

Predictors of attrition among human immunodeficiency virus (hiv) infected youth initiated on antiretroviral treatment in rorya district council, tanzania

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**PREDICTORS OF ATTRITION AMONG HUMAN
IMMUNODEFICIENCY VIRUS (HIV) INFECTED YOUTH INITIATED
ON ANTIRETROVIRAL TREATMENT IN RORYA DISTRICT
COUNCIL, TANZANIA**

By

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**A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree
of Master of Public Health of**

**Muhimbili University of Health and Allied Sciences
October, 2021**

CERTIFICATION

The undersigned certifies that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences dissertation titled; **“Predictors of attrition among human immunodeficiency Virus (HIV) infected youth initiated on antiretroviral treatment in Rorya District Council, Tanzania”**, in (partia) fulfillment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

Prof. Switbert R. Kamazima

(Supervisor)

Date

DECLARATION AND COPYRIGHT

I, **Naseeb M. Shemndolwa**, 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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DEDICATION

I dedicate this research report to my family for their moral and emotional support which gave me the strength and courage to accomplish this study.

ABSTRACT

Background: Retention on HIV care and treatment is an essential pre-requisite in achieving HIV epidemic control as it reduces the chances of treatment failure and further transmission. The burden of HIV infection is higher among youth who also experience higher attrition rates compared to other age groups. Understanding the dynamics of their retention on HIV treatment and predictors of attrition is necessary for establishing streamlined interventions targeting this population.

Objective: This study examined the retention and predictors of attrition among HIV-infected youth enrolled on care and treatment in Rorya District Council (DC), Mara region.

Methodology: A clinic-based cross sectional study was conducted in Rorya DC, Tanzania. Study participants included all HIV-infected youths who were consecutively initiated on ART between October 2017 and September 2018. Records on participant's characteristics during enrolment and their clinic visits to a maximum of 12 months after ART initiation were reviewed. The data on specified variables were captured by using a pre-tested structured data collection tool and Stata IC 14 was used for data entry, cleaning and analysis. The proportion of youths retained were determined by descriptive analysis and predictors of attrition were determined via multivariate logistic regression.

Results: A total of 253 client's records meeting the inclusion criteria were collected and analyzed. Overall the retention at 3, 6, and 12 months were 81.4%, 69.2%, and 59.3% respectively. Independent predictors of attrition among youth were being aged 20-24 years (AOR, 5.3, CI: 2.56-10.94), being male (AOR, 6.61, CI: 2.46-17.74), being single or never married (AOR, 4.66, CI: 2.13- 10.23), having a baseline WHO clinical stage 2 or 3 (AOR, 0.02, CI: 1.09-4.63) and reporting having no treatment supporter (AOR, 9.22, CI: 2.38-35.79).

Conclusion: The overall retention of HIV-infected youth initiated on ART is still low with a higher decline in the first three months of ART and only 59.3% are retained by the end of 12 months. Independent predictors of attrition among youth are age, sex, WHO clinical stage 2 and 3, marital status, and having no treatment supporter. Urgent attention to retaining PLHIV youth initiated on treatment is required and should focus to target youths with high risks for attrition.

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome.
ART	Anti-retroviral therapy.
CBHS	Community Based HIV Services.
CTC	Care and Treatment Clinic.
FSWs	Female Sex Workers.
HIV	Human Immunodeficiency Virus.
KVP	Key and Vulnerable Population.
YKP	Young Key Population.
LTFU	Loss to Follow Up.
MoHCDEC	Ministry of Health, Community Development, Gender, Elderly & Children
MSM	Men who have sex with men.
NACP	National AIDS Control Program (Tanzania).
PLHIV	People Living with HIV.
PMTCT	Prevention of Mother to Child HIV Transmission.
PWID	People who inject drugs.
RCH	Reproductive and Child Health.
SDM	Service Delivery Model.
TACAIDS	Tanzania Commission for AIDS.
THIS	Tanzania HIV Impact Survey.
WHO	World Health Organization.

DEFINITIONS OF TERMS

Retention: A continuous engagement from diagnosis in a package of prevention, treatment, support and care services.[1]

Attrition: A continuous process in which clients drop out of care, which occurs over time, thus present a decline in the number of clients enrolled in care and treatment service.[1]

Loss to Follow Up (LTFU): Refers to HIV-infected individuals who are not taking an ART to refill for a period of 3 months or longer from the last attendance and is not yet classified as dead or transferred-out i.e. clients with unknown outcomes.[2]

Youth: United Nations (UN) defines ‘youth’ for statistical consistency across countries as those persons between the ages of 15 and 24 years.[3]

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

About 36% of new HIV infections occur among the youth every day in the world.[4] Currently, over 4 million youth are HIV-infected globally, and among them, more than 60% are living in Eastern and Southern Africa. In Tanzania, about 0.2 million youth are HIV-infected comprising 11% of all People Living with HIV (PLHIV) in the country.[4] Rorya district which is in the Mara region located in Northwestern Tanzania has an HIV prevalence of 4%.[5]

HIV infection is acquired through vertical transmission (from mother to child) or horizontal transmission (between individuals during sex or needle-sharing with HIV-infected person). While Prevention of Mother to Child Transmission (PMTCT) has reduced a significant number of perinatal HIV-infection over time, horizontal transmission remains a disproportional burden.[6] Youth are at increased risk of HIV infection due to their vulnerable social context and risky behaviours. For vulnerable populations, the risk of HIV transmission is associated with physical and emotional changes as they advance from childhood to adulthood with underdeveloped life skills.[6][7] They are often faced with peer pressure, sexual coercion, and violence including abuse and exploitation.[8] Socio-cultural factors in middle and low-income countries such as female genital mutilation, early marriage, marriage by abduction, wife inheritance and sexual cleansing are also associated with increased exposure and the spread of HIV infection. Furthermore, risky behaviours such as unprotected transactional sex, anal sex, and needle sharing among injecting drug users heighten the chances of acquiring HIV infection.[6]

In order to control the HIV epidemic by 2030, the United Nations (UN) has set forth 90-90-90 and 95-95-95 targets, whereby 2020 and 2030, respectively, at least 90% and 95% of people living with HIV be aware of their status, at least 90% and 95% of those with known status be on antiretroviral treatment (ART) and at least 90% and 95% of PLHIV on ART to achieve

viral suppression.[9] Diagnosis of HIV infection is an entry point into the HIV treatment cascade and linkage to care and retention are vital in achieving viral suppression which is the ultimate goal of HIV treatment and public health measures.

