PREVALENCE OF HIV RETESTING AND ASSOCIATED FACTORS AMONG PERINATAL WOMEN WHO TESTED NEGATIVE IN THE FIRST ANTENATAL SCREENING IN KILIMANJARO REGION

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PREVALENCE OF HIV RETESTING AND ASSOCIATED FACTORS AMONG PERINATAL WOMEN WHO TESTED NEGATIVE IN THE FIRST ANTENATAL SCREENING IN KILIMANJARO REGION

By

Agnes Fridomu Njau

A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Science (Applied Epidemiology) of

Muhimbili University of Health and Allied Sciences
October, 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled **"Prevalence of HIV Retesting and Associated Factors among Perinatal women who tested Negative in the first Antenatal screening in Kilimanjaro Region'',** in (partial) fulfillment of the requirements for the degree in Master of Science (Applied Epidemiology) of Muhimbili University of Health and Allied Sciences.

_____

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Date



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(Co-Supervisor)

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Date

DECLARATION AND COPYRIGHT

I, **Agnes Fridomu Njau**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature……. **Date**……

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ABSTRACT

Background: In Tanzania we have a total of 1.7 million people living with HIV, with the rate of vertical transmission of HIV being 6.9%. In efforts toward elimination of mother to child transmission (e-MTCT) of HIV WHO recommends that all pregnant women who tested negative during first test to be retested, despite this recommendation the prevalence of maternal HIV retesting in Tanzania is 30.4% which is low. Intervention to address this challenge such as on-the-job training of health care workers was conducted all over the country. Therefore, we determined the post-interventional prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening, which has not yet been explored.

Objectives: To determine the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024.

Materials and methods: A facility based cross-sectional study design was conducted involving perinatal women from 37 weeks of gestation to 42 days after delivery who were attending antenatal care, post-natal and Reproductive and child health clinics in Kilimanjaro. Data was collected using a semi-structured questionnaire and information collected involved sociodemographic characteristics, Obstetric history, facility factors and others like stigma and couple HIV testing during first antenatal care visit. Also, information on retesting on third trimester, labor and delivery and, postnatal was collected and HIV results from antenatal care (ANC) card. Data was analyzed by STATA version 15.1 and bivariable and multivariable modified Poisson regression model was used to check for association, because the anticipated prevalence of maternal HIV retesting was >10%.

Results: A total of 467 perinatal women were recruited and 47.1% (95%CI 42.5-51.7) of them were retested for HIV with 3.2% of them testing positive. Factors which were associated with HIV retesting were; being counselled and tested for HIV together with partner during the first ANC visit (Adjusted Prevalence Ratio-APR 1.31; 95%CI:1.07-1.60, P=0.01), attending antenatal care in a health facility with trained healthcare workers (HCWs) on maternal HIV retesting (APR 3.56; 95%CI:1.99-6.39, P<0.001), attending only one

health facility for ANC (APR 1.21; 95%CI:1.01-1.45, P=0.04), attending more than four ANC visits (APR 2.95; 95%CI:1.71-5.09, P<0.001) and having awareness that a woman should be tested twice during pregnancy (APR 1.57; 95%CI:1.28-1.92, P<0.001). Place of residence showed no association with HIV retesting.

Conclusion: Prevalence of HIV retesting among perinatal women is still low compared to the national target of **95%.** HIV retesting was associated with individual and ANC service-related factors. To be able to achieve the HIV retesting target, Ministry of Health and Stakeholders should ensure that interventions to promote adequate ANC attendance, healthcare workers training and provision of quality ANC with proper HIV retesting counseling are advocated.

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ABBREVIATIONS

ANC	Antenatal Care
AIDS	Acquired Immunodeficient Syndrome
ARV	Antiretroviral
CDC	Center for Disease Control and Prevention
e-MTCT	Elimination of Mother to Child Transmission
GA	Gestation Age
HEI	HIV Exposed Infants
HCWs	Health Care Workers
HIV	Human Immunodeficiency Virus
MOH	Ministry of Health
MTCT	Mother To Child Transmission
MUHAS	Muhimbili University of Health and Allied Sciences
PMTCT	Prevention of Mother to Child Transmission
PNC	Post-natal Clinic
PO-RALG	President's Office Regional Administration and Local Government
RCH	Reproductive and Child Health
TFELTP	Tanzania Field Epidemiology and Laboratory Training Program
UNAIDS	The Joint United Nations Program on HIV/AIDS
WHO	World Health Organization

DEFINITIONS OF TERMS

Maternal HIV retesting: It is recommended by WHO that all pregnant women who tested negative during the first test to be retested in the third trimester or, during labor and delivery, and postpartum with the aim of detecting HIV infection which can occur during pregnancy, labor and delivery, and during breast feeding(1).

Mother to child transmission (MTCT) of HIV: refers to the transmission of HIV infection from infected mothers to their infants, this can occur during pregnancy, labor and delivery and during breastfeeding.

Perinatal: Is the period from when a woman becomes pregnant until one year after giving birth.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

HIV (Human Immunodeficiency Virus) is a virus that attacks the body immune system(2). Currently there are about 38.4million people living with HIV (PLHIV) in the world and 54% of these are women and girls with about 69% of those PLHIV are from sub-Saharan Africa(3).

Multiple interventions kept in HIV management has resulted in a global decline in new HIV infections from 2.2 million in 2010 to 1.5 million in 2021(3), also in Tanzania HIV incidence rate has reduced from 22 per 1000 in 2010 to 14 per 1000 in 2019(4),

HIV has caused an estimate of 40.1 million deaths globally since the beginning of the epidemic, with about 650,000 AIDS related deaths in 2021(3), the mortality rate from AIDS related causes in Tanzania has decreased from 120 per 100,000 in 2010 to 49 per 100,000 in 2019(4), this is caused by the availability of treatment and proper management of HIV infection and opportunistic infections. Globally it is estimated that HIV infection has caused 47.63 million disability-adjusted life years (DALYs) in 2019(5).

The amount of money required in the diagnosis, care and treatment of people living with HIV in low and middle-income countries is estimated by UNAIDS to be US$ 29 billion(3), in Tanzania the estimated cost for HIV diagnosis ranges from US$230.61 to US$3330.38, cost for care and treatment of HIV positive pregnant and breastfeeding women varies from US$100.91 to US$812.23 and the cost of care of HIV exposed infant ranges from US$41.53 to US$180.26(6), this shows that it is important to eliminate HIV infection due to the economic burden it causes to the country and globally in its diagnosis and management.

Mother to child transmission (MTCT) of HIV refers to the transmission of HIV infection from infected mothers to their infants, this can occur during pregnancy, labor and delivery and during breastfeeding. Globally it is estimated that 1.3 million women and girls living with HIV become pregnant each year(7). High rate of MTCT of HIV can be seen in sub-Saharan Africa which is 16.9%(8). In Tanzania we have a total of 1.7 million people living

with HIV(4) and prevalence of HIV among pregnant women is 6% giving birth to HIV exposed infants(9) and the rate for MTCT of HIV is 6.9%(10) which is above the set goal of 4%(11).

It is estimated that without any interventions during pregnancy, labor and delivery the rates for mother to child transmission of HIV ranges from 15-45% and it can be reduced to less than 5% if proper interventions are kept in place(12). UNAIDS estimates that 43,050 children born with HIV annually without treatment will die before the age of 2 years old(13). Therefor in efforts to prevent mother to child transmission of HIV as an important step in eliminating HIV infection, PMTCT service started in Tanzania since 2000 it is integrated in the routine reproductive and child health (RCH) services(14), country has adopted the operational plan III 2022-2025 on the elimination of mother to child transmission (e-MTCT) of HIV infection, hepatitis B and syphilis, e-MTCT focuses on triple elimination and prevention of vertical transmission of HIV infection is the priority. In Tanzania all pregnant women attending first antenatal care (ANC) are counselled and screened for HIV and those who test positive are enrolled to the PMTCT program, such that in Tanzania 90% of pregnant women attend ANC clinic, 65% of them make four ANC visits and, 85% of pregnant women deliver in health facility (15).

WHO recommends providing lifelong ARTs to HIV infected pregnant and lactating women regardless of their CD4 cell count, WHO clinical stage or gestation age (option B+ introduced in 2013 in Tanzania), ensuring that viral load suppression is archived before delivery and safe delivery practices are used, provision of ARV prophylaxis for HIV exposed infants (HEI) to reduce chances of HIV infection. Pregnant women are counselled on safer infant feeding and care of the HIV exposed infant which includes exclusive breast feeding in the first 6 months of life followed by mixed breastfeeding up to 12 months.

In efforts towards elimination of MTCT of HIV WHO recommends that in countries with high prevalence of HIV, maternal retesting to be conducted in all HIV negative pregnant women in the third trimester, during labor or postpartum in order to detect HIV infection which can occur during pregnancy and breast-feeding(1). In Tanzania the second test on those pregnant women who tested negative on first test will be done in the third trimester (32-36week), third test will be conducted 3 months after delivery, fourth test 6 months after

delivery and last test will be 18 months after delivery(16). Despite these recommendations the rate for maternal retesting is 30.4%(17) which is low and can be a contributing factor to high rate of MTCT of HIV in the country.

1.2 Problem Statement.

The coverage for maternal retesting is still low in Tanzania example in the study conducted in Njombe Tanzania in 2016 the uptake for maternal retesting in HIV negative mothers was only 30.4% and out of those who retested 13.3% tested positive (17). In 2021 another study was conducted at Ubungo district in Dar es salaam which showed the rate for maternal HIV retesting to be 76.1% and 2.1% of them tested positive (20). These prevalence are low compare to the 95-95-95 UNAIDS target (21). Which involves 95% of PLHIV (pregnant and breast-feeding women) know their status. In response to these on-the-job training of health care workers (HCWs) were conducted by ministry of health in collaboration with implementing partners in September 2022 for a period of one month, in all regions in Tanzania regarding maternal HIV retesting in which they were trained on when to do maternal retesting (the recommended schedules), the importance of maternal HIV retesting and documentation of the retests performed, training was done for 1 day in each facility which was later followed by supportive supervisions in May 2023 in the same area. The aim was to raise the prevalence for maternal HIV retesting in the country as an important step towards the e-MTCT of HIV. This is because the earlier the mother is diagnosed with HIV the earlier, she can be initiated on ARTs which can help in lowering her viral load and caring for her HEI so that the child does not acquire HIV infection.

This study aimed to determine the post-interventional prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening which has not yet been explored in other studies.

The results which will be obtained from this study will be useful in knowing the achievements obtained from the interventions kept in place and to see if more efforts are needed to be kept in place to reach the set goals for maternal HIV retesting.

1.3 Conceptual Framework

Maternal HIV retesting is associated by a number of factors which are grouped into sociodemographic characteristics such as mother's age, level of education, employment status, marital status, partner's level of education and place of residence. Second group is obstetric history which include factors like parity, gestation age at first ANC visit, number of ANC visits made, mode of delivery, place of delivery and level of health facility attended ANC visits. Third group are the facility factors which includes availability of test kits, distance from the health facility, counselling on HIV retesting, time spent unattended and inadequate HCPs, Other factors like knowledge about partner's serostatus, fear of stigma and discrimination.

