

East African Medical Journal Vol. 103 No. 1 January 2026

HEALTH SERVICE PROVISION FACTORS INFLUENCING UTILIZATION OF HIV TESTING SERVICES AMONG PASTORALISTS (A CROSS SECTIONAL DESCRIPTIVE STUDY UNDERTAKEN IN KAJIADO EAST SUB COUNTY, KAJIADO COUNTY -KENYA)

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W.K.Matini, P. Omemo and D. Masinde

ABSTRACT

Background: HIV Testing Services (HTS) are essential for HIV prevention, detection, treatment, and care. Despite progress in Kenya, factors influencing HTS utilization among pastoralists remain underexplored.

Objective: This study assessed health service provision factors influencing HTS utilization among pastoralists in Kajiado East Sub-County, Kajiado County in Kenya.

Methodology: A cross-sectional mixed-methods study was conducted. Quantitative data were collected via questionnaire and analyzed using SPSS version 25. Odds ratios and binary logistic regression were used to determine associations ($p \leq 0.05$). Qualitative data from 8 key informant interviews and 4 focus group discussions were analyzed thematically using NVivo.

Results: A total of 395 respondents were enrolled but those who consented to the study was 384 respondents among pastoralists (response rate 97%). HTS utilization was low at 39.4% (149 out of 378); factors attributed to this included HTS counselor sex ($p=0.005$), counsellor age ($p=0.044$), availability of HTS centre, as well as presence of community health promoters (CHP). A good percentage 33.5% ($n=129$) of respondents preferred community health promoters as HTS counsellor. Respondents recommended more staff diversity, mobile HTS units as well as integration of HTS services in primary health care. Upon adjusting; Recommendation of HTS services to others: Respondents who would not recommend HTS had 96.3% lower odds of utilization (AOR = 0.037, 95% CI: 0.0073–0.1894, $p < 0.001$). Availability of HTS services: Lack of availability remained significantly associated with reduced odds of utilization (AOR = 0.21, 95% CI: 0.05–0.78, $p = 0.02$). Community health promoter: Having a community

health promoter was strongly associated with nearly eight times higher odds of utilization (AOR = 7.93, 95% CI: 1.30–48.55, $p = 0.025$) were independently associated with HTS utilization among pastoralists.

Conclusion: The independent predictors of HTS utilization were willingness to recommend HTS, availability of HTS services, and presence of community health promoters among pastoralist communities. There is need to develop frameworks aimed towards the unique context of pastoralist communities including provision of mobile HTS services in order to improve service uptake.

Keywords: HIV testing, utilization and pastoralists

INTRODUCTION

Human Immunodeficiency Virus (HIV) targets and destroys CD4 cells, and without treatment, it progressively weakens the immune system, potentially leading to AIDS¹. HIV Testing Services (HTS) are essential for linking detection to prevention, treatment, and support, yet utilization is influenced by health service factors such as availability, accessibility, waiting times, confidentiality, and service quality^{2, 3}. Health service provision, whether public or private, significantly influences HTS utilization. The availability and accessibility of testing sites, waiting times, and confidentiality concerns are key factors that influence individuals' decisions to take up HTS⁴. Additionally, the quality of HIV testing services, confidentiality, and service efficiency are critical for HTS utilization⁵. In Sub-Saharan Africa, structural barriers like long distances to health facilities and provider fatigue are common, and these challenges are often worse among pastoralist populations, who face geographical isolation, limited personnel, and inadequate infrastructure^{4,6,7}. In Kenya, pastoralist communities encounter additional deterrents to HTS uptake, including poor roads, lack of transport, perceived incompetence or poor attitudes of health workers, unreliable test results, stigma, and cultural prohibitions against

discussing sexual health with male providers^{8, 10}. While Kenya's Ministry of Health provides HTS policies and the Community Health Services Strategy (2020) promotes community-based testing, these frameworks do not specifically address the unique circumstances of pastoralist populations. Consequently, inequities persist, leading to low HTS utilization in these marginalized groups, yet evidence on the health service provision factors affecting HTS uptake among pastoralists in Kajiado East Sub-County remains limited. Thus, to improve service equity and reduce barriers, training community health promoters from within these populations has been recommended¹¹. This study therefore aimed to assess the health service provision factors influencing HIV testing utilization among pastoralists in Kajiado East Sub-County, Kajiado County, Kenya.