Retention on HIV care and treatment is defined from the initial engagement in care when a person diagnosed with HIV is linked successfully to services, initiated, and retained on care and treatment services.[1] In Sub Saharan Africa, the HIV-infected client is considered retained on care and treatment if he or she is alive and on ART at a specified time point per clinical record.[10] It can be measured with different methods including appointment adherence, clinic visits over a defined period, or a combination of both.[11] Retention has benefits on optimal clinical outcomes, prevention of further HIV transmission of HIV, and reducing healthcare costs. Attending clinic visits allows continuous access to ART, monitoring treatment response, and receiving continuous health education and psychosocial support in coping with HIV and AIDS.[11] Adherence to ART services result in HIV suppression and hence reduced chances of acquiring opportunistic infections as well as further HIV transmission.[12][13].

Attrition refers to a continuous process whereby clients default from HIV care and treatment services. The main categories for attrition include death, self-transfer out, or loss to follow-up (LTFU).[1] There are multiple definitions of classifying patients as LTFU but in Tanzania, the National AIDS Control Program (NACP), a patient is defined as LTFU if more than 90 days have elapsed since his/her last clinic visit.[13]

As one of the HIV epidemic countries, Tanzania has been implementing preventive, treatment and support interventions to accelerate efforts towards ending the HIV epidemic by 2030. These interventions include initiatives to increase focused HIV testing services through optimized provider-initiated testing, and counseling (PITC), community-based HIV testing services (CBHS), index testing, and HIV self-testing. In 2017, the country adopted the test and start strategy which allowed all individuals diagnosed with HIV infection to be linked to care and initiated on lifelong ART regardless of CD4 count or WHO clinical staging.[14]

Therefore, the number of youth who are diagnosed and initiated on ART is increasing and hence the increased demand for retaining them on HIV care and treatment services.

Most of the studies on retention to HIV treatment have focused on adults and among these, several have shown relatively lower retention rates of youth age compared to other age categories.[15-17] However, there is limited knowledge on the specific dynamics of retention on ART and predictors of attrition for this disproportionately affected population.

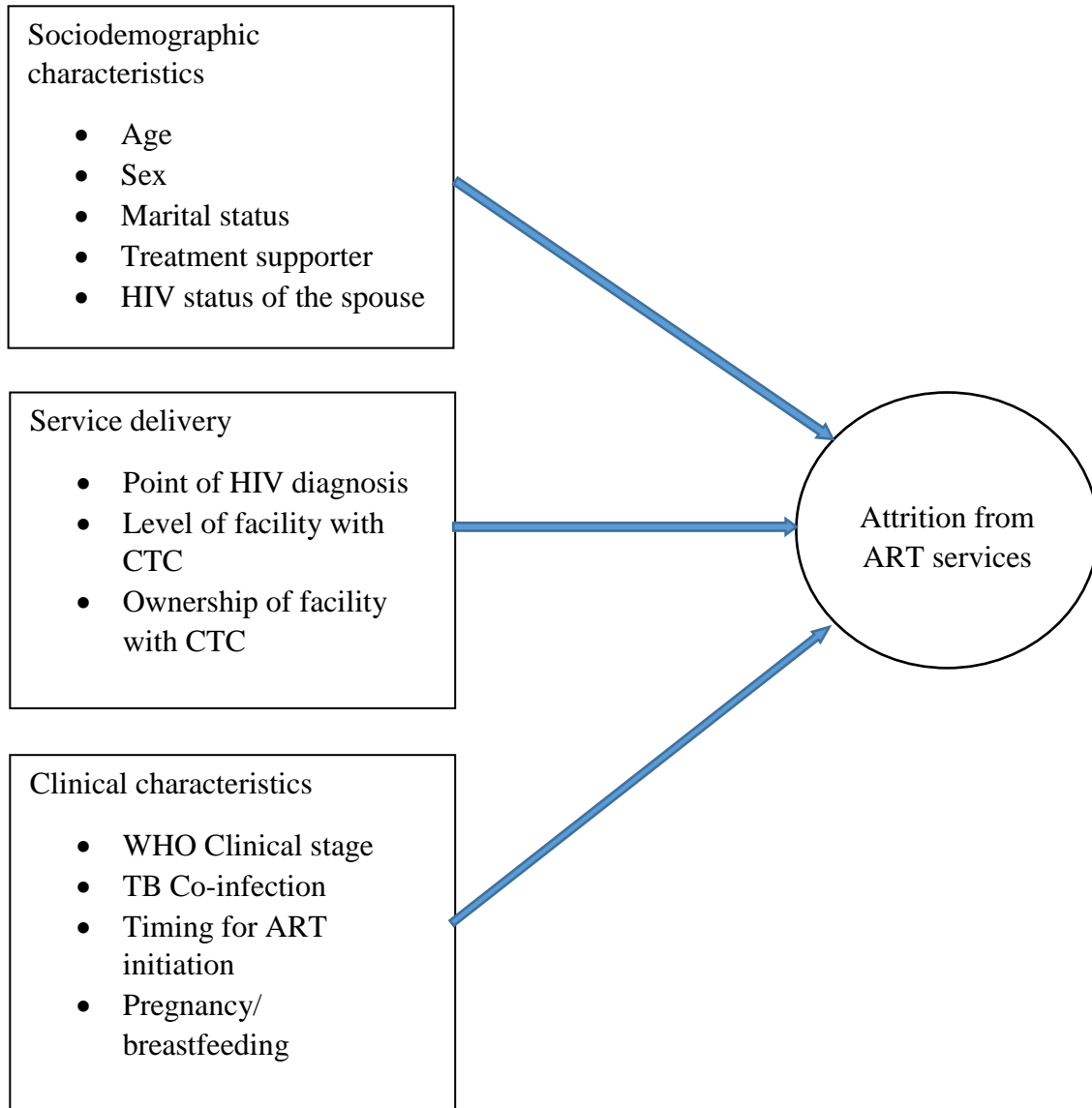
This study analyzed the retention of HIV-infected youth over a 1-year period, and examined socio-demographic and clinical characteristics associated with attrition in Rorya District Council, which has the highest population in the Mara region.