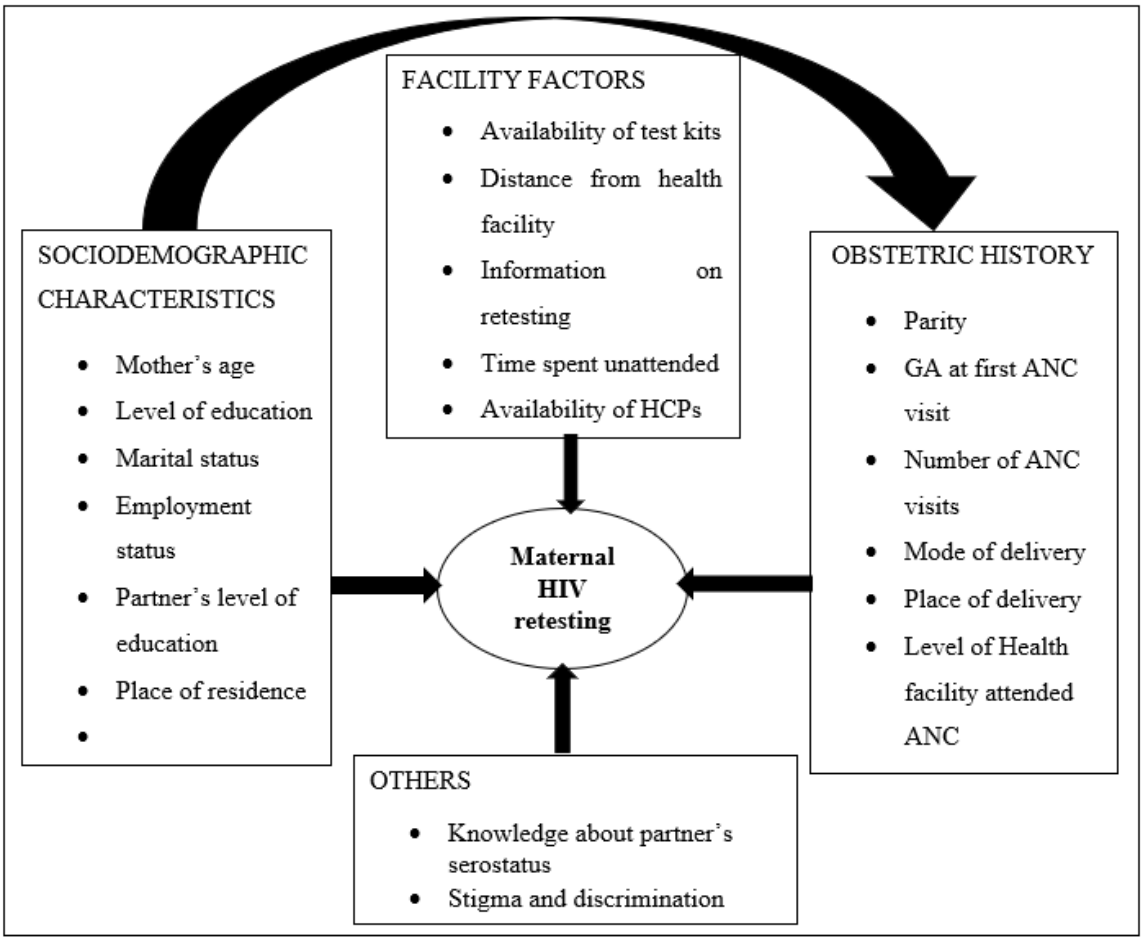


Figure 1: Conceptual framework for maternal HIV retesting

Source: The figure was developed by adopting ideas from Nungu(17) and A. Rogers et al(22)

1.4 Rationale

To develop more measures which will be useful to Ministry of Health and Stakeholders in improving maternal HIV retesting as an important step towards e-MTCT of HIV.

The differences in maternal HIV retesting between rural and urban areas will help Ministry of Health and Implementing Partners in the proper allocation of resources.

1.5 Research Questions

1.5.1 Broad Research Question

What is the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024.

1.5.2 Specific Research Questions

1. What is the prevalence of HIV retesting among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024?
2. What are the factors associated with HIV retesting among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024?

1.6 Objectives

1.6.1 Broad Objectives

To determine the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024.

1.6.2 Specific Objectives

1. To determine the prevalence of HIV retesting among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024.
2. To determine the factors associated with HIV retesting among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, during the year 2024.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence of HIV retesting among perinatal women

The prevalence of HIV retesting among perinatal women varies significantly between countries example in USA in a study conducted in a single hospital in Baltimore, Maryland the prevalence for HIV retesting is 28.4%(23), in African countries highest prevalence of maternal HIV retesting is seen in Kenya, in which 77% of women received at least one programmatic retest(19), in Zambia the prevalence for maternal HIV retesting 3 months after initial test is 67.3%(18), in Mozambique only 40.7% of women returned to ANC 3 months after the initial visit and they were eligible for retest and out of these 84.8% were retested(24), in another study conducted in South Africa which assessed the completeness of maternal HIV retesting only 11% of women received all the three recommended HIV tests (in South Africa pregnant women are tested on the first ANC visit, second test in the third trimester and third test during delivery)(25), in Tanzania according to a study conducted in Njombe the prevalence for maternal HIV retesting is 30.4%(17) another study at Ubungo, Dar es salaam in Tanzania shows maternal HIV retesting prevalence of 76.1%(20) and all these studies show that the prevalence for maternal HIV retesting is low and does not reach the global target that 95% of people (pregnant and breast-feeding) living with HIV know their status(21). Although in Tanzania following low prevalence for maternal HIV retesting interventions were kept in place for the aim of raising the prevalence for maternal HIV retesting so this study focused in determining post-interventional prevalence for HIV retesting and associated factors. The study will focus on maternal HIV retesting conducted in the third trimester, or during labor and delivery or postpartum.

2.2 Proportion of HIV infection among retested perinatal women

The proportion of HIV infection among retested perinatal women is low in many countries example in the study in Mozambique the proportion of HIV positivity is 0.3%(24) and in Kenya is 0.3%(19) that in Zambia is 0.5%(18). In Tanzania there is slightly higher proportion of women who test positive in second test example in Ubungo is 2.1%(20) and in Njombe is 13.3%(17) this could be due to difference in the prevalence of HIV infection between

regions, and in this study we are going to see the proportion of perinatal women who test positive during retest in Kilimanjaro region who had negative HIV results in first test.

2.3 Factors associated with HIV retesting among perinatal women

Marital status in which married women are more likely to be retested than those who are single, cohabiting, widowed or divorced this is seen in the studies conducted in Kenya(19) and Ubungo(20). Also, in a study conducted in Southern Ethiopia revealed that married women have higher odds of HIV testing than others(26).

Number of ANC visits in which those with many numbers of ANC visits are more likely to retest that those with few, examples in study conducted in Njombe maternal HIV retesting is associated with ≥4 ANC visits(17) and the study in Ubungo maternal HIV retesting is associated with ≥5 ANC visits(20). In study conducted in Ethiopia women who made 2-3 ANC visits were more likely to test for HIV than others(27), although in the study in Kenya number of ANC visits showed no associated with retesting(19)

Place of delivery is a factor that is seen to be associated with maternal HIV retesting in which those who delivered at referral hospitals are more likely to retest than those who deliver elsewhere this is seen in the study conducted in South Africa(25), also retesting is associated with receiving perinatal care at teaching hospital as seen in study conducted in USA(23). Women who deliver in health facility are more likely to be tested for HIV than those who deliver elsewhere this can be seen in the study conducted in Nepal(28).

Parity of the woman in which women with many previous pregnancies are more likely to retest this is seen in the study conducted in Kenya(19) although other studies failed to establish the association.

Level of education of the mother and employment status are among the factors associated with maternal HIV retesting such that women with secondary education and higher are more likely to retest than those with primary education or no education and also women who are employed are more likely to retest than those who are unemployed this is seen in the study conducted in Njombe(17). In another study conducted in rural Ethiopia showed that women with secondary education and higher are more likely to utilize voluntary HIV counselling

and testing than others(29) hence making them to have high probability of retesting. According to study conducted in Zambia women with high education level have high odds for testing HIV(30). And in a study in Lubumbashi, DR Congo showed that women with low level of education are less likely to be tested for HIV(31).

Year of enrollment is seen as a factor associated with maternal HIV retesting in studies involving data of more than one year example in study conducted in Kenya those who enrolled in 2018 were more likely to retest than others(19) and also in a study conducted in South Africa those who enrolled in 2015/2016 were more likely to retest than those who enrolled in 2014(25).

Perceived good quality of HIV counselling during the first ANC visit is associated with maternal HIV retesting compare to perceived poor quality and also use of condom during sexual intercourse is associated with HIV retesting these can be seen in the study conducted in Njombe, Tanzania(17).

Mothers age is associated with maternal HIV retesting such that women with age 25-34yrs are more likely to retest than those who are younger or elder and also women who know the HIV status of their partners are more likely to retest than those who do not know this is seen in the study conducted in Ubungo, Dar es salaam(20).

Place of residence is one of the factors associated with HIV retesting such that in a study conducted in Ethiopia showed that, women who resided in rural areas have high acceptability of the provider-initiated HIV testing and counselling(32) hence increasing their likelihood to test and even retest for HIV. But in another study done in East Africa indicated that those who live in rural areas are less likely to test for HIV(33). In Tanzania the association between place of residence and maternal HIV retesting has not been explored and in this study the relationship will be studied.

Distance from health facility such that those who live near to the health facilities offering HIV testing services are more likely to retest than those who live far. In a study done in rural Uganda show that those who live more than 3kms from a health facility offering HIV testing are less likely to be tested(34), also in rural Ethiopia women who walk for more than 30mins to the nearest health facility are less likely to be tested(29). In study conducted in Namibia

show that long distance to health facility prevented women from utilizing ANC services(35) this will eventually lead to failure to retest for HIV.

Availability of test kits given that in facilities were HIV test kits are available at all times women are more likely to retest this is seen in study conducted in Tanzania which showed that availability of tests increased the health care workers adherence to standard protocols of ANC visits(36) increasing chances that perinatal women are retested.

Given information on retesting such that perinatal women who are well informed or knowledgeable about HIV retesting are more likely to retest than those who are not aware. This can be observed in a study in Ethiopia which showed that women with no knowledge on HIV testing are less likely to test(37). Another study in Uganda show that those who are counselled on HIV testing are more likely to know there HIV status(38) this is because the chances they will test is high. Also in another study in South Africa show that those who were not told about HIV testing they did not test(39).

Time spent unattended in health facilities in which perinatal women wait for long hours before they are attended such that they leave without being tested(40), also spending more than 2 hrs. at the health facility before they are attended was associated with poor utilization of HIV testing services this is seen in a study conducted in Tanzania(41).

Inadequate number of health care providers at the health facilities is associated with not testing for HIV this can be seen in low and middle income countries(42), low acceptance of provider initiated HIV testing and counselling is due to shortage of staff according to study conducted in Ethiopia(43).

Fear of stigma and discrimination this can be seen in study undertaken in Kenya which showed that those women who anticipate stigma from their male partners refused to be tested for HIV(44), also in study conducted in South Africa revealed that fear of stigma made patients not to test for HIV(45) and also seen in study done in Brazil(46). Hence fear for discrimination and stigma will negatively affect maternal HIV retesting.

Women who are attended by HCWs who are trained about HIV retesting in pregnant and breast-feeding women are more likely to be retested. This finding is seen in the research conducted in Swaziland which showed that training increases HCWs knowledge about HIV/AIDS(47) and also, in a study conducted in Thailand showed that participants of the intervention group had higher self-efficacy in practice than the control group(48), meaning that they will have better practice that those who did not acquire the training.

Shifting or transfer of health facility during antenatal care can lower the chance that a woman will be retested. This is because it affects the relational and informational continuity build between a HCW and the client(49) hence making them not to be retested. Furthermore, a study in South Africa showed that transfer of patients between facilities was associated with poor outcomes(50).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Design

A facility based cross-sectional study design involving first test HIV negative perinatal women attending antenatal, RCH and post-natal clinics in Kilimanjaro region was employed.