METHODS

Study design: This cross-sectional study was conducted in Kajiado East Sub-County, Kajiado County in Kenya.

Sampling and sample size: Two wards (Imaroro and Kenyawa-Poka), were purposively selected because they host the pastoral community, have established HTS sites, and border the Northern Transport Corridor which connects port of Mombasa to

Great lakes countries and which is believed to be a key driver for HIV infection. Stratified random sampling was used to select four sub-locations: -Two sub locations each per ward (Imaroro and Kenyawa) were purposively chosen for having HTS sites, while two other sub locations (Nkama and Poka) were randomly selected for comparison on HTS access and utilization. The sample size was determined using Fisher's formula, and proportionate-to-size sampling was used to allocate 395 respondents across sub-locations, villages, and manyattas.

Inclusion criteria: The study included adults and mature adolescents aged 15 years and above who had resided in Kajiado East Sub-County for at least six months and provided written informed consent and assent for mature minors. Those who were very sick and unable to respond, or who had resided in the area for less than six months, were excluded.

Data collection: Quantitative data were collected using a structured questionnaire written in English and translated into Maasai for individual interviews. Qualitative data were collected from 8 key informant interviews—comprising: National Coordinator for HIV Testing, County and Sub-County HIV and AIDS and STI Coordinators, HTS counselors, a Clinical Officer, and facility in-charges—and 4 focus group discussions (2 with women, 2 with men). All tools were pretested.

Data analysis

Social demographic of the study participants

A total of 384 pastoralists participated in the survey, yielding a response rate of 97%. Among the study participants 204 (53%)

Quantitative data were entered into Excel 2010, pre-coded, and analyzed using SPSS version 25.0 to generate descriptive statistics. Associations between independent variables (socio-demographic, cultural, economic, and health provision factors) and the dependent variable (HTS uptake) were analyzed using Chi-square tests, binary logistic regression, and multivariate analysis, with statistical significance set at $p \leq 0.05$. Qualitative data were analyzed thematically using NVivo 12, with coding based on predetermined themes from the research questions.

Ethics approval and consent to participate

The ethical approval for this study was obtained from University of Eastern Africa Baraton Institutional Scientific and Ethical Review Committee (#UEAB/ISERC/04/08/2024). Authorization to conduct this research was obtained from National Commission for Science Technology and Innovation (NACOSTI) (#P/24/39122). And informed consent was obtained from each study participant and all the collected data was anonymised and kept confidential.

RESULTS

These results presented are integrated quantitative and qualitative findings on health service provision factors influencing HTS utilization.

were male and the median age was 28 years, with ages ranging from 15 to 72. Most participants were in monogamous marriages (163, or 42.4%), while 181 (47.1%) were unemployed. The majority identified as

Christian, with Protestants making up 270 (70.0%). The most frequently reported level of education was secondary school, accounting for 143 respondents (37.1%) (Table 1).

Table 1: Socio-Demographic Characteristics of the Respondents (n=384)

Variable	Frequency (%)
Age of the respondent (Years)	
Median	28 (15-72)
Gender of respondent	
Female	180 (46.8)
Male	204 (53.2)
Marital Status	
Married monogamous	163 (42.4)
Single	150 (39.1)
Married Polygamous	46 (12.0)
Divorced/Separated	9 (2.3)
Cohabiting	9 (2.3)
Widow/Widower	4 (1.0)
Steady Partner not living together	2 (0.5)
Other	1 (0.3)
Employment Status	
Not Employed	181 (47.1)
Self Employed	108 (28.1)
Student	56 (14.6)
Employed	38 (9.9)
Other	1 (0.3)
Religion	
Protestant	270 (70)
Catholic	92 (23.9)
None	18 (4.7)
Muslim	4 (1)
Level of education	
Secondary	143 (37.1)
None	122 (31.7)
Primary	79 (20.5)
Tertiary and above	38 (9.9)

Utilization of HIV Testing Services (HTS) among pastoralists

In regard to uptake of HIV testing services, only 149 of 378 respondents (39.4%) reported having ever been tested for HIV.