1.2 Problem statement

Youth experience higher HIV infection burden and lower rates of retention on HIV treatment compared to other age population categories. The inability to retain them on HIV treatment undermines efforts towards epidemic control. In Tanzania, there has been a scale-up in intervention to HIV diagnosis focusing on this high-risk population and initiating them on ART as per test and start strategy. However, if they are not retained on ART services, they stand a high chance for treatment failures, acquiring opportunistic infections, and further transmission of HIV. There is limited knowledge on the retention of youth after ART initiation and what predicts their attrition from treatment. In this regard, efforts employed to achieve retention on HIV treatment may not address youth-specific needs and hence not effectively work for them. In view of this, the current study reviewed the retention of this population and predictors of attrition from care and treatment services to inform programs and policy decisions for streamlining interventions to target their specific needs.

1.3 Conceptual Framework

Attrition from treatment among the HIV infected youth on ART is associated with the number of factors during initiation of treatment.



1.4 Rationale of the Study

Retention on HIV treatment is vital for the effectiveness of HIV prevention programs. Understanding the dynamics of retention on HIV care and treatment and predictors of attrition among youth who experience a higher burden of HIV epidemic is crucial for focusing interventions that will address their needs. This study was conducted in Rorya District where HIV prevalence is high and provided information on the rates of retention among youth and demographic and clinical characteristics associated with attrition among them. The study findings are intended to be used by policy and program decision-makers in deriving targeted strategies to address youth-specific needs for retention in this setting and other geographically related regions.

1.5 Research questions

1.5.1 Main research question

What are the retention rates and predictors of attrition among HIV-infected youth enrolled on care and treatment in Rorya DC?

1.5.2 Specific research questions

1. What were the rates of retention among the HIV-infected youths initiated on ART in Rorya DC after 3, 6 and 12 months among those who were enrolled from October 2017 to September 2018?
2. What were the predictors of attrition for HIV-infected youths who were initiated on care and treatment in Rorya DC from October 2017 to September 2018?

1.6 Objectives

Broad objective: To find out the retention of HIV-infected youth initiated on ART and predictors of attrition in Rorya DC, Tanzania.

1.6.1 Specific objectives

1. To determine the proportion of youths who were retained on HIV care and treatment at 3, 6 and 12 months after enrolment among those who were enrolled in Rorya DC from October 2017 to September 2018.
2. To establish demographic and clinical characteristics of HIV-infected youths who defaulted from care and treatment within 12 a months period among those who were enrolled in Rorya DC from October 2017 to September 2018.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Proportion of youth retained on HIV care and treatment

The findings from systematic review and meta-analysis of published studies globally, showed that only 62% of HIV-infected youth were retained on ART.[18] In this review, there were differences between regions with lower retention in Europe, South America and North America and higher ones in Africa and in Asia. The disparity was associated with generalized epidemic patterns of HIV infection and availability of effective PMTCT strategies in Africa where the majority of women become pregnant at this age group.[19]

Analysis of non-perinatally HIV-infected youth in the US demonstrated that less than 47% of newly enrolled HIV-infected youth retained for 1 year, and only 23% retained for 3 years.[20] This study also reported a strong association between retention in 1st year of ART and subsequent retention in the following years emphasizing the benefits of focusing interventions at this critical point.

A systematic review of adolescent HIV continuum of care in South Africa showed 83% of youth on ART were retained on care within the first one to two years of treatment and 81% were virally suppressed.[21] A recent study in Kenya describing 12 years' trend on ART found 72% of 15-19 years old youth and 74% in 20-24 years old youth retained on care.[22] Koech, *et al.*, in a study to determine the characteristics and outcomes of HIV-infected youth and young adolescents enrolled in HIV care in Kenya found that 21% of those initiated on treatment were lost within 12 months after ART initiation.[23]

A study conducted in seven African countries including Tanzania found that compared with older adults, adolescents and young adults had lower rates in all seven countries, reaching statistical significance in three countries (Côte d'Ivoire, Mozambique and Tanzania) in both crude and multivariable analyses. In this study, Tanzania had about 55% of youth retained on care, the rest being LTFU or reported dead.[24]

Findings from several studies have shown a decline in retention overtime among youth on HIV care and treatment.[25-26] A high proportion of youth drops within the first year of treatment and commonly during the first three months of enrolment.[21][27-28] Weigel, *et al.*, found that youth in Malawi experienced poor retention rates in the first year of ART, in particular during the first 3 months.[2] These findings underscore the need for targeted intervention immediately after ART initiation to improve retention among youth.

In Tanzania, a study on magnitude and reasons for attrition from HIV care and treatment showed a gradual decrease on retention over time from 74% at 6 months to 59% at 12 months.[29] Mee, *et al.*, assessed changes in patterns of retention on HIV care and treatment between 2008 and 2016 and found significant decline in retention among youth which was not observed in older age group categories.[17] However, in depth review studies on retention in this age category are limited.

2.3 Predictors of attrition among HIV infected youth initiated on ART

Several factors have been associated with attrition from HIV care and treatment.

Studies on comparison of youth's age category with attrition from HIV care and treatment services found mixed results. Findings from some studies on retention showed that the 15-19 years age group had higher attrition compared to the 20-24 years age group one year after ART initiation.[22][33][35] Contrary, other studies found higher attrition in the 20-24 years age group compared to the 15-19 years.[23][36-37] Furthermore, a number of studies showed no association between youth's age category and attrition.[28] A better understanding of the association of youth's age category with attrition in Rorya DC and similar settings in sub-Saharan Africa is needed to streamline the targeted interventions.

