606	0.0806	**
Secondary education and above.	112	56(50.0)			
Employment status					
Employed	203	107(52.7)	0.6975	0.404	
Unemployed	117	56(47.9)			
Knowledge on HIV viral load testing services					
Have no understanding on HVL testing	81	37(44.3)	1.200	0.273	
Have understanding about HIV viral load test	239	126(52.7)			

*** *p-value <0.05*
** *p-value <0.25*

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For facility factors; level of facility, (χ2=4.38; p = 0.033), and results turnaround time (χ2=5.783; p = 0.016) were significant associate with uptake of HVL testingstatus.

F. Clients' Clinical Characteristics Factors Associate with HIV Viral Load Testing Among Pregnant and Lactating Women Living with HIV.

Table 4: Association between client's clinical characteristics with uptake of HIV viral load testing services.

Characteristics	Uptake of HVL testing				
	N	Tested for HIV viral load	χ2	P -Value <0.005	
Number of years being on ART					
1 year and below	39	16(41.0)	1.746	0.186	**
1 year and above	281	147(52.3)			
Understanding HIV viral load testing date					
No, she is not aware	274	133(48.5)	4.384	0.036	***
Yes, she is aware	46	30(65.2)			
Clients' satisfaction with HIV viral load testing services					
Satisfied	251	133(53.0)	1.959	0.162	**
Not satisfied	69	30(43.5)			
Previous pregnant PMTCT experience					
No	243	126(51.85)	0.3378	0.561	
Yes	77	37(48.05)			

**** p-value <0.05*
*** p-value <0.25*

G. Facility Factors Associated with HIV Viral Load Testing Among Pregnant and Lactating Women Living with HIV.

All facilities had integration of PMTCT services within RCH with majority of facilities having HIV viral load sample collection at centralized laboratory 14/17 facilities. Among 17 facilities, eight had daily HIV viral load sample collection services, seven have HVL collection during all PMTCT clinics and two facilities have HVL sample collection special day among PMTCT clinic days. Time for HIV viral load is throughout the day for majority of facilities 11/17 while few facilities have morning up to mid-day HIV viral load sample collection services.

There is no facility which has reported stock-out of reagents or consumables for HIV viral load sample collection. One facility had central DNA PCR laboratory for HIV viral load testing (Iringa Reginal Referral Hospital), one had functional point of care (Gene X -pert) machine capable of testing HIV viral load, three facilities were hubs with sample processing and temporary storage capacity. Twelve facilities were spoke facilities with no capacity to process and store samples. All samples are being transported by a courier who is supported by implementing partner.

All facilities have at least three health care providers at RCH with at least three trained health care providers on PMTCT and HIV viral load sample collection.

Table 5: Association between facility characteristics with uptake of HIV viral load testing services.

Characteristics	Uptake of HVL testing				
	N	Tested for HIV viral load	χ2	P -Value <0.005	
Level of facility in services provision					
Dispensary	156	68(43.6)			
Health center	89	50(56.2)			
Hospital	75	45(60.0)	6.814	0.033	***
Distance from home to facility					
Less than 5kms	235	119(50.6)	0.0317	0.859	
5kms and above	85	44(51.7)			
Level of HIV viral load testing laboratory services.					

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Facility with PCR machines for HVL	55	32(58.2)	2.210	0.137	**
Facilities with no PCR machines for HVL	265	125(47.2)			
Availability of HIV viral load testing services					
Everyday	182	98(53.9)	1.429	0.232	**
PMTCT clinic day only	138	73(52.9)			
Perceived delayed of HIV viral load results					
Yes	223	112(52.6)	0.690	0.406	
No	107	51(47.7)			

*** *p-value <0.05*
** *p-value <0.25*

H. Multivariable Analysis

A modified Poisson regression was performed to ascertain the effects of predictor variables on the likelihood that HIV positive pregnant and breastfeeding women' uptake for HVL testing. This was done with consideration of cluster effect for different facility level.

Clients' clinical characteristic factors associate with uptake of HIV viral load among pregnant and breastfeeding women was understanding of when supposed to be tested for HIV viral load.

Findings reveal that pregnant and lactating women living with HIV who understand when they are supposed to be tested for HIV viral load had 36% prevalence more to be tested for HIV viral load compared to those who do not understand. (aPR=1.358; p=0.015; 95%CI 1.065-1.737).