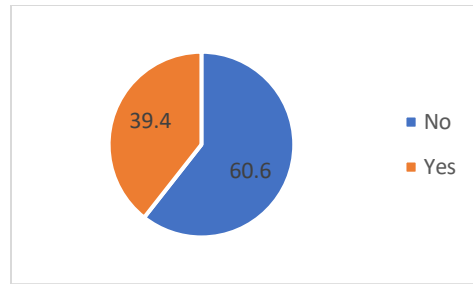


Figure 1: Respondents utilization of HTS

Health service provision factors influencing HTS utilization

Availability of HTS Centers

Majority 59.2% (n=209) of respondents reported that there were no HTS centers in their area with only 40.8% (n=144) having access to HTS (Table 2). The lack of HTS services was statistically significant both crude and adjusted, though significantly reduced the odds of utilization after

adjustments (UAR = 0.2; 95%CI:0.13-0.32; $p < 0.001$) and (AOR = 0.21; 95% CI: 0.05–0.78; $p = 0.02$) (Table 5).

Of those who had utilized HTS, 98.5% (n=130) were satisfied with the service (Table 1). Satisfaction was significantly associated with a positive perception and the likelihood to recommend HTS to others (UAR = 0.0473; 95%CI: 0.0130-0.1718; $p < 0.01$) and (AOR=0.037; 95% CI=0.007-0.189; $p < 0.001$) (Table 5).

Table 2: Availability of and Distance to HTS Centres				
Question	Response	Non-utilization = 0 (n=229)	Utilization = 1 (n=149)	p-value
HTS services available in this area? (n=353)	Yes	52 (25.2%)	92 (62.6%)	<0.001
	No	154 (74.8%)	55 (37.4%)	
Last time you attended HTS, were you satisfied with the service? (n=137)	Satisfied	4 (80.0%)	130 (98.5%)	0.006
	Dissatisfied	1 (20.0%)	2 (1.5%)	
Did you share your HTS results with anyone? (n=149)	Yes	0 (0.0%)	108 (76.1%)	0.078
	No	1 (100.0%)	34 (23.9%)	
Would you recommend HTS services to others? (n=163)	Yes	10 (55.6%)	132 (96.4%)	<0.001
	No	8 (44.4%)	5 (3.6%)	
Does distance affect you or others accessing HTS services? (n=282)	Yes	109 (67.3%)	73 (60.8%)	0.533
	No	53 (32.7%)	73 (60.8%)	

Distance of HTS centers

The study found that 182 of 282 (64.5%) respondents had difficulty accessing the HTS site due to distance (Table 2).

Qualitative data strongly supported this finding. Focus group discussants (FGD) and key informants interviews (KII) stated:

"The HTS center is far, which has led to people not accessing the service due to lack of transport funds." (FGD 1)

"Distance discourages many from seeking HTS services, making it difficult to prioritize their health." (FGD 3)

"High transport costs deter many people from accessing HTS." (KII 2)

"Clients travel more than 20 km, which makes it hard to reach HTS services." (KII 3)

Age of HTS Counselor

Most respondents 80.6% (n=295) reported the age of the counselor did not influence their decision to test (Table 3). However, when asked to mention the age preference of counselors, two-thirds (65.9%, n=253) specified an age (figure 2). Of these, 68% (n=172) preferred counselors aged 21–40 years, while only 2% (n=5) preferred counselors over 50 years (Figure 2). This suggests the potential

role for age preference where it was significant at crude odds ratio and significantly reduced the odds of utilization resulting to no significance after adjustments (UAR = 0.587; 95%CI: 0.348 – 0.988; p=0.045) and (AOR=0.757; 95% CI=0.074 – 7.752; p=0.898) (Table 5).

Qualitative findings revealed nuanced views. Older counselors were often seen as more experienced, while younger counselors could be perceived as lacking maturity:

"The best counselor should be aged 30- 45 years because they are mature." (FGD 4)

"Youths would not like to be attended by an old HTS counselor equal to the age of their parents." (FGD 1)

"Elderly people lack confidence in younger counselors, which affects their willingness to test." (FGD 3).

