



Factors Associated with HIV Self-Testing among Long-Distance Truck Drivers Along Uganda Road in Uasin Gishu County, Kenya

Dennis Kipkosgei Rotich*, Alfred Owino Odongo, and Joseph Muchiri

- Department of Community Health, Epidemiology and Disease Control, School of Public Health, Mount Kenya University, Thika, Kenya.

*Corresponding author: Dennis Kipkosgei Rotich. Email address: denniskrotich@gmail.com

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Abstract

INTRODUCTION

HIV self-testing was introduced to increase the number of HIV testing rates among hard-to-reach populations such as long-distance truck drivers. However, little is known about its uptake in Kenya, where it has been available since 2017, or the factors influencing its utilisation. Therefore, this study aimed to assess the uptake and establish the sociodemographic and behavioural factors associated with HIV self-testing among truck drivers along Uganda Road in Uasin Gishu County, Kenya.

METHODOLOGY

This cross-sectional study recruited 287 participants using proportionate stratified and simple random sampling. Data were collected through a pretested, interviewer-administered questionnaire uploaded to KoboToolbox. Necessary research licences and permits were obtained. Data were analysed using SPSS version 28 for descriptive statistics including means, frequencies, and percentages. Bivariate analysis was used to determine associations between variables, while multivariate logistic regression using a generalised linear model identified true predictors of HIV self-testing at a 95% confidence interval (CI) at $p < 0.05$.

RESULTS

The majority (98.6%) of the 287 participants were male averaging 38.66 years and HIV self-testing uptake was 35.5%. Factors associated with HIV self-testing included the duration of driving specifically 6-10 years (Odds Ratio(OR)=3.0, 95% CI =1.3-6.9, $p=0.008$); moderate and high perceived risk of HIV infection (OR=4.1, 95% CI=1.9-9.1, $p<0.001$ and OR=3.7, 95% CI=1.3-10.8, $p=0.012$); average and excellent HIV knowledge (OR=11.7, 95% CI=2.2-217.4, $p=0.021$ and OR=28.3, 95% CI =5.1-536, $p=0.002$).

CONCLUSION

HIV self-testing uptake remains low, highlighting the need for targeted educational campaigns. Peer-led programs and workplace sensitisation can help reinforce HIV risk perception and knowledge, while interventions should be tailored to meet the needs of drivers of varying degrees of experience.

Keywords: Long-distance Truck Drivers, HIV Self-testing, Uganda Road

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Introduction

Human Immunodeficiency Virus (HIV) remains a major global public health challenge by the end of 2023, 39.9 million people worldwide were living with HIV with over 75% living in Africa and over 52% residing in the Eastern and Southern African regions (1). Despite progress in HIV prevention and treatment, key populations such as long-distance truck drivers (LTDs) continue to face

heightened risks of infection. Studies show that the pooled HIV prevalence among truckers varies widely, with the highest in Africa (14.34%) despite a worldwide prevalence of 3.86% (2). Individual country findings include 19.00 % in India (3) and 0.16% in the United States of America (4). Recent studies in Africa showed a 26% prevalence in South Africa (5) and 15.4% in Mozambique (6), while within East Africa, a prevalence of 25% to 32% was

reported (7). Conversely, recent data from Kenyan truckers is generally lacking.

Frequent mobility and long durations away from their spouses (8,9) often place LTDs in situations of high-risk sexual behaviour, including transactional sex with female sex workers, often without condom use (10,11). The indiscriminate use of alcohol and hard drugs adds impaired judgment and encourages risky sexual behaviour (12,13). Additionally, routine HIV testing is limited along trucking routes due to limited access to healthcare facilities (5). Together, these factors contribute to the ongoing transmission of HIV within this population.

Despite the high risk of contracting HIV, a significant majority of LTDs remain unaware of their status. This lack of awareness plays a huge role in hindering efforts to combat this epidemic. Studies indicate that HIV testing remains underutilised among LTDs in that, 38.2% and 47.4% in South Africa and Togo respectively had ever been tested (5,14) highlighting the need for alternative testing modalities targeting such populations.

