

**ORIGINAL ARTICLE**

Enrollment in HIV Care and Treatment Clinic and Associated Factors Among HIV Diagnosed Patients in Magu District, Tanzania

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## **ABSTRACT**

HIV care and treatment clinics (CTC) are important for management of HIV morbidity and mortality, and to reduce HIV transmission. Enrollment in HIV care and treatment clinics remains low in many developing countries. We followed up 632 newly diagnosed HIV patients aged 15 years and above from Magu District, Tanzania. Logistic regression was used to assess factors significantly associated with enrollment for CTC services. Kaplan-Meier plots and log-rank tests were used to evaluate differences in timing uptake of services. Among 632 participants, 214 (33.9%) were enrolled in CTC, and of those enrolled 120 (56.6%) took longer than 3 months to enroll. Those living in more rural villages were less likely to be enrolled than in the villages with semi-urban settings (OR=0.36; 95% CI=0.17-0.76). Moreover, those with age group 35-44 years and with age group 45 years and above were 2 times higher odds compared to those with age group 15-24 years, (OR=2.03; 95% CI=1.05-3.91) and (OR=2.69; 95% CI=1.40-5.18) respectively. Enrollment in the CTC in Tanzania is low. To increase uptake of antiretroviral therapy, it is critical to improve linkage between HIV testing and care services, and to rollout these services into the primary health facilities.

**Key words:** HIV diagnosis ~ HIV care · Associated factors · Tanzania

## INTRODUCTION

Tanzania, with a population of over 53 million, has an adult HIV prevalence of 4.7% and approximately 1.4 million people living with HIV/AIDS (PLHIV)(1). Annually, there are an estimated 54,000 new HIV infections and 36,000 AIDS-related deaths in Tanzania(1). More than 1.8 million people received HIV counseling and testing in Tanzania in 2015(1). In Mwanza Region, the HIV prevalence was 7.2% in 2016(2). The World Health Organization (WHO) recommends that all individuals diagnosed with HIV-infection should be referred to HIV care and treatment clinics (CTC) in order to start Anti-Retroviral Therapy (ART)(3). It has been estimated that, globally only 18.2 million (46%) HIV infected individuals were receiving HIV treatment in 2006 (4). During the same period, only 60% of adult PLHIV were receiving HIV treatment in Sub-Saharan Africa (5). Thus greater efforts are needed to improve access and coverage of CTC in these populations.

HIV testing services are important points of entry for HIV treatment, care and management. Those diagnosed with HIV should be referred for early initiation of ART, and more effective management of co-infections and opportunistic infections associated with HIV(6). ART initiation enables HIV positive people to manage their HIV status and also helps to prevent new HIV infections(7). In order to access these services, people need to test for HIV and to know their status, but studies have shown that even after receiving a positive HIV test, many patients delay going to CTC, or do not access the services at all(3).

Delayed enrollment into CTC may lead to high morbidity, mortality among PLHIV, and further HIV transmission to HIV sexual partners. Studies have shown that many HIV patients took more than 3 months to enroll into CTC after diagnosis(8). Delays in enrolling into CTC are attributed to: time to internalize the HIV positive` results; poor health education on HIV; fear of stigma,

fear of disclosing HIV status to partner, worries of family reaction, as well as socio-demographic factors such as age, marital status and sex(9, 10). Distance to health facilities is an important health system factor associated with enrollment in CTC. Patients who are willing and ready to start ARTs, and those who have means of transportation, as well as older patients and those with more education are more likely to access CTC(9). Enrollment into CTC is higher among women than men(10). People with HIV living in urban areas of Tanzania are more likely to enroll in CTC than patients in rural areas(11).

In Tanzania, efforts to promote CTC enrollment have included decentralizing of CTC delivery to primary health care facilities, the use of brochures and posters to sensitize the population on the importance of ART, and increasing the information given by HIV counselors(12). CTC services have been improved through the change of guidelines to enable PLHIV to initiate ART regardless of CD4 counts or WHO staging criteria(12). Despite these efforts, CTC enrollment remains below the national, and international targets of 90% of PLHIV on ART (13)(14). In 2015, it was estimated that only 53% of people with advanced HIV infection had initiated ART in Tanzania(4). There is a need to increase the number of people who know their HIV status, and to improve linkage to CTCs in order to increase the number of people on ART in order to reach the ambitious 90-90-90 targets set by UNAIDS in 2014(3). This study aimed to estimate the enrollment and timing of HIV care and treatment clinics by those newly diagnosed with HIV in Magu District, Mwanza Region during 2015-2016.