"The Maasai community view young counselors as their daughters and are not willing to be attended by them at the HTS." (KII 4).

"At my facility the gender does not matter a lot but if you are for example 25 years and below, no Masai man will be tested by you, they will say that you are a kid. From 30-35, there are no issues. But old age is also a problem. Someone will say that "Hako kamzee, mimi hapana." (KII 5).

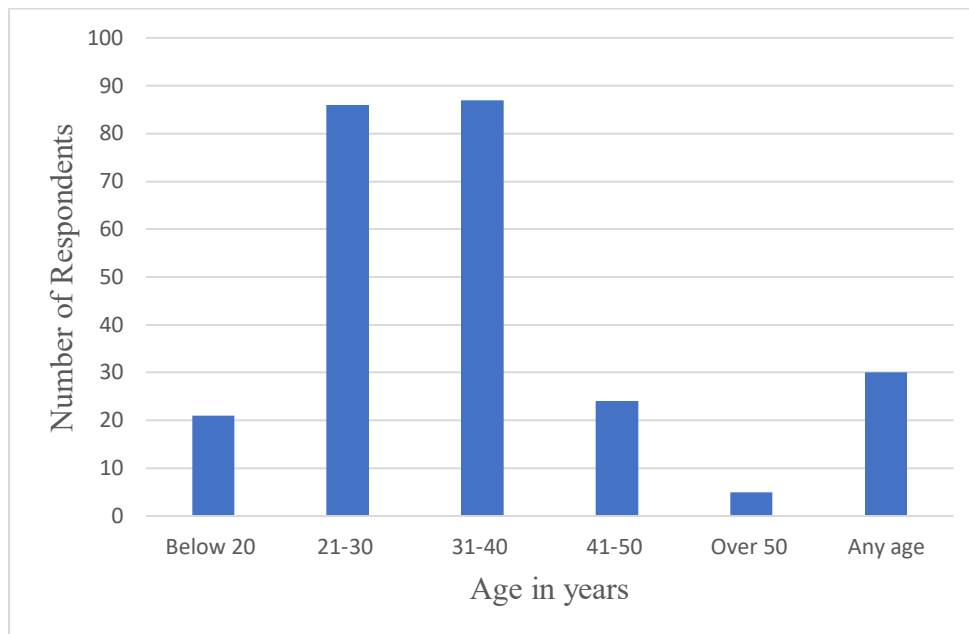


Figure 2: Respondents mention of age of preference of HTS counselor

Sex of HTS Counselor

Less than a third of respondents 28%, (n=104) reported being influenced by the sex of the HTS counselor (Table 3). Among respondents who had utilized HTS, 69.5% (n=155) preferred having both male and female counselors (Table 2). However, when further analysis was undertaken it revealed that sex of counselor was not significant in either analysis (Table 5).

Qualitative data highlighted the importance of gender-concordant counseling for comfort, particularly when discussing sensitive issues:

"There is a need for both genders to be available in HTS centers." (FGD 1)

"Male counselors are needed to counsel males, and female counselors for female clients." (FGD 4)

"Clients prefer counseling from someone of the same gender for comfort." (FGD 3)

"Women are often reluctant to speak openly with male counselors." (KII 7)

"Male clients prefer to interact with male counselors for discussing sensitive topics." (KII 3)

"Maasai community, especially male is resistant to being attended by female counselors and in case of a female HRS counsellor, may decline to go." (KII 5).

Attitude of HTS Counselor

The majority of respondents 79.6% (n=257) did not believe the attitude of the HTS counselor affected their decision to go for HIV test (Table 3). However, qualitative data revealed that negative attitudes could be a significant deterrent:

"Clients want someone who is polite and can keep their secrets." (FGD 1)

"The attitude of counselors affects the turn-up of clients." (FGD 4)

"Counselor behaviours and reputation can influence clients' decisions to get tested." (KII 3).