Due to concerns about the high prevalence of HIV and low uptake of testing among hard-to-reach populations, HIV self-testing (HIVST) was introduced in 2017 in Kenya (15). Among these populations in Africa, HIVST uptake has been established to range from 97.7% to 59.3% (16,17). Nevertheless, truck drivers in Kenya have a low HIV self-testing uptake of 1.3% (18), which is significantly lower than the 4.1% observed in the general population aged 15–64 years (19) and 25.2% among young adults (20). Some of the factors which may explain this low uptake are the high cost of the kits (21), accuracy distrust (22,23), non-provision of pre-test and post-test counselling (24,25) and anxiety that follows test results (26,27).

Factors associated with HIVST are complex and cut across demographic as well as behavioural dimensions. These include age (21,28,29), education levels (29) gender (30) and marital status (28), as well as, the perception towards testing positive (8,31),

the level of HIV knowledge (32–34), and risky sexual behaviours.

This study, therefore, sought to evaluate the extent of HIV self-testing among long-distance truck drivers and establish the factors associated with its use. Understanding these factors can help increase testing, decrease the risk of transmission, and attain the Joint United Nations Programme on HIV/AIDS (UNAIDS) 95-95-95 goals to end AIDS by 2030 (35).

Methodology

Study design and site

This study utilized a cross-sectional study design. The study was conducted along Uganda Road, a major transport corridor in Kenya. It is the largest in East Africa stretching from Nairobi City to Malaba Border Post. It is a major transit route for LTDs in East-Central Africa. Within Uasin Gishu County, it traverses Turbo-Juakali, Roadblock and Burnt Forest Towns which are favourite stop and rest points because of accommodation, free parking and other amenities aside from entertainment joints and female sexual workers.

Study population

Participants were the LTDs and their assistants/turnboys from Kenya, Uganda, Tanzania, Sudan, Rwanda, Burundi and the Democratic Republic of Congo, aged ≥ 18 years and fluent in Kiswahili and/or English were included. Those drivers who refused to consent and the mentally unstable based on observational screening for erratic behaviour, distress, or disorientation during initial interactions were excluded from the study.

Sample size

The sample size for this study was derived using Cochran's Formula, $n = z^2pq/e^2$ (36). The study's p (0.731) was adopted from a Kenyan survey of LTDs (37). The margin error (e) was set at 5%. The complementary proportion $q=1-p$ accounted for the remainder of the population not captured by p . The confidence level was 95 % ($z=1.96$) giving an initial sample size (n) of 302 participants. Cochran's adjustment formula ($n_1 = n/(1+n/N)$)

for finite populations was applied, lowering the sample size to 268. Because LTDs spent on average 14 days traversing the various countries to the original starting point, N was calculated to be 2380 (170 drivers per day at all the parking lots multiplied by 14 days).

Finally, an allowance of a 10% non-response rate was added to the final sample size to reach 295 long-distance truckers as the desired sample size.

Sampling criteria

Stratified sampling was used with parking lots as strata to select respondents for interviews. Out of 170 total available parking spots, 23.5% were in Burnt Forest Town, 35.3% in Roadblock Town, and 41.1% in Turbo-Jua Kali Town. Based on proportionate sampling, the sampling units comprised 70 in Burnt Forest Town, 104 in Roadblock Town, and 121 in

Turbo-Jua Kali Town yielding a total of 295 long-distance truck drivers to be interviewed. Systematic random sampling was used to recruit the drivers at the parking points with the assumption that parking was orderly.

Data collection methods and procedures

A pretested interviewer-administered questionnaire developed by the researchers was used to collect data. The questionnaire was divided into socio-demographics and behavioural characteristics sections. The language of instruction used was English and /or Kiswahili as this was understood locally and within the East Africa region. Data captured to KoboToolbox software from different study sites was continuously checked for verification and conciliations to ensure the highest quality.