Similarly, inconsistent data are available on the association between sex and attrition rates among the youth population. On one hand, several studies found that youth males had a higher risk of attrition compared to female youth.[35][38-39] Lamb, *et al.*, found lower retention among both pregnant and non-pregnant women compared to men one year after ART initiation.[40] On the other hand, findings from other studies showed a higher likelihood of

attrition among female youths compared to their counterpart.[31-32] Moreover, there are studies that found no difference in attrition between female and male youths.[41]

Single persons and those who are separated or divorced have been found to have increased risk of attrition as a result of lack of social support and hence inability to adequately deal with the stigma and overall social and economic burden associated with HIV infection.[40] Hassan, *et al.*, found single clients have higher attrition rates compared to married monogamous and polygamous.[16] This finding is consistent with observation from another study conducted by Moges, *et al.*, in Ethiopia and Mecha, *et al.*, in Kenya.[22][42] In contrast, other studies have shown no association between marital status and attrition among youth on HIV treatment.[28][43] A study conducted in Tanzania to assess factors associated with attrition among PLHIV found that clients with young age and those with single marital status were at higher risk for attrition compared to their counterparts.[15]

A number of studies have reported less attrition among PLHIV on ART with treatment supporters compared to their counterparts.[2][42][44] This may be attributed by the social support to overcome psychosocial and structural barriers to access and adhere to HIV care and treatment services.[45-46] Non-disclosure of HIV status has been identified as one of the reasons for a delay in taking medication and attending appointment clinics in fear of stigma and discrimination.[47] A study in Kisumu, Kenya, also showed a higher risk for attrition among clients who have never disclosed their status as compared to youth who had disclosed their status to anyone (family/friends).[28]

Furthermore, a study conducted in a rural setting in Tanzania showed that clients who had no HIV-infected partners were at high risk of attrition and the lack of family support and stigma were cited as contributing reasons.[38] Brown, *et al.*, found an association of the increased retention with the presence of infected household member among youth on HIV treatment compared to the counterpart.[43]

The WHO Clinical stage of client's initiated on ART has been associated with the risk for attrition. Several studies have found a significant association of advanced WHO clinical stage with attrition among HIV-infected youths initiated on ART.[16][39][49] Other studies have

observed that advanced WHO clinical staging was protective of attrition among HIV-infected youth on HIV treatment.[37] Additionally, some studies found no association between WHO stage and attrition.[50-51]

Pregnancy and breastfeeding states have been identified as one of the risks for attrition among PLHIV on care and treatment services.[28][36] Puttkammer, *et al.*, found that only 47% of pregnant women were retained after 12 months of ART initiation with 25% defaulting within the first three months after enrolment.[37] In this study, among the pregnant women, the youth had poorer retention than older pregnant women one year of ART initiation.[37] In the analysis focusing on attrition among youth after ART initiation showed higher attrition among youth enrolled through PMTCT compared to other entry points.[40] Although youth males have been observed to have relatively lower rates of retention, Ojwang, *et al.*, found that women who became pregnant, show lower retention rates compared to non-pregnant women and men.[28] A similar observation was found in a multicountry analysis (Kenya, Tanzania and Uganda) which compared the rates and factors associated with LTFU in the young population. In this study, older adolescents (15-19 years) had significantly higher attrition compared to young adolescents or adults.[49]

Clients co-infected with HIV and TB are at increased risk of morbidity and mortality as HIV infection exacerbates the progression of TB and TB accelerates the rate of HIV progression. Tayler-Smith, *et al.*, observed significant levels of patient attrition from HIV treatment due to either ART non-adherence or non-adherence to TB treatment.[52] As TB is the leading cause of death for PLHIV, some individuals die from untreated TB before they are diagnosed with TB/HIV co-infection. However, Lamb, *et al.*, found higher rates of retention among youth enrolled on HIV care and treatment while on TB treatment compared to those who were not on TB treatment.[40]

The rates of attrition have also been found to be associated with the level of the facility delivering ART services. In a study conducted in East Africa, PLHIV receiving ART services in the District hospitals had lower attrition rates compared to primary healthcare facilities.[48] This was explained to be attributed by availability of additional services such as laboratory

capacity as well as clients were experiencing less stigma in being attended outside their local community. Other studies found lower attrition rates in settings with decentralized HIV care and treatment services where accessibility is improved.[56][58] Lamb, *et al.*, found no significant difference on attrition among youth by location or type of facility.[40]

A study by Umeonkokwo *et al.*, found that PLHIV on ART were more satisfied with care and treatment services in Public health facilities compared to Private health facilities.[72] In this study, the satisfaction was measured by convenience, affordability, technical quality and effective communication. Contrary, the results from the study in Lesotho found no difference on the rates of attrition among public and private healthcare facilities providing HIV care and treatment services.[53]

A number of studies have also examined the association between testing point and attrition.[73-75] Genberg *et al.*, demonstrated that PLHIV entering on care from various testing points had different attrition patterns in western Kenya, with lower rates of attrition among clients diagnosed from the community based HIV intervention services (CBHS) compared to those from voluntary testing and counselling (VCT) and Provider Initiated Testing and Counselling (PITC).[73] Moreover, this study observed that PLHIV on ART who were diagnosed from CBHS were less likely to remain disengaged from care compared to clients from VCT and PITC. Contrary, another study in Mozambique found relatively higher attrition rates among clients who were diagnosed on CBHS testing points compared to VCT.[75]

Timing for ART initiation has also been identified to influence the attrition of HIV-infected youth on care and treatment services. On one hand, some studies have found same-day ART initiation to significantly increase the rate of attrition from HIV treatment among youth.[25][37][54] Matare *et al.*, study showed a consistent increase in attrition at 3, 6 and 12 months since ART initiation in the universal treatment era compared to pre-universal treatment strategy.[25] Contrary, a study in Malawi found a reduction in the attrition rates after the test and start strategy.[36] Additionally, other studies found delayed ART initiation to significantly predict attrition.[43][55]

There is therefore substantial disparities in retention rates and what predicts attrition among HIV-infected youth on care and treatment services. In Tanzania, little is known on the retention rates of HIV infected youths who are initiated on ART and what predicts attrition among this age group. The current study determined the retention and predictors of attrition among youth who are notably disproportionately affected by the HIV epidemic. Knowledge gained is intended to inform Rorya Health Management and policy decision-makers for developing streamlined interventions addressing youth's specific needs to be retained on HIV care and treatment services.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

This was a cross sectional study conducted in September 2020 and involved reviewing the medical records of youths who were enrolled on HIV care and treatment from October 2017 to September 2018 in Rorya DC. For each youth, data on socio-demographic and clinical characteristics during enrolment and follow up clinic visit records for the period of 12 months after enrolment were collected. This study used a quantitative method approach. The first step was to identify facilities offering HIV care and treatment services. These facilities were then visited where Pre-ART and ART registers were used to shortlist unique CTC IDs for all clients meeting the age and date of enrolment inclusion criteria for obtaining and reviewing individual CTC files. Records of the clients meeting the inclusion criteria were then collected from CTC2 files using a pre-tested data collection tool.