Table 3: Influence of sex, age and attitude of the counsellor

Question	Category / Response	Utilization = 0 (n=229)	Utilization = 1 (n=149)	p-value
Respondents influenced by the sex of the HTS counselor (n=371)	Yes	68 (30.5%)	36 (24.3%)	0.415
	No	155 (69.5%)	112 (75.7%)	
Which sex of counselor would you prefer? (n=311)	Male	32 (17.4%)	16 (12.6%)	0.043
	Female	36 (19.6%)	11 (8.7%)	
	Both	116 (63.0%)	100 (78.7%)	
Does the age of the counselor influence you from going for HTS? (n=371)	Yes	35 (16.0%)	36 (24.5%)	0.07
	No	184 (84.0%)	111 (75.5%)	
Does the attitude of the HTS counselor influence your use of HTS? (n=323)	Yes	35 (17.6%)	31 (25.0%)	0.269
	No	164 (82.4%)	93 (75.0%)	

Policy issues influencing HTS uptake

Key informants identified policy-related barriers. The lack of self-testing kits and restrictive screening criteria that rely on reported symptoms or risk behaviours were seen as major hindrances.

The KIIs, who are charged with day to day HTS activities, had this to say:

"They do not have self-testing kits. When they did, they were mostly taken up by the youths below 30." (KII 7)

"If a client does not show symptoms, the healthcare provider might not initiate HIV testing and so a lot of people end up testing when it is late." (KII 2)

Informants noted that pastoralists are not classified as a high-risk group for routine retesting, despite lifestyle factors that may increase vulnerability.

Respondents' recommendations to improve HTS uptake

Most respondents 40% (n=153) preferred health promoters, 33.5% (n=129) preferred Community Health Promoters while religious

leaders were preferred by 32.5% (n=126) as HTS counselors, additionally, respondents recommended the need for provision of mobile HTS services 28% (n=143). Inferential statistics was significant on community health promoter being preferred and staff need for more training was significant recommendation to improve HTS utilization (Table 4).

Qualitative data also revealed some recommendations:

"The government needs to build more HTS centers around the community." (FGD 1)

"There is a need for mobile HTS to cater for clients living in the interior parts." (FGD 4)

"Provision of mobile HTS services is essential to reduce the cost of services." (KII 3)

"Provision of self-testing kits for people especially young people who keep asking for them and for convenience" (KII 4)

"Counselors should be both male and female, young and old, to cater to all clients." (FGD 4)

"Age diversity in counseling staff is crucial for client comfort and trust." (KII 3).

Qualitative data further showed that:

"Training and community awareness should be intensified on the importance of HTS services." (FGD 4)

"Community Health Promoters can play a significant role in promoting HTS." (FGD 3)

"Engaging local leaders can enhance awareness and reduce stigma." (FGD 2)

"Training community resource persons will help offer HTS services effectively." (KII 3)

"Training Community Health Assistants (CHAs) on HTS provision to diversify service providers." (KII 1)

Integrating HTS services with other healthcare activities is crucial for comprehensive care. Post-test clubs provide ongoing education, reduce stigma, and encourage health engagement. Regular supervisory visits and incentives motivate counselors, ensuring quality care and early issue resolution. This was revealed during FGDs and KIIs:

"There is a need for regular supervisory visits for counselors to correct problems early.

Integration of HTS services with other health services e.g family planning is essential." (FGD 3)

"Establishment of post-test clubs can offer ongoing health education." (FGD 4)

"Counselor motivation is crucial for maintaining service quality." (KII 2)

Collaboration between public and private sectors as well as other stakeholders is crucial for improving healthcare infrastructure and establishing more HTS centers.

FGDs and KIIs stated that:

"Provision of more HTS centers in schools and markets will increase accessibility. Funding proposals are necessary for establishing more HTS centers." (FGD 3)

"Collaborating with private facilities can help provide more services." (FGD 4)

"Intersectoral collaboration to establish HTS sites in community organizations." (KII 1)

"Engaging NGOs can support the setting up of more HTS centers." (KII 4)

Table 4: Respondents' preference of HTS counselor and recommendations to improve HTS utilization

Question	Response	Non utilization	Utilization	P value
Community Health Promoter (CHP) (n=384)	No (0)	163 (71.2%)	89 (59.7%)	0.049
	Yes (1)	66 (28.8%)	60 (40.3%)	
Religious leaders (n=384)	No (0)	157 (68.6%)	98 (65.8%)	0.852
	Yes (1)	72 (31.4%)	51 (34.2%)	
Health promoters (n=384)	No (0)	137 (59.8%)	87 (58.8%)	0.485
	Yes (1)	92 (40.2%)	61 (41.2%)	
Teachers (n=384)	No (0)	220 (96.1%)	141 (94.6%)	0.696
	Yes (1)	9 (3.9%)	8 (5.4%)	