## **METHODS**

### **Study design and population**

This study was based on secondary data from the Kisesa Health and Demographic Surveillance System (HDSS)(7) which conducts population and HIV monitoring through Demographic Surveillance and Epidemiological sero-surveys respectively. The aim of the HDSS is to monitor the population in terms of births, deaths mobility, HIV infection and impact of HIV on demographic correlates. The study area covers nine villages located about 20km east of Mwanza City along the main road to Kenya with 35,000 people under surveillance in 2015. Three villages on the main road are classified as semi-urban as they have a regular bus service into Mwanza City, and are close to the health facility, while the other 6 villages are classified as rural. From September, 2015 to December, 2015 a community based serological survey (sero 8) was conducted in the study area to which all study area residents aged 15 years and above were invited. All those who consented were offered voluntary testing and counselling (VCT) for HIV. All survey participants testing HIV positive who had not previously enrolled in CTC were included in the analysis. HIV positive clients were traced to the CTC at the local health facility using their HDSS unique identifiers.

### **Data definitions and analysis**

The dependent variable was enrollment in HIV care and treatment clinic (CTC). The time taken to access the services was defined as the time between VCT and first enrollment at CTC. For those who did not access the services their follow up time was censored on 30<sup>th</sup> September 2016. Independent variables included: place of residence (semi-urban or more rural); sex; education; age

categorized in four age groups 15-24 years, 25-34 years, 35-44 years, 45 and above years; and whether a referral slip was given to the HIV positive participant.

Data analysis was performed using STATA version 13 software. The mean and standard deviation were used to summarize normally distributed characteristics and frequencies (with percentages) were used to summarize categorical variables.

Both univariate and multivariable analysis were performed using logistic regression to estimate the odds ratio (OR) with the respective 95% confidence intervals (95% CI) to measure the strength of association between enrollment in CTC and the included predictors. Each variable was included in the univariate model separately looking for the estimate and p-value from the Wald test. Variables with p-value of less than 0.05 were considered to be independently associated with the outcome therefore, included in the multivariable regression model. Kaplan-Meier analysis was used to study the time to enrollment in CTC, comparing those living in semi-urban villages to those living in more rural villages. Log-rank (LR) tests were used to compare whether survival probabilities between the relevant groups were statistically significantly different or not. The median time (and interquartile range) to enrollment in CTC was reported for all groups.

## **Ethical Considerations**

Ethical approval to conduct this study was obtained from Kilimanjaro Christian Medical University College (KCMUCo) through certificate number is 990. Permission to use the data was granted by the TAZAMA project which had approval from the National Ethical Review Committee (NatREC) through certificate number NIMR/HQ/R.8c/Vol.1/307. Privacy and confidentiality were observed in the course of implementation and analysis through use of unique identifier rather than participants' names.