3.2 Study area

This study was conducted in Rorya DC, northwestern Tanzania. The council has a population of 265,241 and is bordered by Tarime district to the east, Butiama district to the south, Lake Victoria to the west and the Republic of Kenya to the north. It is a rural setting district with few towns, largest being Shirati and the main economic activities in this council are farming, fishing and livestock keeping. The district is dominated by Luo people, others being Kurya and Simbiti. It has the highest HIV prevalence in the region and the common cultural practices fueling HIV transmission include FGM, early marriages, sexual cleansing, wife inheritance, and mourning by preparing a big feast as a sign of departure of their loved ones for a couple of weeks.

The council had 44 healthcare facilities and among them, 36 (82%) were providing HIV care and treatment services. There were 19 facilities with dedicated PLHIV care and treatment clinics and the remaining 17 facilities had a standalone RCH clinics integrating HIV care and

treatment to pregnant and breastfeeding women. Each facility used standardized national registers and CTC files. Pre-ART register was used to document clients enrolled in care, ART register recorded the details of ARV prescribed and dispensing register captured ARV drugs dispensed to the clients. Each client had a CTC2 file with detailed information on his/her demographic data and clinic records for each visit made. Facilities with CTC had a CTC2 database which stored the electronic data entered from CTC2 files.

3.3 Study population

Youth who were diagnosed HIV positive, linked and initiated on ART between October 1st, 2017 to Sept 30th, 2018 in all CTC and RCH clinics providing PMTC services, Rorya DC and their records were available on CTC2 files. This period was chosen to get a reflection on retention dynamics following adoption of test and start strategy in Tanzania which started on 2017. We decided to include only the first year on ART as this is a critical period for subsequent retention in the following years.[20]

3.3.1 Inclusion criteria

1. Confirmed HIV-infected youth newly enrolled on care and initiated on treatment between October 1st, 2017 to Sept 30th, 2018 in Rorya DC.
2. The clients with the age between 15 to 24 years during enrolment.

3.3.2 Exclusion criteria

1. Transfer in clients who were enrolled on care at another facility were excluded.
2. Transfer out clients during the follow-up period were also excluded as their progress to care in the other facility could not be tracked.

3.5 Sample size and techniques

The sample size was calculated using a single proportion formula

$$n = \frac{Z^2 p(100-p)}{\epsilon^2}$$

Whereby;

Z = level of confidence (1.96 for 95% confidence level)

p = proportion of attrition among youth initiated on ART within a 1 year period which is 19%. [17]

e = margin of error, in this study level of precision is set at 5%

$$n = \frac{1.96^2 \times 19 \times (100-19)}{5^2} = 236.5$$

The minimum sample size required was 237 clients. To meet this sample size, all youth who met inclusion criteria from 36 health facilities which were providing care and treatment services to PLHIV in Rorya DC were enrolled in the study.

3.6 Data collection

Data was collected with the help of two research assistants (RA). They were recruited based on their medical backgrounds, basic computer applications knowledge and previous data collection experience. They were then provided with two days of training on the research protocol, handling data on human subject with confidentiality, review of data source tools and the data collection tool with practical sessions in the Musoma Referral Regional Hospital. The facilitator who was the principal investigator emphasized on accuracy and completeness and capacitated the RA on reviewing multiple data sources to complement or validating inconsistent information.

3.7 Ethical consideration and research clearance

This study used data collected as part of routine care and treatment services for PLHIV. Ethical clearance was obtained from the MUHAS Institutional Review Board (MUHAS IRB) and permission to access data was granted by the office of Mara Regional Administration and Rorya district authority and management of the respective facilities. Client's identification variables such as name were not used for confidentiality purposes.

3.8 Study variables

Clinical records for clients enrolled on HIV care and treatment services were captured and monitored using CTC2 files and the CTC2 database. Information captured during enrolment includes the client's baseline demographic and clinical review data. Appointment and attendance dates were recorded during each follow-up clinic visit.

3.8.1 Independent variables

In this study, independent variables were:

1. Age
2. Sex
3. Marital status
4. Testing modality
5. Timing for ART initiation
6. Identified treatment supporter
7. Known HIV status of the spouse
8. Level of enrolling facility
9. Ownership of enrolling facility
10. WHO Stage during enrolment
11. TB co-infection during enrolment
12. Pregnancy/breastfeeding state

3.8.2 Dependent variable

The dependent variable in this study was the attrition.

3.9 Data collection tool and validity and reliability

A pre-defined data collection tool was developed and used to abstract the study participant's information from the facility records. The primary source of information was the individual CTC 2 files and the CTC2 database, and ART registers were used to compliment or validate information. Information gathered included sociodemographic and baseline clinical characteristics and attendance visits made within a period of 12 months after ART initiation.

3.10 Data entry and processing

Data collected in the the pre-defined tool were compiled in an excel template and then imported to Stata statistical package version 14 for cleaning and analysis.

3.11 Data analysis

We used frequency and proportions in the descriptive analysis. Means and standard deviation was used to summarize continuous variables. Bivariate logistic regression was used to explore the association between baseline characteristics and attrition using Chi-square test at a 0.1 significance level. Variable categories which were significantly associated with attrition in bivariate analysis at p value of <0.1 were included in the single and multivariate analysis to determine those with the strongest independent association with attrition. Crude and adjusted Odds Ratios with their corresponding 95% confidence intervals are presented.

3.12 Strength and limitation of the study

The strength of this study relies on the use of the national standardized data sources that facilitated capturing of consistent data.