Respondents' recommendations to improve HTS utilization

Question	Response	Non utilization	Utilization	P value
Staff need more training on HIV information (n=384)	No (0)	176 (76.9%)	93 (62.4%)	0.003
	Yes (1)	53 (23.1%)	56 (37.6%)	
The Centre should be opened over the weekend (n=384)	No (0)	189 (82.5%)	130 (87.2%)	0.266
	Yes (1)	40 (17.5%)	19 (12.8%)	
Need to change layout of HTS site (n=384)	No (0)	219 (95.6%)	139 (93.3%)	0.512
	Yes (1)	10 (4.4%)	10 (6.7%)	
Need more staff (n=384)	No (0)	200 (87.3%)	119 (79.9%)	0.083
	Yes (1)	29 (12.7%)	30 (20.1%)	
Counselors shouldn't be residents of the area (n=384)	No (0)	204 (89.1%)	136 (91.3%)	0.561
	Yes (1)	25 (10.9%)	13 (8.7%)	
Need provision of mobile HTS (n=384)	No (0)	145 (63.3%)	90 (60.4%)	0.064
	Yes (1)	84 (36.7%)	59 (39.6%)	

Multivariate analysis of key factors

A multivariate logistic regression model was built to identify factors independently associated with HTS utilization (Table 2, 3 and 4). After adjustment for covariates, the following factors remained significant: Lack of HTS (availability) significantly reduced the odds of HIV testing (AOR = 0.21; 95% CI: 0.05–0.78; $p = 0.02$), presence of Community Health Promoters was

associated with higher odds of testing (AOR = 7.93; 95% CI: 1.30–48.55; $p = 0.025$), not recommending HTS services to others was strongly associated with not utilizing HTS (AOR = 0.037; 95% CI: 0.007–0.189; $p < 0.001$) and dissatisfaction with the last HTS service showed a strong, borderline significant association with non-utilization (AOR = 0.06; 95% CI: 0.004–0.83; $p = 0.081$) (Table 5).

Table 5: Bivariate and Multivariate analysis of variable in relation to HTS utilization

Variable	Category	UAR (Crude OR)	95% CI (UAR)	P-value	AOR (Adj OR)	95% CI (AOR)	P-value (MV)
	No	0.2	0.13 – 0.32	<0.001	0.21	0.05 – 0.78	0.02

Availability of HTS services and HTS utilization	Yes (ref)	1	—	—	—	—	—
Selected variables that may influence respondents HTS utilization							
Community Health promoter	Yes	1.66	1.08 – 2.57	0.021	7.93	1.30 – 48.55	0.025
	No (ref)	1	—	—	—	—	—
Staff need more training on HIV information	Yes	2	1.27 – 3.14	0.003	1.2	0.31 – 4.61	0.789
	No (ref)	1	—	—	—	—	—
Shortage of counselors	Yes	0.76	0.28 – 2.07	0.59	—	—	—
	No (ref)	1	—	—	—	—	—
Hostility from counselors	Yes	1.29	0.39 – 4.31	0.673	—	—	—
	No (ref)	1	—	—	—	—	—
Lack of privacy/confidentiality	Yes	0.99	0.45 – 2.19	0.981	—	—	—
	No (ref)	1	—	—	—	—	—
Distance of the HTS Centre	Yes	1.12	0.63 – 2.01	0.699	—	—	—
	No (ref)	1	—	—	—	—	—
Perception on sex of the counselor and HTS utilization	Yes (Ref)	1	—	—			
	No	1.365	0.852 – 2.187	0.196			
Preferred sex of counselor	Male (Ref)	1	—	—			
	Female	0.611	0.248 – 1.508	0.285			