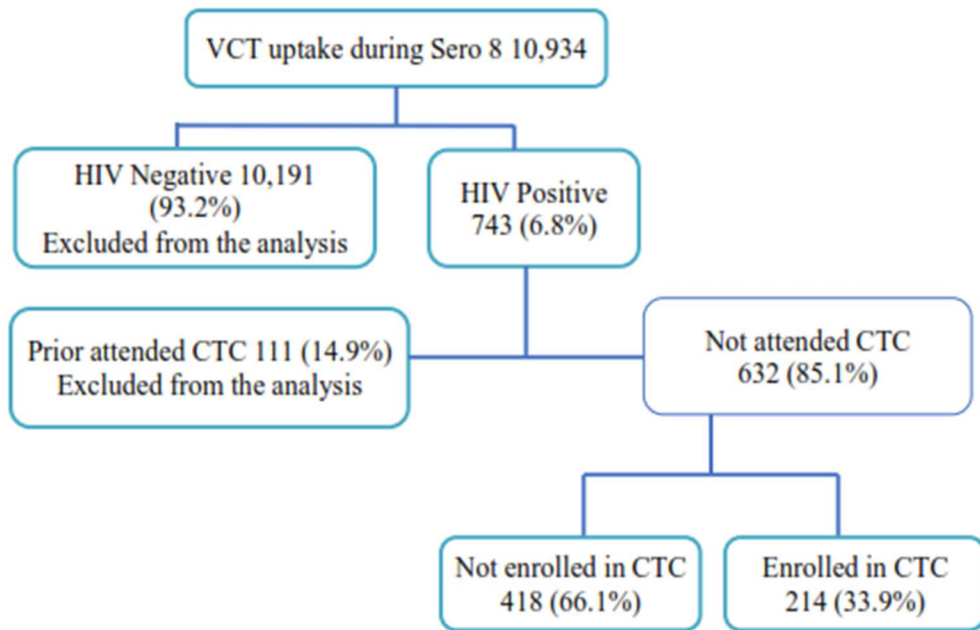


Figure 1 Flow diagram for HIV diagnosed people from VCT Serological survey to HIV care and treatment clinics 2015-2016



## RESULTS

### **Characteristics of the study participants:**

A total of 10,934 residents from the Kisesa HDSS attended the sero-survey and consented to an HIV test, with 743 participants testing HIV positive for an overall HIV prevalence of 6.8% (Figure 1). Participants, who had previously attended HIV care and treatment clinic (CTC) before sero-survey round 8, were excluded, leaving 632 newly diagnosed HIV positive participants (who had not yet attended CTC) in the analysis (Table 1). The overall mean age of the participants was 39 years (standard deviation 13 years) ranging from 15 to 81 years. More of the newly diagnosed HIV positive study participants were between age 25 and 34 years (N=193, 30.5%), female (N=435, 68.8%), Christian religion (N=522, 82.6%), monogamously married (N=328, 51.9%), non-educated (N=334, 52.9%), living in the semi-urban villages (N=576, 91.1%), Sukuma tribe (N=561, 88.8%), those who did not have referral records (N=376, 59.5%) and those who earned money from work activities (N=506, 80.1%) (Table 1).

### **Time taken from HIV positive test to enrollment in CTC**

The median time between the HIV positive test and enrollment in CTC was 6.2 months (range: 0.05 to 9.68 months) while 418 (66.1%) participants were censored (not enrolled in CTC by 30<sup>th</sup> September 2016) after a median time of 7.6 months (range: 5.01 to 9.68 months) (Table 2). Among patients who were enrolled in CTC, 120 (56.6%) enrolled after 3 months of HIV diagnose, 49 (23.1%) enrolled between 1 and 3 months and 43 (20.3%) enrolled less than 1 month. The Kaplan Meier curves of enrollment in CTC for those living in semi-urban villages and more rural villages separately are show in Figure 2. Those living in semi-urban villages had significantly better chance to be enrolled in the CTC than those living in more rural villages (Log rank  $p < 0.008$ ).

### **Factors associated with enrollment in HIV care and treatment clinic**

Table 3 show that place of residence and age were significantly associated with enrollment in CTC after adjusting for potential confounding factors. Those who lived in more rural villages were 64% less likely to be enrolled in CTC than those who lived in semi-urban villages (OR = 0.36; 95% CI =0.17-0.76). Moreover, those with age group 35-44 years and with age group 45 years and above had 2 times higher odds compared to those in the age group 15-24 years (OR=2.03; 95% CI= 1.05-3.91) and (OR=2.69; 95% CI= 1.40-5.18) respectively. However, sex of the client had no statistical significant association with enrollment in CTC.