This study has some limitations that may have influenced the results. The study relied on the retrospective data collected from the routine care and service delivery which could be subjected to errors and data incompleteness. These were minimized by using multiple data sources to complement and validate the information. The study focused on only data that are routinely captured in a day to day care and treatment services.

Other important information such as KVP category, occupation and the level of education which were found as predictors of attrition among PLHIV in literature could not be assessed as the tools were not capturing these data. Attrition may have included clients with unknown outcomes such as unascertained death, self transfers and clients who were later re-engaged to care. However, the findings still provide an insight on the rate and its association with baseline characteristics.

CHAPTER FOUR

4.0 RESULTS

A total of 36 health facilities out of 44 in the council were included in the study. The remaining 8 facilities (18%) were excluded because they were not offering the HIV care and treatment services.

4.1 Description of the study participants

Records for a total of 253 eligible clients who met inclusion criteria were reviewed. Among them, 85% were females, 64.8% were aged 20-24 years and 33.6% were enrolled while pregnant or breastfeeding. The clients with identified treatment supporter were 91.3% and 1.19% screened positive for TB Co-infection. Majority of youth started ART within 7 days of confirmed diagnosis and only 8.3% started ART after 7 days of diagnosis. The table below shows more information on description of the study population.

Table 1: Characteristics during enrolment (n253)

Characteristics	Categories	Frequency, n	%
Sex	Male	38	15.0
	Female	215	85.0
Age	15-19	89	35.2
	20-24	164	64.8
Marital status	Married/Cohabiting	170	67.2
	Single	12	4.7
	Divorced/Separated/Widowed	71	28.1
Testing modality	VCT(Self referral/CBHS)	100	39.5
	PITC	153	60.5
Level of facility	DISPENSARY	76	30.1
	HEALTH CENTRE	78	30.8
	HOSPITAL	99	39.1
Facility ownership	Gov	136	53.8
	FBO	95	37.5
	Private	22	8.7
WHO stage	Stage 1	72	28.5
	Stage 2	71	28.1
	Stage 3	102	40.3
	Stage 4	8	3.2
TB screening	Screen -ve	250	98.8
	screen +ve	3	1.2
Pregnancy	Pregnant/breastfeeding	85	33.6
	Non pregnant/breastfeeding	130	51.4
ART initiation	Within 7 days	232	91.7
	Beyond 7 days	21	8.3
Treatment supporter	Yes	231	91.3
	No	22	8.7
HIV status of the spouse	Known	20	7.9
	Unknown	162	64.0

4.2 Retention of HIV infected youth initiated on ART at 3, 6 and 12 months of enrolment

Among the study participants, the proportion of youth retained declined over time from 81.4%, 69.2% and 59.3% respectively at 3, 6 and 12 months of ART initiation respectively (Table 2).

Table 2: Proportion of HIV-infected youth retained in 3, 6 and 12 months.

Months since ART initiation	n	%
3	206	81.4%
6	175	69.2%
12	150	59.3%

4.3 Bivariate analysis of the predictors for attrition

In bivariate analysis, it was found that sex, age, marital status, testing modality, level of facility, facility ownership, WHO stage, pregnancy state and identification of treatment supporter variables were statistically significant with attrition. (Table 3)

Table 3: Bivariate analysis of baseline characteristics with attrition (Chi² ; p-value)

Characteristics	Categories	Attrition		Chi ²	p-value
		n	%		
Sex	Female	102	47.4	17.525	0.000
	Male	32	84.2		
Age	15-19	33	37.1	13.908	0.000
	20-24	101	61.6		
Marital status	Single	53	74.7	19.614	0.000
	Married/Cohabiting	74	43.5		
	Divorced/Separated/Widowed	7	58.3		
Testing modality	VCT(Self referral/CBHS)	63	63.0	6.685	0.010
	PITC	71	46.4		
Level of facility	Dispensary	35	46.0	7.436	0.024
	Health centre	36	46.2		
	Hospital	63	63.6		
Facility ownership	FBO	62	65.3	10.106	0.006
	Gov	64	47.1		
	Private	8	36.4		
WHO stage	Stage 1	28	38.9	9.955	0.019
	Stage 2	37	52.1		
	Stage 3	64	62.8		
	Stage 4	5	62.5		
TB screening	Screen -ve	133	53.2	0.470	0.493
	screen +ve	1	33.3		
Pregnancy	Preg/b-feeding	30	35.3	25.852	0.000
	Non Preg/b-feeding	72	55.4		
ART initiation	Within 7 days	122	52.6	0.161	0.689
	Beyond 7 days	12	57.1		
Treatment supporter	Yes	117	50.7	5.715	0.017
	No	17	77.3		
HIV status of the spouse	Known	6	30.0	20.525	0.000
	Unknown	75	46.3		

4.3 Multivariate analysis on the predictors for attrition

Factors which were statistically significant were further analyzed by logistic regression and found that being male was associated with more than six times higher odds of attrition (AOR; 6.61, 95%CI: 2.5-17.7) compared to female. Also being in the age group of 20-24 years was associated with five times higher odds (AOR; 5.3, 95%CI: 2.5-10.9) compared to those aged 15-19 years. More information is shown in the table below. (Table 5)