Table 1:
Sociodemographic Characteristics of Long-Distance Truck Drivers

	Variable	Frequency (n)	Percentage (%)
Gender	Male	283	98.6
	Female	4	1.4
Age (Years)	18-34	113	39.4
	35-54	157	54.7
	Over 54	17	5.9
	Mean $\pm$ SD	38.7 $\pm$ 9.6	
Education Level	None	4	1.4
	Primary	127	44.3
	Secondary	136	47.4
	Tertiary	20	7.0
Religion	Christian	186	64.8
	Muslims	97	33.8
	Unaffiliated/Other	4	1.4
Marital Status	Single	47	16.4
	Married	234	81.5
	Previously married	6	2.1
Salary (KSh)	$\leq$ 20,000	57	19.9
	20,001-40,000	203	70.7
	$\geq$ 40,000	27	9.4
Country of Origin	Democratic Republic of Congo	4	1.4
	Kenya	237	82.6
	Rwanda	4	1.4
	Sudan	1	0.3
	Tanzania	22	7.7
	Uganda	19	6.6
Driving Experience	0-5	86	30.0
	6-10	55	19.2
	11-15	65	22.6
	Over 15	81	28.2

Note: SD is the standard deviation. KShs. Is Kenyan Shillings

A pre-test study was done in the Cheptiret truck parking stage to assess the clarity, understandability and practicality of the questionnaire. Cheptiret has a similar setting to the Burnt Forest, Turbo-Jua Kali and Roadblock parking stages. Twenty-seven questionnaires were administered using systematic random sampling. We slightly revised the wording according to the comments in light of validity concerns. Questionnaire reliability was checked using Cronbach's alpha coefficient (0.73) which was within an acceptable range.

Data analysis

Data downloaded from the KoboToolbox was imported to SPSS version 28 for coding, cleaning and analysis using the Statistical Package for Social Sciences (SPSS)

version 27. Quantitative data was analysed using means, frequencies, and percentages and presented using tables. At a 95% confidence interval, a bivariate analysis was performed using the Chi-square tests. The association was established, with a significant p -value of <0.05 . To adjust for the impact of other variables, all statistically significant variables from bivariable analysis were subjected to multivariate logistic analysis using a generalised linear model. All logistic regression factors with a p -value of <0.05 were identified as true predictors of HIVST among LTDs.

Ethical considerations

Participants were recruited voluntarily and confidentiality of the information was safeguarded removing any identifiers.

Table 2:
Bivariable Analysis Between HIV Self-Testing and Sociodemographic Factors

Variable		HIVST Utilization			χ^2	df	p -value
		Total (N=287) % (n)	Yes (n=102) % (n)	No (n=185) % (n)			
Gender	Male	98.6 (283)	35.5(102)	65.0 (184)	2.757	1	0.097
	Female	1.4 (4)	75.0(3)	25.0 (1)			
Age (Years)	18-34	39.4 (113)	32.3 (33)	43.2(80)	8.202	4	0.084
	35-54	54.7 (157)	63.7 (65)	49.7 (92)			
	Over 54	5.9 (17)	3.9 (4)	7.0 (13)			
Education Level	None	1.4 (4)	1.0 (1)	1.6 (3)	8.681	3	0.034*
	Primary	44.3 (127)	39.2 (40)	47.0 (87)			
	Secondary	47.4 (136)	47.1 (48)	47.6 (88)			
Religion	Tertiary	7.0 (20)	12.7 (13)	3.8 (7)	5.167	2	0.076
	Christian	64.8 (186)	69.6 (71)	62.2 (115)			
	Muslims	33.8 (97)	27.5 (28)	37.3 (69)			
Marital Status	Unaffiliated/Other	1.4 (4)	2.9 (3)	0.5 (1)	3.670	2	0.160
	Never Married	16.4 (47)	10.7 (11)	19.5 (36)			
	Married	81.5 (234)	87.3 (89)	78.4 (145)			
Salary (Ksh)	Previously Married	2.1 (6)	2.0 (2)	2.2 (4)	5.475	2	0.065
	≤20,000	19.9 (57)	12.7 (13)	23.8 (44)			
	20,001-40,000	70.7 (303)	75.5 (77)	68.1 (126)			
Country of Origin	≥40,000	9.4 (27)	11.8 (12)	8.1 (15)	1.737	5	0.884
	DRC	1.4 (4)	2.0 (2)	1.1 (2)			
	Kenya	82.6 (237)	80.4 (82)	83.8 (155)			
Driving Experience	Rwanda	1.4 (4)	2.0 (2)	1.1 (2)	11.649	3	0.009*
	Sudan	0.3 (1)	0.0 (0)	0.5 (1)			
	Tanzania	7.7 (22)	7.8 (8)	7.6 (14)			
Driving Experience	Uganda	6.6 (19)	7.8 (8)	5.9 (11)	11.649	3	0.009*
	0-5 Years	30.0 (86)	23.5 (24)	33.5 (62)			
	6-10 Years	19.2 (55)	28.4 (29)	14.1 (26)			
Driving Experience	11-15 Years	22.6 (65)	25.5 (26)	21.1 (39)	11.649	3	0.009*
	Over 15 Years	28.2 (81)	22.5 (23)	31.4 (58)			