3.2 Study Setting

Kilimanjaro is a region located in the northern part of Tanzania, and according to a study conducted in northern Tanzania the rate for MTCT of HIV is estimated to be high (6.3%) (51) Kilimanjaro consist of six districts which are Hai District, Moshi District, Mwanga District, Rombo District, Same District and Siha District (Figure 2). Moshi District is divided into two administrative Councils which are Moshi Municipal Council and Moshi District Council. Kilimanjaro has a total area of 5,120 sq mi, with a total of 335 health facilities offering PMTCT services and out of these 126 facilities received on-the-job training of HCWs on maternal HIV retesting.

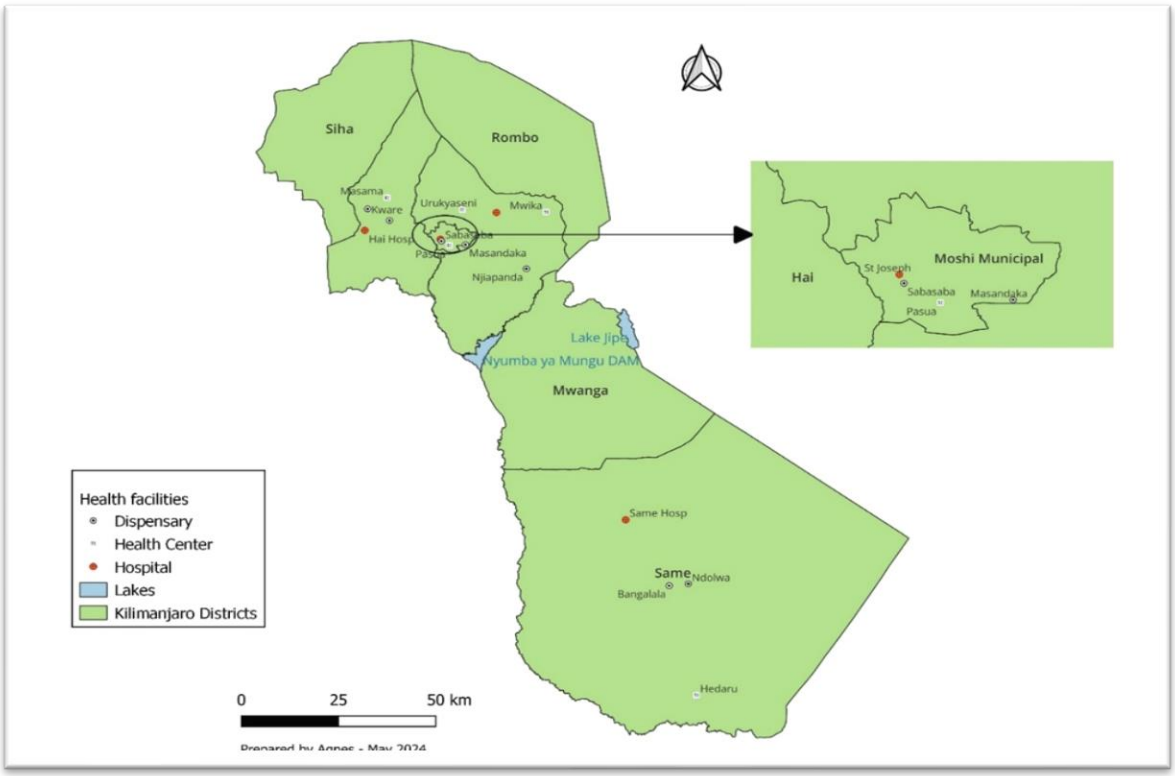


Figure 2: Map of Kilimanjaro region with selected Health facilities from four District Councils

3.3 Study Population

Perinatal women from 37 weeks of GA to 42 days after delivery, who were attending ANC, post-natal clinic or were taking their newborns for immunization at the reproductive and child health clinic in the selected health facilities.

3.3.1 Inclusion Criteria

Perinatal women who previously tested HIV negative during their first antenatal screening and had their ANC cards with them.

3.3.2 Exclusion Criteria

Those who were unable to consent due to various reasons such as mental health problems were excluded.

3.4 Sample Size

Sample size was calculated using a single proportion formular where 95% confident interval was used and precision level set at 5% (20).

P was the prevalence of HIV negative perinatal women who were retested of 76.1% according to the study conducted at Ubungo, Dar es salaam in Tanzania and the non-response rate of 10% (20).

Design effect of 1.5 was used(26).

$$n = DE^* \frac{(1.96)^2\, p(1-p)}{d^2}$$

$$n = 1.5^* \frac{(1.96)^2\, 0.761(1-0.761)}{(0.05)^2}$$

$$n = 420$$

final sample size = n / (100- NRR)

final sample size = 420 / (100-10)

= 467

Hence the minimum sample size for this study was 467

3.5 Sampling Technique

Multi-stage Cluster Sampling technique was used in which out of the 6 districts in Kilimanjaro, 3 district were selected in which Moshi District was selected conveniently, since it consists of the most urban council which is Moshi Municipal Council and rural

district council which is Moshi District Council. The remaining two districts were selected using simple random sampling technique employing lottery method. On the second stage, from selected four District Councils (Hai District Council, Moshi Municipal Council, Moshi District Council and Same District Council) stratified sampling techniques was used in which health facilities were stratified into those which received on-the-job training of HCWs and those which did not receive on-the-job training and 2 facilities were selected from each stratum using simple random sampling, hence a total of 8 trained and 8 untrained health facilities were selected (Figure 3). Facilities involved were those with RCH and post-natal clinic and also, those with high volume of clients. From the selected heath facilities simple random sampling was employed to select perinatal women meeting the inclusion criteria, perinatal women were selected on each facility based on the sampling weights proportional to the number of clients.

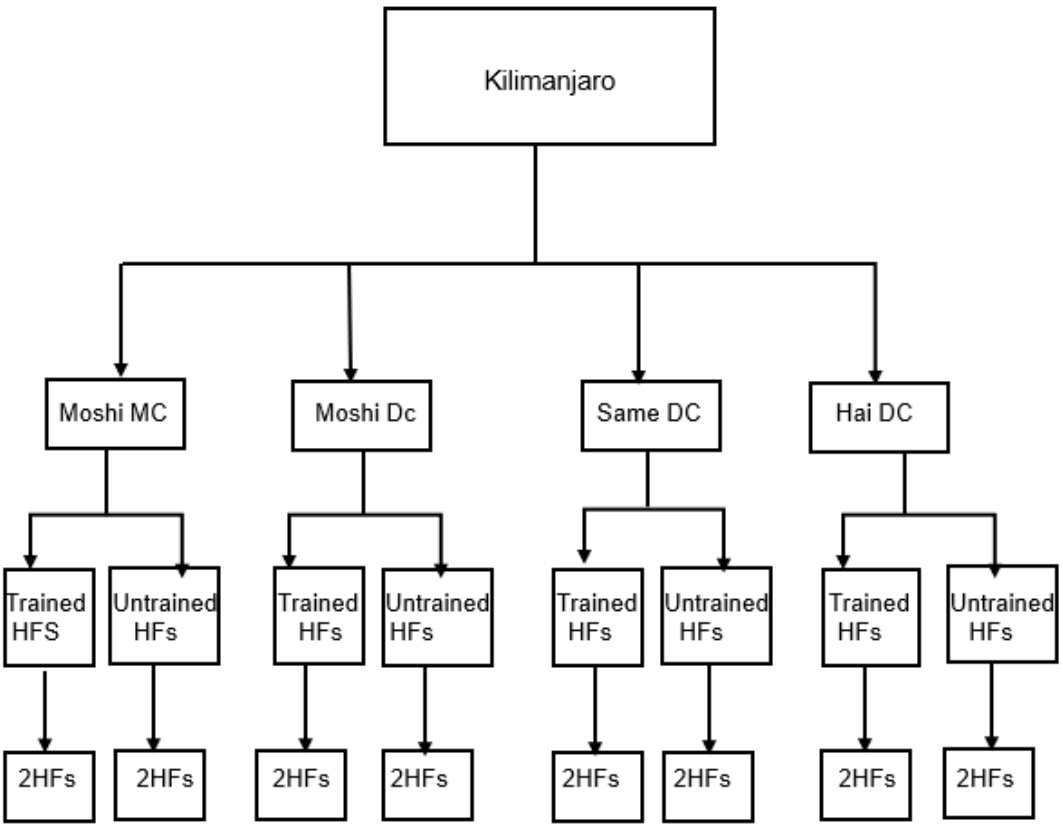


Figure 3: Sampling of health facilities where perinatal women were recruited to be included in the study

3.6 Variables

3.6.1 Independent Variables

Independent variables which were assessed included distance from health facility which was categorized (≤10min, 11-30min, >30min), time spent unattended (<1hr, 1-2hrs, >2hrs) and employment status (employed, entrepreneur, farmer and housewife). Other variables were dichotomized example mother's age which was grouped (15-24yrs. and 25-44yrs.), mother's level of education low and high (secondary education and above), partner's level of education low and high, marital status married/Cohabiting vs others, parity ≤3 vs >3, mode of delivery SVD vs C/S, number of ANC visits ≤3 vs ≥4, gestation age at first ANC visit ≤12weeks vs ≥13weeks, place of residence rural vs urban (Moshi Municipal Council), Awareness on HIV testing during pregnancy twice vs Others(I don't know, once,3 ,4 or 5times), couple HIV testing during first ANC visit yes vs no, unavailability of test kits yes vs no, health facility training (trained vs untrained), attended more than one facility for ANC yes vs no, and fear of stigma and discrimination in which a list of 8 items were adapted from study in Kenya(44) which proved to be successful in accessing anticipated HIV/AIDS stigma, with 8 questions, were responded as yes vs no.

3.6.2 Dependent Variables

The dependent variable was HIV retesting which was dichotomized into retested vs not retested.

3.7 Data Collection

Data was collected using a semi structured questionnaire. Questionnaire was developed in English and later translated to Kiswahili. Three research assistants were trained to assist in data collection, questionnaire was administered through face-to-face interview. In which ANC cards were retrieved from perinatal women, and those who met the inclusion criteria and were selected to be in the study, a written informed consent was obtained from them. The information which was collected involved sociodemographic data such as age, marital status, level of education, employment status, partners level of education and place of residence. Obstetric history including parity, gestation age at first antenatal visit, number of antenatal visits made, mode of delivery and place attended ANC visits. Facility factors like ever given information about repeat HIV testing, availability of test kits, time spent

unattended, distance from health facility, and other information like couple HIV testing at first ANC and fear of stigma and discrimination. HIV retesting information on the 32-36week, labor or postpartum and the retest results were collected, this information was verified with that filled on the ANC card in-case of any discrepancy the information on ANC card was used.

3.8 Validity and Reliability

Pretesting was conducted at Majengo Health Center which was not included in the sampling process to see if the structured questionnaire developed had simple and clear language which was easily understood by research participants while avoid confusion and misinterpretation and any problem which was encountered was corrected, I also sought expert review from ministry of health (PMTCT-unit) on the questionnaire and some of the questions were adopted from previous conducted studies.

Reliability was ensured by training data collection assistants on maternal HIV retesting and by using standardized procedures in data collections to minimize variations (Data was collected with the help of software Kobo collect App). Test and retest reliability was estimated in which a single group of perinatal women in Majengo Health Center were administered with the questionnaire in two different occasions with an interval of 1 week to look at the consistency of the responses.

3.9 Data Analysis

Data was cleaned and analyzed with the help of STATA version 15.1.