Table 4: Univariate and Multivariate regression

Characteristics	Categories	LTF		Univariate regression			Multivariate regression		
		n	%	OR	p-value	95% CI	OR	p-value	95%CI
Sex	Female	102	47.4	1 (ref)					
	Male	32	84.2	5.91	0.000	2.37-14.01	6.61	0.000	2.46-17.74
Age	15-19	33	37.1	1 (ref)					
	20-24	101	61.6	2.72	0.000	1.60-4.64	5.30	0.000	2.56-10.94
Marital status	Married/ Cohabiting	74	43.5	1(ref)					
	Single	53	74.7	3.80	0.000	2.07-7.06	4.66	0.000	2.13-10.23
	Divorced/Separated/ Widowed	7	58.3	1.80	0.324	0.55-5.95	2.39	0.210	0.73-2.95
Testing modality	PITC	71	46.4	1 (ref)					
	VCT(Self referral/CBHS)	63	63.0	1.97	0.010	1.17-3.29	1.46	0.288	0.73-2.95
Level of facility	Dispensary	35	46.0	1(ref)					
	Health centre	36	46.2	1.00	0.990	0.53-1.89	0.92	0.801	0.47-1.79
	Hospital	63	63.6	2.05	0.021	1.11-3.77	2.35	0.179	0.68-8.14
Facility ownership	Private	8	36.4	1(ref)					
	FBO	62	65.3	3.29	0.016	1.25-8.63	0.22	0.005	0.08-0.63
	Gov	64	47.1	1.56	0.353	0.61-3.94	1.13	0.824	0.39-3.27
WHO stage	Stage 1	28	38.9	1(ref)					
	Stage 2	37	52.1	1.71	0.113	0.88-3.32	2.29	0.021	1.13-4.63
	Stage 3	64	62.8	2.65	0.002	1.42-4.92	2.14	0.025	1.09-4.17
	Stage 4	5	62.5	2.62	0.211	0.57-11.82	1.69	0.512	0.35-8.24
Pregnancy	Preg/b-feeding	30	35.3	1 (ref)					
	Non Preg/b-feeding	72	55.4	2.28	0.004	1.29-4.00	1.78	0.111	0.88-3.63
Treatment supporter	Yes	117	50.7	1(ref)					
	No	17	77.3	4.34	0.012	1.38-13.64	9.22	0.001	2.38-35.79

CHAPTER FIVE

5.0 DISCUSSION

In this study, the retention of youth in HIV care and treatment was found to significantly decline overtime. Being aged 20-24 years, being male, being single or never married, having a baseline WHO clinical stage 2 or 3 and reporting having no treatment supporter were independent predictors of attrition among HIV infected youth initiated on ART in Rorya DC.

A higher decline in retention was noted in the first three months after enrolment. These findings were also observed from the other studies in Sub Saharan Africa.[2][25][27][37]. This could be due to the fact that the first three months are critical in coping up with the diagnosis and new experience with the ARTs.[47][32] Drug's side effects, stigma, and perceived well-being have been cited as contributing factors to lower retention rates of youth on care and treatment services.[34][47][32]

The proportion of clients retained at 12 months in this study are much lower compared to that reported by Mee, *et al.*, in his study conducted in Tanzania which reviewed the patterns of retention on HIV treatment between 2008 and 2016.[17] However, the results from this study are comparable to those from other studies in Sub Saharan Africa settings.[20][28][43] Complex and dynamic factors have been identified to specifically affect the optimal retention of PLHIV youth on care and treatment services. These include HIV associated-stigma, socioeconomic stressors, poor risk perception of consequences of non-adherence and depression.[47][59][59-60] Engagement of peers in the delivery of HIV care and treatment services have been used to address the factors affecting retention of youths on care.[60-61] Adopting this strategy may promote retention in the current study area setting. Moreover, active tracing of clients immediately after missing the appointment has been identified as one of the effective measures to improve the retention of clients prior to being categorized into attrition.[62-63] Further studies are needed to evaluate effective tracing mechanisms which will work better in youth especially in the first three months of HIV treatment.

Attrition observed may have included a substantial proportion of clients self-transferred to another facility or died who could not be reached and reported. It is common for clients who find unfavourable service in one facility to silently transfer to another facility, retest for HIV, and get re-enrolled. The mobile clients may also be re-testing and get enrolled in multiple facilities due to unawareness of the procedures or when avoiding the procedures for collecting a transfer out letter each time they shift to another location. The current database can not capture clients already registered elsewhere unless the names are exactly the same. There is therefore a need to determine the true outcome of youth clients who are categorized as attrition. Innovations to deliver simplified and user-friendly ART services among mobile populations may reduce attrition and account for clients who will be refilled in the site other than the facility they were enrolled in.

In our study, we found that males had higher attrition rates compared to females. This is similar to other studies conducted in Sub-Saharan Africa.[35][49] The reasons could be due to their economic activity constraints and poor health-seeking behaviours.[24][65-66] A study in Kenya revealed that delivering care and treatment services near the youth male's residence or site of economic activity promotes the uptake of the services.[66] This may be attributed to the time and financial costs saved on increasing access to service. The analysis of the cost in accessing the ART services in 7 regions of Tanzania showed males spent significantly higher travel costs than females.[67] Furthermore, extending ART refill services to a community setting has been demonstrated to decrease the substantial risk for attrition among males of all age populations.[68-69] Further studies are needed to evaluate the impact of community ART refill services on reducing the risk of attrition for male youths.

In this study, being aged 20-24 years was an independent predictor of attrition. Koech, *et al.*, reported similar findings among youths enrolled on HIV care in Kenya.[23] At this age interval, youth may have already been economically independent which may be associated with increased mobility. The 2019 guideline on the differentiated service delivery of care and treatment services in Tanzania suggests the provision of special consideration to the mobile population by offering longer ART refills adapted to the client's travel plans.[41] Successful

implementation of this approach may significantly improve the retention of youth in this age category. Contrary, the findings from other studies indicate that youth aged 15-19 have higher attrition rates compared to 20-24.[33][35] The differences may be due to differences in socio-economic contexts from the current study settings.

In this study, being single or never married was found to be the independent predictor of attrition among the HIV infected youth on care and treatment services. The finding in this study is consistent with finding by Mecha et al.[22] This might be because of a lack of social support in adherence to treatment and dealing with the stigma. In contrast, other studies found no association between the marital status and attrition among youth on HIV treatment.[23][48] Further exploration on the role of partner support among youth on HIV treatment is needed to derive streamlined strategies in retaining them on care.

A number of studies have shown less attrition among PLHIV clients with treatment supporters compared to their counterparts.[57][66][70] Nakamanya, *et al.*, described the role of treatment supporters in providing psychological coping and reminding clients to take their medication and therefore encouraging adherence to ART services.[57] The current study affirms the significance of the role of the treatment supporter in the retention of HIV-infected youths on care and treatment services.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Retention of HIV-infected youth who are initiated on ART declines over time with the significant drop in the first 3 months of enrolment. Predictors of attrition include sex, age, marital status, WHO stage and having no identified treatment supporter.