Under facility factors, level of facility by whether being dispensary, health center or hospital was statically significant associated with HIV viral load testing among pregnant and lactating women living with HIV attending services.

It has been observed that clients who receive PMTCT services from hospital and health center had 38% and 30% higher prevalence respectively for testing HIV viral load compared to those who receive at lower dispensary level. Hospital HVL testing (aPR=1.383; p=0.014; 95%CI=1.068 -1.79) and HVL testing at Health Center (aPR=1.299; p=0.047; 95%CI =1.004 -1.681)

Table 6: Multivariable analysis for HIV viral load testing among PMTCT clients, Iringa Municipal, Tanzania.

Variable Category	CPR	p-value <0.05	APR	p-value <0.04	p-value <0.05	
Understanding HIV viral load						
No	Reference					
Yes	1.344(1.053 – 1.715)	0.018	1.358	0.015(1.062-1.737)	0.015	***
Level of Education						
Primary education and below	Reference					
Secondary education and above	0.972(0.774 – 1.221)	0.807	0.946	0.488(0.808-1.107)	0.488	
Number of years being on ART						
Less than 1 year	Reference					
1 year and above	1.275(0.861 – 1.889)	0.226	1.274	0.228(0.86-1.888)	0.228	
Clients' satisfaction with HIV viral load testing services						
Not satisfied	Reference					
Satisfied	1.219 (0.909 – 1.635)	0.187	1.222	0.18(0.911-1.639)	0.18	
Level of facility in services provision						
Dispensary	Reference					
Hospital	1.376(1.064 - 1.780)	0.015	1.383	0.014(1.068-1.79)	0.014	***
Health center	1.289 (0.997 - 1.666)	0.052	1.299	0.047(1.004-1.681)	0.047	***

***** p-value <0.05**

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IV. DISCUSSION

The study aimed at determining the proportional of HIV viral load testing uptake and associated factors among pregnant and lactating women living with HIV in Iringa municipal, Tanzania. It was revealed that about 50.9% of respondents received a HVL test for the past six months' prior study time. Client understanding on when she is supposed to be tested for HIV viral load and level of facility identified significant predictor for uptake of HVL among pregnant and lactating women living with HIV attending PMTCT services in Iringa Municipal.

A. Proportional of Pregnant and Breastfeeding Women Tested for HIV Viral Load

The proportion of HIV positive pregnant and breastfeeding women tested for HVL in this study was lower, (50.9%), than recommended PMCTC Guidelines of above 95% (31). This has similar findings as study done in Cameroon. (9) Furthermore, the uptake of HVL reported in this study is comparable to what was discovered in a study performed in South Africa where 47.1% reported to test for viral load and that done in Kampala Uganda at 43% for first HVL(14,29).

The proportion of women taking HVL testing in established this research is slightly higher than the most recent country prevalence of HVL testing among mother that have been reported by the Ministry of Health (MOH/UNICEF, 2019) and study done in Manicaland province in Zimbabwe which revealed 31.6% coverage among pregnant and lactating women living with HIV(7).

Despite the fact that the proportional of HIV viral load testing is higher comparable to the study performed in South Africa and Kampala, there are disagreements between the findings of this study and those reported studies. For instance, studies done in Kenya showed higher coverage of HIV viral testing at 72% (11) which is higher than what has been reported in the current study. Same slightly higher finding was found in Maynmar 57.8% (95% CI: 53.3% to 62.2%) however this was from non-PMTCT HIV positive clients and was based on first HIV testing only. The disparity in technique and research environment, as well as the socio-demographic characteristics of study participants and the availability and accessibility of health-care infrastructures, might all be factors for variation on uptake rate of HVL testing.

B. Clients' Social Demographic Characteristics Associated with HIV Viral Load Testing Among Pregnant and Lactating Women Living with HIV.