Note. HIVST = HIV Self-Testing. *= p -value <0.05 . DRC= Democratic Republic of Congo

The Institutional Research Ethics Committee of Mount Kenya University approved the research (MKU/ISERC/2917) as approval number 1961. A research permit from the National Commission for Science, Technology & Innovation (NACOSTI), license number NACOSTI/P/23/27627 was issued.

Results

Sociodemographic characteristics

All 287 questionnaires were validated and analysed representing a 97.2% response rate. The majority of the participants were male (n=283, 98.6%). The average age, monthly wage, and driving duration were 38.7 years, Kenyan Shillings (KShs) 29,750.9, and 11.9 years, respectively. The oldest truck driver was 66 years old, while the youngest was 19 years. The highest-paid driver received KShs. 50,000, and the lowest paid earned KShs. 3,000. The most experienced truck driver had driven trucks

for 43 years, while the least experienced had driven trucks for only one year. Table 1.

Uptake of HIVST

In terms of HIV self-testing (HIVST) uptake, 35.5% of LTDs reported having ever utilized HIVST as a form of HIV testing, despite 69.7% being aware of HIVST. Cited hindrances included insufficient knowledge on the use of the kits (47.2%, n=102), anxiety based on outcome (42.6%, n=92), self-harm potential (36.6%, n=79) and high cost of kits (35.6%, n=77). Others included lack of pre-test and post-test counselling (32.4%, n=70) and accuracy concerns of the kits (17.6%, n=38).

Sociodemographic and behavioural factors associated with HIVST

Bivariate analysis of sociodemographic factors showed that the level of education, chi-square (χ^2) = 8.681, degree of freedom (df)=3, p = 0.034) and the duration of driving (χ^2 = 1.649, df=3, p = 0.009) were statistically significant.

Table 3:
Bivariable Analysis Between HIV Self-Testing and Behavioural Factors

Variable		HIVST utilization			χ^2	df	p-value
		Total (N) % (n)	Yes(n=102) % (n)	No(n=185) % (n)			
Substance use	Yes	58.5 (168)	69.7 (66)	60.7 (102)	2.481	1	0.115
	No	41.5 (119)	30.3 (36)	39.3 (83)			
Sexual Activity on the Highway	Yes, within the last 6 months	54.7 (157)	63.7(65)	50.3 (93)	5.198	1	0.023*
	No, within the last 6 months	45.3 (130)	36.3 (37)	49.7 (92)			
Duration away from Family	≤ 1 week	18.5 (53)	16.0 (17)	19.4 (36)	0.341	1	0.559
	> 1 week	81.5 (234)	83.0(85)	80.6 (149)			
Previous HIV test experiences	Good	66.8 (173)	70.6 (72)	64.3 (101)	1.091	1	0.296
	Bad	33.2 (86)	29.4 (30)	65.1 (56)			
Condom use in the last 1 year	Yes	73.2 (115)	75.4 (49)	71.7 (66)	0.258	1	0.611
	No	26.8 (42)	24.6 (16)	28.3 (26)			
STD infection on highways	Yes	29.3 (84)	36.3 (37)	25.4 (47)	3.752	1	0.053
	No	70.7 (203)	63.7 (65)	74.6 (138)			
HIV Knowledge	Excellent	44.6(128)	53.9(55)	39.4(73)	12.539	2	0.002*
	Average	47.7(137)	45.1(46)	49.2(91)			
	Poor	7.7(22)	1.0(1)	11.4(21)			
Perception of HIV infection	High risk	15.0(43)	17.6(18)	13.5(25)	12.274	2	0.002*
	Moderate	36.9(106)	48.0(49)	30.8(57)			
	Low risk	48.1(138)	34.3(35)	(103)			

Note. * = p < 0.05. N=287. Y= Yes. Df = degree of freedom. Only LTDs who engaged in sexual practices along the highway

These were then entered into multivariate regression analysis. However, age, gender, religion, salary earnings and marital status were statistically insignificant. Table 2.