For categorical variables, frequency and proportions were used to summarize the socio-demographic and obstetric characteristics of the study participants. The difference between proportions for categorical variables was compared using chi-square test, age was summarized using median and interquartile range. Prevalence of perinatal women who underwent HIV retesting was calculated and the respective 95% CI and also, the proportion of women who tested positive in the retest was calculated. Measure of association was calculated using prevalence ratio and 95% confidence interval was used, bivariable modified Poisson regression was used to check if there was an association between independent and dependent variable and respective P-values. Modified Poisson regression was used because

the outcome variable (HIV retesting) is binary and also, the prevalence of HIV retesting among perinatal women was >10%. Variables with P-value of < 0.2 from bivariable model were entered in a multivariable analysis to control for confounders, if magnitude of confounding was >10% then this showed that there was an effect of confounder. P value of < 0.05 was considered statistically significant in all models.

3.10 Ethical Considerations

Ethical approval for conducting the study was obtained from Muhimbili University of Health and Allied Sciences institutional review board. Permission for study conduction in the health facilities was obtained from Regional administrative secretary, regional medical officer, district medical officers and facility medical office in charge. Participants were provided with necessary information about the study and written informed consent was obtained and those who refuse to participate were excluded, adolescent between 15-18 yrs. (matured minor) who were matured and able to consent were included, Confidentiality of the participants was protected by use of identification number and information was only accessed by the researchers.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio-Demographic and Obstetric Characteristics of the Participants

A total of 467 perinatal women who met the inclusion criteria were interviewed. The median age of the study participants was 27 years. with interquartile range of (23-31years). Majority of the study participants lived in rural areas 332(71.1%), they were married/cohabiting 413(88.4%) with about halve having low level of education 239(51.2%) and engaged in entrepreneurial activities 210(45.0%). Most of the study participants had parity of less than four 377(80.7%), they made their first ANC visit at gestation age more than 12 weeks 328(70.2%) and they made ≥ 4 ANC visits 390(83.5%). Majority of them had normal delivery 287(78.5%) (Table 1).

Table 1: Sociodemographic and Obstetric characteristics of Perinatal women who tested Negative in the first Antenatal screening in Kilimanjaro region, April to May 2024.

Variable	Description	Frequency (N = 467)	Percentage
Age group	15-24	178	38.1
	25-44	289	61.9
Place of residence	Rural	332	71.1
	Urban	135	28.9
Marital status	Single/Divorced/Widowed	54	11.6
	Married/Cohabiting	413	88.4
Level of Education	Low	239	51.2
	High	228	48.8
Partner's level of education	Low	208	44.5
	High	259	55.5
Employment status	Housewife	107	22.9
	Employed	27	5.8
	Small business	210	45.0
	Peasant	123	26.3
Parity	≥4	90	19.3
	≤3	377	80.7
Gestation age	≥13	328	70.2
	≤12	139	29.8
Number of ANC visits	≤3	77	16.5
	≥4	390	83.5
Mode of delivery	Caesarean section	80	21.8
	SVD	287	78.2
Health facility training	Untrained	68	14.6
	Trained	399	55.4

NOTE: Total frequency for mode of delivery is 367 because 100 perinatal women had not yet delivered.

4.2 Prevalence of HIV retesting among perinatal women

HIV retesting was performed in 47.1% (95% CI 42.5-51.7) of the perinatal women in Kilimanjaro region during the study period. Of those retested, majority 196(89.1%) were tested during antenatal and about 3.2% (95% CI 1.3-6.4) of them turned positive (Figure 4). Prevalence of HIV retesting was significantly higher among those who were married/cohabiting 202(48.9%) than those who were single, divorced or widowed 18(33.3%) (p=0.03). Higher prevalence of HIV retesting was seen among perinatal women who made their first ANC clinic visit at ≤12 weeks 75(54.0%) than those who made first visit in more than 12 weeks 145(44.2%) (p=0.05). Additionally, high proportion of HIV retesting was seen among perinatal women who made ≥ 4 ANC visits 209(53.6%) than those who made less than 4 ANC visits 11(14.3%) (p<0.001). There was no significant difference in the proportion of HIV retesting in relation to age, place of residence, level of education, employment status, parity and mode of delivery (Table 2).

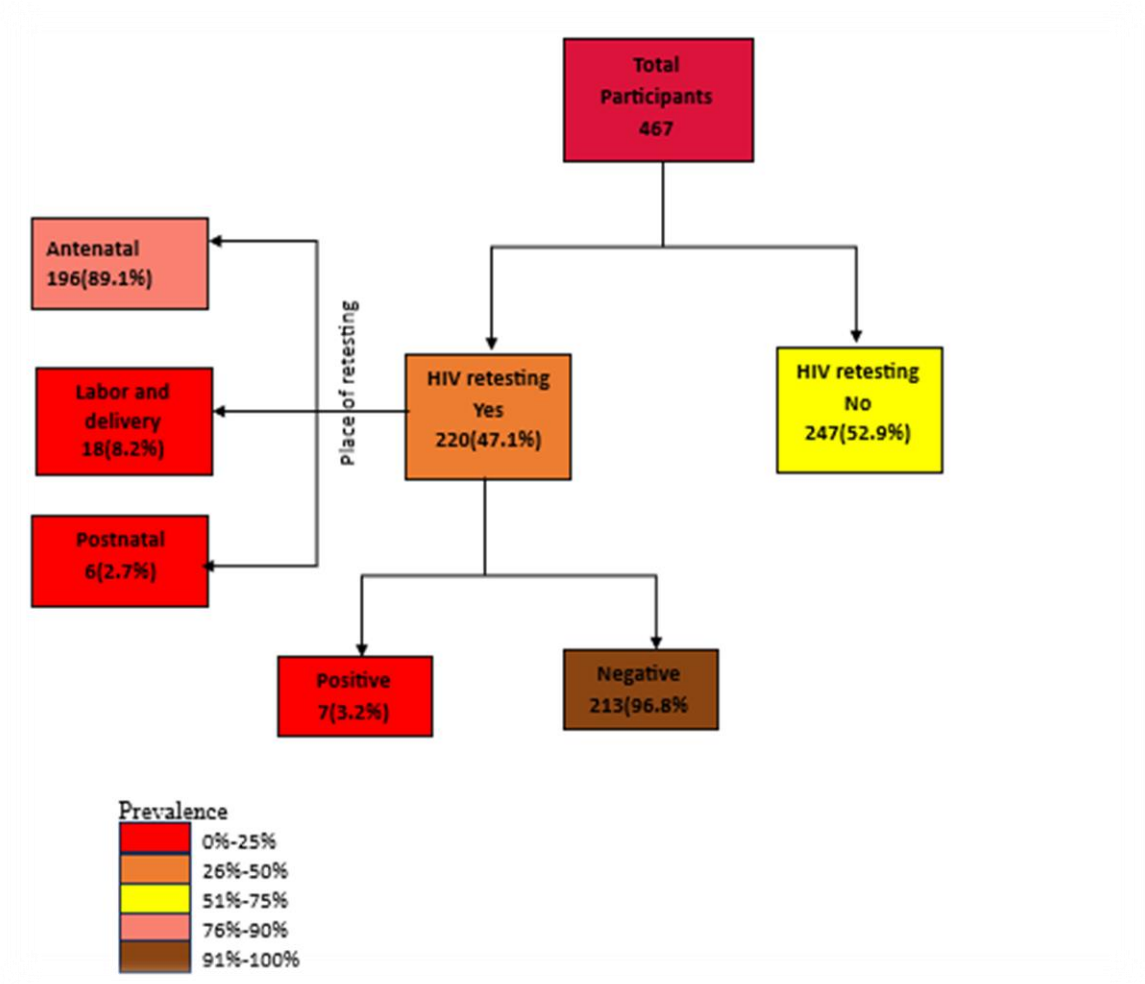


Figure 4: Prevalence of HIV retesting among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, April to May 2024.

Table 2: Prevalence of HIV retesting among perinatal women who tested negative in the first antenatal screening according to sociodemographic and obstetric characteristics in Kilimanjaro region, April to May 2024

Variable	Description	HIV retesting No n (%)	HIV retesting Yes n (%)	P value (Chi-square)
Age group	15-24	100 (56.2)	78 (43.8)	0.26
	25-44	147 (50.9)	142 (49.1)	
Place of residence	Rural	184 (55.4)	148 (44.6)	0.09
	Urban	63(46.7)	72 (53.3)	
Marital status	Single/Divorced/Widowed	36 (66.7)	18 (33.3)	0.03
	Married/Cohabiting	211 (51.1)	202 (48.9)	
Level of Education	Low	134 (56.1)	105 (43.9)	0.16
	High	113 (49.6)	115(50.4)	
Partner's level of education	Low	119 (57.2)	89 (42.8)	0.09
	High	128 (49.4)	131 (50.6)	
Employment status	Housewife	61 (57.0)	46 (43.0)	0.23
	Employed	16 (59.3)	11 (40.7)	
	Small business	100 (47.6)	110 (52.4)	
	Peasant	70 (56.9)	53 (43.1)	
Parity	≥4	47 (52.2)	43 (47.8)	0.89
	≤3	200 (53.0)	177 (47.0)	
Gestation age	≥13	183 (55.8)	145 (44.2)	0.05
	≤12	64 (46.0)	75 (54.0)	
Number of ANC visits	≤3	66 (85.7)	11 (14.3)	<0.001
	≥4	181 (46.4)	209 (53.6)	
Mode of delivery	Caesarean section	42 (52.5)	38 (47.5)	0.71
	SVD	144 (50.2)	143 (49.8)	
Health facility training	Untrained	59 (86.8)	9 (13.2)	<0.001
	Trained	188 (47.1)	211 (52.9)	

4.3 Factors associated with HIV retesting among perinatal women

In bivariate analysis gestation age, couple HIV testing during first ANC visit, number of ANC visits, health facility training and awareness on HIV testing during pregnancy showed a significant association with HIV retesting. Perinatal women who made their first ANC visit at a gestation age of ≤12 weeks (Crude prevalence ratio-CPR 1.22; 95%CI:1.00-1.48, P=0.05) those who attended ANC at a trained health facility (CPR 4.00; 95%CI:2.20-7.40, P<0.001) and those who made ≥4 ANC visits (CPR 3.75; 95%CI:2.15-6.54, P<0.001) were more likely to be retested than their counterparts. Perinatal women who were tested together with their partners during the first ANC visit were 29% more likely to be retested than those who were not (CPR 1.29; 95%CI:1.05-1.60, P=0.02) and those who were aware that a woman should be tested two times during pregnancy were almost two times more likely to retested than the others (CPR 1.91; 95%CI:1.54-2.36, P<0.001). Age, place of residence, level of education, employment status, parity, mode of delivery, attended more than one facility for ANC, distance from health facility, time spent unattended and unavailable HIV test kits showed no association with HIV retesting. Lastly, anticipation of stigma showed no association with HIV retesting (Table 3).

Multivariate regression analysis was conducted to assess independent factors associated with HIV retesting. Couple HIV testing during first ANC, number of ANC visits, health facility training, attended more than one facility for ANC and awareness on HIV testing during pregnancy were independently associated with HIV retesting. Perinatal women who were counselled and tested for HIV together with their partners during the first ANC visit had 31% higher likelihood of retesting for HIV than those who were not tested with their partners (Adjusted prevalence ratio-APR 1.31; 95%CI:1.07-1.60, P=0.01), perinatal women who made ≥4 ANC visits had almost three times the prevalence of HIV retesting than those who made less than four ANC visits (APR 2.95; 95%CI:1.71-5.09, P<0.001) and those who attended their ANC clinic at a health facility with trained health personnels on HIV retesting had 3.56 times higher likelihood of retesting for HIV than those who attended in a facility with untrained health personnel (APR 3.56; 95%CI:1.99-6.39, P<0.001). Perinatal women who attended only one health facility during ANC had 21% higher retesting prevalence than those who attended more than one facility (APR 1.21; 95%CI:1.01-1.45, P=0.04). Lastly, perinatal women who had awareness that pregnant women should be tested for HIV twice

had 57% higher prevalence of HIV retesting than those who don't know or knew only once, 3, 4 and five times (APR 1.57; 95%CI:1.28-1.92, P<0.001).