There was no statistical significance in social demographic features in association with uptake of HIV viral load testing among pregnant and lactating women in this study. This has similar findings as study done in Uganda and Manicaland province in Zimbabwe, in which age, gravidity, gestational age, marital status, and adherence at 12 months were not significant predictors of HIV viral load testing among pregnant women living with HIV. (7,29)

C. Clients' Factors Associated with HIV Viral Load Testing Among PMTCT Clients

Among clients' factors assessed, only clients who had understanding their date of HIV viral load sample collection was statistically significant associate with HIV viral load testing. This correlate with their demand for HIV viral load testing services whereby clients who have ever demand HIV viral load testing services had 36% higher prevalence of being tested for HIV viral load compared to those who never requested. This finding could be confounded by knowledge on HIV viral load testing, however, there was no statistical significant on association between knowledge of importance of HIV viral load testing and being tested for HIV viral load.

Findings from this study, differ from findings for study done in Littoral region in Cameroon where there was statistically significant for married women compared to those who were single. Married women had statistically significant higher proportional of HIV viral load testing at 61.8% vs 42.5%; AOR =2.385, P=0.00275. PMTCT mothers who were on ART before PMTCT compared to those who were PMTCT naïve by 56.7% vs 5.8%; AOR =21.270, P=0.0043.(9)

This study has similar findings on social demographic association with HIV viral load testing uptake among PMTCT mothers with study done in Mutare district of Manicaland province, Zimbabwe. There was no statistical significant on association with social demographic characteristics. (7)

D. Facility Factors Associated with HIV Viral Load Testing Uptake Among PMTCT Clients.

Facility factors found in this study associated with HIV viral load testing among pregnant and breastfeeding women are facility level.

Findings, showed increase of HIV viral load testing as moving from lower-level facilities (dispensaries) to higher level facilities Health Center and Hospital). Health center have 30% higher proportional respectively for testing HIV viral load compared to those who receive at lower dispensary level while hospital pregnant and lactating women living with HIV have 38% prevalence to be tested for HIV viral load compared to dispensary level. This study had similar findings as study done in Manicaland province in Zimbabwe (7)

This study was differed with findings done Gombe Uganda where Health center IV had 1.85 times Odd of being not-tested for HIV viral load compared to those of Health center III. This finding explained by disproportional support provided in facilities of high volumes compared to those low volume facilities in term of resources distribution and regular supportive supervision from both government and implementing partners.

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V. CONCLUSION

This study aimed at determining the proportional and predictive factors associated with HIV viral load testing uptake among HIV positive pregnant and lactating women receiving care in Iringa Municipal, Tanzania. Results indicates that 50.9% of pregnant and lactating women living with HIV current on care, have at least one HIV viral load within the past six months which is far below national target of reaching 95% by 2030.

Clients' social demographic were not predictive factors associated with uptake of HIV viral load however, level of facilities and client's awareness on when they are due for HIV viral load testing were significant associated with prediction on HIV viral load testing. This could be contributed by multiple factors including different support and supervision provided at different level of facilities with low level facilities being provided less support compared to high level facilities.

VI. RECOMMENDATIONS

These findings showing low proportion of HIV viral load testing among pregnant and lactating women living with HIV in Iringa Municipal Council should be considered when implementing prevention vertical transmission of HIV in Iringa Municipal. This will enable country efforts to reach the target of elimination of mother to child transmission of HIV.

- *Council Level Recommendations:*

In order to achieve the eradication of mother-to-child HIV transmission, it is advised that Iringa Municipal Council and its current implementing partners should consider closing implementation gaps regarding HIV viral load testing among pregnant and lactating women living with HIV.

- *Facility Level Recommendations:*

More effort has to be put into lower-level institutions where coverage of HIV viral load testing is lower among pregnant and lactating women living with HIV than in hospitals and health centers. This includes establishing techniques to help pregnant and lactating women living with HIV have better understanding on their date of HIV viral load sample collection. Health care workers at RCH should put more effort into raising awareness so that all pregnant and lactating women living with HIV are aware of when they are scheduled for HIV viral load testing.

- *Limitation of the Study and Further Studies*

This study could not explore much at policy implementation including fidelity of implementation of HIV viral load testing protocol/guideline at RCH, knowledge, attitude and practices of HIV viral load testing among health care providers at RCH.

Documentation challenges especially on participants treatment files and data recorded into client's database. To mitigate this, data triangulation between electronic database, clients' files and client information was done to all files with discrepancy in information provided.

Further study is needed to evaluate more on the fidelity of HIV viral load testing protocol and HIV viral load sample collection process and results utilization to have deeper understanding why different level of facilities have different level of HIV viral load testing uptake.

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