Perception on age of the counselor and HTS utilization	Both	1.724	0.894 – 3.326	0.104			
	Yes (Ref)	1	–	–	1	–	–
	No	0.587	0.348 – 0.988	0.045 **	0.757	0.074 – 7.752	0.898
Perception on attitude of the counselor and HTS utilization	Yes (Ref)	1	–	–			
	No	0.64	0.371 – 1.106	0.11			
Respondents satisfaction in the last HTS visit	Satisfied (Ref)	1	–	–	1	–	–
	Dissatisfied	0.062	0.005 – 0.827	0.035 **	0.06	0.004 – 0.830	0.081
Respondents' views on recommendation of HTS services to others	No (ref)	1	–	–	–	–	–
	No	0.0473	0.0130 – 0.1718	<0.001	0.037	0.0073 – 0.1894	<0.001

The overall summary is that;

Recommendation of HTS services to others:

Respondents who would not recommend HTS had significantly lower odds of utilization (OR = 0.047, 95% CI: 0.013–0.172, $p < 0.001$). **Availability of HTS services:** Lack of availability was associated with reduced odds of utilization (OR = 0.20, 95% CI: 0.13–0.32, $p < 0.001$). **Community health promoter:** Having a community health promoter was associated with higher odds of utilization (OR = 1.66, 95% CI: 1.08–2.57, $p = 0.021$). **Staff need more training on**

HIV information: Respondents who believed staff needed more training had higher odds of utilization (OR = 2.00, 95% CI: 1.27–3.14, $p = 0.003$). **Perception on age**

of the counsellor: Those who felt the counsellor's age mattered had lower odds of utilization (OR = 0.587, 95% CI: 0.348–0.988, $p = 0.045$). **Satisfaction in the last HTS visit:** Dissatisfied respondents had significantly lower odds of utilization (OR = 0.062, 95% CI: 0.005–0.827, $p = 0.035$).

After adjusting for confounders, the following factors remained independently

associated with HTS utilization:

Recommendation of HTS services to others:

Respondents who would not recommend HTS had 96.3% lower odds of utilization (AOR = 0.037, 95% CI: 0.0073–0.1894, $p < 0.001$). **Availability of HTS services:**

Lack of availability remained significantly associated with reduced odds of utilization (AOR = 0.21, 95% CI: 0.05–0.78, $p = 0.02$). **Community health promoter:**

Having a community health promoter was strongly associated with nearly eight times higher odds of utilization (AOR = 7.93, 95% CI: 1.30–48.55, $p = 0.025$).

DISCUSSION

The findings reveal a confluence of logistical, interpersonal, and health system barriers that contribute to sub-optimal HTS uptake among pastoralists' communities.

The overall utilization rate of 39.4% underscores significant gaps in service access and acceptability. This is far below the global targets by the Joint United Nations HIV/AIDS programme (UNAIDS) 95-95-95 targets for 2025, which aim for 95% of people living with HIV (PLHIV) to know their status, 95% of those diagnosed to receive treatment, and 95% to achieve viral suppression¹².

The most pronounced barrier identified was the lack of HTS services in the study area and the considerable distance to existing sites. This is consistent with previous literature that have highlighted geographical isolation as a fundamental challenge for pastoralist access to the HTS^{4,8}. The study found that the majority of respondents had no HTS site in their area, and this was significant in reducing the odds of testing. This echoes studies from Cameroon and broader Sub-Saharan Africa,

where travel challenges and physical inaccessibility directly impede HTS uptake^{5,13}. Qualitative data, citing "lack of funds" for transport, demonstrates that distance is not just a geographic issue but a significant economic one. This reinforces the argument for decentralized, community-embedded HTS models. The mobile HTS units, as evidenced by studies on mobile health interventions in low-resource settings, represents a critical and practical strategy to overcome these spatial and temporal barriers¹⁴.

The influence of counselor age and sex on testing willingness points to the critical role of interpersonal dynamics in HTS delivery. While a majority quantitatively stated these factors did not influence them, the revealed preferences—for counselors aged 21-40 years (peaking at 30-45 in qualitative data) and for gender-concordant counseling—are highly important. This mirrors findings from Western Kenya, where older adults preferred older healthcare providers, associating age with experience, maturity, and competence¹⁵. The qualitative insights from this study are particularly revealing, illustrating how these preferences are deeply rooted in Maasai cultural norms. The study found that older men did not prefer to be counseled by young HTS counselors, whom they may view as their daughters, and generally preferred discussing sensitive sexual health topics with a counselor of the same gender. Therefore, tailoring counselor deployment to align with these community-specific demographics will go a long way in building the trust necessary for effective HTS counseling and service uptake.