Table 1 Socio-demographic characteristics of study participants by place of residence 2015-2016

Characteristics	Total, n (%)	Place of residence		Chi-square P Value
		Rural	Semi-urban	
Total n, (row %)	632 (100%)	56 (8.9%)	576 (91.1%)	
Age group (Years), n (column %)				0.735
15-24	75 (11.9%)	66 (11.5%)	9 (16.1%)	
25-34	193 (30.5%)	176 (30.6%)	17 (30.4%)	
35-44	180 (28.5%)	164 (28.4%)	16 (28.5%)	
45 and above	184 (29.1%)	170 (29.5%)	14 (25%)	
Sex, n (column %)				0.010*
Male	197(31.2%)	26 (46.4%)	171 (29.7%)	
Female	435 (68.8%)	30 (53.6%)	405 (70.3%)	
Religion, n (column %)				0.114
Muslim	26 (4.1%)	5 (8.9%)	21 (3.7%)	
Christian	522 (82.6%)	46 (82.1%)	476 (82.6%)	
Other	84 (13.3%)	5 (8.9%)	79 (13.7%)	
Marital status, n (column %)				0.264
Never married	79 (12.5%)	9 (16.1%)	70 (12.2%)	
Monogamously Married	328 (51.9%)	31 (55.4%)	297 (51.5%)	
Polygamous Married	47 (7.4%)	6 (10.6%)	41 (7.1%)	
Widower/Separate/Divorce	178 (28.2%)	10 (17.9%)	168 (29.2%)	
Education level, n (column %)				0.792
No education	334 (52.9%)	32 (57.1%)	302 (52.4%)	
Primary education	275 (43.5%)	22 (39.3%)	253 (43.9%)	
>Primary education	23 (3.6%)	2 (3.6%)	21 (3.7%)	
Ethnicity, n (column %)				0.753
Sukuma	561 (88.8%)	49 (87.5%)	512 (88.9%)	
Other	71 (11.2%)	7 (12.5%)	64 (11.1%)	
Earn money from work, n (column %)				0.770
Yes	506 (80.1%)	44 (78.6)	462 (80.2%)	
No	126 (19.9%)	12 (21.4)	114 (19.8%)	
Record of referral slip, n (column %)				0.105
Yes	256 (40.5%)	17 (30.4%)	239 (41.5%)	
No	376 (59.5%)	39 (69.6%)	337 (58.5%)	

\*Statistically significant variables.

P-value used was Wald test

Table 2 A summary of timing to enrollment in CTC 2015-2016

Event	Number (Percentage)	Median follow up time (range: 0.05-9.68)	Total analysis time at risk
Enrolled in CTC	212 (33.7%)	6.2 months	3734 months
Censored (Not enrolled in CTC)	418 (66.3%)	7.6 months	
Total	630		

Table 3 Factors Associated with Enrollment in CTC in Magu District 2015-2016

Variable	Total number Enrolled n (%)	Unadjusted Odds Ratio (OR) (95% CI)	Adjusted Odds Ratio (OR) (95%CI)
Total, n (%)	214 (33.9%)	NA	NA
Age group (Years)			
15-24	15 (20%)	Reference	Reference
25-34	59 (30.6%)	1.76 (0.93-3.35)	1.68 (0.88-3.23)
35-44	63 (35%)	2.15 (1.13-4.10)*	2.03 (1.05-3.91)*
45 and above	77 (41.9%)	2.88 (1.52-5.44)*	2.69 (1.40-5.18)*
Sex			
Male	61 (31%)	Reference	Reference
Female	153 (35.2%)	1.21 (0.84-1.73)	1.23 (0.84-1.80)
Religion			
Muslim	7 (26.9%)	Reference	
Christian	179 (34.3%)	1.42 (0.58-3.43)	
Other	28 (33.3%)	1.36 (0.51-3.61)	
Marital status			
Never married	25 (31.7%)	Reference	
Monogamously married	106 (32.3%)	1.03 (0.61-1.75)	
Polygamous married	15 (31.9%)	1.01 (0.47-2.20)	
Widower/Separate/Divorce	68 (38.2%)	1.34 (0.76-2.34)	
Education level			
No education	126 (37.7%)	Reference	Reference
Primary education	82 (29.8%)	0.70 (0.50-0.99)*	0.76 (0.53-1.08)
>Primary education	6 (26.1%)	0.58 (0.22-1.52)	0.77 (0.38-1.54)
Place of residence			
Semi-urban villages	205 (35.6%)	Reference	Reference
More rural villages	9 (16.1%)	0.35 (0.17-0.72)*	0.36 (0.17-0.76)*
Ethnicity			
Sukuma	198 (35.3%)	Reference	Reference
Other	16 (22.5%)	0.53 (0.30-0.96)*	0.56 (0.31-1.03)
Earn money from work			
Yes	168 (33.2%)	Reference	
No	46 (36.5%)	1.16 (0.77-1.74)	
Record of referral slip			
No	137 (36.4%)	Reference	
Yes	77 (30.1%)	0.75 (0.53-1.05)	

\*Statistically significant variables.