Significant behavioural factors established in the bivariate analysis included having had sexual intercourse along the highway in the past 6 months ($\chi^2=5.198$, $df=1$, $p=0.023$), level of HIV knowledge ($\chi^2=12.539$, $df=2$, $p=0.002$) and perceived risk of infection ($\chi^2=12.274$, $df=2$, $p=0.002$) these factors were further analysed by multivariate regression. However, substance use, time spent on the highway away from family, previous HIV test experiences, protection/condom use within the last 1 year, and sexually transmitted disease (STD) infection on highways were statistically insignificant. Table 4.

With multivariate regression analysis, the duration of driving long-distance trucks was the sole significant sociodemographic factor associated with HIVST, particularly among the 6-10 year group (OR=3.0, 95% CI=1.3-6.9, $p=0.008$). Among the behavioural factors, perceptions towards being infected and knowledge of HIV/AIDS were significant predictors of HIVST. However, variables such as sexual activity along the highway in the last 6 months did not demonstrate statistically

significant impacts on HIVST in this context. LTDs with a moderate and a high perceived risk of HIV infection had 4.1 times (95% CI=1.9-9.1, $p<0.001$) and 3.7 times (95% CI=1.3-10.8, $p=0.012$) higher odds of using an HIVST kit compared to those with a low perceived risk, respectively. Table 4.

Discussion

The current study found that the uptake of HIVST was surprisingly low given the high level of awareness of its existence. This is comparatively low compared to similar studies (16,17). Nonetheless, it is higher than a Kenyan study which showed that despite 78.6% of young adults having ever heard of HIVST only 25.2% had ever used it (20). This huge gap between awareness and practice implies that a high proportion of drivers may be aware of HIVST but are unable to utilise the services.

The perceived barriers to the adoption of HIVST corroborate with prior literature which affirmed that the high cost of the kits (21), anxiety, fear and denial of test results (26,27), lack of counselling before and after the self-test (24,25) and accuracy concerns about the kits (22,23) were impediments to self-testing.

Table 4:

Multivariable Logistic Regression Analysis of Sociodemographic and Behavioural Factors Associated with HIV Self-Testing

	Variable	Odds Ratio (OR)	95% CI		P-value
			Lower	Upper	
Education Level	None	1	Ref		
	Primary	1.5	0.1	35.0	0.738
	Secondary	1.6	0.1	36.6	0.716
	Tertiary	5.2	0.4	133.3	0.223
Duration of Driving Trucks (Years)	0-5	1	Ref		
	6-10	3.0	1.3	6.9	0.008*
	11-15	2.0	0.9	4.4	0.101
	Over 15	1.3	0.6	2.8	0.521
Sexual activity along the highway	No, in the last 6 months	1	Ref		
	Yes, in the last 6 months	0.927	0.5	1.9	0.831
HIV knowledge	Poor	1	Ref		
	Average	11.7	2.2	217.4	0.021*
	Excellent	28.3	5.1	536.7	0.002*
Perception of HIV infection	Low risk	1	Ref		
	Moderate Risk	4.1	1.9	9.1	<0.001*
	High risk	3.7	1.3	10.8	0.012*

Note. * = $p < 0.05$. Ref = Reference value. CI = Confidence Interval

Subsequent HIVST scale-up efforts should address these barriers while emphasizing its key advantages such as accessibility, privacy and timely results.