There was a strong preference for Health Workers and Community Health Promoters

(CHPs) as HTS providers, coupled with the significant positive association between CHP presence and HTS utilization, highlighting a promising pathway for improving access. CHPs, as trusted community members, can bridge the formal healthcare gap and align services with the mobile pastoralist lifestyle. This aligns with recommendations from scoping reviews on nomadic health, which advocate for training community-based providers from within these populations to improve equity¹⁶. Furthermore, the qualitative data indicated that integrating HTS with other primary health services (e.g., family planning, general treatment) reduces stigma and makes health facilities more appealing. This finding is supported by evidence that service integration improves overall health service utilization and outcomes, suggesting that bundling HTS with routine care can normalize testing and improve uptake¹⁶.

The study also identified critical policy-level weaknesses that exacerbate access challenges. The absence of HIV self-testing (HIVST) kits limits a crucial, discreet, and convenient testing modality, particularly for youths, negating the universal goal for HTS as well as the success of the convenient testing model in reaching underserved groups¹⁸. Additionally the reliance on symptom- or risk-based screening criteria within provider-initiated testing and counseling (PITC) models misses asymptomatic individuals, leading to late diagnosis. This is a well-documented weakness of symptom-dependent screening¹⁷. Furthermore, national guidelines for annual re-testing often classify pastoralists as "low-risk," overlooking the vulnerabilities associated with their mobile livelihoods and interactions along transport corridors. This creates a dangerous gap

where a potentially vulnerable population is systematically excluded from routine testing. These policy gaps highlight a significant mismatch between national HIV testing frameworks and the epidemiological and socio-cultural realities of pastoralist communities, necessitating targeted policy adaptations.

Study limitations

This study's findings should be interpreted considering its limitations. The cross-sectional design precludes establishing causal relationships between the identified factors and HTS utilization. Recall bias may affect the accuracy of self-reported testing history and past service experiences. While translation efforts were made, nuances in qualitative responses in Maasai may have been lost. Finally, the study was conducted in one sub-county, which may limit the generalizability of findings to all pastoralist communities in Kenya.

CONCLUSION AND PUBLIC HEALTH IMPLICATIONS

In conclusion, this study demonstrates that low HTS utilization among pastoralists is significantly influenced by remediable health service factors: geographical inaccessibility, counselor characteristics, and policy frameworks that fail to accommodate pastoralist realities. To translate these findings into action, a multi-faceted, community-informed intervention strategy is required. First, service delivery must be decentralized through the scale-up of mobile HTS units and the wide distribution of HIV self-testing kits to overcome geographical and temporal barriers. Second, investment in a diverse competent workforce is essential; this involves recruiting, training, and deploying a diverse

counseling workforce that reflects community age and gender preferences, while also strengthening the role of trusted Community Health Promoters. Furthermore, integrating and normalizing HTS by routinely incorporating it into all primary healthcare contacts can reduce stigma and improve accessibility. Finally, revising national HTS guidelines to recognize the specific vulnerabilities of mobile pastoralist populations, actively promoting self-testing, and supporting inclusive, non-stigmatizing testing criteria. By implementing these targeted strategies, Kenya can make substantive progress toward equitable HTS access, a critical step for achieving epidemic control, achieving UNAIDS global targets and ensuring that pastoralist communities are not left behind in the HIV response through increased uptake of HTS.

Acknowledgments

We are highly grateful to the study participants for taking part in the study area. Also, my research assistants and my supervisors for guiding me throughout the research work.

Authors' contributions

MWK, PO and DM conceptualized the study and participated in all the areas in manuscript development. MWK, PO, DM and JM wrote the manuscript. All the authors reviewed the final manuscript and approved it for submission.

Funding

None

Availability of data and materials

The data are available upon reasonable request from the corresponding author.

Consent for publication

Not applicable.

Competing interests

The authors have declared that no competing interests exist.

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