Table 3: Regression analysis of factors associated with HIV retesting among perinatal women who tested negative in the first Antenatal screening in Kilimanjaro region, April to May 2024

Variable	HIV retesting No n (%)	HIV retesting Yes n (%)	Bivariate analysis		Multivariate analysis	
			CPR (95% CI)	P value	APR (95% CI)	P value
Age groups						
15-24	100 (56.2)	78 (43.8)	***Ref***			
25-44	147 (50.9)	142 (49.1)	1.12 (0.91-1.37)	0.27		
Place of residence						
Rural	184 (55.4)	148 (44.6)	***Ref***			
Urban	63(46.7)	72 (53.3)	1.2 (0.98-1.46)	0.08	0.91 (0.75-1.09)	0.30
Marital status						
Single/Divorced/Widowed	36 (66.7)	18 (33.3)	***Ref***			
Married/Cohabiting	211 (51.1)	202 (48.9)	1.47 (0.99-2.17)	0.05	1.10 (0.79-1.52)	0.55
Level of education						
Low	134 (56.1)	105 (43.9)	***Ref***			
High	113 (49.6)	115(50.4)	1.15 (0.95-1.39)	0.16	0.95 (0.77-1.18)	0.64
Partner's level of education						
Low	119 (57.2)	89 (42.8)	***Ref***			
High	128 (49.4)	131 (50.6)	1.18 (0.97-1.44)	0.10	1.10 (0.89-1.36)	0.40
Employment Status						
Housewife	61 (57.0)	46 (43.0)	***Ref***			
Employed	16 (59.3)	11 (40.7)	0.95 (0.57-1.57)	0.84		
Small Business	100 (47.6)	110 (52.4)	1.22 (0.95-1.57)	0.13		
Peasant	70 (56.9)	53 (43.1)	1.00 (0.74-1.35)	0.99		
Parity						
≥4	47 (52.2)	43 (47.8)	***Ref***			
≤3	200 (53.0)	177 (47.0)	0.98 (0.77-1.25)	0.89		
Gestation Age						
≥13	183 (55.8)	145 (44.2)	***Ref***			
≤12	64 (46.0)	75 (54.0)	1.22 (1.00-1.48)	0.05	1.16(0.98-1.39)	0.09
Couple HIV testing during first ANC Visit						
No	111 (60.0)	74 (40.0)	***Ref***			
Yes	136 (48.2)	146 (51.8)	1.29 (1.05-1.60)	0.02	1.31 (1.07-1.60)	0.01

Table 3. (Continued)

Variable	HIV retesting No n (%)	HIV retesting Yes n (%)	Bivariate analysis		Multivariate analysis	
			CPR (95% CI)	P value	APR (95% CI)	P value
Number of ANC visits						
≤3	66 (85.7)	11 (14.3)	***Ref***			
≥4	181 (46.4)	209 (53.6)	3.75 (2.15-6.54)	<0.001	2.95 (1.71-5.09)	<0.001
Mode of delivery						
Caesarean section	42 (52.5)	38 (47.5)	***Ref***			
SVD	144 (50.2)	143 (49.8)	1.05 (0.81-1.35)	0.72		
Health facility training						
Untrained	59 (86.8)	9 (13.2)	***Ref***			
Trained	188 (47.1)	211 (52.9)	4.00 (2.20-7.40)	<0.001	3.56 (1.99-6.39)	<0.001
Attended more than one facility for ANC						
Yes	116 (58.0)	84 (42.0)	***Ref***			
No	131 (49.1)	136 (50.9)	1.21(0.99-1.48)	0.06	1.21 (1.01-1.45)	0.04
Awareness on HIV testing during pregnancy						
Don't know, 1,3,4 and 5 times	157 (67.7)	75 (32.3)	***Ref***			
Twice	90 (38.3)	145 (61.7)	1.91 (1.54-2.36)	<0.001	1.57 (1.28-1.92)	<0.001
Distance from health facility						
31-180min.	99 (53.5)	86 (46.5)	***Ref***			
10-30min.	128 (50.6)	125 (49.4)	1.06 (0.87-1.30)	0.55		
≤10min.	20 (69.0)	9 (31.0)	0.67 (0.38-1.17)	0.16		
Time spent unattended						
>2hrs.	9 (50.0)	9 (50.0)	***Ref***			
1-2 hrs.	78 (57.3)	58 (42.7)	0.85 (0.52-1.41)	0.54		
<1hr.	160 (51.1)	153 (48.9)	0.97 (0.61-1.57)	0.93		
Unavailable HIV test kits						
Yes	15 (62.5)	9 (37.5)	***Ref***			
No	232 (52.4)	211 (47.6)	1.27 (0.75-2.15)	0.37		
ANTICIPATED HIV STIGMA						
Anticipated losing job						
Yes	9 (52.9)	8 (47.1)	***Ref***			
No	238 (52.9)	212 (47.1)	1.00 (0.60-1.67)	0.99		
Anticipated family refusing to provide care when ill						
Yes	24 (57.1)	18 (42.9)	***Ref***			
No	223 (52.5)	202 (47.5)	1.11(0.77-1.59)	0.58		
Anticipated rejection by family members						
Yes	28 (58.3)	20 (41.7)	***Ref***			
No	219 (52.3)	200 (47.7)	1.15 (0.81-1.63)	0.45		

Table 3. (Continued)

Variable	HIV retesting No n (%)	HIV retesting Yes n (%)	Bivariate analysis		Multivariate analysis	
			CPR (95% CI)	P value	APR (95% CI	P value
Experiencing negative treatment at work or school						
Yes	10 (66.7)	5 (33.3)	***Ref***			
No	237 (52.4)	215 (47.6)	1.43 (0.69-2.94)	0.34		
Anticipated being left by partner or spouse						
Yes	79 (57.3)	59 (42.8)	***Ref***			
No	168 (51.1)	161 (48.9)	1.14 (0.92-1.43)	0.23		
Anticipated Suffering physical abuse from your partner						
Yes	66 (51.2)	63 (48.8)	***Ref***			
No	181 (53.6)	157 (46.4)	0.95 (0.77-1.17)	0.64		
Anticipated being isolated from the society						
Yes	22 (56.4)	17 (43.6)	***Ref***			
No	225 (52.6)	203 (47.4)	1.09 (0.75-1.58)	0.66		
Anticipated Losing friends						
Yes	57 (52.3)	52 (47.7)	***Ref***			
No	190 (53.1)	168 (46.9)	0.98 (0.79-1.23)	0.89		

CHAPTER FIVE

DISCUSSION, LIMITATION, CONCLUSION AND RECOMMENDATIONS

5.0 Discussion

The study estimated the prevalence of HIV retesting and associated factors among perinatal women who tested negative during the first antenatal care screening. Our study showed that the prevalence of HIV retesting among perinatal women was 47.1% and among those who retested 3.2% of them tested positive for HIV. HIV retesting was significantly higher among women who were tested for HIV together with their partners on the first ANC visit, those who were attended by a trained health care worker who had prior training on HIV retesting among perinatal women and those who made more than four ANC visits. Furthermore, HIV retesting was significantly higher among perinatal women who attended only one health facility for ANC and those who had awareness that a woman should be tested for HIV twice during pregnancy.

Prevalence of HIV retesting in our study is lower than in the study conducted in Kenya in which 77% of women received at least one programmatic retested(19). This can be explained by the fact that Kenya included Maternal HIV retesting in their guidelines since 2018(52), while in Tanzania it was included in 2023(16) . However, the estimated prevalence of HIV retesting in. this study was higher than that of a study conducted in Njombe in which 30.4% of women were retested(17). The higher retesting proportion in this study could be explained by the increased number of healthcare workers in health facilities who have received training on HIV retesting to pregnant and breast-feeding women this is because in 2022 HCWs were trained on HIV retesting in pregnant and breastfeeding women.

In this study, 3.2% of women who were retested were found to be infected with HIV. This estimate was higher than in the studies conducted in Mozambique (0.3%) (24), Kenya (0.3%) (19), and in Zambia 0.5%(18), but it was lower than in a study conducted in Njombe which was 13.3%(17) . The higher proportion of HIV seropositivity in Njombe could be attributed by the fact that Njombe has higher prevalence of HIV infection in the general population than Kilimanjaro(53).

Perinatal women who made more than four antenatal care visits were more likely to retest than those who made less than four visits. This is because women who make many ANC visits increases their time of encounter with health care worker hence higher probability of retest. Similar findings have also been reported in a study conducted in Ethiopia in which women who visited ANC two or three times were more likely to accept voluntary counselling and testing because they were exposed to more health related knowledge(26). Similarly, results from a study, conducted in Njombe indicated that pregnant women who made more than four ANC visits were more likely to retest(17).

Perinatal women who had awareness that a woman should be tested twice during pregnancy had higher likelihood of retesting for HIV compared to their counterparts. This finding is consistent with the study conducted in Adis abbas Ethiopia which showed that the reason for not testing for HIV among pregnant women was lack of knowledge about HIV Counselling and testing(37). Results from another study conducted in Rwanda showed that pregnant women with comprehensive knowledge on HIV were more likely to retest(54). All these studies highlight the importance of providing knowledge and disseminating information on HIV and HIV testing during perinatal period which can be done during antenatal care visits and through media campaigns.

Furthermore, it was observed that pregnant women who were counseled and tested together with their partners during the first antenatal care visit, had higher prevalence of HIV retesting than those who were not tested with their partners. This could be explained by the fact that those who were tested together with their partners knew the serostatus of their partners making them more confident to retest. This finding is corroborated by a study conducted in Nigeria showing that willingness to self-test was lower among women who were unaware of their husbands HIV status(55) . A study done in Ubungo also showed that knowledge of partner's serostatus was associated with HIV retesting(20). This strengthens the importance of encouraging pregnant women to attend antenatal care clinic together with their partners on the first ANC visit so that they can be counselled and tested for HIV together.

Attending a health facility with trained health care workers on maternal HIV retesting during pregnancy and breast feeding was associated with HIV retesting among perinatal women in this study. This finding is consistent with the research conducted in Swaziland which showed

that training increases HCWs knowledge about HIV/AIDS(47). Likewise, a study conducted in Thailand showed that participants of the intervention group had higher self-efficacy in practice than the control group(48). This showcases the importance of training HCWs attending pregnant and breastfeeding women in all health facilities in the country regarding HIV retesting in pregnant and breast-feeding women as an important step in reaching the 95% goal of maternal HIV retesting.

Perinatal women who attended only one health facility for antenatal care were more likely to be retested than those who attended more than one facility. Attending only one health facility build clients relational continuity with the HCWs ultimately building trust and involving them in improving their health over time(49). Furthermore, information continuity on their patients will more likely increase the possibilities of retesting their patients(49). A study in South Africa showed that transfer between facilities was associated with poor outcomes(50). In relation to HIV retesting among pregnant and breastfeeding women shifting health facilities increases the chances of not been retested because not all HCWs in all health facilities are trained on HIV retesting.

5.1 Limitation

During recruitment, women who did not have ANC cards were excluded and this might have introduced selection bias hence fail to represent all pregnant women. Recall bias for other HIV related services not recorded in ANC cards might have affected our findings. However, the possibility for this event is rare due to rigorous training of healthcare workers and dedicated use of ANC cards. We used cross-sectional study design which may be difficult to establish causality.