The increased awareness of the ease and significance may help bridge the gap between knowledge and action, enhancing uptake. HIVST use was more common among experienced drivers who had worked for 6-10 years as they were 3 times more likely to use HIVST than those who have been driving for less than 6 years. This shows rather an interesting scenario in that analytically, age is most often connected with driving experience, risk perception and resulting behaviour change. Lower utilisation of HIVST services from younger drivers, particularly less experienced or recently employed drivers might be explained by reasons like having a lower perceived personal risk for HIV infection, lack of awareness or due to prejudice about HIV testing. Drivers with 6 to 10 years of experience may have acquired knowledge about HIV transmission mechanisms and the importance of prevention. This increased awareness could enhance their perception of risk, motivating them to adopt HIV self-testing (HIVST). Consequently, their heightened sensitivity to potential exposure may reinforce their decision to practice HIVST. Drivers with 6 to 10 years of experience may have acquired knowledge about HIV transmission mechanisms and the importance of prevention. This increased awareness could enhance their perception of risk, motivating them to adopt HIV self-testing (HIVST). Consequently, their heightened sensitivity to potential exposure may reinforce their decision to practice HIVST(37). In addition, diseases start to surface with ageing. In this age group, the truckers may embrace general health checkups hence HIVST may be offered or suggested to increase self-testing. Through learning the reasons for which mid-range LTDs use HIVST, interventions and campaigns for awareness can be designed in such a way that they can; target directly the drivers of this category and increase the number of users.

Truck drivers with a high and moderate perceived risk of HIV infection had 4.1 times and 3.7 times higher odds of using an HIVST kit compared to those with a low perceived risk respectively. HIV risk perception affects a person's decision to be tested for HIV. This agrees with the Health Belief Model which suggests that perceived risk is an important element affecting health behaviours (31). Earlier studies have shown that a large proportion of LTDs feel at risk of HIV infection due to factors that include indiscriminate drug and alcohol use (12,13), constant mobility and separation from intimate partners (8,9) transactional sexual encounters with female sexual workers and non-condom use (10,11). This underscores the importance of assessing and perhaps changing truckers' perceptions about risk as one of the most important interventions required in promoting HIVST.

Long-distance truck drivers with average and excellent HIV knowledge also had statistically significantly higher utilisation of HIVST compared to those with poor HIV knowledge with odds ratios of 11.7 and 28.3 respectively. This is in concordance with other studies which have established that the degree of health literacy one possesses is positively linked to health behaviours (34). It has been established that when people have adequate information about a disease, they are in a position to make the right choices where prevention is concerned (33). As regards HIV, the findings show that increased knowledge of HIV transmission and testing enhances the likelihood of testing (32). This is why there is a need to come up with sexual health education focused on enhancing HIV health literacy among LTDs who may not afford to visit conventional health facilities. This is very important as it is only when a person is informed does one takes action to protect their sexual health. This finding emphasises health literacy as an antecedent of preventive health behaviours.

Study limitations

Reliance on self-reported information could have led to social desirability and recall

bias, especially on sensitive questions like protection or condom use. However, confidentiality on the sensitive questions was assured.

Conclusion

This study highlights a low uptake of HIVST among LTDs in Kenya, despite high awareness of its existence. It reveals an awareness-to-action gap in that although there was high awareness of HIVST, slightly more than a third of drivers reported having used it. Key predictors of HIVST were drivers with mid-range experience (6-10 years), high perceived HIV risk and good HIV knowledge all of which provide actionable insights for targeted interventions. These findings are particularly significant in the context of the UNAIDS 95-95-95 goals, as LTDs are a key population whose occupation and behaviours contribute disproportionately to HIV transmission. Enhancing their HIVST uptake is crucial in achieving the UNAIDS targets to end AIDS as a public health threat.

Recommendations

To boost HIVST uptake and close the awareness-to-action gap, peer-led programs and workplace sensitisation by employers should be used to conduct targeted educational campaigns that focus on LTDs' perceptions, knowledge of risk and driving experience especially the midrange drivers (6-10 years). Additionally, HIVST should be integrated into routine health services at parking and border stop clinics supported by free kit distribution by the Ministry of Health and other stakeholders. By implementing these initiatives, Kenya can edge closer to the UNAIDS 95-95-95 among LTDs.

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Author contact

- Dennis Kipkosgei Rotich - denniskrotich@gmail.com (https://orcid.org/0000-0002-2388-668X)
- Alfred Owino Odongo - AOwino@mku.ac.ke (https://orcid.org/0000-0002-4138-2434)
- Joseph Muchiri - JMuchiri@mku.ac.ke (https://orcid.org/0000-0003-0469-4866)

Conflict of Interests. The authors declare no competing interests.

Availability of data statement. Data supporting the study available on request.

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