P-value used was Wald test

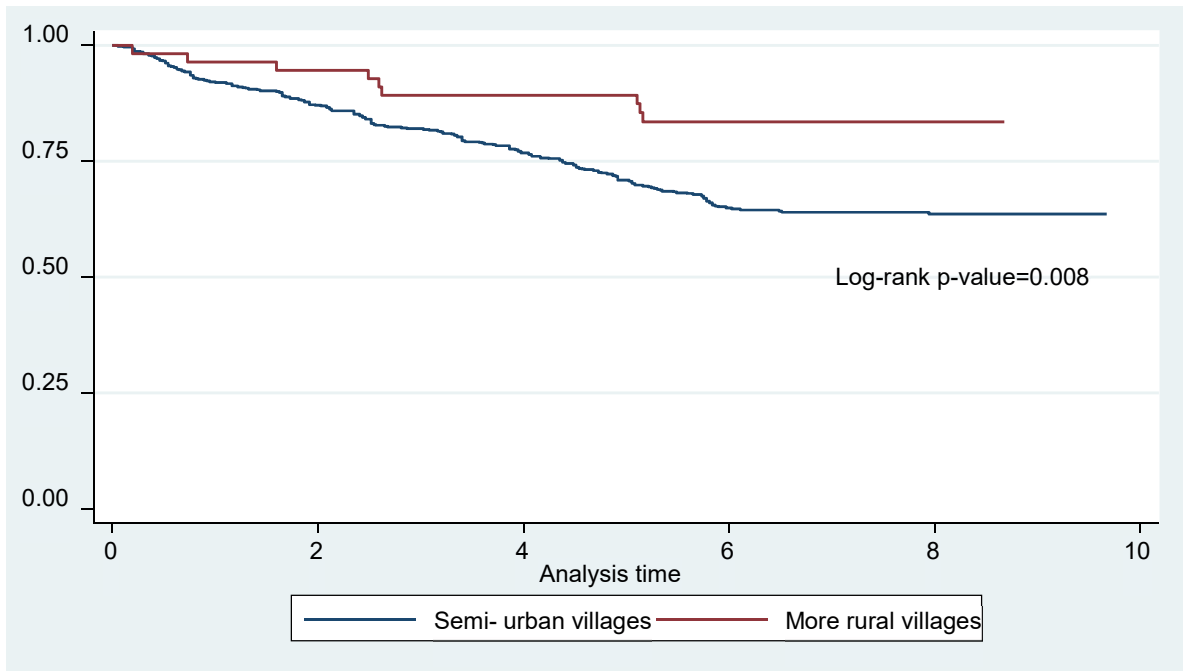


Figure 2 Kaplan-Meier curves showing timing of enrollment measures in months for Semi-urban villages and more rural villages 2015-2016

## DISCUSSION

Following HIV diagnosis, enrollment into HIV care and treatment clinics is crucial, so that PLHIV can initiate ART. This study shows that, from a community based serological survey in Magu district, Tanzania, the proportion of newly diagnosed PLHIV enrolled into CTC was low. In addition, those who did enroll delayed enrollment after HIV diagnosis, with over half of them taking 3 months or more to enroll in CTC.

The level of enrollment in CTC among participants diagnosed in the sero-survey was well below the national and global target of 90% of all newly HIV diagnosed to initiate ART treatment. Although the level of enrollment in CTC in Magu is lower than the WHO targets it is higher than reported elsewhere. A study conducted in Rufiji District, Tanzania in 2015 reported only 16% enrolled in CTC(15). A study in Swaziland in 2016 reported an enrollment of 27% among newly diagnosed HIV cases(10). A study conducted in Uganda in 2010 reported only 25% of newly diagnosed PLHIV enrolled in CTC(16). The higher number of enrollment in our study could be attributed to the repeated sensitization campaigns from ongoing HIV/AIDS interventions in the villages, encouragement by counselors and decreased stigma compared to the past, now that effective treatment is available. Moreover our study has similar enrollment to those reported in Namibia, where 33.5% of newly diagnosed patients were enrolled in CTC(17). Studies in rural South Africa(18) and England(19) have reported higher enrolments than we observed in the Magu study and this is presumably down to the existence of more effective follow ups and linkage systems in these more developed settings.