5.2 Conclusion

Prevalence of HIV retesting among pregnant and breastfeeding women is still low compared to the national target of 95% with 3.2% of women retesting positive for HIV. Factors which were associated with HIV retesting among perinatal women were couple HIV testing during first ANC visit, number of ANC visits, health facility training, attending only one health facility for ANC and lastly, awareness on HIV testing during pregnancy. Place of residence showed no association with HIV retesting

5.3 Recommendations

To archive the 95% target of HIV retesting among pregnant and breastfeeding women, Ministry of Health and Implementing Partners should train all health care workers attending pregnant and breastfeeding women in all health facilities in the country on HIV retesting for pregnant and breastfeeding women. Ministry of Health should continue to provide knowledge on HIV testing during pregnancy and breast feeding to perinatal women so that they can be aware of when they are to be retested. Ministry of Health and Stakeholder should Continue to sensitize pregnant women to go with their partners on the first ANC visit so that they can be counselled and tested for HIV together and also, for them to make the 6 recommended ANC visits.

REFERENCES

1. WHO. Consolidated guidelines on HIV testing services [Internet]. Vol. 53, North Carolina medical journal. 2019. p. 55. Available from: https://www.who.int/publications/i/item/978-92-4-155058-1

2. Prevention, Centers for Disease Control. About HIV_AIDS _ HIV Basics _ HIV_AIDS _ CDC. Centre for Disease control and prevention (CDC). 2019. p. 1.

3. Joint United Nations Programme on HIV/AIDS (UNAIDS). Global HIV & AIDS statistics — Fact sheet [Internet]. Unaids. 2021. p. 2020–2. Available from: https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf

4. Global AIDS Monitoring. Progress reports submitted by countries - United Republic of Tanzania. Ctry Prog Rep [Internet]. 2020;5–48. Available from: https://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/2020countries

5. Wu J, Lai T, Han H, Liu J, Wang S, Lyu J. Global, regional and national disability-adjusted life years due to HIV from 1990 to 2019: findings from the Global Burden of Disease Study 2019. Trop Med Int Health. 2021 Jun;26(6):610–20.

6. Vyas S, Luwanda LB, Guinness L, Kajoka D, Njau P, Renju J, et al. Cost variations in prevention of mother-to-child HIV transmission services integrated within maternal and child health services in rural Tanzania. Glob Public Health. 2021 Feb;16(2):305–18.

7. WHO. Global HIV Programme [Internet]. World Health Organization. 2020. p. HIV data and statistics. Available from: https://www.who.int/data/gho/data/themes/hiv-aids/data-on-the-size-of-the-hiv-aids-epidemic%0Ahttps://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/strategic-information/hiv-data-and-statistics

8. Astawesegn FH, Stulz V, Conroy E, Mannan H. Trends and effects of antiretroviral therapy coverage during pregnancy on mother-to-child transmission of HIV in Sub-

Saharan Africa. Evidence from panel data analysis. BMC Infect Dis. 2022 Feb;22(1):134.

9. Mboya E, Mizinduko M, Balandya B, Mushi J, Sabasaba A, Amani DE, et al. HIV burden and the global fast-track targets progress among pregnant women in Tanzania calls for intensified case finding: Analysis of 2020 antenatal clinics HIV sentinel site surveillance. PLoS One. 2023;18(10):e0285962.

10. Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS data 2023 [Internet]. 2023. Available from: https://www.unaids.org/sites/default/files/media_asset/data-book-2023_en.pdf

11. UNAIDS DATA 2020 [Internet]. [cited 2023 Jun 11]. Available from: https://www.unaids.org/sites/default/files/media_asset/2020_aids-data-book_en.pdf

12. World Health Organization. Elimination of Mother-to-child Transmission | WHO | Regional Office for Africa [Internet]. 2016. Available from: https://www.afro.who.int/health-topics/hivaids/emtct

13. UNICEF. The mother of all prevention | UNICEF United Republic of Tanzania [Internet]. Available from: https://www.unicef.org/tanzania/stories/mother-all-prevention

14. NATIONAL GUIDELINES FOR THE MANAGEMENT OF HIV AND AIDS 6th 2017 – NACP-National AIDS Control Programme [Internet]. Available from: https://nacp.go.tz/download/national-guidelines-for-the-management-of-hiv-and-aids/

15. Ministry of Health (MoH) [Tanzania Mainland], Ministry of Health (MoH) [Zanzibar], National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS) and I. Tanzania Demographic and Health Survey and Malaria Indicator Survey 2022 Key Indicators Report [Internet]. Dodoma, Tanzania, and Rockville, Maryland, USA: MoH, NBS, OCGS, and ICF; 2023. Available from: https://dhsprogram.com/pubs/pdf/PR144/PPR144.pdf

16. United republic of Tanzania. Ministry of Health. National AIDS Control Programme (NACP). National integrated HIV,Viral Hepatitis and STI management guidelines. 2023.

17. Nungu SI, Mghamba JM, Rumisha SF, Semali IA. Uptake and determinants for HIV postpartum re-testing among mothers with prenatal negative status in Njombe region, Tanzania. BMC Infect Dis. 2019 May;19(1):398.

18. Mandala J, Kasonde P, Badru T, Dirks R, Torpey K. HIV Retesting of HIV-Negative Pregnant Women in the Context of Prevention of Mother-to-Child Transmission of HIV in Primary Health Centers in Rural Zambia: What Did We Learn? J Int Assoc Provid AIDS Care. 2019;18:2325958218823530.

19. Penumetsa M, Neary J, Farid S, Kithao P, Richardson BA, Matemo D, et al. Implementation of HIV Retesting During Pregnancy and Postpartum in Kenya: A Cross-Sectional Study. Glob Heal Sci Pract. 2022 Feb;10(1).

20. Syikilili T, Kabalimu T, Semali I, Ntabaye M, Mashalla Y. Uptake of HIV Re-Testing among Postpartum Women Who Initially Tested Negative during Antenatal Visit in Ubungo District, Dar es salaam. Glob J Health Sci. 2022 May 9;14:22.

21. Frescura L, Godfrey-Faussett P, Feizzadeh A A, El-Sadr W, Syarif O, Ghys PD. Achieving the 95 95 95 targets for all: A pathway to ending AIDS. PLoS One. 2022;17(8):e0272405.

22. Rogers AJ, Akama E, Weke E, Blackburn J, Owino G, Bukusi EA, et al. Implementation of repeat HIV testing during pregnancy in southwestern Kenya: progress and missed opportunities. J Int AIDS Soc. 2017 Dec;20(4).

23. Liao C, Golden WC, Anderson JR, Coleman JS. Missed Opportunities for Repeat HIV Testing in Pregnancy: Implications for Elimination of Mother-to-Child Transmission in the United States. AIDS Patient Care STDS. 2017 Jan;31(1):20–6.

24. Teasdale CA, Choy M, Tsiouris F, De Gusmao EP, Banqueiro ECP, Couto A, et al. HIV retesting for pregnant and breastfeeding women across maternal child health

services in Nampula, Mozambique. PLoS One. 2023;18(3):e0283558.

25. de Beer S, Kalk E, Kroon M, Boulle A, Osler M, Euvrard J, et al. A longitudinal analysis of the completeness of maternal HIV testing, including repeat testing in Cape Town, South Africa. J Int AIDS Soc. 2020 Jan;23(1):e25441.

26. Gizaw R, Gebremdhin S. Acceptance of HIV Counseling and Testing among Antenatal Clinic Attendees in Southern Ethiopia. Ethiop J Health Sci. 2018 Jul;28(4):413–22.

27. Assefa S DD. Willingness of antenatal care attendees towards voluntary HIV counseling and testing, Southern, Ethiopia. Int J Pregn Chi Birth [Internet]. 2020;6(4):104–12. Available from: https://doi.org/10.15406/ipcb.2020.06.00206

28. Bhattarai N, Bam K, Acharya K, Thapa R, Shrestha B. Factors associated with HIV testing and counselling services among women and men in Nepal: a cross-sectional study using data from a nationally representative survey. BMJ Open. 2021 Dec;11(12):e049415.

29. Teklehaimanot HD, Teklehaimanot A, Yohannes M, Biratu D. Factors influencing the uptake of voluntary HIV counseling and testing in rural Ethiopia: a cross sectional study. BMC Public Health. 2016 Mar;16:239.

30. Heri AB, Cavallaro FL, Ahmed N, Musheke MM, Matsui M. Changes over time in HIV testing and counselling uptake and associated factors among youth in Zambia: a cross-sectional analysis of demographic and health surveys from 2007 to 2018. BMC Public Health. 2021 Mar;21(1):456.

31. Albert MT a N, Kayamba P, Donnen P, Chenge FM, Humblet P, Dramaix M, et al. [Postpartum women with unknown HIV status in Lubumbashi, DR Congo: proportion and determinants]. Pan Afr Med J. 2012 Aug 14;12:25.

32. Gebresillassie BM, Emiru YK, Erku DA, Mersha AG, Mekuria AB, Ayele AA, et al. Utilization of Provider-Initiated HIV Testing and Counseling as an Intervention for PMTCT Services Among Pregnant Women Attending Antenatal Clinic in a Teaching

Hospital in Ethiopia. Front public Heal. 2019;7:205.

33. Astawesegn FH, Stulz V, Agho KE, Mannan H, Conroy E, Ogbo FA. Prenatal HIV Test Uptake and Its Associated Factors for Prevention of Mother to Child Transmission of HIV in East Africa. Int J Environ Res Public Health. 2021 May;18(10).

34. Larsson EC, Thorson AE, Pariyo G, Waiswa P, Kadobera D, Marrone G, et al. Missed Opportunities: barriers to HIV testing during pregnancy from a population based cohort study in rural Uganda. PLoS One. 2012;7(8):e37590.

35. Amungulu M, Nghitanwa E, Mbapaha C. An investigation of factors affecting the utilization of antenatal care services among women in post-natal wards in two Namibian hospitals in the Khomas region. J Public Health Africa. 2023 Apr 20;14.

36. Bintabara D, Nakamura K, Ntwenya J, Seino K, Mpondo BCT. Adherence to standards of first-visit antenatal care among providers: A stratified analysis of Tanzanian facility-based survey for improving quality of antenatal care. PLoS One. 2019;14(5):e0216520.

37. Deressa W, Seme A, Asefa A, Teshome G, Enqusellassie F. Utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia. BMC Pregnancy Childbirth. 2014 Sep;14:328.

38. Namara-Lugolobi EC, Nakigozi G, Namukwaya Z, Kaye DK, Nakku-Joloba E. Prevalence and predictors of unknown HIV status among women delivering in Mulago National Referral Hospital, Kampala, Uganda. Afr Health Sci. 2017 Dec;17(4):963–73.

39. Mohlabane N, Tutshana B, Peltzer K, Mwisongo A. Barriers and facilitators associated with HIV testing uptake in South African health facilities offering HIV Counselling and Testing. Heal SA Gesondheid [Internet]. 2016 Oct 11;21:86–95. Available from: https://www. researchgate.net/ publication/324640853_ Barriers_and_facilitators_associated_with_HIV_testing_uptake_in_South_African_ health_facilities_offering_HIV_Counselling_and_Testing

40. Kwapong GD, Boateng D, Agyei-Baffour P, Addy EA. Health service barriers to HIV testing and counseling among pregnant women attending Antenatal Clinic; a cross-sectional study. BMC Health Serv Res [Internet]. 2014;14(1):267. Available from: https://doi.org/10.1186/1472-6963-14-267

41. Alfred M, Beati M, David N, Robert D, Edith T, David U, et al. Barriers to accessibility and utilization of HIV testing and counseling services in Tanzania: experience from Angaza Zaidi programme. PAMJ [Internet]. 2016 Apr;23(189). Available from: https://www.panafrican-med-journal.com/content/article/23/189/full

42. Razzaq A, Raynes-Greenow C, Alam A. Barriers to uptaking HIV testing among pregnant women attending antenatal clinics in low- and middle-income countries: A systematic review of qualitative findings. Aust New Zeal J Obstet Gynaecol [Internet]. 2021 Dec 1 [cited 2023 Aug 2];61(6):817–29. Available from: https://doi.org/10.1111/ajo.13430

43. Abdurahman S, Seyoum B, Oljira L, Weldegebreal F. Factors affecting acceptance of provider-initiated HIV testing and counseling services among outpatient clients in selected health facilities in Harar Town, Eastern Ethiopia. HIV AIDS (Auckl). 2015;7:157–65.