6.2 Recommendations

This study revealed rates of retention decline over time among HIV-infected youth enrolled on care and treatment and highlighted significant predictors of attrition. Urgent implementation of the following recommendations by Rorya DC health management may improve the retention of youth on HIV care and treatment services

1. Focusing on youth's retention specifically during the first three months on ART should be intensified. The adoption of youth PLHIV peers in navigating through care and treatment services and providing peer counselling may be needed to optimally address youth's specific barriers to retain on care. Youth with no identified treatment supporter will also benefit from peer support.
2. Male youth and those who are in the 20-24 years age category have been found to be at risk of attrition and is attributed to their economic activity constraints and high mobility. Consideration on extending care and treatment services through community ART refills and offering longer hours for ART services will promote their retention.

In addition, further research to determine the outcomes of attrition among youth is recommended to account for clients who may have silently transferred to another facility or died. Moreover, there is an urgent need for qualitative analysis of the predictors for attrition to develop a deeper understanding and streamlining relevant intervention measures.

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APPENDICES

Appendix 1: Data abstraction tool

Date of confirmed diagnosis..... Date of ART initiation

D.O.B Age Sex

Residential ward..... CTC I.D

Testing site of Diagnosis:	<input type="checkbox"/> PITC <input type="checkbox"/> CBHS		
Type of CTC facility	<input type="checkbox"/> Gov <input type="checkbox"/> Private <input type="checkbox"/> FBO		
Level of facility	<input type="checkbox"/> Dispensary <input type="checkbox"/> Health centre <input type="checkbox"/> Hospital		
ART initiation:	<input type="checkbox"/> 1-7 days <input type="checkbox"/> 8-14 days <input type="checkbox"/> >14days		
WHO stage at ART initiation:			
TB Screening/diagnosis	<input type="checkbox"/> Screen +ve <input type="checkbox"/> Screen -ve <input type="checkbox"/> Not done		
Pregnancy/breastfeeding	<input type="checkbox"/> Pregnant <input type="checkbox"/> Breastfeeding <input type="checkbox"/> Non-pregnant/breastfeeding <input type="checkbox"/> Not Applicable		
Identified treatment supporter:	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Marital status	<input type="checkbox"/> Single <input type="checkbox"/> Married/ Cohabiting <input type="checkbox"/> Separated/Divorced /Widow/ed		
HIV Status of spouse/partner	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Unknown <input type="checkbox"/> HIV-ve <input type="checkbox"/> HIV+ve		
Attendance visits (Months)	Date scheduled	Date attended	Status
1			
2			

3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Appendix 3: Copy of ethical clearances

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES

P.O. Box 65001
 DAR ES SALAAM
 TANZANIA
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 E-mail: dpgs@muhas.ac.tz

Ref. No. HD/MUH/T.536/2017

17th March, 2020

Shemdolwa, Naseeb Mussa,
 MPH-Distance Learning,
 School of Public Health and Social Sciences,
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED: "RETENTION AND PREDICTION OF ATTRITION AMONG HIV INFECTED YOUTH INITIATED ON ANTIRETROVIRAL TREATMENT IN RORYA DISTRICT COUNCIL, TANZANIA"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from **17th March, 2020 to 16th March, 2021**. In case you do not complete data analysis and dissertation report writing by **16th March 2021**, you will have to apply for renewal of ethical clearance prior to the expiry date.

Dr. Emmanuel Balandya

ACTING: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
 cc: Dean, School of Public Health and Social Sciences, MUHAS

**THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION & LOCAL GOVERNMENT**

MARA REGION
Tel. No.028-2622005, 2622004,
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**REGIONAL COMMISSIONER'S OFFICE,
MARA REGION,
P.O. BOX 299,
MUSOMA.
TANZANIA**

Ref. No. FA 190/270/01/63

28th April, 2020.

District Administrative Secretary,
Rorya

RE: RESEARCH PERMISSION FOR MR. SHEMDOLWA, NASEEB MUSSA

Reference is made to the above mentioned subject.

The above named is a student of **Muhimbili University of Health and Allied Sciences** with Reg.No. **HD/MUH/T.536/2017** who is at the moment required to conduct research as part of his study programmes.

The purpose of this letter is to inform you that permission has been granted to the student named above to conduct data collection for a research study at your District from **17th March, 2020 to 16th March, 2021**.

The title of the Research is *"Retention and Prediction of Attrition among HIV Infected Youth initiated Antiretroviral Treatment in Rorya District Council- Tanzania"*

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

Thank you.

Lucas Mbinga

For: **REGIONAL ADMINISTRATIVE SECRETARY
M A R A**

Copy to: Regional Administrative Secretary (In file)
M A R A

✓ Director of Research and Publications
P.O. Box 65001,
Dar es Salaam

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA MARA
 Anwani ya simu: "Admin"
 E-mail: rasmara@pmoralg.go.tz
 Unapojibu tafadhali taja



OFISI YA MKUU WA WILAYA,
S.L.P 1
RORYA,

11 MEI, 2020.

Kumb. Na. RE.10/31/17

Mkurugenzi Mtendaji,
 Halmashauri ya Wilaya ya Rorya,
 S.L.P 250,
Rorya.

YAH: KIBALI CHA UTAFITI KWA BWANA SHEMDOLWA NASEEB MUSSA.

Rejea somo hilo hapo juu lahusika.

Namtambulisha kwako mtajwa hapo juu ambaye ni mwanafunzi wa Chuo Kikuu cha Muhimbili mwenye namba ya usajili **HD/MUH/T.536/2017** ili aweze kufanya utafiti kukamilisha hitaji la masomo yake kuhusiana na Mada Ya;

"Retention and Prediction of Attrition among HIV Infected Youth Initiated Antiretroviral Treatment in Rorya District Council- Tanzania".

Lengo la barua hii ni kukutaarifu kuwa kibali kimetolewa kwake ili aweze kufanya utafiti wake vituo vya afya hapa Wilayani, Utafiti huu utafanyika kuanzia mwezi machi, **2020 hadi machi 2021.**

Mpe ushirikiano wa kutosha kwa kumtambulisha katika maeneo katika vituo vya afya ili aweze kukamilisha masomo yake.

Nakutakia utekelezaji Mwema.

V.A. Kimath

Kny.KATIBU TAWALA (W)
RORYA

KATIBU TAWALA WILAYA
RORYA

Nakala:

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