Our study showed that more than half of the newly diagnosed patients who enrolled in CTC did not take-up the services until 3 months after HIV diagnosis. This was similar to results from other studies in Swaziland(10), India(20), and U.S.A(21), where many patients delayed enrollment to CTC after they have been diagnosed with HIV. This could be due to the psycho-social issues related to HIV making them less motivated to access CTC. In addition it may be HIV counselors are not highly skilled or do not have enough time for effective counseling due to multiple duties and heavy counseling work load. Counseling needs to account for patients' delay in acceptance of their HIV status, health education on HIV, and fears of stigma and social economic factors. However, in a study from French Guiana most HIV patients enrolled within 1 month of HIV diagnosis(22). This may be because this study focused on the private sector and specialized hospital with more skilled HIV counselors and patients with higher socio-economic status.

Our study showed enrollment in CTC for those living in semi-urban villages, close to the health facility providing the services was significantly higher compared to those residing in more rural villages. This aligns with an earlier cohort study in Mbeya Tanzania(11), where the availability of CTC within the same health facility makes enrollment in HIV service much easier and more convenient for recently diagnosed HIV cases. Additionally rural areas patients tend to travel longer distances to facilities, have limited or no transportation and lack money to pay for transport(23).

A study in Swaziland showed contrary results, with significantly greater enrollment in CTC in rural rather than urban settings(10). This could possibly due to people living in urban areas, preferring to be enrolled outside their area in order to avoid stigma compared to people living in rural areas with no much flexibility. Although Tanzania has made significant progress in increasing HIV care and treatment clinics (CTC), our study strongly suggests a need to address health system



facilitators and barriers, such as availability of integrated and de-centralized CTC within each village.

This study also shows that, age group 35-44 years, age group 45 and above was statistically significant with enrollment in CTC. However, sex was not significantly associated with enrollment into CTC. These results are similar to studies in Uganda(9) and Mozambique(8) which found that age was significantly associated with enrollment while sex was not significantly associated.

All participants in the serological survey were offered voluntary HIV testing and counselling and 99% accepted (opt-out consent) and received their HIV results. These results are representative of the population attending sero surveys, but may not represent the population who did not come to the sero survey. The design of the dataset enabled us to link HIV positive participants diagnosed with HIV during the sero-survey to CTC through the unique individual HDSS identifier. This identifier also enabled the study to confirm those who were previously enrolled in CTC before the sero-survey. However, some HDSS residents whom their HDSS number could not be obtained easily when attending CTC were traced through a point of care linkage application which is used in Kisesa health center(24) Some clients from the HDSS area may have enrolled in CTC outside of the study area, moved to other places, thus underestimating the true uptake of CTC in this population.

## CONCLUSION

The proportion of newly diagnosed PLHIV who enroll in HIV care and treatment clinic (CTC) is low, 214 (33.9%). The study also showed that many newly diagnosed HIV patients delayed by more than three months before enrolling in CTC. To increase the potential of ART to reduce HIV transmission, and HIV-related morbidity and mortality, we need to substantially improve linkage services and early enrollment in CTC in Tanzania, as there are multiple barriers facing newly diagnosed PLHIV. Age and place of residence were only factors associated with enrollment in CTC, reiterating the importance of devolving the CTC so they are close to the HIV counselling and testing centers. A qualitative study is needed to better understand the barriers to accessing CTC and people's perceptions and experiences with CTC especially those in the younger age groups. It would also be useful to take contact details and residence information from newly diagnosed HIV cases, so that those with delayed access to CTC services could be traced.

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**Legend for Figures:**

Figure 1: Flow diagram for HIV diagnosed people from VCT Serological survey to HIV care and treatment clinics 2015-2016.

Figure 2: Kaplan-Meier curves showing timing of enrollment measures in months for Semi-urban villages and more rural villages 2015-2016.