44. Turan JM, Bukusi EA, Onono M, Holzemer WL, Miller S, Cohen CR. HIV/AIDS stigma and refusal of HIV testing among pregnant women in rural Kenya: results from the MAMAS Study. AIDS Behav. 2011 Aug;15(6):1111–20.

45. Peltzer K, McHunu G, Tutshana B, Naidoo P, Matseke G, Louw J. Predictors of non-uptake of human immunodeficiency virus testing by tuberculosis public primary patients in three districts, South Africa. Iran J Public Health. 2012;41(11):19–26.

46. Martins TA, Kerr L, Macena RHM, Mota RS, Dourado I, Brito AM de, et al. Incentives and barriers to HIV testing among female sex workers in Ceará. Rev Saude Publica. 2018 Jun;52:64.

47. Kamiru HN, Ross MW, Bartholomew LK, McCurdy SA, Kline MW. Effectiveness of a training program to increase the capacity of health care providers to provide

HIV/AIDS care and treatment in Swaziland. AIDS Care. 2009 Nov;21(11):1463–70.

48. Phoosuwan N, Lundberg PC, Phuthomdee S, Eriksson L. Intervention intended to improve public health professionals' self-efficacy in their efforts to detect and manage perinatal depressive symptoms among Thai women: a mixed-methods study. BMC Health Serv Res. 2020 Feb;20(1):138.

49. Schwarz D, Hirschhorn LR, Kim J-H, Ratcliffe HL, Bitton A. Continuity in primary care: a critical but neglected component for achieving high-quality universal health coverage. BMJ Glob Heal. 2019;4(3):e001435.

50. Odayar J, Chi BH, Phillips TK, Mukonda E, Hsiao N-Y, Lesosky M, et al. Transfer of Patients on Antiretroviral Therapy Attending Primary Health Care Services in South Africa. J Acquir Immune Defic Syndr. 2022 Jul;90(3):309–15.

51. Buchanan AM, Dow DE, Massambu CG, Nyombi B, Shayo A, Musoke R, et al. Progress in the prevention of mother to child transmission of HIV in three regions of Tanzania: a retrospective analysis. PLoS One. 2014;9(2):e88679.

52. Republic of Kenya. Ministry of Health. National AIDS & STI Control Program (NASCOP). Guidelines on Use of Antiretroviral Drugs for Treating and Preventing HIV Infection in Kenya [Internet]. 2018.

53. Joint United Nations Programme on HIV/AIDS (UNAIDS). Tanzania HIV/AIDS [Internet]. 2023. Available from: https://www.usaid.gov/sites/default/files/2023-06/HIV-AIDS TANZANIA Factsheet.pdf

54. Nuwabaine L, Kawuki J, Namulema A, Asiimwe JB, Sserwanja Q, Gatasi G, et al. Factors associated with HIV testing among pregnant women in Rwanda: A nationwide cross-sectional survey. PLOS Glob public Heal. 2024;4(1):e0002728.

55. Iliyasu Z, Galadanci HS, Musa AH, Iliyasu BZ, Nass NS, Garba RM, et al. HIV self-testing and repeat testing in pregnancy and postpartum in Northern Nigeria. Trop Med Int Health. 2022 Jan;27(1):110–9.

APPENDICES

Appendix I: English Questionnaire

SECTION A: INTRODUCTION		
1	Name of interviewer……	Date of interview……
2	Participant ID……	Health facility name…….
3	Region……	District……Ward…… Village/Street……...
SECTION B: SOCIODEMOGRAPHIC CHARACTERISTICS		
1	Age	…….
2	Level of education (circle only one answer)	a) No formal education b) Primary education c) Secondary education d) University
3	Partner's level of education (circle only one answer)	a) No formal education b) Primary education c) Secondary education d) University
4	Marital status (circle only one answer)	a) Single b) Married c) Divorced d) Widowed e) Cohabiting

5	Employment status (circle only one answer)	a. Employed b. Entrepreneur c. Farmer d. Unemployed
SECTION C: OBSTETRIC AND MEDICAL HISTORY (Confirm with the information filled in the antenatal card)		
1	Parity	……..
2	Place attended antenatal care clinic (select one)	a. Dispensary b. Health center c. Hospital d. Regional referral hospital e. Zonal referral hospital
3	For the current pregnancy have you ever attended another health facility for ANC services	a. Yes b. No If yes what is the level of the health facilities attended……
4	Date at first ANC booking	…./…../……..
5	Gestation age at first ANC booking	…… weeks
6	Date at first HIV test	…./…../……
7	Did your partner get tested (select one)	a. Yes b. No

8	Do you know his results (Select one)	a. Yes b. No
9	Number of ANC visits	…….
10	Has the mother already delivered? (Skip questions number 11 and 12 if the mother has not delivered)	a. Yes b. No
11	Place of delivery (select one)	a. Home delivery b. Dispensary c. Health center d. Hospital e. Regional referral hospital f. Zonal referral hospital
12	Mode of delivery (select one)	a. Spontaneous vaginal delivery b. Cesarean section c. Assisted vaginal delivery
SECTION D: INFORMATION ABOUT MATERNAL HIV RETESTING		
1	Were you ever informed at any time about repeat HIV testing while attending ANC?	a. Yes b. No

2	How many times is one supposed to retest during pregnancy?	…… If I don't know write I don't know
3	How many times is one supposed to retest during breast feeding	…… If I don't know write I don't know
SECTION E: FACILITY FACTORS		
1	What is the average time required for you to arrive at the nearest health facility providing HIV counselling and testing services to pregnant and breast-feeding women?	……. minutes
2	Have you ever visited a health facility for HIV test and be informed that the test kits were not available?	a) Yes b) No
3	Are the existing healthcare personnel enough to attend to all pregnant and breast-feeding women coming to this clinic?	a) Strongly agree b) Agree c) Uncertain d) Disagree e) Strongly disagree
4	How long do you wait at the clinic without being attended to?	……minutes

SECTION F: HIV/AIDS STIGMA		
Do you think any of these possible consequences might happen if you test positive for HIV and others discover this information? (Circle answer)		
1	Bad treatment from health care workers	Yes/No
2	Losing job	Yes/No
3	Family refusing to provide care when ill	Yes/No
4	Rejection by family members	Yes/No
5	Experiencing negative treatment at work or school	Yes/No
6	Being left by partner or spouse	Yes/No
7	Suffer physical abuse from your partner	Yes/No
8	Isolated from the society	Yes/No
9	Lose friends	Yes/No
SECTION G: HIV RETESTING INFORMATIONS (verify with ANC card)		
1	Were you retested for HIV during pregnancy, labor and delivery or during postnatal	a. Yes b. No
2	If yes, what were the results	a. Positive b. Negative
3	Date for second HIV retesting	……./……./……..

4	Where was the retesting done	a. ANC b. Labor and delivery c. Post-natal If at ANC, at what GA ……weeks
5	If no, what do you think is the reason behind not getting retested	…….
6	What do you think should be done to improve maternal HIV retesting (encourage women retest)	……

Appendix II: Dodoso La Kiswahili

SEHEMU A: UTANGULIZI		
1	Jina la mdadisi …….	Tarehe ya mahojiano …….
2	Namba ya utambulisho ……	Jina la kituo cha huduma ……...
3	Mkoa ……...	Wilaya……... Kata……. Kijiji/mtaa…….
SEHEMU B: TAARIFA ZA UTAMBULISHO ZA MSHIRIKI		
1	Umri	……
2	Kiwango cha elimu (chagua jibu moja)	a. Sijawahi Kwenda shule b. Elimu ya msingi c. Elimu ya sekondari d. Chuo kikuu
3	Kiwango cha elimu cha mwenza (chagua jibu moja)	a. Sijawahi Kwenda shule b. Elimu ya msingi c. Elimu ya sekondari d. Chuo kikuu
4	Hali ya ndoa (chagua jibu moja)	a. Sijaolewa b. Nimeolewa c. Nimeachika d. Mjane e. Tunaishi bila ndoa
5	Unajishugulisha na kazi gani (chagua jibu moja)	a) Nimeajiriwa b) Mjasiriamali

		c) Mkulima d) Mama wa nyumbani
SECTION C: TAARIFA ZA MIMBA NA AFYA (Hakiki taarifa anazotoa na zilizojazwa kwenye kadi ya kliniki ya ujauzito)		
1	Amejifungua mara ngapi	…….
2	Mahali alipohudhuria kliniki ya ujauzito (Chagua jibu moja)	a. Zahanati b. Kituo cha afya c. Hospitali d. Hospitali ya rufaa ya mkoa e. Hospitali ya rufaa ya kanda
3	Wakati wa ujauzito uliwahi hudhuria kituo kingine cha afya kwa ajili ya kliniki ya uzazi?	a) Ndiyo b) Hapana Kama ndiyo, hicho kituo ni cha kiwango gani…….
4	Tarehe ya maudhurio ya kwanza ya kliniki ya ujauzito	……/…../…….
5	Umri wa mimba alipofanya hudhurio la kwanza la kliniki ya ujauzito	…… wiki
6	Tarehe ya kipimo cha kwanza cha VVU	……./……./…….
7	Je, mwenza alipimwa maambukizi ya VVU	a. Ndiyo b. Hapana
8	Je, unajua hali ya maambukizi ya VVU ya mwenza wako	a. Ndiyo b. Hapana
9	Idadi za maudhurio ya kliniki ya ujauzito	…….

10	Je, mama kashajifungua tayari? (Ruka swali la 11 na 12 kama bado hajajifungua)	a) Ndiyo b) Hapana
11	Mahali alipojifungulia (Chagua jibu moja)	a. Nyumbani b. Zahanati c. Kituo cha afya d. Hospitali e. Hospitali ya rufaa ya mkoa f. Hospitali ya rufaa ya kanda
12	Namna aliyojifungua (Chagua jibu moja)	a. Kawaida b. Kwa upasuaji c. Kujifungua kwa msaada njia ya uke
SEHEMU D: TAARIFA JUU YA UFAHAMU WA KIPIMO CHA MARUDIO CHA VVU		
1	Je, ulishawahi ambiwa juu ya kipimo cha marudio cha VVU wakati wowote wa maudhurio ya kliniki?	a. Ndiyo b. Hapana
2	Ni mara ngapi mama mjamzito anatakiwa kupima maambukizi ya VVU	…….. (kama hajui andika sijui)
3	Ni mara ngapi mama anayenyonyesha anatakiwa kupima maambukizi ya VVU	…….. (kama hajui andika sijui)

SEHEMU E: SABABU ZA VITUO VYA HUDUMA		
1	Je, unatumia wastani wa muda gani kufika katika kituo cha afya kinachotoa huduma za ushauri na upimaji wa VVU kwa wanawake wajawazito na wanaonyonyesha karibu nawe?	Dakika ……
2	Je, umewahi kutembelea kituo cha afya kwa ajili ya kupima VVU na ukajulishwa kuwa vifaa vya upimaji havipo?	a) Ndiyo b) Hapana
3	Je, watoa huduma wa afya waliopo wanatosha kuhudumia wanawake wajawazito na wanaonyonyesha wote wanaofika kliniki hii?	a) Nakubaliana sana b) Nakubaliana c) Sina uhakika d) Siungi mkono e) Siungi mkono kabisa
4	Je, unasubiri kliniki bila kuhudumiwa kwa muda gani?	Dakika ……
SEHEMU F: UNYANYAPAA WA VVU/UKIMWI		
Je, unafikiri mojawapo ya matokeo haya yanaweza kutokea ikiwa utapimwa na kukutwa na VVU na wengine wakagundua habari hii? (Chagua jibu sahihi)		
1	Kutendewa vibaya na wafanyakazi wa huduma za afya	Ndiyo/hapana
2	Kupoteza kazi	Ndiyo/hapana
3	Familia kukataa kukupa huduma wakati wa ugonjwa	Ndiyo/hapana

4	Kukataliwa na wanafamilia	Ndiyo/hapana
5	Kukutana na matibabu hasi kazini au shuleni	Ndiyo/hapana
6	Kuachwa na mwenza	Ndiyo/hapana
7	Kukumbana na unyanyasaji wa kimwili kutoka kwa mwenza	Ndiyo/hapana
8	Kuachwa pekee katika jamii	Ndiyo/hapana
9	Kupoteza marafiki	Ndiyo/hapana
SEHEMU G: TAARIFA JUU YA KIPIMO CHA MARUDIO CHA VVU (thibitisha nakilicho andikwa kwenye kadi ya kliniki ya ujauzito)		
1	Je, uliwahi fanyiwa kipimo cha marudio cha VVU wakati wa ujauzito, kujifungua au baada ya kujifungua	a. Ndiyo b. Hapana
2	Kama ndiyo, majibu yakoje	a. Anamaambukizi b. Hanamaambukizi
3	Tarehe ya kipimo cha pili cha marudio kilifanyika	……/……./……..
4	Kipimo kilifanyika wapi?	a. Kwenye kliniki ya wajawazito b. Wakati wa kujifungua c. Kwenye kliniki ya baada ya kujifungua Kama ni kwenye kliniki ya wajawazito, umri wa mimba ulikuwa……... wiki
5	Kama hapana, nini ndiyo sababu iliyokupelekea kutofanya kipimo cha marudio	……
6	Unashauri nini kifanyike ili kuchochea upimaji wa marudio wa VVU kwa kina mama wajawazito na wanaonyonyesha	……

Appendix III: Informed Consent (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES, DIRECTORATE OF RESEARCH & PUBLICATIONS

ID-NO ……

Consent to participate in this study

Hey, Am Agnes Fridomu Njau. Doing research with the objective of determining the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, 2024.

Objective

The objective of this research is to gather information on the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, 2024. We request you to be part of this research because you are a woman who is attending ANC, RCH and post-natal clinic and you tested negative during your first HIV test when pregnant. If you decide to participate, a number of questions will be asked using a questionnaire which will take only 10 minutes and also your ANC card will be reviewed by the researcher, and only non-identifying information will be asked such as your age.

Confidentiality

We promise to keep all the information collected confidential. Information will be accessible only to the research team and no identifying information will be included.

Risk

Participating in this study will not cause you any harm.

Withdrawal rights

Study involvement is voluntary and refusal to participate won't involve any loss of privileges or penalty.

Benefits:

Findings obtained from this research will be useful in promoting awareness about maternal HIV retesting in pregnant and breastfeeding as an important step towards elimination of MTCT of HIV. Factors associated with maternal HIV retesting identified in this study will be used to provide recommendations for improvement

Contacts:

For any questions regarding this research;

Kindly reach out to main researcher; Agnes Njau-0653149567

Email: ansilanjau5@gmail.com.

For questions about participants' rights contact;

Chairperson of college research and publication communities: **Prof. Bruno Sunguya**
P.O.BOX 65001, Dar es Salaam

Phone number: +255685217272

I_____ acknowledge that I have read and understood the information within this document and all my concerns were responded. Therefore, I agree to be part of this study.

Participant's signature _____

Investigator's signature_____

Date consent signed _____

Appendix IV: Informed Consent (Swahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI
FOMU YA RIDHAA
NAMBA YA UTAMBULISHO……

Ridhaa ya kushiriki katika utafiti huu.
U hali gani? Mimi naitwa Agnes Fridomu Njau, ninafanya utafiti wenye lengo la kutathimini kiwango cha upimaji wa marudio wa VVU na sababu za upimaji miongoni mwa wanawake waliokuwa hawana maambukizi wakati wa kipimo cha kwanza cha VVU walipokuwa wajawazito Kilimanjaro, 2024.

Malengo ya utafiti.
Madhumuni ya utafiti huu ni kukusanya taarifa kuhusu kiwango cha upimaji wa marudio wa VVU na sababu za upimaji miongoni mwa wanawake waliokuwa hawana maambukizi wakati wa kipimo cha kwanza cha VVU walipokuwa wajawazito Kilimanjaro, 2024. Tunakualika kuwa mmoja wa washiriki katika utafiti huu kwa sababu wewe ni mwanamke ambaye ni mjamzito au umejifungua hivi karibuni na ulipimwa kipimo cha kwanza cha VVU wakati ukiwa mjamzito na kukutwa huna maambukizi. Ikiwa utachagua kushiriki, utaulizwa maswali kuhusiana na upimaji wa marudio wa VVU na hayatachukua zaidi ya dakika 10 kukamilika. Taarifa zitakazokusanywa hazitakuwa na utambulisho wa moja kwa moja kama umri.

Usiri.
Tunakuhakikishia kuwa taarifa zako tulizokusanya zitakuwa siri. Wanao husika na utafiti huu ndo wanaweza kuziona. Taarifa zote za utambulisho binafsi hazitawekwa kwenye kumbukumbu zetu.

Madhara:
Hutopata madhara yoyote kwa kushiriki kwenye utafiti huu.

Haki ya kujitoa na njia mbadala:
Ushiriki katika utafiti huu niwa hiari. Usipochagua kushiriki kwenye utafiti huu hutapata madhara yoyote mfano adhabu au kupoteza faida.

Faida:

Matokeo yatokanayo na utafiti huu yatasaidia kuongeza uelewa juu ya kiwango cha upimaji wa kipimo cha marudio cha VVU miongoni mwa wakina mama wajawazito na wanaonyonyesha ili kupunguza kasi ya maambukizo ya VVU kutoka kwa mama kwenda kwa mtoto. Pia utafiti huu utawezesha kutambua sababu zinazoweza kuhusishwa na upimaji wa marudio wa VVU kwa kina mama wajawazito na wanaonyonyesha na kutoa mapendekezo jinsi ya kuongeza kiwango cha upimaji wa marudio wa VVU ilikupunguza maabukizo ya VVU kutoka kwa mama kwenda kwa mtoto.

Watu wa kuwasiliana nao.

Kwa maswali juu ya utafiti huu wasiliana na;

Mratibu mkuu wa utafiti; Agnes Njau-0653149567,

Barua pepe: ansilanjau5@gmail.com.

Kwa maelezo zaidi juu ya haki za mshiriki wasiliana na;

Mwenyekiti wa kamati ya chuo ya utafiti na machapisho; Prof. **Bruno Sunguya**,

S.L.P 65001 Dar es Salaam,

Namba ya simu: +255685217272.

Mimi_____ninakiri kuwa nimesoma na nimeilewa kilichoandikwa kwenye fomu hii na maswali yangu yamejibiwa. Nimeridhia kushiriki katika utafiti huu.

Saini ya mshiriki ……

Saini ya mtafiti …….

Tarehe …….....

Appendix V: Ethical Clearance

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/2015 Date: 07/02/2024

MUHAS-REC-02-2024-2015
AGNES FRIDOMU NJAU
SHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE OF HIV RETESTING AND ASSOCIATED FACTORS AMONG PERINATAL WOMEN WHO TESTED NEGATIVE IN THE FIRST ANTENATAL SCREENING IN KILIMANJARO REGION

Reference is made to the above heading,

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 07/02/2024
EXPIRATION DATE OF APPROVAL: 07/02/2025

STUDY DESCRIPTION:
Purpose:

The purpose of this facility base cross-sectional study is to determine the prevalence of HIV retesting and associated factors among perinatal women who tested negative in the first antenatal screening in Kilimanjaro region, 2024.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014554.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Appendix VI: Introduction letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.830/2022

13th February, 2024

The Regional Administrative Secretary,
P.O. Box 3070,
KILIMANJARO

Re: INTRODUCTION LETTER

The bearer of this letter is Agnes Fridomu Njau (HD/MUH/T.830/2022), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. Applied Epidemiology.

As part of his studies he intends to do a study titled: **"Prevalence of HIV Retesting and Associated Factors Among Perinatal Women who Tested Negative in the First Antenatal Screening in Kilimanjaro Region."**

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Victoria Mwanihwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c. Agnes Fridomu Njau

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam; Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VII: Permission Letter

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS

TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA KILIMANJARO
Anwani ya Simu:'REGCOM'KILIMANJARO
Simu Na. Moshi +255 (027) 2754236/7,
Nukushi Na. +255 (027) 2752184
Barua Pepe : ras@kilimanjaro.go.tz
ras.kilimanjaro@tamisemi.go.tz
Unapojibu tafadhali taja:

Ofisi ya Mkuu wa Mkoa,
17 Barabara ya Florida,
S.L.P 3070,
25107 - MOSHI

Kumb. Na. DC.109/228/01/"J"/57

16 Februari, 2024

Mkurugenzi wa Manispaa,
S.L.P 318,
MOSHI.

Mkurugenzi Mtendaji,
Halmashauri ya Wilaya,
HAI, SIHA, MOSHI, ROMBO, MWANGA na **SAME**

Kuh: **KIBALI CHA KUFANYA UTAFITI**

Tafadhali husika na somo tajwa hapo juu.

2. Mwanafunzi **Agness Fridomu Njau** wa Chuo Kikuu cha Afya na Sayansi Muhimbili amepata kibali cha kufanya utafiti ikiwa ni sehemu ya masomo yake.

3. Utafiti huu unalenga kuenea kwa upimaji wa VVU na mambo yanayohusiana na Wanawake wajawazito ambao walipimwa bila kipimo katika uchunguzi wa kwanza wa ujauzito Mkoani Kilimanjaro, ***"Prevalence of HIV Retesting and Associated factors among Perinatal Women who tasted negative in the first antenatal screening in Kilimanjaro Region".***

4. Kwa barua hii, nautambulisha utafiti huu kwako ili uweze kumpa ushirikiano atakaouhitaji kufanikisha utafiti huu.

5. Ninashukuru kwa ushirikiano.

Devotha Nsapara
Kny:- **KATIBU TAWALA WA MKOA**

Nakala: Katibu Tawala wa Mkoa - Aione kwenye jalada

Agness Njau,
MWANAFUNZI

Appendix VIII: Digital Receipt

turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Agnes Njau
Assignment title:	PROPOSAL
Submission title:	PREVALENCE OF HIV RETESTING AND ASSOCIATED FACTORS ...
File name:	Final_Dissertation_edited.docx
File size:	5.59M
Page count:	56
Word count:	12,897
Character count:	70,885
Submission date:	27-Jun-2024 07:45AM (UTC+0300)
Submission ID:	2163947533



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Appendix IX: Plagiarism Certificate



PREVALENCE OF HIV RETESTING AND ASSOCIATED FACTORS AMONG PERINATAL WOMEN WHO TESTED NEGATIVE IN THE FIRST ANTENATAL SCREENING IN KILIMANJARO REGION

ORIGINALITY REPORT

28%	25%	14%	11%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	dspace.muhas.ac.tz:8080 Internet Source	5%
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3	Submitted to Muhimbili University of Health and Allied Sciences Student Paper	3%
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